United States Department of the Interior

FISH AND WILDLIFE SERVICE
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, MN 55111-4056

IN REPLY REFER TO:

FWS/NWRS-AP

JAN 24 2001

Dear Reader:

The U.S. Fish and Wildlife Service (Service) is pleased to provide this Final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for DeSoto National Wildlife Refuge (Refuge) in Nebraska and Iowa. The plan was developed with input and assistance from a wide representation of the public, other government agencies, non-government conservation agencies, and Service employees.

This CCP presents goals, objectives, and strategies to manage the Refuge for the next 15 years. The EA (Appendix A.) was prepared in accordance with the National Environmental Policy Act which involved public participation in the development of a set of four possible management alternatives (A through D). The alternatives ranged from a passive, minimal management approach, to a no-change from current management levels, to maximum management, staffing and development.

The Service's Preferred Alternative (Alternative D) provides for significant increases in Refuge management efforts that will lead to an optimal balance between the needs of fish and wildlife and their habitats and opportunities for the public to use and enjoy the Refuge and its natural ecosystems.

Several public use activities have been determined to be compatible with the purpose of the Refuge and the mission of the National Wildlife Refuge System. Documentation of these determinations are in Appendix D and are subject to public review and comment before they are finally implemented; therefore these determinations will not be implemented until 45 days after the date of this CCP. Comments on the public use compatibility determinations may be directed to the Service during this 45-day period at the following address:

U.S. Fish and Wildlife Service
24385 State Highway 51
Puxico, Missouri 63960

We are grateful to all who participated during the planning process. If you have any questions, please contact Mr. Jim Salyer at 417-926-6273 or Ms. Judy McClendon at 573-222-6001.

Sincerely,

for William J. Hartwig
Regional Director

DeSoto National Wildlife Refuge Comprehensive Conservation Plan

Table of Contents

Executive Summary..... i

Chapter 1 — Introduction and Background.....1
Introduction.....2
The Refuge Vision.....5
Purpose of and Need for the Plan.....5
The U.S. Fish and Wildlife Service..... 6
The National Wildlife Refuge System..... 6
Existing Partnerships..... 8
Legal and Policy Guidance.....9

Chapter 2 — The Planning Process.....10
Issues.....10
Wildlife Populations and Habitat Management..... 13
Resource Protection.....16
Public Education and Recreation..... 16
Partnerships.....17
Public Comments on Draft Comprehensive Conservation Plan..... 17

Chapter 3 — The Refuge Environment.....20
Geographic/Ecosystem Setting..... 20
The Lower Missouri River Ecosystem..... 20
Migratory Bird Conservation Initiatives..... 24
Partners in Flight..... 24
North American Waterfowl Management Plan..... 25
Arctic Goose Management Initiative.....26
Region 3 Fish & Wildlife Conservation Priorities..... 27
Refuge Resources, Cultural Values and Uses.....28
General.....28
Climate.....28
Geology, Hydrology and Soils.....29
Wetlands.....30
Vegetation.....30

Fish and Wildlife....32
Land Use and Zoning....38
Contaminants and Water Quality....38
Socioeconomic Environment....40
Cultural Resources....42
Public Use....45
Special Management Topic....47
Wilderness Review....47

Chapter 4 — Current Refuge Management and Programs....49
Habitat Management....49
DeSoto Lake....49
Wetlands and Moist Soil Units....50
Grasslands....51
Croplands....52
Woodlands....52
Plant Pest Control....54
Habitat Restoration....55
Wetlands Restoration — Off Refuge....56
Upland Restoration — Off Refuge....56
Upland Restoration — On Refuge....56
Fish and Wildlife Management....56
Monitoring and Studies....56
Game Management....57
DeSoto Lake Fishery Management....59
Bird Banding....60
Disease Monitoring and Treatment....60
Nest Structures....61
Other Wildlife Management Activities....61
Resource Protection....61
Law Enforcement....61
Cultural Resource Management....62
Facilities Maintenance....65
Safety....65
Public Education and Recreation....65
Visitor Center Programs....66
Entrance Fees and Permits....68
Interpretive Programs and Non-Consumptive Uses....69
Environmental Education....69
Consumptive Uses....69
Outreach....70
Coordination and Partnering....71

Chapter 5 — Planned Refuge Management and Programs.....73
Introduction.....73
Goals, Objectives, and Strategies.....77
Wildlife Populations and Habitat Management.....77
Resource Protection.....91
Public Education and Recreation.....94
Partnerships.....101

Chapter 6 — Plan Implementation.....106
Personnel Needs.....106
Funding.....107
Step-down Management Plans.....107
Partnership Opportunities.....108
Monitoring and Evaluation.....109

Appendix A — Environmental Assessment.....113
Abstract.....113
Chapter 1 — Purpose and Need for the Proposed Action.....114
Purpose and Need for Action.....114
Background.....114
Decision Framework.....115
Authority, Legal Compliance, and Compatibility.....116
Scoping of the Issues.....116
Issues and Concerns..... 116
Chapter 2 — Alternatives for Management.....119
Introduction.....119
Formulation of Alternatives.....119
Descriptions of Alternatives.....120
Alternative A: No Action (Current Management)..... 120
Alternative B: Maximize Historic Habitat Restoration.....121
Alternative C: Maximize Compatible Public Uses.....122
Alternative D: Optimize Natural Resources & Public Use.....123
Chapter 3 — Affected Environment.....125
Chapter 4 — Environmental Consequences.....132
Effects Common to All Alternatives.....132
Cultural Resources.....132
Other Topics.....132
Effects that Vary Between Alternatives.....132
Alternative A.....132
Alternative B.....133
Alternative C.....134
Alternative D.....136
Alternatives Matrix..... 138

Chapter 5 — List of Preparers.....149
Chapter 6 — List of Agencies and Persons Consulted.....151
Chapter 7 — References.....151

Appendix B — Glossary.....152

Appendix C — Refuge Operations Needs (RONS) and Maintenance Management Systems (MMS) Lists.....154

Appendix D — Compatibility Determinations.....162

Appendix E — Species Lists.....185

Appendix F — Compliance Requirements.....212

Appendix G — Bibliography.....216

Appendix H — Mailing List.....225

Appendix I — Cropland Evaluation Matrix..... 228

Appendix J — List of Preparers.....232

Appendix K — Comments on Draft CCP/EA 234

List of Figures

1. DeSoto National Wildlife Refuge Vicinity Map..... 3

2. Ecosystems of Region 3 of the U.S. Fish and Wildlife Service..... 21

3. Land Uses on DeSoto National Wildlife Refuge in 1999..... 39

4. DeSoto National Wildlife Refuge Public Use Facilities..... 67

5. Proposed Future Land Uses on DeSoto National Wildlife Refuge..... 76

List of Tables

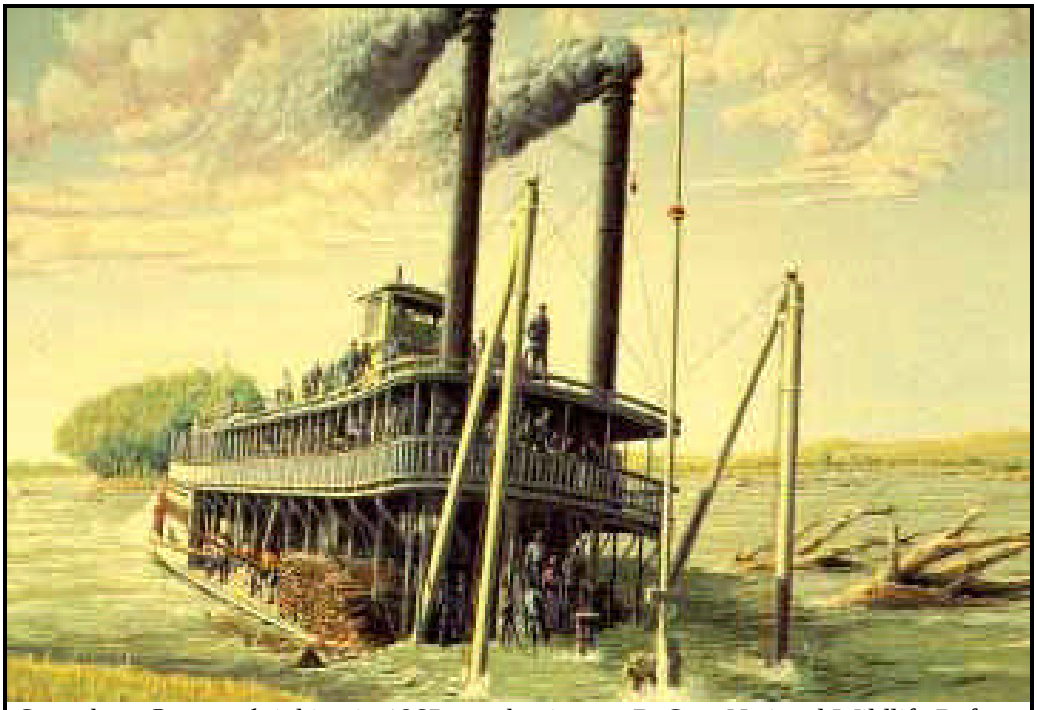
1. Threatened and Endangered Species in the Vicinity of DeSoto Refuge..... 37

2. FY 1999 Comparative Visitation to DeSoto National Wildlife Refuge..... 46

List of Photographs and Drawings

Snow goose by Bob Hines, USFWS.....v
DeSoto National Wildlife Refuge Visitor Center..... viii
Snow geese flock on lake in front of DeSoto Visitor Center, November 1982..... xiv
Steamboat *Bertrand* sinking in 1865 on what is now DeSoto National Wildlife Refuge.... xiv
White pelican at DeSoto NWR.....7
Steamboat *Bertrand* model in DeSoto Visitor Center..... 8
DeSoto volunteer Jack Brownrigg and Treynor (IA) School students..... 9
DeSoto Lake in winter.....14
Snow geese fill the sky at DeSoto every autumn.....15
Fishing clinic at DeSoto Lake.....19
Bald eagle.....23
DeSoto staff banding Canada geese.....25
Loggerhead shrike.....26
White-tailed buck in DeSoto bottomland forest..... 31
Kestrel.....33
Channel catfish.....34
Piping plover.....35
Bertrand cargo exhibit in Visitor Center..... 44
View of geese on DeSoto Lake from Visitor Center..... 46
Morel mushroom..... 47
Snow geese landing at DeSoto.....48
Looking south along DeSoto Lake from near the Missouri Meander Trail..... 50
Aquatic vegetation in DeSoto wetland.....51
Daisy fleabane.....52
Great horned owl.....53
White-tailed deer at DeSoto NWR.....57
Snow geese over DeSoto Refuge.....58
1984-85 Duck Stamp — American widgeon.....59
Largemouth bass.....60
Bertrand Collection artifacts.....63
DeSoto Refuge Visitor Center beside DeSoto Lake.....66
Rose-breasted grosbeak painting by Louis Agassiz Fuertes..... 70
“Suitcase for survival”.....72
DeSoto National Wildlife Refuge, DeSoto Lake, and the Missouri River..... 73
Excavating the *Bertrand* in the late 1960's.....74
Beaver.....75
Spigot from *Bertrand* Collection.....104
“Beauty of the hunt”.....105
Lamps in the *Bertrand* Collection..... 110
DeSoto visitors at the Visitor Center 112
Coyote pup.....187
Snapping Turtle.....188
Yellow bullhead catfish..... 192
Wood duck.....224

Snow geese flock on lake in front of DeSoto Visitor Center, November, 1982
credit: John Jave



Steamboat *Bertrand* sinking in 1865 on what is now DeSoto National Wildlife Refuge
painting by Jim Trott

FINDING OF NO SIGNIFICANT IMPACT
for implementation of the
DeSoto National Wildlife Refuge
Comprehensive Conservation Plan and Environmental Assessment
Nebraska and Iowa

For the reasons presented below and based on a review and evaluation of the information and data contained in the supporting reference, I have determined that implementing Alternative D of the Environmental Assessment associated with the Comprehensive Conservation Plan (CCP) for DeSoto National Wildlife Refuge is not a major Federal action significantly affecting the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969. An environmental impact statement will, accordingly, not be prepared.

Reasons:

Management goals, objectives, and strategies were not significantly changed, but future programs and uses allows the Refuge to be managed in a more natural and diverse manner while supporting the mission of the National Wildlife Refuge System and ensuring that management is consistent with federal, state, and county plans.

Implementation of Alternative D would allow management to seek the best or optimal balance between the competing ideals of wildlife conservation and public use.

The proposed management plan will utilize an ecosystem approach which will benefit a diversity of fish and wildlife, including endangered and threatened species and their habitats.

Opportunities for wildlife-dependent activities such as observation, photography, hunting, fishing, environmental education, and interpretation will be enhanced.

Following the recommendations in the CCP will ensure that Refuge management is consistent with the mandates of the National Wildlife Refuge System.

No adverse economic impact on the local community will occur as a result of implementation of Alternative D and the CCP. Cropland reduction will phase out over time by attrition of participants.

Supporting Reference:

DeSoto National Wildlife Refuge Final Comprehensive Conservation Plan and Environmental Assessment, Washington County, Nebraska and Harrison and Pottawattamie Counties, Iowa

Regional Director

1-24-01
Date

Chapter 1
Introduction and Background

DeSoto National Wildlife Refuge lies astride the border of two Midwestern "breadbasket" states – Iowa and Nebraska. DeSoto also straddles the Missouri River. Records of explorers, early trappers and the Lewis and Clark Expedition all indicate a great abundance and variety of fish and wildlife in the Missouri River Basin. Once known as "the Big Muddy," nowadays the Missouri is much less muddy and much more predictable. It has been regulated – but not entirely tamed (as recent floods have shown) – by a half-century of developing dams, reservoirs, jetties, levees, and other structures intended to control floods and provide for navigation, irrigation, hydro-electricity, and recreation. While substantial benefits have been reaped, these civil works have severely impacted the Missouri's natural habitats, flora, and fauna, including those of the DeSoto Refuge.

Today, the Missouri River ecosystem is a highly modified environment. Much of it is now slack water sitting behind reservoirs and most of the open stream channelized. Its banks are now heavily industrialized in places, and intensive agriculture flourishes on its floodplain. DeSoto National Wildlife Refuge exists as a remnant, a near-representation of what natural habitats once were in the pre-development era, but can never again become; it is one of the "pearls" of ecologically important areas on the reach of the Missouri below Sioux City. Its oxbow lake, riparian forests, native grasslands, wetlands, and specially-managed croplands provide a diversity of habitats attractive to many species of wildlife, most notably migratory waterfowl and other birds. DeSoto is internationally renowned for its spectacular fall migration of hundreds of thousands of snow geese – and for this reason perhaps has a special role to play in the management of this beautiful but now overabundant species.

DeSoto Refuge is unique in that it is the site of the "recovered" sunken steamboat *Bertrand*. This cargo-carrying riverboat hit a partially submerged snag on the old DeSoto Bend in April, 1865. Displays of its recovered and restored cargo are a major refuge attraction. These artifacts, buried for over a century and unearthed from their muddy sarcophagus in 1968, are like a time capsule. Observing, studying, interpreting and displaying them offers insights into the past – into the bygone era of exploration and settlement of the American West.

This plan describes how DeSoto Refuge will provide for migratory and endangered species within its boundaries, work with partners to improve habitats beyond its boundaries, expand opportunities for wildlife viewing and fishing, further develop environmental education, interpretation of natural and cultural history, and provide outreach programs to increase appreciation of fish, wildlife and the environmental influence of Western settlement.

Introduction

DeSoto National Wildlife Refuge (NWR) inherits its historic name from the major bend at this point of the Missouri River. The bend was named after the nearby river town of DeSoto, once the county seat of Washington County, Nebraska, as well as a ferry crossing. DeSoto prospered in the 1850's and 1860's, before being abandoned in the late 19th century when the main Missouri River channel shifted and left the townsite "high and dry" several miles from the river. The refuge is located about 25 miles north of Omaha, Nebraska, in Harrison and Pottawattamie Counties, Iowa, and Washington County, Nebraska. It lies about midway between the towns of Missouri Valley, Iowa, and Blair, Nebraska. See Figure 1. DeSoto NWR is 7,823 acres in size, 3,499 of which are in Iowa and 4,324 in Nebraska.

DeSoto NWR was established on March 12, 1958. It was authorized by the Migratory Bird Conservation Act of 1929 (16 U.S.C. § 715d) for *"…use as an inviolate sanctuary or for other management purposes, for migratory birds."* Later, the Refuge Recreation Act of 1962 (16 U.S.C. § 460k-1) identified additional purposes for which the refuge was suitable: *"…(1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species…"*

The Fish and Wildlife Act of 1956, as amended [16 USC ss 742f (a) (4) (5)], is the specific law granting authority for acquiring lands for national wildlife refuges. Under this Act, the Secretary of the Interior is authorized to take steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources, including but not limited to research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein. The Act also authorizes the Fish and Wildlife Service to accept gifts of real or personal property for its benefit and use in performing its activities and services. Land acquisition for DeSoto Refuge began in 1958. By the end of 1959 about 6,000 acres had been acquired, a majority of the present acreage.

DeSoto's mission statement elaborates on the refuge's purposes: *"To preserve and restore indigenous biological communities, with emphasis on wetland and riverine flora and fauna, and to provide both cultural and natural history interpretations for environmental education; and wildlife-dependent recreation, where and when such uses are compatible with the primary purposes of the refuge."*

While the central focus of this Comprehensive Conservation Plan (CCP) is DeSoto National Wildlife Refuge, it also encompasses the DeSoto Fish and Wildlife Management District, which allows private landowners to enroll their lands in specific habitat improvement programs. At present, the District conducts management activities in 18 Iowa counties, as well as similar stewardship activities in eastern Nebraska. The primary emphasis of this CCP is on the Missouri River bottomlands at DeSoto Refuge, focusing on maintenance and enhancement of the Missouri River ecosystem for current and future generations of the American public.

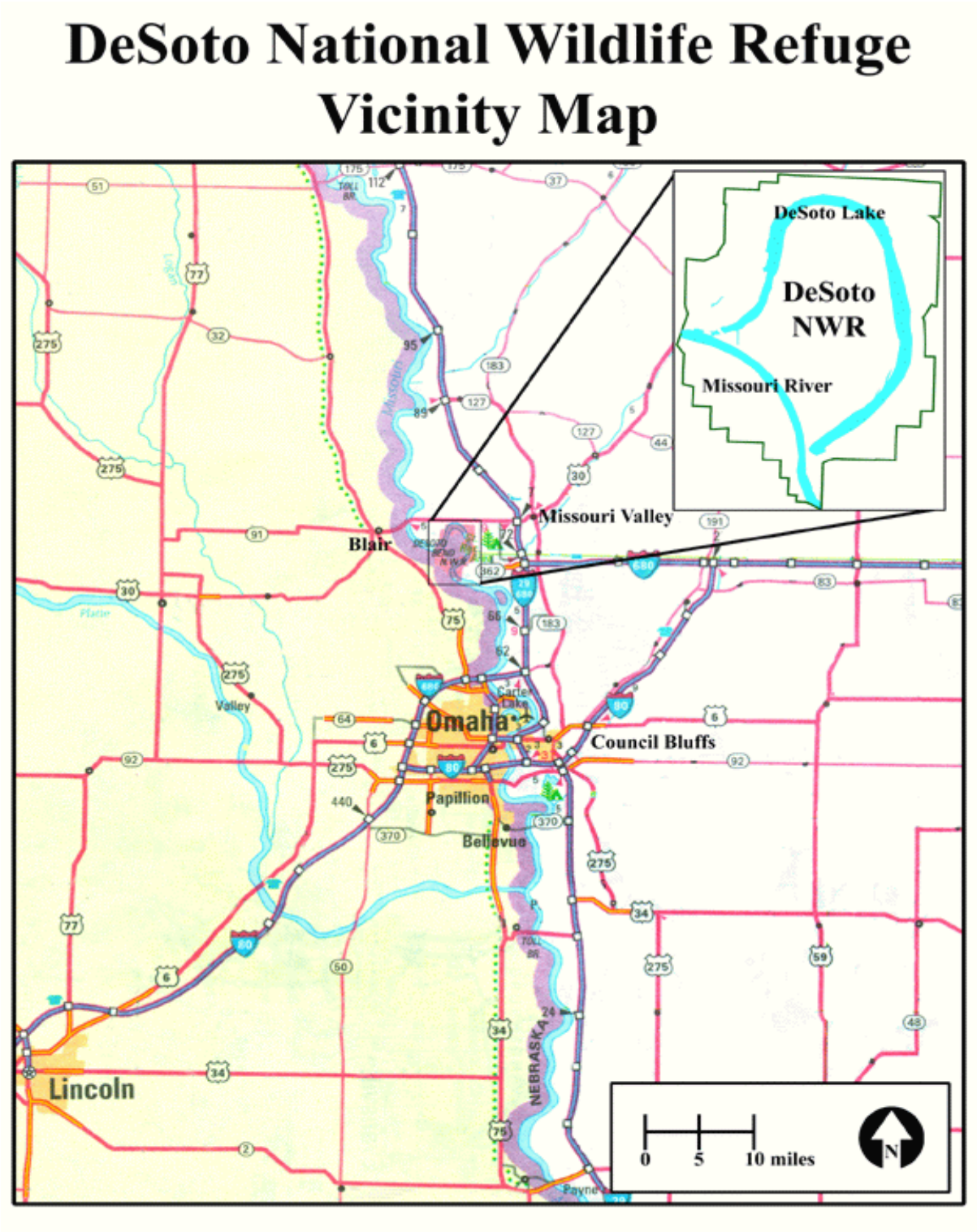

DeSoto National Wildlife Refuge
Vicinity Map
DeSoto Lake
DeSoto
NWR
Missouri River
Missouri Valley
Blair
Omaha
Council Bluffs
Papillion
Bellevue
Lincoln
NEBRASKA
0
5
10 miles
N

Figure 1

Due to the proximity of Boyer Chute NWR several miles downstream and across the Missouri, DeSoto staff has also been managing this refuge since its establishment, under an agreement with a different administrative region (Region 6). A separate CCP will be prepared for Boyer Chute in the future as development, management activities, and further land acquisition proceed at this newer unit.

DeSoto Refuge came into being at a time when refuge managers put much emphasis on providing "hot" foods, like corn, for migrating waterfowl. Farming techniques and willing local cooperators were an easy and economical way to provide such foods. In the early 1960's, woodlands were actually cleared to make way for additional cropland at DeSoto. Now refuge managers rely more on natural habitat quality and diversity and less on cultivated crops. This CCP recommends that approximately 1,500 acres of cropland on DeSoto NWR be reverted to about 1,140 acres of native grasslands, 355 acres of cottonwood forest, and 14 acres of moist soil management units and other wetland types.

DeSoto NWR manages a variety of habitats that provide resting, foraging, and nesting opportunities for nearly 250 species of resident and migratory birds. The major habitat types include woodlands (3,345 acres), freshwater aquatic (900 acres), croplands (1,990 acres), and native grasslands (1,640 acres). DeSoto Lake is a seven-mile long oxbow lake, which contributes 788 acres of aquatic area to the refuge's rich habitat mix. This diversity of habitats supports an abundance of resident plant, mammal, bird, reptile, amphibian, and fish species.

Management techniques now used on the refuge include control of DeSoto Lake water levels, wetlands and moist soil units; biological, chemical and mechanical control of invasive plant species; mowing, haying and prescribed burning of grasslands; biological rotations on cropland; food plots; some tree planting, grass seeding, and hunting of white-tailed deer and waterfowl.

In 1994, a team from the U.S. Fish and Wildlife Service considered alternative ways to better protect and restore the living resources of DeSoto NWR. One of the primary recommendations of this evaluation was that DeSoto's efforts should move in the direction of "ecosystem management." This entails viewing the refuge in the context of regional conservation priorities, with a central goal of maintaining and reconstructing the best possible approximation of native communities by restoring natural ecological processes, structure, and composition. More specifically, refuge managers have embarked on a shift away from croplands to native grasslands and woodlands, more emphasis on non-game migratory birds like the neotropical migrants, and consideration of the hydrologic relationship of DeSoto Lake to the Missouri River.

DeSoto NWR's staffing includes 21 full- and part-time positions divided into six functions: biological program, public use, law enforcement, museum program, maintenance and administrative.

The Refuge Vision

The Refuge Vision describes an ideal future set of conditions that are expected to be the result of the stated management goals, objectives, and strategies:

DeSoto National Wildlife Refuge represents both cultural and natural resources of the past and present. This refuge attracts high use by both people and wildlife. Because of the recovery of the artifacts from the Steamboat Bertrand*, the DeSoto Visitor Center's theme is truly "a place where wildlife and history meet." A high level of environmental education and interpretation exists as this refuge reaches its potential as a demonstration site for applied wildlife management practices. A strong stewardship ethic is demonstrated by the reversion of over 2,500 acres of former cropland to more natural and diversified habitat.*

The refuge serves as an outstanding example by providing a variety of habitats for healthy and diverse populations of wildlife, while at the same time trying to minimize the effects of habitat fragmentation. Along with being an important migratory bird stop-over (neotropical songbirds as well as waterfowl), DeSoto remains a popular people place where wildlife can be readily seen and enjoyed. Compatible wildlife-dependent recreation is encouraged by a supportive professional staff. All facilities are maintained at Service standards. Funding is adequate to support a unified and diverse staff of well-trained, committed employees, according to the staffing plan.

DeSoto Refuge makes a significant contribution to the "string of pearls" concept. This concept envisions numerous sites along the Missouri River reach below Sioux City, Iowa, that are dedicated to restoration and preservation of natural floodplain ecosystems. Bottomland forests are being restored along the river. Seasonal flooding naturally regenerates cottonwood stands. Native grasslands have been re-established. Restored wetlands once more attract a significant migration of ducks along the river corridor. Snow goose populations have been reduced to sustainable levels throughout their flyways. Large numbers of refuge visitors utilize excellent facilities to enjoy the out-of-doors and to become more knowledgeable about their environment.

Purpose of and Need for the Plan

This Comprehensive Conservation Plan (CCP) identifies the role DeSoto NWR will play in supporting the mission of the National Wildlife Refuge System and provides primary management guidance for the refuge. The plan articulates management goals for the next 15 years and defines objectives and strategies that will achieve those goals. Several legislative mandates within the National Wildlife Refuge System Improvement Act of 1997 have guided the development of this plan. These mandates include:

- Wildlife has first priority in the management of refuges.

- Wildlife-dependent recreation activities of hunting, fishing, wildlife observation, wildlife

photography, environmental education and interpretation are the acceptable public uses of the Refuge System. These uses, commonly referred to as the "Big Six," will be accommodated when they do not interfere with the refuge's purposes or the mission of the Refuge System.

, Other uses of the refuge will only be allowed when they are determined to be appropriate and compatible with the refuge purposes and mission of the Refuge System.

Following the recommendations in the CCP will enhance management of DeSoto National Wildlife Refuge by:

- Providing a clear statement of direction for future management of the refuge.
- Giving refuge neighbors, visitors, and the general public an understanding of the Service's management actions on and around the refuge.
- Ensuring that the refuge's management actions and programs are consistent with the mandates of the National Wildlife Refuge System.
- Ensuring that refuge management is consistent with federal, state and county plans.
- Establishing long-term refuge management continuity.
- Providing a basis for the development of budget requests for refuge operations, maintenance, and capital improvement needs.

The U.S. Fish and Wildlife Service

> *"Working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people."* – Mission of the U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service is the primary federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. Specific responsibilities include enforcing federal wildlife laws, managing migratory bird populations, restoring nationally significant fisheries, administering the Endangered Species Act, and restoring wildlife habitat such as wetlands. A significant portion of the Service's mission is accomplished within the National Wildlife Refuge System.

The National Wildlife Refuge System

> *"To administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."* – Mission of the National Wildlife Refuge System

Managing the National Wildlife Refuge System has evolved into a significant role for the Service. Founded in 1903 by President Theodore Roosevelt with the designation of Florida's Pelican Island as a refuge for herons and egrets, the National Wildlife Refuge System is the world's largest collection of lands specifically managed for fish and wildlife. The System is a network of more than 500 national wildlife refuges encompassing more than 93 million acres of public land and water. The majority of these lands — 82 percent — is in Alaska, with approximately 16 million acres in the lower 48 states and several island territories. Refuges provide habitat for more than 5,000 species of birds, mammals, reptiles, amphibians, fish, and insects.

White pelican at DeSoto NWR
credit: David Menke

Like Pelican Island, many early national wildlife refuges were created for herons, egrets and other water birds. Others were set aside for large mammals such as elk and bison. Most refuges, however, have been created to protect migratory waterfowl. This is a result of the United States' responsibilities under international treaties for migratory bird conservation as well as other legislation, such as the Migratory Bird Conservation Act of 1929. A map of the National Wildlife Refuge System shows refuges dotting the four major flyways that waterfowl follow from their northern nesting grounds to southern wintering areas.

National Wildlife Refuges also play a vital role in preserving endangered and threatened species. Among the refuges that are well known for providing habitat for endangered species are Aransas NWR in Texas, the winter home of the whooping crane; the Florida Panther Refuge, which protects one of the nation's most endangered mammals; and the Hawaiian Islands Refuge, home of the Laysan duck, Hawaiian monk seal, and many other unique species.

Refuges also provide educational and recreational opportunities for people. When it is compatible with wildlife and habitat needs, refuges can be used for wildlife-dependent activities such as hunting, fishing, wildlife observation, photography, environmental education and interpretation. Many refuges have visitor centers, nature trails, automobile tours, and environmental education programs. Nationwide, more than 35 million people visited national wildlife refuges in 1999.

The National Wildlife Refuge System Improvement Act of 1997 established many mandates aimed at making the management of national wildlife refuges more cohesive. The preparation of Comprehensive Conservation Plans is one of those mandates. The legislation requires the Secretary of the Interior to ensure that the mission of the National Wildlife Refuge System and

purposes of the individual refuges are carried out. It also requires the Secretary to maintain the biological integrity, diversity, and environmental health of the refuge system.

Steamboat *Bertrand* model in DeSoto Visitor Center
credit: Michael Whye

Existing Partnerships

The mission statement of the Fish and Wildlife Service stresses "...working with others...." Partnerships with other federal agencies as well as tribal, state, and city governments and schools are important elements in refuge management. Other agencies can provide invaluable assistance in research and maintenance. Partnerships with private groups and non-profit organizations greatly enhance public investment in the refuge, building enthusiasm for its mission and support in funding issues.

In addition to the partnerships that the U.S. Fish and Wildlife Service holds on a national level, DeSoto NWR maintains informal partnerships with the Iowa office of the Natural Resources Conservation Service, Midwest Regional Office of the National Park Service, the Iowa Department of Natural Resources, Nebraska Department of Game and Parks, Harrison County Conservation Board and other County Conservation Boards, Iowa State University Extension, Papio-Missouri River NRD, Midwest Interpretive Association, Ducks Unlimited, Pheasants Forever, Omaha Chapter of the National Audubon Society, local chapters of the Boy Scouts of America and Girl Scouts of America, certain African-American churches in Omaha, the Omaha and Winnebago Indian Tribes, and 4-H Clubs.

DeSoto volunteer Jack Brownrigg and Treynor (IA) School students
credit: Bruce E. Weber

Legal and Policy Guidance

In addition to the legislation establishing the refuge and the National Wildlife Refuge System Improvement Act of 1997, other federal laws, executive orders, and regulations govern the administration of DeSoto National Wildlife Refuge. See Appendix F for a list of the guiding laws and orders.

Chapter 2
The Planning Process

The planning process for this CCP began with a "kick-off" meeting in July 1999. Initially, members of the CCP planning team and refuge staff identified a list of issues and concerns that were associated with management of the refuge. These preliminary issues and concerns were based on staff knowledge of the area and association with citizens in the community. The planning team, consisting of refuge staff, Service planners and a consultant to the Service, then invited refuge neighbors, organizations, local government agencies and local staff of national and state government agencies, schools, and interested citizens to share their thoughts in a focus group meeting (19 participants) on August 18, 1999 and at an open house session on September 14, 1999 (12 participants). The planning team accepted oral and written comments at the open house. Five written comments were received.

In October, 1999, the planning team met for an intensive three-day workshop to develop and consider four management alternatives that addressed the issues and concerns in different ways. The alternatives generally describe levels of management varying from near passive to more intensive. Once an alternative level of management is selected, methods for achieving that level can be developed. (The four management alternatives are described in the Environmental Assessment of Appendix A on page 113.)

Subsequent planning team meetings in November, 1999 and January, 2000 were held with Region 3 U.S. Fish and Wildlife Service officials and biologists in Fort Snelling, Minnesota to critique and revise these draft alternatives and associated goals and objectives. In February, 2000 the planning team again met for two days at DeSoto Refuge to further refine goals, objectives, and strategies.

Issues

The focus group raised a diverse range of issues facing the refuge. An initial list of 38 issues was consolidated into the following list of 19 issues concerning DeSoto NWR, which were ranked by the group in order of importance.

The issues listed here reflect terms and experiences familiar to the focus group participants. Each of the issues is included in the alternatives analysis matrix of the Environmental Assessment (Appendix A) beginning on p. 132, in a format that is more compatible to the structure of Service programs.

- Lake management issues – reconnect to river; dredging; structures; water levels; drainage; sedimentation. *DeSoto Lake is the principle geographic feature of the refuge landscape — attracting both waterfowl and people — and its present and future condition will in good part be influenced by management decisions and actions taken by refuge staff and other stakeholders.*

- Grassland/cropland management – balance in land use management. *The refuge must decide the appropriate ratio between these two upland habitat types based on what is most beneficial for wildlife.*

- Snow goose management. *Snow geese are too numerous for their own good and the good of their Arctic breeding habitat. As a principal stopover, DeSoto must contribute to solving this overpopulation problem in a manner that does not simply just drive the geese away from the refuge altogether.*

- Drainage — legal drains entering the refuge. *These ditches, which drain surrounding private agricultural lands, back up and flood farmlands when lake levels are high. They also transport significant sediments, nutrient runoff, and contaminants to DeSoto Lake. Perhaps a study is needed to determine and implement feasible alternative routes for these ditches so that DeSoto Lake is bypassed.*

- Regional perspective – river complex; natural complex; ecosystems approach; consider big picture in planning. *DeSoto Refuge is not an island unto itself; management of its lands and waters affects and is in turn affected by the dynamics of natural and human systems of which it is a part.*

- Deer and beaver effects on adjoining property. *White-tailed deer and beaver from refuge populations are both capable of damaging surrounding private property, the former from eating and the latter from flooding; they need to be monitored and if necessary, controlled.*

- Fishery management in lake and other agencies as stakeholders. *Refuge staff actively manage the DeSoto Lake sport fishery in conjunction with other Service and state fishery biologists. Decisions must be made concerning stocking, controlling rough-fish competition, water quality, and fishery renovation.*

- Public use activities on the refuge; south gate recreation area and campground developed by Iowa Department of Natural Resources. *Managers of Iowa DNR's Wilson Island State Park, which abuts the southeast corner of the refuge, are interested in expanding their recreational development (camping) onto the refuge.*

- Outreach and education; public relations. *DeSoto Refuge must involve its neighbors, its visitors, and the wider community of which it is a part in a more positive and pro-active manner.*

- Prairie wetlands. *The refuge should capitalize on opportunities to maintain, enhance, and increase prairie wetlands.*

- Water quality and nutrient levels in DeSoto Lake. *A vexing issue is how to improve water quality (dissolved oxygen and clarity) and reduce excessive nutrient levels that tarnish this valuable resource. Hypothetical solutions exist, but tend not to be feasible or practicable.*

- Invasive species (e.g. rough-fish and unwanted plants). *DeSoto Refuge faces the ongoing challenge of trying to control rough-fish populations in the lake, which tend to overwhelm sportfish, and monitoring and controlling the spread of a number of undesirable and/or non-native plant species which can infest large amounts of habitat, displacing native species.*

- Riparian forests. *Cottonwoods, which play an important ecological role, are gradually disappearing from DeSoto's riparian forests due to a lack of seasonal flooding along the regulated Missouri River. Restoring and renovating cottonwood stands will prove challenging.*

- Endangered species. *As a national wildlife refuge, a key function of DeSoto is to enhance the survival of threatened and endangered species, of which there are several in the area, including birds and fish.*

- Environmental monitoring. *Keeping track of changes in a number of environmental indicators through time is needed to generate the information and perspective essential to good decision-making and prudent resource stewardship.*

- Overall biodiversity relative to landscape. *The issue is how to best contribute to enhancing biodiversity in the region through active management of the limited amount of land and habitat on the refuge itself.*

- Priority accorded to *Bertrand* exhibit. *The* Bertrand *Collection, a unique cultural resource, is a major responsibility and visitor attraction of this* <u>*wildlife*</u> *refuge, a situation that may strike some as incongruous or inappropriate.*

- Building and facility maintenance and upkeep. *In recent years refuge funding has been inadequate to support ever-needed basic maintenance of roads, buildings, and public use facilities.*

- Cooperate with other agencies & work with private lands. *DeSoto staff collaborate with other public and private entities in management activities both on and off the refuge. For such partnerships to function effectively requires constant communication and commitment.*

<u>Note: Lower rankings generally imply the issue or activity is already resolved or is a mandate about which no management decisions are necessary.</u>

The most salient of these issues are organized and discussed below by themes – wildlife population and habitat management, resource protection, public education and recreation, and partnerships. The most pressing issues facing the refuge are those related to management of wildlife populations and their habitat.

Wildlife Populations and Habitat Management

Croplands and Upland Habitats – In the early days of DeSoto Refuge management, emphasis was on farming grain crops – primarily corn and soybeans – to attract migrating waterfowl and to show the local farming community that the refuge, and not just private farms, would be supplying grains to hungry ducks and geese. Providing farming opportunities to farmers also helped the new refuge gain acceptance in the agricultural community from which some of its acres had been taken.

Large and growing concentrations of migrating waterfowl did indeed visit the refuge, particularly the hundreds of thousands of snow geese that now pass through the refuge each fall on their way south. Tens of thousands of mallards were also common fall visitors. However, the attraction to waterfowl could just as well have been the placid, protected waters of DeSoto Lake, which provide a needed sanctuary for resting, sleeping, and loafing. In any case, encouraging such large concentrations of waterfowl may be detrimental to the continental welfare of the species. Subsequently, the U.S. Fish and Wildlife Service and DeSoto Refuge have shifted emphasis toward biodiversity conservation and ecosystem management to benefit a broader complex of flora and fauna, particularly trust species and threatened and endangered species. This evolution of philosophy and mission has resulted in reversion of some cropland acreage to more natural – and regionally scarce – habitats such as native grasslands, riparian forests dominated by cottonwood, and moist soil/wetland plant communities.

At present almost 2,000 acres are leased to several local farmers for the cultivation of corn and other grains, using an innovative biological rotation, which minimizes the use of artificial inputs like fertilizer and pesticides. One-third of the harvest is left behind for migratory waterfowl and resident mammals and birds, or harvested and transferred to other refuges through inter-elevator grain transfers, in accordance with the Service Refuge Manual 6 RM 4.13 (5/24/85). Acreage devoted to cropland is down considerably from its peak of more than 3,000 acres. The issue facing DeSoto resource managers is how much cropland should be retained and how the retired cropland should be utilized.

Cottonwoods and Riparian Forests – Standing in the DeSoto Visitor Center viewing gallery and gazeing across DeSoto Lake, one is immediately struck by the leafy wall of riparian forest standing tall on the opposite side. In another fifty years, however, if existing trends continue, that wall of green foliage may look very different – not so tall, for one thing. Mature specimens of the dominant canopy tree, the cottonwood (*Populus deltoides*) are slowly dying off and not being replaced by younger cottonwoods. Rather, a much smaller, scrubbier, understory tree – the rough-leafed dogwood (*Cornus drummondii*) – is coming up in their place. Cottonwood forests require periodic flooding for regeneration to occur, and since DeSoto Lake was cut off from the channelized Missouri River by a levee in 1960, these floods have not occurred. As a result, the comparatively short-lived cottonwoods are gradually disappearing. One concern is that bald eagles use tall cottonwoods as perches. Another is that a variety of cavity-using birds and mammals depend on them; since cottonwoods have soft wood subject to decay and woodpecker drilling, holes and cavities that provide valuable shelter and nest-sites for wildlife are easily formed.

The issue facing DeSoto NWR managers is this: Should they attempt to circumvent the process of forest succession now underway (as set in motion by human manipulation of the Missouri's floodplain) in an effort to save the cottonwoods, or allow this "unnatural" succession to unfold on its own even if it leads to a less attractive, less ecologically functional forest?

DeSoto Lake and the Missouri River – Still another management issue relates to the aquatic habitat of DeSoto Lake. This oxbow lake was created in 1960 by construction of a cut-off levee, separating it from the Missouri River except for gravity flows through inlet and outlet structures within the levee.

The effectiveness of these structures is limited by their size, but more importantly by the magnitude of river flows; low river flows limit fresh water inflows and high river flows limit the outlet function. In recent years, the latter has been much more problematic. The lake also serves as a connection for surface drainage ditches from private land to the river. These ditches carry significant loads of silt and chemicals which jeopardize the long-term life of this oxbow lake environment.

DeSoto Lake in winter
credit: Leon Kolankiewicz

Low lake elevations result in undesirable concentrations of nutrients, chemicals, and aquatic fauna, producing eutrophic conditions undesirable for fish and aesthetics. Extremely high lake levels, such as those that prevailed for much of 1999, inundate nature trails, boat ramps and other public use facilities, in addition to interfering with management of refuge habitat and private farmlands outside the refuge.

Two issues confront DeSoto management: Should DeSoto Lake be reconnected with the Missouri River to restore natural riverine habitat to benefit trust species and riverine fishes? If not, should a strong, long-term commitment be made to stabilize DeSoto as a high-quality, unique oxbow lake, even if it means that extraordinary measures must be taken to provide desired lake

level and water quality controls? Or, should current management practices be continued that could eventually lead to the demise of this oxbow lake environment?

Snow Geese – At the turn of the new century, the mid-continent population of snow geese is in trouble, not because there are too few birds but because there are too many – what Ducks Unlimited calls "a perilous abundance." In recent years, their population has been growing at 5-8 percent a year (a "doubling time" of just 9-14 years), and now stands at 3 million or more. Snow geese nest in northern Canada on Arctic tundra in the vicinity of Hudson Bay and the Arctic Ocean. Vast areas of cultivated grain along the migration route support much greater numbers in wintering areas of the central and southern U.S. than can be accommodated in their northern breeding range. As a result, snow geese are now ravaging their tundra habitat as they attempt to feed themselves and their goslings. They are causing long-term (if not permanent) damage to slow-growing tundra plant communities and other wildlife that depend on these communities.

Snow geese fill the sky at DeSoto every autumn
credit: John Jave

DeSoto Refuge annually hosts roughly half a million snow geese migrating southward. Over the years, management has successfully attempted to make the refuge an attractive sanctuary for migratory waterfowl. Many tens of thousands of visitors each autumn delight in the dramatic spectacle of snow geese flocks so numerous they blot out the sky. Now, managers must effect a change of course and the public must face the fact that this may be "too much of a good thing." Deliberate population reductions and sanctuary disturbance must be carefully orchestrated along the migration corridors to avoid out-of-control results.

What role, if any, should DeSoto National Wildlife Refuge play in the continent-wide, international effort to reduce snow geese numbers before further damage is done to Arctic habitat or the population crashes on its own?

Resource Protection

Refuge Facilities – Like all institutions, DeSoto Refuge must live within a budget, and doing so necessitates prioritizing a number of programs and projects that compete for funding and staffing. These include managing endangered species, biodiversity, aquatic and upland habitat, fish and wildlife populations, cultural resources, and public use. DeSoto's unique role as conservators of the artifacts from the Steamboat *Bertrand* is expensive and perpetual. These artifacts are on display in the Visitor Center, which also provides exhibits on natural history and an outstanding view of DeSoto Lake and its migratory waterfowl. The Center and its exhibits and artifacts are costly to maintain. In fact, the backlog of artifact and display problems is growing. How do the Visitor Center and its exhibits relate to high priority wildlife management activities?

Invasive (Unwanted) Species and Animal Damage Control – DeSoto Refuge, like many nature reserves and wild areas throughout the United States, is increasingly intruded upon by a number of species of plants and animals, both terrestrial and aquatic, that are either non-native (alien) or undesirable. That is, they do not "belong." These "weedy" organisms were introduced one way or another by human beings. They harm the refuge's native flora and fauna by preying on them or competing with them for limited food, space, and resources. In the worst cases, weedy species can lead to the extirpation (local extinction) of native species or wholesale alteration of plant and animal communities. As a rule, invasive plants are not utilized by native animals for food or shelter as effectively as the native flora to which these animals are adapted. Other wildlife species, although native to the refuge, may be able to cause damage both on and off-refuge. Should DeSoto Refuge managers actively and aggressively combat the ongoing invasion of exotic species by diverting scarce budgetary resources to this mission, or should the refuge adopt a "let nature take its course" approach to all species? How should wildlife populations be controlled to limit their impact on habitat and facilities?

Public Education and Recreation

DeSoto Lake Recreational Fishery – In its early years, DeSoto Lake boasted a good sport fishery. After years of decline, by the early 1980s, rough-fish (non-game fish) had largely taken over the lake from sportfish. In an effort to restore the sport fishery, refuge managers and state agencies carried out a number of measures to improve aquatic habitat and control rough-fish. These culminated with a major renovation in 1985, including drawdown and chemical treatment of the lake. Since that time, more than 35 million sport fish (mostly fry) have been stocked in DeSoto Lake. For a number of years, the sport fishery was better. Yet once again, rough-fish, particularly gizzard shad, have come to dominate the lake.

Should DeSoto Lake fish populations be aggressively managed to maintain a good sport fishery, or should other alternatives be considered, such as the "hands off" approach of allowing the fish species complex to be self-controlled, or even re-connecting DeSoto Lake to the Missouri River, so that riverine species may also utilize the lake? If another intensive, expensive renovation is to take place, what will be the methods used and what will be the source of funding?

Partnerships

Role in the Community and Relations with Neighbors – People in rural communities sometimes view national wildlife refuges as intrusions in the local culture and a source of conflict between natural resource issues and people welfare issues. DeSoto Refuge is sometimes viewed as wasted area that would be better used as productive cropland. The refuge staff strive to obtain public input and be responsive to public concerns in decision-making. These efforts could likely be improved through more formal associations such as a "Friends of DeSoto" group, advisory committees and structured volunteer organizations.

DeSoto National Wildlife Refuge does not exist as an island unto itself. The management actions undertaken on its 7,823 acres affect surrounding landowners, residents, and jurisdictions, the interests of other Federal, state, and local agencies, the public in general, and the larger natural ecosystems of which the refuge is a part. In turn, the actions of these entities have a pronounced effect on wildlife populations, habitat and environmental quality within the refuge. Over the years, refuge staff have built working relationships and conducted a number of cooperative ventures with stakeholders in the wider community. Still, when different parties have fundamentally different goals, it is to be expected that tensions between these goals can arise. Refuge management must perform a balancing act in pursuing DeSoto's mission and being good neighbors. Can the refuge find ways to be more accommodating of these other interests without compromising its basic mission?

Public Comments on Draft Comprehensive Conservation Plan

A part of the planning process was to solicit comments on a fully developed Draft Comprehensive Conservation Plan (DCCP) and the Environmental Assessment (EA). A DCCP/EA was made available for review by the public, by those who participated in the focus group, by interested agencies and organizations, and by others. (See Appendix H.) An open house session for anyone interested in the DCCP/EA was held September 7, 2000, at DeSoto National Wildlife Refuge. Media releases announced the event and also invited anyone interested to submit written comments on the DCCP/EA to the Service. A total of 14 people attended the open house session and a total of 14 written comments were received either at the open house or by mail. The full texts of those comments are presented in Appendix K. The following is a summary discussion of those written comments.

The number of **comments from public users** of the refuge was disappointingly low. Those who did comment urged the planning team to consider ways of making the public use season and public access to the refuge more user friendly throughout the year. Their suggestions included an extended wildlife observation season and auto tour route, access to the refuge through both the north and south entrance gates in the off season, improved road surfaces, public restrooms closer to the boat ramps and adding upland game hunting opportunities.

Response: Goal 3.2 and its subsequent objectives and strategies address all the expressed concerns. The refuge staff is committed to careful monitoring of the interrelationships of the

various public use opportunities in order to maximize quality experiences and minimize conflicts between users. One example is that extension of the wildlife viewing season and the auto tour route could contribute to Goal 1.2, reducing snow goose concentrations.

Comments from other resource agencies (Federal, State) suggested the CCP could be improved by strengthening the goals relating to : (1) Threatened and endangered species (T&ES); (2) DeSoto Lake management; (3) Habitat diversity; and (4) Fishing and hunting opportunities.

Response: The comments concerning T&ES focused on a need for more positive action to restore and preserve nesting habitat for the least tern and piping plover. The planning team revised the T&ES section in Chapter 3 to reflect more clearly the ongoing nesting habitat preservation efforts and to define a specific habitat management effort for the future. Also, the planning team revised Goal 1.6 in Chapter 5 from one that addressed bald eagles only to one that includes positive action for all T&ES that are known to be in the vicinity of the refuge.

There were also critical comments that the Service should make extraordinary efforts to restore riverine fishery habitat that would help in the recovery of the endangered pallid sturgeon and candidate endangered species sturgeon chub and sicklefin chub. Even though restoration of riverine habitat similar to what existed prior to modification of the Missouri River channel and establishment of the refuge may be ideal for terns, plovers, sturgeon and chubs, implementation of the concept is extremely complex. Basically the concept involves reconnecting the lake with the river in some manner that provides a more ideal habitat for the subject species. Restoring connectivity with the river will likely have significant impacts on river and lake hydrology and the lake's sport fishery. At least one agency opposed this concept. In order to scientifically and practically evaluate this concept, Goal 1.7 in Chapter 5 has been revised to describe a proposed comprehensive study to compare the biological and recreational values of an oxbow lake environment with that of a reconnected lake environment. The results of this study will help the Service determine which option would best support the missions of the Service and the refuge.

Comments expressing concern about habitat diversity were focused on the plant complexes that would occupy the cropland acres proposed to be retired. Goal 1.4 has been revised to put more emphasis on reestablishing native tall grass prairie grass and forb species.

Comments concerning public fishing and hunting opportunities called for their continuation and perhaps making some more liberal. The long range future of sport fishing is dependent on the outcome of the oxbow lake/reconnected lake comparison study. In the meantime, sport fishery management will be continued. Some interest was expressed that small game hunting should be allowed on the refuge. Because of the wide array of public use opportunities on the refuge, small or upland game hunting opportunities have not been considered compatible for two reasons: potential conflicts with wildlife observation, and small populations. Goals 3.3 and 3.4 in Chapter 5 have been revised to include management and monitoring efforts that could lead to improved sport fishing and small game hunting opportunities in the future.

Comments from private organizations were similar to those of the resource agencies concerning threatened and endangered species, and reconnecting the lake with the river. Some

comments advocated elimination all hunting and fishing on the basis that it violated the intent of the National Wildlife Improvement Act of 1997, or that these programs provided benefits to only a small constituency. Other organizations advocated increasing hunting and fishing opportunities on the basis that participants were exposed to the principals of sound resource management of regulated fishing and hunting.

Response: The Service believes a proper balance of wildlife-dependent recreation can include hunting and fishing. A balance of consumptive and non-consumptive public use activities serves a larger public constituency and broader spectrum of natural resource interests. The compati- bility determination documents in Appendix D reflect the careful consideration given to each public use activity before it is allowed to occur on the refuge.

Fishing clinic at DeSoto Lake
credit: Bruce E. Weber

Chapter 3
The Refuge Environment

Geographic/Ecosystem Setting

The Lower Missouri River Ecosystem

The U.S. Fish and Wildlife Service has implemented an ecosystem approach to fish and wildlife conservation. Under this approach the Service's goal is to contribute to the effective conservation of natural biological diversity through perpetuation of dynamic, healthy ecosystems by using an interdisciplinary, coordinated strategy to integrate the expertise and resources of all stakeholders. Figure 2 displays the eight ecosystems within the Service's Region 3.

DeSoto National Wildlife Refuge lies within the Lower Missouri River Ecosystem and astraddle the river itself. The physical and chemical characteristics of the river have significant influences on the management of DeSoto's floodplain lands. (See Figure 3, p. 39.)

> "……from the Bluff on the 2d rise immediately above our Camp, the most butifull prospect of the River up & Down and the Countrey Opsd. prosented it Self which I ever beheld; The River meandering the open and butifull Plains, interspursed with Groves of timber, and each point Covered with Tall timber…"
>
> --*The Journals of Lewis and Clark*
> Monday, July 30, 1804

The Missouri River is the nation's second longest, flowing 2,250 miles through seven states from the Rocky Mountains to the Mississippi, and draining one-sixth of the land mass of the contiguous United States. At the time of the Lewis and Clark Expedition two centuries ago (1804-1806), the Missouri floodplain was a diverse 2,300-mile-long ecosystem that included braided channels, riparian lands, chutes, sloughs, islands, sandbars, and backwaters. The dynamic "Big Muddy" (so dubbed because of its high sediment load) continually reshaped its channel and floodplain through a never-ending process of creation and destruction, deposition and erosion. The Missouri River was a complex natural system supporting an extraordinary diversity of fish, wildlife, and plants.

It flooded annually, on a cycle that typically included a March/April rise caused by rain and melting snow on the Great Plains and a higher June flood pulse, when the Missouri filled with runoff from Rocky Mountain snow-melt. In summer and fall the river discharge declined, reaching a low point in late December. Fall rains sometimes prompted a slight rise in October or November. This rise and fall, and the resulting deposition within the floodplain, created some of the country's best wetland and bottomland habitats, along with potentially productive agricultural lands.

Figure 2 inserted here

The importance and potential of the Missouri River as a navigation channel was first recognized by early American explorers. By the mid-1800's, the river was already heavily traveled by steamboats and keelboats. As demand for commercial transportation grew in the second half of the 19th century, so did demand to "tame" the river by removing woody debris, snags and other hazards to boat traffic. The first half of the 20th century was marked by intensive channelization of the river and the beginning of reservoir construction, including six major flood control dams in the Missouri's upper reaches. These dams did indeed help reduce flooding, but in so doing, altered the natural flood cycle on which the ecosystem depended.

Vestiges of this history of engineering/navigation works are visible even today from DeSoto's Visitor Center windows in the form of piling dikes protruding from the shores of DeSoto Lake. These durable bald cypress pilings were placed there from 1935 to 1942 by the Army Corps of Engineers to accrete land where the river had spread out, in other words, to narrow and deepen the channel. The project ceased during World War II and did not resume after the Missouri's enormous 1952 flood.

> "When Lewis and Clark traveled up the Missouri in 1804 on their way to the West Coast, the river was varied and dynamic, with caving banks, snag-filled side channels and thousands of sandbars and islands. It teemed with life.
>
> "For the better part of two centuries, however, the government's engineers have transformed much of the muddy, free-flowing Missouri into little more than a barge canal and a series of slackwater reservoirs. The river Lewis and Clark knew is mostly lost."
>
> — Stephen Ambrose, author of *Undaunted Courage: Meriwether Lewis, Thomas Jefferson, and the Opening of the American West*; "Save the Missouri River," Omaha *Sunday World-Herald*, February 6, 2000

The 1944 Flood Control Act (Pick-Sloan) and the Missouri River Bank Stabilization and Navigation Project were intended to control erosion and protect land along the river. These and other projects eventually converted the Missouri from a free-flowing river into a series of reservoirs and channelized waterways, effectively separating the river from its floodplain. By 1972, the river's length had been shortened by 46 miles and its surface water area decreased from 121,739 acres to 71,151 acres. River flows have been changed primarily to enhance flood control and navigation and to provide hydroelectric power. Normal flow patterns are reversed at dams, where high flows in the spring are suppressed, and low summer and fall flows augmented (USFWS, "Lower Missouri River Ecosystem," at www.fws.gov/r3pao/ecosys/lowmiss.htm).

This vast engineering program has had devastating impacts on fish and wildlife populations and habitat. Roughly 168,000 acres of natural channel and 354,000 acres of associated habitat have been lost on the lower 730 miles of river. This acreage became accreted lands on which agricultural and industrial development occurred. Shallow water habitats, essential to fish spawning and rearing of young, have been reduced by 90 percent in some areas. In addition, islands and sandbars, important nesting habitat for migratory birds and other species, have been virtually eliminated. Moreover, riparian forest habitat was reduced from 76 percent of floodplain

vegetation in the 19th century to just 13 percent by 1972 (USFWS, "Lower Missouri River Ecosystem").

In addition to extensive habitat modification along the river and within the larger watershed, chemical contamination has emerged as an issue in the last half-century. With nearly 95 percent of the drainage basin's land area dedicated to agriculture, non-point sources are a major contributor to pollution along the river and its floodplain. Erosion of farmland soils as well as direct rainfall runoff can introduce fertilizers and a variety of pesticides into the bottomland ecosystem. These substances may be toxic both through direct exposure as well as through bioaccumulation in the food chain with secondary effects on reproduction and behavior. For example, DDT and its breakdown products DDD and DDE, thin eggshells. (Because of their persistence in the environment, and the potential for bioaccumulation, the use of many organochlorine pesticides like DDT has been banned in the U.S.) Over the years, periodic monitoring by the Fish and Wildlife Service detected these synthetic organic toxins at significant concentrations in Missouri River fish. For banned chemicals, these levels have tended to decline as background residues diminish. Toxic heavy metals such as mercury, selenium, copper, and cadmium in sediments and fauna of the Missouri River and its tributaries have also been documented over the years. High concentrations of heavy metals alter metabolic processes in plants and animals, leading to reduced survival. Past mining activities, industrial discharges and natural occurrences have been identified as sources of these heavy metals.

As well as non-point sources of pollution, there are also numerous "point" sources along the Missouri and its tributaries regulated by National Pollutant Discharge Elimination System (NPDES) permits administered by the U.S. Environmental Protection Agency and state regulatory agencies. NPDES permits must be obtained by publicly-owned sewage treatment facilities and private industrial discharges. Many pipelines carrying natural gas, crude oil and petroleum products traverse the river and its tributaries. In 1988 and 1990 the potential for pipeline breaks was realized with two actual ruptures releasing petroleum products into tributaries which ultimately ended up in the Missouri River. There is also the potential for spills or releases of hazardous waste from transportation vehicles such as barges, trucks and trains. Superfund sites and other uncontrolled hazardous waste sites found within the river's floodplain could contribute to the contamination of the river waters during a flood.

Bald eagle
credit: Mike Lockart, USFWS

The potent combination of these physical and chemical changes to the river, its floodplain, and its watershed have taken a heavy toll on native plants and animals. Five species of plants and seven species of wildlife found in the lower Missouri River ecosystem are considered Federally endangered or threatened. These are the decurrent false aster, Mead's milkweed, Missouri bladderpod, prairie bush-clover, western

prairie fringed orchid, bald eagle, least tern, piping plover, Indiana bat, pallid sturgeon, Niangua darter, and pink mucket pearlymussel. Two other species — the sturgeon chub and the sicklefin chub — are candidates for Federal listing. Numerous other species are rare or declining enough to cause concern. Many fish species native to the river are experiencing serious population declines. Information from some parts of the river indicates long-term declines in productivity of commercial and some sport fisheries, along with the invertebrates that sustain many aquatic species.

In recent years, Federal and state agencies have begun cooperating to rehabilitate those elements of the Lower Missouri ecosystem most amenable to restoration, such as backwater sloughs, unprotected partials of floodplain, and riparian remnants. Ironically, these efforts were given a boost by the back-to-back, highly destructive floods of 1993 and 1995. Although moderate to large floods along the Missouri have mostly been controlled, catastrophic floods have not. Unusual conditions in those years coincided to raise the river to levels never before recorded, causing levee breaks, massive damage to crops and property, and significant loss of life (38 dead in 1993). These tragedies led many landowners to consider selling their land to state and Federal agencies for uses that would not be impacted by future flooding, such as wildlife refuges or conservation areas.

While it is impractical in this day and age to dream of restoring the Missouri River to a pristine condition, much can still be done to substantially improve its value for native flora and fauna. Upcoming restoration efforts will probably entail a combination of re-establishing natural flood pulses and reconnecting the river to its floodplain in places where parcels of land can be acquired from willing sellers. This is already happening at the Service's newly established Big Muddy National Fish and Wildlife Refuge. This refuge consists of small tracts of land along the river from Kansas City to St. Louis where flooding, scouring, and deposition have been detrimental to agriculture but beneficial to wildlife and natural habitats.

DeSoto Refuge also represents an opportunity to re-establish floodplain habitats such as woodlands, grasslands and wetlands.

Migratory Bird Conservation Initiatives

Partners in Flight

Nationally and internationally, several nongame bird initiatives are in the planning stage, with implementation beginning in the near future. Partners In Flight (PIF) */ Compañeros en Vuelo / Partenaires d'Envol* is an international initiative launched in 1990 in response to growing concern about population declines of many land bird species, and in order to emphasize the conservation of birds not covered by existing initiatives and treaties. The initial focus was on species that breed in the Nearctic (North America) and winter in the Neotropics (Central and South America); the focus has expanded to encompass most landbirds and other species requiring terrestrial habitats.

The central premise of PIF is that the resources of public and private organizations in North and South America must be combined, coordinated, and increased in order to achieve success in

conserving bird populations in this hemisphere. PIF is a cooperative effort involving partnerships among federal, state and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, the academic community, and private individuals. Currently partners include 16 federal agencies, 40 non-governmental organizations (NGO's), over 60 state and provincial fish and wildlife agencies, numerous universities, and the forest industry.

PIF is developing Bird Conservation Plans, primarily for landbirds, in numerous physiographic areas. The plans include priority species lists, associated habitats, and management strategies. The same elements will be byproducts of ongoing planning efforts for shorebirds (U.S. Shorebird Conservation Plan) and colonial waterbirds (North American Colonial Waterbird Conservation Plan). As the plans are finalized, DeSoto NWR will strive to implement conservation strategies outlined in these plans to the extent possible and practical.

DeSoto NWR lies within PIF Physiographic Area #32, Dissected Till Plains. Species priorities for this area can be found at http://www.cbobirds.org/pif/physios/32.html. PIF has designated Important Bird Areas that include a number of refuges. Likewise, the Western Hemisphere Reserve Network includes several refuges.

A goal of Partners in Flight is to integrate all migratory bird conservation programs under the umbrella of the North American Bird Conservation Initiative. This is a continental effort to have all migratory bird initiatives operate under common Bird Conservation Regions, and for implementers to consider the conservation objectives of all birds together to optimize the effectiveness of management strategies.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP), signed in 1986, outlines a broad framework for waterfowl management strategies and conservation efforts in the United States, Canada, and Mexico. The goal of the NAWMP is to restore waterfowl populations to historic levels. The NAWMP is designed to reach its objectives through key joint venture areas, species joint ventures, and state implementation plans within these joint ventures.

DeSoto staff banding Canada geese
credit: Bruce E. Weber

The Fish and Wildlife Service has made major contributions to the habitat conservation goals of NAWMP through its Waterfowl Production Area program and basic acquisition program. Waterfowl Production Areas are

wetlands with upland buffers for nesting habitat that are generally small in acreage and sometimes include water control structures. They are open to hunting.

NAWMP is innovative because it is international in scope yet is implemented at the regional level. Its success depends on partnerships involving federal, state, provincial, and local governments, businesses, conservation organizations, and individual citizens, called joint ventures. Joint ventures develop implementation plans focusing on areas of concern identified in the Management Plan. NAWMP partners not only advance waterfowl conservation, but make substantial contributions toward the conservation of all wetland-dependent species.

In 1994 and again in 1998 NAWMP was updated and habitat goals expanded. In 1986, Plan goals were to protect and restore some 6 million acres of wetlands habitat. The 1998 Plan update called for 12.2 million acres of wetlands and associated uplands to be protected and 15.2 million acres to be restored and enhanced. The goal of restoring continental waterfowl populations to numbers seen in the 1970s remains essentially unchanged.

The Lower Missouri ecosystem and DeSoto National Wildlife Refuge are situated within the Upper Mississippi River and Great Lakes Region Joint Venture. This Joint Venture updated its implementation plan in 1998, expanding partnerships into 10 upper Midwest states and revising its habitat and population objectives to include migrating waterfowl and non-game migratory birds. Due in large part to conservation activities associated with projects funded through the North American Wetlands Conservation Act, Joint Venture partners were able to conserve over 60,000 acres of habitat in 1998.

Even though there are no specific NAWMP projects on DeSoto Refuge, waterfowl visiting the refuge may very well be the beneficiaries of projects elsewhere in the flyway.

Arctic Goose Management Initiative

Excessive numbers of the mid-continent population of snow geese are causing widespread damage to Arctic habitats used by these geese and other wildlife. For two decades, this population has been expanding rapidly, at an average rate of about 5% per year. The major cause of this sustained (but not sustainable) population growth is improved winter survival and recruitment brought about by a virtually unlimited food supply. Food is now essentially unlimited due to the expansion and productivity of modern agriculture in the Midwestern landscape and the availability of sanctuaries and refuges. Snow geese have effectively been released from their former winter carrying capacity restraints and now exceed the carrying capacity of their summer breeding grounds in northern Canada.

Barring management intervention to reduce the size of the mid-continent snow goose population, over-grazing and over-grubbing will continue to severely – and perhaps irreversibly – degrade plant community structure in the Arctic tundra ecosystem. Over-exploitation leads to increases in soil salinity which can impede recovery of formerly dominant species. Plant communities associated with goose breeding are finite in area and distribution.

In 1997, the Arctic Goose Habitat Working Group recommended the formation of an Arctic Goose Management Initiative overseen by the Arctic Goose Joint Venture of the North American Waterfowl Management Plan. The Working Group also recommended that the mid-continent snow goose population be reduced by 5-15% annually for the foreseeable future, primarily through more liberal hunting regulations to allow increased harvest. Finally, the Working Group recommended that additional hunting be allowed in and near state, provincial and federal wildlife refuges.

Responding to this initiative, in 1999 DeSoto managers successfully sought authorization for a guided snow goose hunt, which opened in November. Approximately 60 geese were harvested. While the number of birds harvested by such a hunt will be a tiny fraction of the overall transitory population, hunting pressure on the refuge could also serve to disrupt and disperse the birds, forcing them to move to other areas where hunting can also occur. DeSoto managers recognize that the fall snow goose migration at the refuge is a magnificent natural spectacle that attracts many visitors to the refuge. While contributing to the crucial international effort to reduce snow goose numbers, precautions will be taken to avoid the undesirable outcome of driving them away from the refuge altogether.

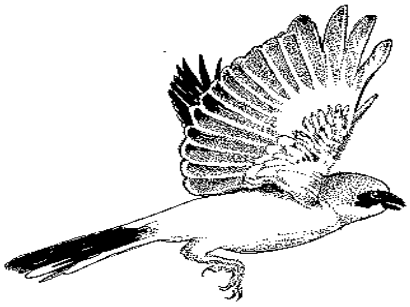
Region 3 Fish & Wildlife Resource Conservation Priorities

The Government Performance and Results Act (GPRA) of 1993 required the U.S. Fish and Wildlife Service to identify its most important functions and to direct its limited fiscal resources toward those functions. From 1997 to 1999 within Region 3, a group looked at how best to identify the most important functions of the Service within the region. The group recognized that the Service has a complex array of responsibilities specified by treaties, laws, executive orders, and judicial opinions that exceed the agency's budget.

The group recognized that at least two approaches are possible in identifying conservation priorities — habitats and species. The group chose to focus on species because (1) species represent biological and genetic resources that cannot be replaced, (2) a focus on species conservation requires a concurrent focus on habitat, and (3) by focusing on species assemblages and identifying areas where ecological needs come together the Service can select the few key places where limited efforts will have the greatest impact. Representatives of the migratory bird, endangered species, and fisheries programs in Region 3 identified the species that require the utmost attention given our current level of knowledge. Representatives prioritized the species based on biological status (endangered, threatened, for example), rare or declining levels, recreational or economic value, or "nuisance" level. The group pointed out that species not on the prioritized list are important too. But, when faced with the needs of several species, the Service should emphasize the species on the priority list.

The following priority species, identified by the U.S. Fish and Wildlife Service as threatened or endangered, rare or declining, have been recorded at DeSoto NWR:

- Bald eagle
- Piping plover
- American woodcock
- Least tern
- Loggerhead shrike
- Wood thrush
- Grasshopper sparrow
- Henslow's sparrow
- Dickcissel
- Bobolink
- Eastern meadowlark



Loggerhead shrike
credit: Robert Savannah

The ecosystem context, the over-arching conservation programs, state listed species, and the regional resource conservation priorities were considered in the preparation of this Comprehensive Conservation Plan.

Refuge Resources, Cultural Values and Uses

General

Surrounded by a landscape dedicated primarily to growing corn and soybeans, DeSoto National Wildlife Refuge is dedicated to managing semi-natural habitat for the benefit of waterfowl and other wildlife. With its unique Steamboat *Bertrand* Collection, it is also a place "where wildlife and history meet." Each autumn the refuge hosts hundreds of thousands of migratory waterfowl, particularly snow geese but many other species as well, on their way south for the winter. This marvelous natural spectacle draws many thousands of visitors locally and from across the country. The refuge also boasts DeSoto Lake, a 7-mile long oxbow lake that provides boating, fishing, and wildlife viewing opportunities. The Missouri River itself bisects the refuge. DeSoto embraces a diversity of habitats, including riparian or floodplain woodlands, managed native grasslands, wetlands, and low-input croplands on a "biological rotation."

Climate

"...living in Nebraska is like putting your right foot in a bucket of cold water and your left foot in a bucket of warm water, then it all averages out to normal."
--Laurie Niles
Omaha World-Herald, January 7, 1996

The climate of DeSoto National Wildlife Refuge is characteristic of mid-latitude, mid-continental regions. Annual precipitation (rainfall and snowfall combined) is approximately 30 inches; average snowfall is 29.5 inches. As typical of areas with continental climates, there are wide temperature fluctuations between the seasons. Summers are hot and winters are quite cold with sub-zero weather not unusual. January

maximum temperatures average in the upper twenties, and minimums about ten degrees Fahrenheit. July maximums average about ninety and minimums in the mid-sixties.

Geology, Hydrology and Soils

DeSoto NWR is situated entirely within the historic floodplain of the Missouri River. A floodplain is the area of flat ground alongside a river that is inundated by floods. Although the refuge is now separated from the river by a levee, DeSoto's landforms, its soils and its oxbow lake are all a direct result of the natural fluvial processes of meandering, deposition and scouring carried out by the Missouri for countless eons.

The Missouri is the greatest of the rivers draining the eastern slopes of the Rocky Mountains and crossing the Great Plains toward its rendezvous with the Mississippi. Like all rivers traversing the gentle gradients of lowlands, the lower Missouri meandered, that is, its sinuous channel shifted back and forth across its floodplain over time, forming an ever-changing panorama of loops, curves, bends, and oxbows. As the river flowed, any curve or meander in its course was accentuated by the current. On the outside of the curves the water velocity of the current was greatest, and therefore the erosion it caused as it swept around the outer bend was also greatest. The Missouri would undercut the outside bank, scouring and carrying away earth. On the curve's inside, the current was slow and it deposited any transported material, building up a gentle slip-off slope.

As each meander migrated outward, the river gradually changed its course across the floodplain. A loop in the Missouri's path could become so circuitous, so far away from the shortest, most direct route that it would eventually be cut off from the main channel, usually in a flood, forming an oxbow lake. DeSoto Bend was a long loop in the Missouri River that was well on its way to being pinched off into an oxbow lake at some point in the future. But engineers eager to control the unruly river beat nature to it, excavating a new cutoff channel and building a levee to create DeSoto Lake in 1960. The formerly dynamic, erratic Missouri River now wears what amounts to a straight-jacket that controls most but not all of its "mood swings," as witnessed by the dramatic floods of 1993 and 1995.

As a consequence of the historic cycle of annual floods as well as the Missouri's tendency to carve new river channels, DeSoto Refuge soils were formed from coarse to fine-textured recent alluvium (river-deposited sediments). These soils are generally low to moderate in organic matter, calcareous, ranging from neutral to moderately alkaline. Available phosphorus is generally low, while the supply of available potassium is generally high. Permeability (ability of water to percolate through soil) ranges from rapid to slow. In some areas, clays and loams form the upper layer of the soil and are underlain by fine sand and sandy loams. Loams are generally fertile soils, usually containing a significant amount of organic matter.

Some areas on the refuge contain soils consisting entirely of clay, and some all of sand. Still other sites have sandy loams over clay or clay loams. Most refuge fields do not have a consistent soil type from one end to the other, which makes management challenging.

Wetlands

The National Wetlands Inventory (NWI) is an extensive, ongoing survey by the U.S. Fish and Wildlife Service of aquatic habitats across the United States. The NWI is based on interpretation of aerial photographs, not ground surveys, and its criteria differ somewhat from those used in jurisdictional wetlands delineations for permitting by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. The NWI has identified approximately 1,560 acres of 32 different types of wetlands on DeSoto Refuge. DeSoto Lake and the Missouri River together comprise about 60 percent of this total wetland acreage. Temporarily flooded riparian forests adjacent to the river are also included. (Due to the levees along the river banks these forests may no longer flood with any regularity.) At present, staff are actively managing 101 acres of marsh-like wetlands and moist soil units on the refuge.

Vegetation

Woodlands — It is likely that most of what is now DeSoto National Wildlife Refuge was once covered with bottomland forest, although the continual shifting and meandering of the river channel probably removed the forest cover periodically and maintained some areas in prairie grass. The common species described in this area by Lewis and Clark included cottonwood, oak, black walnut and hickory. The Missouri was then a meandering corridor of braided, sinuous channels, sandbars, backwaters, sloughs and marshlands, all connecting the river to its floodplain. Willows colonized bare islands and sandbars, to be suceeded by cottonwoods, which in the natural process of plant community succession were replaced by silver maple, boxelder, red mulberry and American elm. Beginning in the late 1800s, some lands in the river bottom were cleared for cropland. Other clearing for agriculture was conducted in the 1940s and 1950s. As recently as 1963-64, an additional 350 acres of DeSoto NWR were cleared for cropland.

Currently, DeSoto contains approximately 3,345 acres of riparian woodlands and brushlands. Cottonwood (*Populus deltoides*) is the predominant canopy tree in this forest type. Reaching 100 feet or more in height, it towers above all other trees in the floodplain. These stands were likely established when the Missouri River was actively flooding, scouring and depositing soils in natural processes that are no longer occurring on a regular basis. Today, in the absence of this dynamic force, proper conditions for the regeneration of cottonwood stands rarely occur.

The majority of the existing cottonwoods appear to be between 50 to 70 years of age and extensive mortality has been occurring in these stands for several years. Concerns have been raised regarding minimal regeneration of this species (at DeSoto and wherever else floodplains are no longer flooded). Old cottonwoods are currently being replaced by more shade-tolerant species that do not depend on flooding, such as hackberry (*Celtis occidentalis*), red mulberry (*Morus rubra*), and green ash (*Fraxinus pennsylvanica*), which may result in improved mast

White-tailed buck in DeSoto bottomland forest
credit: John Jave

(fruit and nut) production as these species become dominant. However, at the present time, the most obvious successional change is a dense midstory of roughleaf dogwood (*Cornus drummondii*), averaging 10-12 feet in height.

Other common trees of DeSoto Refuge's floodplain woodlands include black willow, sandbar willow, black walnut, boxelder, eastern red cedar, and the exotic Chinese elm.

Native Grasslands — The exact extent to which the lands that are now DeSoto Refuge were covered by native prairie grasslands (versus floodplain woodlands) prior to modern settlement and agriculture is unknown. What is known is that DeSoto now supports native grass species found in both the tall grass and short grass prairie. The refuge is located in the zone of gradation between the two, with the true tall grass prairie to the east and the short grass prairie further to the west. At present, managed grasslands dominated by native species occupy approximately 1640 acres at DeSoto in units scattered throughout the refuge.

The native grasses found at DeSoto NWR include:

- Sideoats grama *(Bouteloua curtipendula*), an erect perennial that grows as tufts scattered among other grasses. It tends to replace taller grasses if overgrazing occurs.
- Little bluestem (*Schizachyrium scoparium*), a perennial, is the dominant grass of the mid-grass prairie and the State Grass of Nebraska. This grass is found in sandy fields and its seeds are valuable to small birds in winter.
- Switchgrass (*Panicum virgatum*), a perennial that grows easily on moist, sandy soil as well as drier sites and produces high hay yields.
- Canada wild rye (*Elymus canadensis*), a perennial cool season grass found over most of North America and reaching four feet in height.
- Big bluestem (*Andropogon gerardi*), a tall perennial known as the "king of native grasses"

and the "prince of the prairie." It can reach 6-8 feet in height, is relished by livestock; few prairie grasses equal it in forage quantity or quality.

- Sand lovegrass (*Eragrostis trichodes*), a perennial distinguished by delicate seedheads with hundreds of tiny seeds. It grows best on sandy soils.
- Eastern gamagrass (*Tripsacum dactyloides*), a stout perennial that reaches heights of up to 9 feet, and grows in large clumps up to four feet in diameter. Authorities believe it is related to corn.
- Indiangrass (*Sorghastrum nutans*), a coarse perennial that is one of the dominant species of the tall grass prairie. It may reach 6 feet or more when mature and has beautiful golden seed heads.
- Buffalo grass (*Buchloe dactyloides*) is a low, creeping perennial that is an important forage species in the short grass prairie. It once sustained vast herds of buffalo.
- Blue grama (*Bouteloua gracilis*) is a short bunch grass known as the "queen of the plains," because of its excellent forage quality.

Other grasses used in seed mixes for grassland restoration include needlegrass, Virginia wildrye, and wheatgrass. Grass mixes are wet warm-season, mesic warm-season, sandy warm-season, and cool-season, depending on soil preference and planting time of year.

Croplands — At one time almost half the refuge was cultivated. The rationale for cropland was that it provided food and loafing areas for migrating waterfowl, and food, cover, and edge for other wildlife species. Since the 1970s the acreage devoted to cropland has gradually been reduced. At present approximately 1990 acres (about one-quarter) of the refuge are maintained in a low-input (minimal fertilizers and no insecticides) "biological rotation." The principal crops are corn, soybeans, sweet clover, milo, alfalfa, and grass hay.

Fish and Wildlife

Birds, Mammals, Reptiles, Amphibians, and Other Wildlife — DeSoto NWR's mosaic of habitats support a number of vertebrate species, which are listed in Appendix E. Although wildlife habitats and populations on the refuge have been drastically altered by human activities ranging from channelization of the Missouri River to agricultural cultivation, DeSoto still contains significant wildlife resources due to its proximity to the Missouri, its location along principal migratory flyways, and as a result of the Service's management and conservation efforts.

In typical years, hundreds of thousands of snow geese utilize the refuge as a resting and feeding area during their fall migration between Arctic nesting grounds and Gulf Coast wintering areas. These spectacular concentrations are generally seen in November and December; smaller concentrations occur in March and early April. Such large gatherings of snow geese rarely occur elsewhere in Iowa or Nebraska; one other comparable congregation does take place on the Platte River in central Nebraska, during the spring northward migration. As discussed elsewhere, mid-continent snow geese populations have burgeoned in recent decades. Canada geese show up at DeSoto as well, though in much smaller numbers. Peak populations of 70,000 or more ducks, mostly mallards, also utilize the refuge during fall migration. Peak duck populations are significantly down in recent years. Other species of ducks include the wood duck, green-winged

Kestrel
credit: David Menke

teal, black duck, northern pintail, blue-winged teal, northern shoveler, gadwall, American widgeon, canvasback, redhead, ring-necked, greater and lesser scaups, common goldeneye, bufflehead, hooded merganser, common merganser, red-breasted merganser, and ruddy duck.

Each fall, numerous bald eagles follow the geese into the refuge and out of it again, as the migration proceeds south. Peak numbers of bald eagles usually occur in late November and December, and again in early March. As many as 143 have been observed at one time. Eagles are often found perched in cottonwoods along DeSoto Lake when waterfowl are present.

DeSoto's woods and fields attract a variety of songbirds, including neotropical migrants, and other resident wildlife. During migration periods, warblers, gulls, herons, and egrets abound. White pelicans and cormorants usually stop in the area for several weeks during their migrations. Owls, pheasants, and bobwhite quail are common too, and remain on the refuge year around. Overall, almost 250 different avian species have been reported on the refuge.

Approximately 300 white-tailed deer make the refuge their home. Many local visitors drive the auto-tour loop at dusk to see the deer grazing in the fields. Other mammals found in woods and fields include cottontail rabbits, raccoons, skunks, badgers, coyotes, opossums, and fox squirrels. Coyotes are often seen resting on the ice-covered lake on sunny winter days. Backwater areas of DeSoto Lake and several wetlands serve as habitat for beaver, muskrat, and mink. Foxes, weasels and other animals also occur on the refuge. Overall, about 40 species of mammals have actually been identified on DeSoto, or are strongly suspected to be present, including two species of shrew, eight bats, eight carnivores, seventeen rodents, and two species of rabbits.

The presence of about 30 reptile species is known or inferred at DeSoto, including seven turtles, three skinks, and 21 species of snakes. At least ten species of amphibians have been observed on the refuge, including two species of salamanders, three toads, and five species of frogs. Appendix E lists them by species. Scores of butterfly species seen at DeSoto are also included in Appendix E.

Fish – There are two main communities of fish that occur on DeSoto Refuge – those species that occur in DeSoto Lake, many of which are stocked for their sport-fishing qualities, and the

naturally-occurring riverine species that are found in the Missouri River where it cuts across the refuge. DeSoto Lake contains a number of stocked game fish species, including largemouth and white bass, black and white crappie, channel and flathead catfish, bluegill, green sunfish, walleye, and northern pike. Among the rough-fish whose populations have grown in recent years are carp, buffalofish, and gizzard shad. Gizzard shad dominate the lake's biomass and are undoubtedly providing a considerable food source for predator fish. A complete list of the species collected and caught in DeSoto Lake is presented in Appendix E.

More than 80 species of fish are found in the lower Missouri River and may possibly occur within the reach that bisects DeSoto Refuge, including one or more species of sturgeons, gars, chubs, carp, shiners, catfishes, basses, crappies and minnows. These are shown in Appendix E. While only the pallid sturgeon is listed at this time, a number of other native species are considered to be in trouble due to the environmental changes in the Missouri mentioned above. The sicklefin chub and the sturgeon chub are both candidate species for federal listing and six others are considered species of concern: the lake sturgeon, paddlefish, flathead chub, western silvery minnow, plains minnow, and blue sucker.

Channel catfish
credit: USFWS

Threatened and Endangered Species – DeSoto NWR has provided important habitat for threatened and endangered species (TES) since its inception. The bald eagle, which has been proposed to be de-listed by the Service, has been an annual fall and winter visitor since the refuge was created. The T & E least tern and piping plover were recorded nesters in the early years of the Refuge but have not been observed in the last two decades. The recently de-listed peregrine falcon has been a rare refuge visitor. While there are no known year-round federally listed TES using the refuge, four species continue to be given special attention and two other candidate species, the sturgeon chub and sicklefin chub, are recognized as potential inhabitants in reaches of the Missouri River below Omaha, Nebraska:

- The **bald eagle** (*Haliaeetus leucocephalus*) is a threatened species that the Service plans to de-list. By the 1950s and 1960s, a combination of poaching, habitat loss,

and pesticide poisoning had sent bald eagle numbers in the Lower 48 states into a tailspin. However, since the bald eagle was protected under the Endangered Species Act (ESA) in 1978, the number of nesting pairs and their productivity (fledglings per nest) have increased dramatically, from a low of about 1,000 to almost 6,000 today. The bald eagle is now thriving due, at least in part, to the ban on DDT and other persistent insecticides and the provisions of the ESA, The bald eagle is a common refuge visitor in the fall and spring months but has never successfully nested on the refuge. In the fall, 70 to 100 eagles will use the refuge as long as ducks and geese are still in the area, or until the lake freezes over. The peak fall concentration was 120 in 1985. The most bald eagles ever counted at DeSoto was 143 in the spring of 1999.

- The **least tern** (*Sterna antillarum*) interior population is an endangered species. Least terns nested on the refuge as recently as the 1970's but are now observed only sporadically; no nests have been seen since 1977, even though the formerly used nesting areas have been maintained. Dams, reservoirs, and other changes to river systems, including the Missouri, have eliminated most historic least tern habitat. The wide, braided channels dotted with sandbars that are preferred by the terns have been replaced by narrow, vegetated river corridors.

- The **piping plover** (*Charadrius melodus*) is also a federally listed endangered species. Its history of use on the refuge is similar to that of the least tern as described above. As many as 100 individuals and 20 plover nests were documented in the mid-1960's. The last piping plover observed at DeSoto was in 1977. It is in trouble because of the loss/degradation of natural habitat, nest disturbance and predation throughout its range. Many of the riverside beaches and sand dunes traditionally used by piping plovers for nesting have been lost to river channel modifications, and regulated water releases from dams have provided too much water or too little. In addition, piping plovers are very sensitive to the presence of humans. Too much disturbance from people or their pets causes the parent birds to abandon their nest.

Piping Plover
Courtesy USFWS, Region 3

The terns and plovers utilized the large sandbar area on the southwest, or inlet, arm of DeSoto Lake. The sandbar was originally a spoil pile mechanically deposited when the new river channel was dredged and the levee was constructed in 1958 and 1959. The terns and plovers were perhaps attracted to this man-made sandbar when the natural sandbars were destroyed by the re-

channeling project. These birds also made some use of a 1,800-foot strip of the former north swimming beach. Encroaching vegetation and public use on these sandy areas were not compatible with tern and plover needs. Public use of these areas was halted in 1988 and the sandy areas have been disced annually to control the vegetation. This effort provides approximately 40 acres of sandbar habitat resembling the natural habitat of least terns and piping plovers. The sandy areas continue to be maintained in case these birds will someday resume nesting on the refuge.

- The **pallid sturgeon** (*Scaphirhynchus albus*) – is found within the Lower Missouri ecosystem, though it is scarce. Its presence within the short reach of the Missouri flowing through the refuge is unlikely, but possible. All of the more than 3,300 miles of riverine habitat within the pallid sturgeon's range have been adversely affected by man. Approximately 28 percent has been impounded, which has created unsuitable lake-like habitat; 51 percent has been channelized into deep, uniform channels; the remaining 21 percent is downstream of dams which have altered the river's hydrograph, temperature and turbidity. Commercial fishing and environmental contaminants may have also played a role in the pallid sturgeon's decline. There is practically no opportunity for the refuge to aid in the recovery of the pallid sturgeon short of re-connecting DeSoto Lake with the river.

  This oxbow lake (lacustrine) environment has little or no flow velocity, a recognized requirement for pallid sturgeon spawning, and there is no positive ingress/egress for breeding adults. The lake might serve as nursery habitat for larval pallid sturgeon if it was more of a riverine (having a flow-through) environment. Reconnecting the lake with the river is not a simple option, nor is there adequate biological information available to support any presumption that re-connection will aid in the recovery of the pallid sturgeon. Reconnecting the lake and the river to create a flow could result in the lake being filled with sand and silt within a few years. Diverting river flow through the lake with enough velocity to maintain a channel will significantly alter the river's main flow. A comprehensive study is proposed in Chapter 5 to investigate the likely results of an upstream re-connection, a downstream re-connection, or both; inlet and/or outlet structure design would be an extremely critical factor. Until more information is available, the refuge staff will continue its close association with fisheries biologists in assessing refuge habitat potentials for aiding in the recovery of the pallid sturgeon.

The **sicklefin chub** (*Macrhybopsis meeki*) and **sturgeon chub** (*Macrhybopsis gelida*) are candidates for Federal listing. They have declined dramatically in abundance in the Lower Missouri River in Nebraska and Iowa. Both fish species are specialized to inhabit swift currents over sand or fine gravel bottoms. The chubs inhabit turbid water and use external taste buds instead of eyes to locate food. Connected floodplain backwaters are used as nursery habitats by young fish. Modifications to the Missouri River have reduced the amount of swift turbid river and floodplain habitats available to these species.

Table 1 lists threatened and endangered species that are known to occur or potentially occur in the vicinity of DeSoto National Refuge.

Table 1 - Threatened and Endangered Species reported in the vicinity of DeSoto National Wildlife Refuge

Species	Federal			State*	
	Endangered	Threatened	Candidate	Endangered	Threatened
Bald Eagle *(Haliaeetus leucocephalus)*		X	Proposed to be de-listed	X	
Interior Least Tern *(Sterna antillarum)*	X			X	
Piping Plover *(Charadrius melodus)*	X				X
Northern Harrier *(Circus cyaneus)*				X	
Red-shouldered Hawk *(Buteo lineatus)*				X	
Long-eared Owl *(Asio otus)*					X
Short-eared Owl *(Asio flammeus)*				X	
Henslow's Sparrow *(Ammodramus henslowii)*					X
Lake Sturgeon *(Acipenser fulvescens)*					X
Pallid Sturgeon *(Scaphirhynchus albus)*	X			X	
Sicklefin Chub *(Hybopsis meeki)*			to be listed		
Sturgeon Chub *(Hybopsis gelida)*			to be listed		
American Ginseng *(Panax quinquefolium)*					X

*Nebraska and/or Iowa (highest ranking between them)

Land Use and Zoning

DeSoto NWR is located in one Nebraska and two Iowa counties with primarily agricultural land use. The portion of the refuge (4,615 acres, or 59%) in Washington County, Nebraska, is zoned A-1, agriculture/farming, a category which includes forest and conservation areas as well as public parks and certain other outdoor recreation facilities. The portion (2,582 acres, or 33%) in

Harrison County, Iowa, is zoned C-1, Conservation District, a category which includes parks, outdoor recreation areas and conservation reserves. Finally, the portion (626 acres, or 8%) in Pottawattamie County, Iowa, is zoned A-1, open space and conservation. The Zoning Departments of all three counties consider the refuge to be consistent with their land use plans.

Within the 7,823-acre refuge itself, at the present time, approximately 40 percent of the refuge is wooded, 25 percent is cultivated cropland (including fallow areas), 20 percent is grassland, 10 percent is DeSoto Lake, and the remaining five percent a combination of the Missouri River, wetlands, and developed sites (roads, parking lots, buildings, etc). Figure 3 is a refuge map showing current land uses. In the coming years, as cropland is retired, the percentage of that land use will decline and those of woodlands and grasslands will increase.

Contaminants and Water Quality

DeSoto Lake has had ongoing problems with water quality, both because of runoff laced with fertilizers, sediments, and pesticides from the agricultural land uses that predominate in the 12,000-acre upstream drainage basin of the lake and because of the high concentrations of fish and waterfowl that live in or use the lake. High inputs of organic substances and nutrients push the lake toward eutrophication, two symptoms of which are low dissolved oxygen (DO) and summer algal blooms. Low DO in DeSoto Lake has caused fish kills occasionally (though less frequently in recent years). Algal blooms also reduce oxygen, interfere with other more desirable aquatic organisms, and are aesthetically unattractive in and of themselves. Fish kills from low DO led to the installation of an artificial aeration system in 1985, which has helped reduce the severity of the problem.

In addition to low DO, the lake has also suffered from high turbidity (poor water clarity), which is believed to be a function primarily of rough-fish stirring up and re-suspending bottom sediments. Two other causes are from erosion of exposed lakeshores and suspended sediments transported to the lake by drainage ditches. Turbidity in turn interferes with photosynthesis and the survival of submerged and emergent vegetation. After DeSoto Lake was “renovated” in 1985, water quality was excellent and submerged aquatic vascular plants covered an estimated 700 acres of the lake bottom. Such vegetation not only added oxygen to the water but provided aquatic habitat structure beneficial to fish populations.

As well as the very tangible, visible problems with dissolved oxygen and turbidity, there are more hypothetical concerns over whether toxins — primarily residues of pesticides used in agriculture — could be contaminating the lake’s water, accumulating in sediments, and through the phenomenon of bio-magnification, accumulating to even higher concentrations in the flesh of

FIGURE 3 INSERTED HERE

fish and the creatures that feed on fish. A limited amount of sampling and testing for pesticides in the lake has been conducted, such as for the herbicide atrazine (used in corn production to control weeds, and slightly to moderately toxic to animals), which has detected chronic concentrations at low levels. In general, the replacement of persistent pesticides like DDT and other organochlorines with shorter-lived organophosphates and carbamates over the last thirty years has reduced the problem of long-term pesticide residue accumulation.

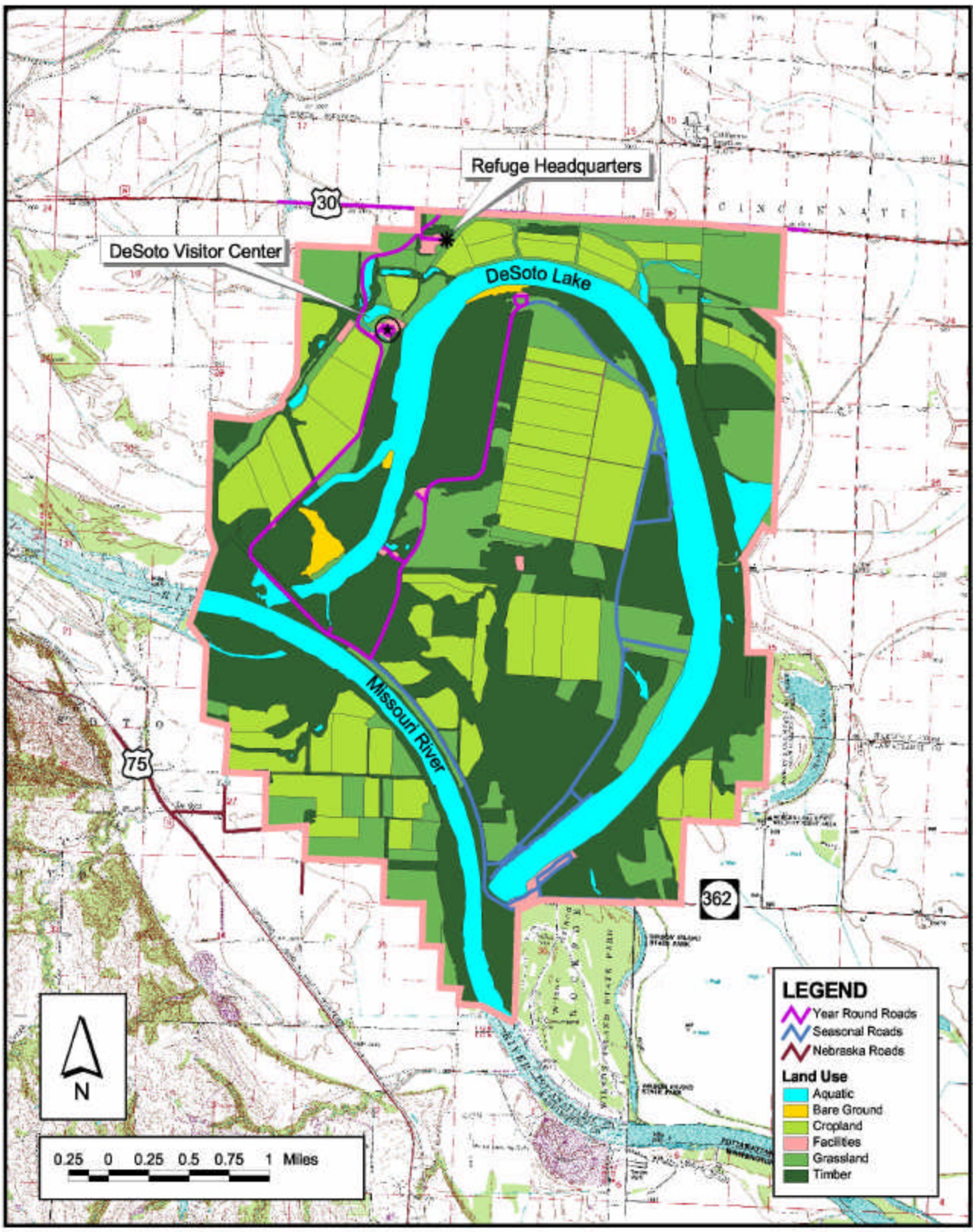


Figure 3 - Land Uses on DeSoto National Wildlife Refuge in 1999

Socioeconomic Environment

Because it straddles the present Missouri River channel as well as the historic one, DeSoto NWR is located in three counties and two states: Harrison and Pottawattamie counties, Iowa and Washington County, Nebraska. The refuge is located about midway between Missouri Valley, Iowa, and Blair, Nebraska along U.S. Highway 30, which abuts its northern edge. Interstate 29, five miles to the east, is a major route from central Canada to Omaha, Nebraska and Kansas City, Missouri. Interstate 80/680, a trans-continental route, is eight miles southeast.

Harrison County, Iowa is a largely rural county with a substantial farming presence. Its 1998 population was estimated at about 15,360, up 4.3 percent from the 1990 population of 14,730. The population is about 99 percent white. The Census Bureau estimated the median household income at $27,000 in 1993 (compared to $28,900 for Iowa as a whole), with 12.6 percent of the population living below the poverty line (against an 11.1 percent average for the state). By 1995, Census estimated that Harrison County's median household income had risen to about $30,100 and its poverty rate declined to 11.2 percent. In terms of the labor force, 17 percent are managerial or professional; 26 percent are technical, sales, and administrative support services; 16 percent are in farming, forestry and fishing; 11 percent are precision production, craft and repair; and 17 percent are operators, fabricators, and laborers.

Washington County, Nebraska is also a largely rural county with a large farming presence. It's 1998 population was estimated at about 18,660, up 12.4 percent from the 1990 population of 16,600. The population is about 99 percent white. The Census Bureau estimated the median household income at $36,500 in 1993 (compared to $29,000 for Nebraska as a whole), with 6 percent of the population living below the poverty line (against a 10.7 percent average for the state). By 1995, Census estimated that Washington County's median household income had risen to about $40,800 and its poverty rate declined to 5.1 percent. Thus, it can be seen that Washington County is slightly more populous and affluent than Harrison County, and slightly more affluent than Nebraska overall. Harrison County, in contrast, is slightly less affluent than Iowa as a whole.

With approximately 7,000 residents, the town of Blair is the largest in Washington County, as well as the county seat. It is also the Nebraska settlement closest to DeSoto Refuge. In 1993, the fortunes of Blair and Washington County received a boost when Cargill, Inc. built a $200 million wet corn-milling facility in town. This plant underwent a $97 million expansion in 1995.

About eight percent of DeSoto Refuge, the southeastern corner, falls into Pottawattamie County, Iowa. This county includes the town of Council Bluffs, directly across the Missouri River from Omaha, Nebraska. The 1999 estimated population of Pottawattamie County was 86,425, about two-thirds of whom live in Council Bluffs, where the largest employers are casinos, an insurance company, and two hospitals. Over 95 percent of the county is non-Hispanic white. The Census Bureau estimated the median household income at just over $30,000 in 1993 (revised to $33,155 in 1995), with 12.5 percent of the 1993 population living below the poverty line. Overall, agriculture is a much smaller part of the economy and way of life in Pottawattamie County than in either Harrison or Washington counties.

Spending associated with wildlife observation, hunting, and fishing generates a substantial amount of economic activity across the United States, and DeSoto National Wildlife Refuge is no exception. Visitors to DeSoto spend money on a wide variety of goods and services, including food, lodging, transportation, outdoor apparel, binoculars, cameras, film, ammunition, and fishing tackle. Using data from the *1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* and techniques developed by outdoor recreation economists and refined by the U.S. Fish and Wildlife Service's Division of Economics, it is possible to derive preliminary estimates of the economic benefits of DeSoto Refuge to surrounding communities. Total annual expenditures related to DeSoto visitation are approximately $6.8 million, of which about 98% is from wildlife-watching. This spending in turn generates economic activity — increased output, jobs, income, and tax revenue — throughout the local and regional economy. The total annual industrial output from DeSoto is estimated at $11.7 million; this is associated with approximately 190 jobs, $3.2 million in annual job income, $340,000 in state sales tax revenue, and $121,000 in state income tax revenue.

To these economic benefits can be added three others: 1) about $855,000 in DeSoto's annual payroll to approximately 20 employees, which generates additional economic activity from purchases in the local and regional economy; 2) tens of thousands of dollars of purchases of materials, equipment, and services from local suppliers; and 3) crops grown on the refuge by cooperating farmers valued at approximately $206,000 annually. Total annual federal government expenditures at DeSoto Refuge (i.e. its budget of about $1.2 million, or the sum of categories 1 and 2) lead to a direct output of approximately $1.1 million, total output of $1.9 million, 43 total jobs and total employee compensation of about $1.1 million within the local and regional economy.

DeSoto's agreements with local farmers stipulate leaving one-third of the harvest for the refuge to use for waterfowl and wildlife feeding. After reimbursements to various cooperators, any excess grains are transferred to other Fish and Wildlife Service field stations by means of inter-elevator grain transfers. These grain transfers are used as wildlife food supplements. Contributions have averaged $103,000 annually in recent years, and went to Agassiz, Big Stone, Shiawassee, Swan Lake, Tamarac, Upper Mississippi, and Necedah in Region 3; Erie, Blackwater, and Great Swamp in Region 5; and Kulm WMD, Lake Andes, Fort Niobrara-Valentine, and National Elk in Region 6.

Cultural Resources

Cultural Resources Background and Potential — Responding to the requirement in the National Wildlife Refuge System Improvement Act that Comprehensive Conservation Plans will include "the archaeological and cultural values of the planning unit," the Service determined that available information is sufficient to provide a useful summary within the CCP.

Cultural resources are "those parts of the physical environment — natural and built — that have cultural value to some kind of sociocultural group ... [and] those non-material human social

institutions...." (Thomas F. King, 1998, *Cultural Resource Laws and Practice: An Introductory Guide*, Altamira Press, p.9). Cultural resources include historic sites, archeological sites and associated artifacts, sacred sites, traditional cultural properties, buildings and structures, and cultural items (human remains, funerary objects, sacred objects, and objects of cultural patrimony) (McManamon, Francis P. DCA-NPS; letter 12-23-97 to Walla Walla District, Corps of Engineers). Historic properties are those sites, objects, structures and districts eligible for or listed on the National Register of Historic Places. Most cultural resources are considered eligible for the National Register until determined to be ineligible.

As of May 1, 2000, Harrison and Pottawattamie counties in Iowa and Washington County in Nebraska contain 27 properties on the National Register of Historic Places. One is the *Bertrand* site and collection on DeSoto Refuge. The others are not in the vicinity of the refuge and are likely not representative of cultural resources on the refuge.

DeSoto Refuge contains 13 reported or surmised cultural resources sites, all of which are historic period Western culture sites. Just under 200 acres of the refuge have been subjected to archeological survey. Historical and geological evidence and assumptions indicate the shifting Missouri River has erased all prehistoric and most historic period archeological sites that may have existed within the Refuge boundaries, although the Iowa State Historic Preservation Officer criticized the 1978 Blakeslee survey for not including subsurface testing for buried occupation layers.

All proposals in this CCP involving acquisition, development and/or excavation, if implemented, will comply with the requisites of the National Environmental Policy Act, National Historic Preservation Act, and state laws.

Ten Indian tribes have expressed interest in the three counties, and thus potentially in the refuge. As tribes, their special and legal concerns would be for traditional and cultural properties, sacred sites, and cultural items. The ten tribes are the Iowa Tribe of Kansas and Nebraska, the Iowa Tribe of Oklahoma, the Kickapoo Tribe in Kansas, the Omaha Tribe of Nebraska, the Otoe-Missouira Tribe of Oklahoma, the Prairie Band of Potawatomi, the Sac & Fox Nation of Oklahoma, the Sac & Fox Tribe of Missouri, the Sac & Fox of the Mississippi, and the Winnebago Tribe of Nebraska. These ten tribes need to be invited to consult on undertakings and archeological permits that could involve their interests.

Other local organizations that could have an interest in cultural resources on the refuge and that should be contacted as part of consultation for undertakings are the Harrison County Historic Preservation Commission, the Harrison County Historical Society, the Washington County Historical Society, and the Historical Society of Pottawattamie County.

> "...taking a steamboat up the Missouri was one of the most precarious undertakings in the history of navigation. What any pilot may have learned about the river on his last boat trip, or even yesterday, was of no use to him today."
>
> --Bernard DeVoto
> *Across the Wide Missouri*, 1948

The Steamboat *Bertrand* Collection — DeSoto NWR's Visitor Center is home to a premier archaeological collection of 200,000 artifacts excavated from the buried hull of the Steamboat *Bertrand*. In 1865, the year the Civil War ended, the *Bertrand* was bound for the newly discovered goldfields of Montana from St. Louis, Missouri. It hit one of the many snags, or submerged logs, for which the Missouri was notorious, about twenty miles north of Omaha, Nebraska. The *Bertrand* sank into the depths of the river, its cargo a complete loss. Local legend indicated the ship carried whiskey, coins and 500 flasks of mercury to be used in the mining process, a veritable treasure trove worth hundreds of thousands of dollars.

The Steamboat *Bertrand* was originally owned by J.J. Roe and Company of Saint Louis, Missouri. Roe and his partners developed the Idaho and Montana Transportation Line to move supplies up the Missouri River to newly created Fort Benton in the Montana Territory. The first steamboats arrived in the Fort Benton area by 1859. In the 1860's, goldstrikes in modern day Idaho and Montana opened the floodgates of migration to that area from the States. Prospectors and settlers created the demand to send steamboats carrying large shipments of supplies to these once sparsely populated places. Merchants learned fast that more easily acquired wealth could be had from the pockets of miners, rather than toiling to discover some elusive gold veins. Although the two-month river journey from St. Louis to the Territory was treacherous, a single successful shipment might earn as much as the value of the boat itself. In any event, most of the materials on the *Bertrand* were insured.

Using historical documents and a flux gate magnetometer, modern salvors discovered the wreck on DeSoto Refuge in 1968. Since the boat's hull was on federal government property, the salvors agreed, under the requirements of the American Antiquities Preservation Act of 1906, to hand all manmade artifacts over to the U.S. Fish and Wildlife Service for permanent exhibition and preservation in a public museum. By 1969, the *Bertrand* had been completely excavated from its 30-foot deep, mud tomb under the auspices of National Park Service archaeologists.

Unfortunately for the salvors, the treasure they sought had eluded them. Insurance company divers had removed most of the mercury and other valuables way back in 1865. Nevertheless, an extraordinary array of tools, clothing, food, and equipment remained in the hull. These materials were in remarkably good condition, having been preserved in an anaerobic, only slightly acidic, medium. The collection is a treasure trove of another sort for researchers and historians who normally find only bits and pieces of material culture at archeological sites.

Bertrand cargo exhibit in Visitor Center
credit: Michael Whye

Stabilization of the fragile cargo of the *Bertrand* began before the excavation was completed. Temporary storage and conservation labs were constructed to minimize further deterioration of objects made of fabric, leather, wood and metal. Conservation techniques were developed by trial and error. In the meantime, construction of the Visitor Center was begun to provide more sophisticated, controlled environments and conservation facilities. Today those artifacts are somewhat secure in the Visitor Center. However, deterioration never completely stops and re-application of conservation processes is an ongoing necessity. Limited budgets and manpower have resulted in maintenance backlog for the *Bertrand* Collection.

The Visitor Center houses artifacts from the Steamboat *Bertrand*. Many of the goods are not what one would expect to find in the rough-and-tumble mining towns of the nineteenth century American frontier. Apart from the necessities of clothing, tools, and food, the cargo also included olive oil and mustard from France, bottled tamarinds and a variety of canned fruits, several varieties of alcoholic beverages called bitters, and powdered lemonade in a can. Some consignees even ordered brandied cherries, not the kind of inventory one would associate with merchants on the U.S. frontier. The *Bertrand* Collection reflects the long history of Americans' predilection for the finer things in life.

A state-of-the-art, collection storage area protects the cargo of the boat. Visitors may view this area through a glass wall, 150 feet in length. A conservation lab for artifact preservation, collection research area and library, are staffed by museum professionals. The center also contains a theater and exhibition galleries. Permanent exhibits discuss the impact steamboat cargoes and passengers had on the frontier through town-building, farming, logging and mining. From the outset, each of these pursuits, while laying the foundation for prosperity and growth, also produced long-term adverse effects upon Native American inhabitants, the environment and wildlife habitats. Exhibits address the history of wildlife refuges, which were created to help

conserve and restore wildlife. Temporary exhibits include a variety of topics from art shows to interpretive programs.

Public Use

Visitation and recreation by the public are encouraged on national wildlife refuges for activities that are compatible with the refuge purpose and mission. There are six priority, wildlife-dependent public uses: wildlife observation, photography, environmental education, interpretation, hunting, and fishing. DeSoto National Wildlife Refuge has all of these.

DeSoto NWR is one of the more heavily visited national wildlife refuges. In the 1960s visitation averaged about 197,000 per year. In the 1970s the annual average climbed to 341,000 per year, and in the 1980s it rose yet again to 396,000, with a single year peak of 473,038 visitors in 1982. From 1990 to 1999 (the most recent year for which figures are available), visitation dropped somewhat to an annual average of 295,000. Refuge staff attribute this decline in visitation to several factors:

- Swimming, high-speed boating and water skiing were all banned from DeSoto Lake in the 1980s. This led to a decline in the number of summertime recreationists participating in these intensive activities. These uses were judged incompatible with the refuge purpose and mission; they are also not wildlife-dependent.

- The imposition of an entrance fee in 1987 appears to have discouraged a number of former and prospective users.

- Other entities have begun providing outdoor recreational, nature observation, and fishing opportunities in the region over the last couple of decades.

- In the last several years, annual visitation has dipped well below 300,000, due in good part to excessive water levels in DeSoto Lake which limited public access by flooding facilities like parking lots, boat ramps, and trails.

The great preponderance of visitors to DeSoto come to observe wildlife and to partake of the interpretive opportunities in the Visitor Center, with smaller numbers coming for environmental education, hiking/walking, fishing, and hunting. November is usually the busiest month of the year, coinciding with the fall snow goose and waterfowl migration. Visitor Center staff estimate that about 50 percent of visitors are non-resident, that is, they come from more than an hour's drive away. (By this definition, visitors from Omaha, Nebraska, the nearest large city, would qualify as resident.) In 1999, the registration book recorded people from all 50 states and Puerto Rico. DeSoto attracts an impressive variety of foreign visitors. In 1999, they came from Nepal, Czechoslovakia, Ecuador, Japan, Germany and nearly 50 other nations.

View of geese on DeSoto Lake from Visitor Center
credit: W. Lauritzen

Table 2 below displays visitation for fiscal year 1999, broken down by activity. Using a different breakdown, in FY 1995, there were 309,300 visitor days in total, 141,100 visitor days at the Visitor Center, 248,100 visitor days for nature trails, 700 visitor days for hunting, and 5,700 visitor days for fishing. (The total does not equal the sum of the separate activities because of multiple-purpose visits.)

Table 2
FY 1999 Comparative Visitation to DeSoto National Wildlife Refuge

Activity	1999 Visits	Activity Hours
Interpretation	472,396	240,930
Environmental education	8,227	24,927
Consumptive wildlife recreation (hunting, fishing)	10,777	31,079
Non-consumptive wildlife-related recreation	218,502	148,662
Non-wildlife recreation	4,478	2,237
Total activity hours		447,835

Special Management Topic

Wilderness Review

As part of the CCP process, lands within the legislative boundaries of DeSoto National Wildlife Refuge were reviewed for wilderness suitability. No lands were found suitable for designation as Wilderness as defined in the Wilderness Act of 1964.

DeSoto NWR does not contain 5,000 contiguous roadless acres, nor does the refuge have any units of sufficient size to make their preservation practicable as Wilderness. The lands of the refuge have been substantially affected by humans, particularly through agriculture and regulation of the Missouri River. As a result of both extensive modification of natural habitats and ongoing manipulation of natural processes, adopting a "hands-off" approach to management at the refuge *per se* would not facilitate the restoration of a pristine or pre-settlement condition, which is the goal of wilderness designation.

Morel mushroom
credit: John Jave

Snow geese landing at DeSoto
credit: John Jave

Chapter 4
Current Refuge Management and Programs

Habitat Management

Management of DeSoto's range of habitats requires a variety of techniques to preserve, restore, and enhance habitat conditions. Both active and passive management are used to provide the required conditions for resting, feeding, and reproduction for a diverse complex of fish, wildlife, and plant species.

DeSoto Lake

The water level of DeSoto Lake fluctuates with the weather, runoff, and flow of the Missouri River. Inlet and outlet structures control flows from the river to the lake and vice-versa. The ideal water level in the lake ranges from a minimum elevation of 986.5 ft. msl to a not-to-exceed level of 989.5 ft. msl, which are consistent with bank protection and access to facilities. The ability to regulate the lake's water level seasonally is crucial to different functions. Fall drawdown is made to provide for waterfowl use, growth of littoral vegetation, and enhanced predation on forage fish. Full pool elevations in winter are needed to reduce the probability of fish winterkills. Early spring drawdown is made to accommodate spring runoff from the refuge's contributing drainage area.

At present, however, the ability to regulate water level is seriously limited both by Missouri River water levels, governed by releases from Gavins Point Dam upstream, and inflows from four drainage ditches carrying water from the approximately 12,000 acres of largely agricultural lands in the watershed. When the river is running high, the lake cannot be lowered. In recent years, excessive lake levels in the summer months have sharply interfered with fishing, boating, certain parking lots and use of lakeside trails.

DeSoto Lake was "renovated" in 1985 (chemically treated with 9,000 gallons of Rotenone) to eliminate rough-fish and improve aquatic habitat. In the years since, numerous efforts have been undertaken to enhance water quality in the lake and improve aquatic habitat. These include installing an artificial aeration system with 16 helixers (to raise dissolved oxygen levels), dropping Christmas trees into the lake to provide bottom structure and cover for fish, and placing riprap (large rocks) to stabilize banks to prevent erosion, turbidity, and sedimentation. The once popular recreational pursuits of high-speed boating and water skiing on the lake were banned in the 1980's in part because of the waves and subsequent bank erosion they caused.

Looking south along DeSoto Lake from near the Missouri Meander Trail (note exposed bank)
credit: Leon Kolankiewicz

DeSoto management's efforts have been only partially successful. While this oxbow lake is still an outstanding asset for the refuge, providing sanctuary for migratory waterfowl as well as sport fishing opportunities, it has declined in value over time. In the forty years since its creation from the DeSoto Bend of the Missouri River, the lake has gradually become shallower. In addition, muddy, silt-laden eutrophic (low oxygen, high nutrient) conditions tarnish the lake's beauty, water quality, habitat, and sport fishery potential.

The refuge recently cooperated with Dr. Carla DeLucci and her undergraduate biology students from Dana College in Blair, Nebraska in a DeSoto Lake water quality monitoring project. This study indicated that water quality conditions in 1997 and 1998 improved over those reported in 1979 and 1994. Nevertheless, possible contaminant issues (primarily with excessive quantities of the nutrients phosphorus and nitrogen) exist due to the application of sewage sludge by the Blair, NE sewage treatment plant and from waste by-products from a nearby corn processing plant onto farmlands within the DeSoto Lake watershed. Use of both materials is increasing. Ongoing monitoring is needed.

Wetlands and Moist Soil Units

At present, DeSoto NWR actively manages approximately 100 acres as wetlands and moist soil units. Pumping is typically required in the fall to recharge these units with water in time for fall waterfowl migration. These wetland areas are heavily used by waterfowl. Because beavers and muskrats occasionally damage the moist soil unit levees, regular maintenance and repair is required.

Aquatic vegetation in DeSoto wetland
credit: staff photo

There is a need to prepare a wetland/moist soil unit management plan to specify water depths and seasonal regimens that will support target aquatic plants and invertebrates important to waterfowl and other aquatic habitat users.

Grasslands

The acreage of grasslands on DeSoto has been increasing since the 1980's as croplands are gradually retired. Approximately 1640 acres of the refuge are presently managed as grasslands in more than 40 different units with varying soils properties that affect the types of grasses that do best on those sites. Extensive records are maintained of grassland management history, unit by unit. Overall, soil fertility is good, climatological conditions supportive, and topographic features conducive to intensive management of high-quality grasslands composed primarily of native species.

DeSoto NWR has two step-down management plans that are used in managing grasslands — the *Grassland Management Plan* and the *Fire Management Plan*. Grassland management objectives are to: provide habitat for grassland-loving birds; maintain and enhance bald eagle and other raptor feeding habitat; provide nesting habitat for waterfowl and resident game birds; improve overall habitat diversity on the refuge; protect water quality and soils from erosion; and provide unique public use and interpretive opportunities to create an appreciation and knowledge of grasslands and their uses by wildlife. Management actions related to stand establishment, vigor, maintenance and weed control are conducted with these objectives in mind.

Actions taken for vigor and maintenance usually require manipulation and have centered around mowing, haying, and prescribed burning. Grazing has not been conducted. In recent years the refuge has contracted with a local farmer to harvest fields of alfalfa twice annually and smooth bromegrass once annually. (The bromegrass is managed for snow goose green browse near the Bob Starr Overlook.) Harvest dates are delayed to avoid disturbing nesting birds.

In FY 1997 fifteen grassland units totaling 229 acres were prescription burned. In FY 1998, nine units totaling 94 acres were burned. DeSoto also recently participated in studies by Professor Fred Van Dyke of Northwestern College, Iowa, on the comparative responses of avian communities to prescribed burning versus mowing on the fragments of warm-season, tall grass prairie found on the refuge. Preliminary findings suggest that prescribed burning may be preferable to mowing for prairie conservation and rejuvenation. Both techniques succeed in deterring encroachment by woody vegetation, but burning appears to stimulate greater short-term

primary productivity and higher habitat quality. However, overall community diversity of plants and birds appears to be more sensitive to size and shape of the area than to either burning or mowing. These results underscore the importance of assembling larger and less fragmented blocks of prairie habitat.

Daisy Fleabane
credit: George Grube

Croplands

Cultivated acreage has been declining as croplands are gradually reverted to grasslands and woodlands. Almost 2,000 acres (about one-quarter) of the refuge are presently managed as croplands. Several cooperative farmers from the local community work this land on a two-thirds/one-third crop-share lease: one-third of the harvest is allocated to the refuge. The cropland provides food and loafing areas for migrating waterfowl, and food, cover, and edge for other species. Crops grown include corn, soybeans, sweet clover, milo, alfalfa, and hay grass.

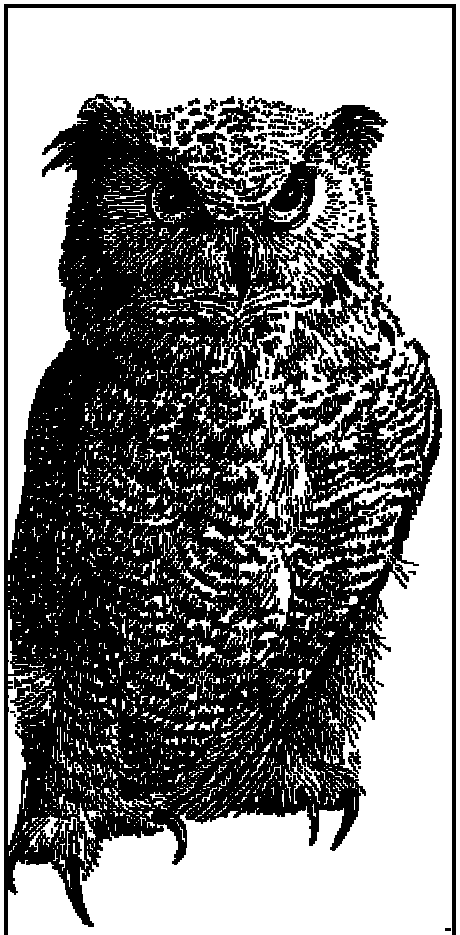
In recent years, both a biological crop rotation and a conventional crop rotation have been used. The biological rotation depends on minimal use of inputs such as fertilizers and pesticides. Integrated pest management is also employed. The acreage in conventional crop rotation has steadily declined, and stood at 12.5 percent of total cropland in 1998.

For a number of years, small wildlife food plots ranging in size from 10 to 24 acres were scattered throughout the refuge in isolated areas within larger non-crop habitats. However, in 1997 the only farmer with farm equipment small enough to operate efficiently declined to continue, precipitating the abandonment of the food plots. Plots were either incorporated into adjacent cropland, reverted to grasslands and incorporated into adjacent grasslands, or reverted to stand-alone grasslands. Production of milo was continued, but it was planted along the edge of existing corn fields.

Woodlands

Approximately 3345 acres of DeSoto Refuge are under forest cover at present. This acreage has gradually increased over the last two decades with the reversion of croplands. About 650 acres of woodlands have been added in the last ten years alone. Management of woodlands generally involves less frequent manipulation than with wetlands and grasslands, because of the slower succession of forest communities.

Management of woodlands at DeSoto is under the general guidance of two step-down management plans — the *Forest Management Plan* and the *Bottomland Reforestation Plan*. Forest management objectives include: providing roosting and sanctuary for bald eagles and other raptors; providing diversity of habitat types to benefit a wide range of wildlife species; providing cavities for other species like owls, wood ducks, woodpeckers, squirrels and raccoons, which use them for cover or nesting; and providing forested habitat for environmental education, public interpretation, and wildlife-viewing opportunities for visitors.



Great Horned Owl
credit: Robert Savannah

As mentioned in the previous chapter, cottonwood is the dominant forest canopy species in these bottomland or riparian forests. The majority of cottonwoods appear to be between 50 and 70 years of age and were likely established naturally when the Missouri River was actively flooding, scouring, and depositing sediments. Cottonwoods are a pioneering species and they are not long-lived. Extensive mortality has been occurring over the last two decades with minimal regeneration. This raises concerns about the species' future in DeSoto forests, and in turn, about the functions it serves for wildlife, such as for bald eagle roosting and cavity nesting. Old cottonwoods are being replaced by more shade-tolerant species that do not depend on flooding for site preparation, like hackberry, mulberry, green ash, and most noticeably, roughleaf dogwood.

Flooding of appropriate sites to promote cottonwood regeneration has been tried on a limited basis with some success. The most feasible management technique for regeneration of cottonwoods is intermittent flooding of ground disked when the mature cottonwoods are dropping their seed during the summer.

Another forest management technique used elsewhere is prescribed burning, both to regenerate fire-dependent species, avoid the build-up of combustible fuel, and control undesirable underbrush. However, DeSoto's bottomland forests are not prescription burned because the sites are generally too wet to carry a fire.

In 1972 a 320-acre Research Natural Area was established adjacent to the Missouri River and the southeastern arm of DeSoto Lake. It consists of an overstory of mature cottonwoods, a midstory of roughleaf dogwood, and an understory of poison ivy and horsetail species. This area has historically been used as a roosting site by bald eagles and is currently the primary eagle roosting site on the refuge. No manipulation or management activities have been permitted in this area. Research is encouraged, but to date no studies have been conducted.

Plant Pest Control

DeSoto NWR practices the judicious mechanical and chemical control of weeds. Weeds are plants that are "out of place" or undesirable because they are noxious, invasive, exotic (non-native or alien), or simply over-abundant to the extent that they interfere with habitat or wildlife objectives.

Exotic plant species, which often aggressively invade new habitats, are of particular concern and are receiving more management attention from public land management agencies. The Department of Interior has published a list of plant species considered to be exotic, invasive or a nuisance species. The following plant species on the Interior's "hit list" have been observed at DeSoto NWR.

Plant pest species of significance are:

< Yellow sweet clover (*Melilotus officinalis*) - A biennial routinely planted as a single-year green manure crop in the refuge's biological crop rotation. Also, it was planted as a nurse crop (i.e., a nitrogen source) with newly seeded warm-season grasses until 1994. If it is allowed to produce seed, it can be a significant problem since the seed can remain viable in the soil profile for decades.

< Reed canary grass (*Phalaris arundinacea*) - Common floral under story component in riparian corridors along the Missouri River.

< Smooth bromegrass (*Bromus inermis*) - Refuge personnel routinely planted it to establish permanent ground cover in the early history of the refuge. It has been planted in more recent history as a living firebreak. Currently, there are several fields in the refuge being managed as cool-season grass habitat.

< Purple loosestrife (*Lythrum salicaria*) - It was first observed in 1998 in a former river chute on the refuge near the Missouri River. This chute is frequently flooded during moderate to high water levels. Scattered individual plants have been observed throughout this area and hand weeded in both 1998 and 1999. Infestations are likely coming from established sites upstream.

< Common reed (*Phragmites australis*) - This has been present within the refuge in small isolated sites along drainage ditches and DeSoto shoreline for many years. Annual application of glyphosate has steadily reduced the infestation level.

< Musk thistle (*Carduus nutans*) - This weed is the most common invasive species on the refuge. There are several widely scattered infestations. Some infestations are significant. The musk thistle seed head weevil was released in 1996. Its establishment and population level has been monitored ever since. The number of seed heads infested with this insect has steadily increased over the years. However, the musk thistle population has not yet been affected.

< Velvet leaf (*Abutilon theophrasti*) - This is a very common species in cropland habitats and disturbed sites. It is rarely observed in well-established permanent vegetation.

Other plant pest species observed on the refuge, but in isolated sites and very low population levels are: autumn-olive (*Elaeagnus umbellata*), Canada thistle (*Cirsium arvense*), cats claw vine (*Macfadyena unguis-cati*), cotoneaster (*Cotoneaster* sp.), crown vetch (*Coronilla varia*), dame's rocket (*Hesperis matronalis*), tall fescue (*Festuca elatior*), henbit (*Lamium amplexicaule*), common mullein (*Verbascum thapsus*), multiflora rose (*Rosa multiflora*), Canada thistle (*Cirsium arvense*), and tree of heaven (*Ailanthus altissima*).

Other species of concern are Chinese elm (*Ulmus parviflora*), roughleaf dogwood (*Cornus drummondi*), and smooth sumac (*Rhus glabra*). Chinese elm is an exotic while roughleaf dogwood and smooth sumac are native species. All three species, particularly roughleaf dogwood, are encroaching on grasslands throughout the refuge.

In the last several years, the following weed management has taken place:

- The herbicide glyphosate was applied to small portions of DeSoto Lake (5-10 acres) and several acres of moist soil units to control the aquatic weed phragmites.
- Glyphosate was also applied to under one acre of buffalograss turf to control invasive Kentucky bluegrass.
- The herbicides 2,4-D + dicamba were applied to five acres of turf grass around the Visitor Center to control a variety of broadleaf turf weeds.
- 15 acres of agricultural levee were subjected to treatment by 2,4-D + dicamba one year and mowing the next to control roughleaf dogwood and smooth sumac.
- 60 acres of woody vegetation along the refuge boundary were mowed.
- 154 acres of grasslands were mowed to control encroaching roughleaf dogwood and Chinese elm.
- 4000 lineal feet of a variety of grass and broadleaf weeds along the Wood Duck Pond Trail were treated with the herbicide bromacil.

Habitat Restoration

Natural habitats in the Midwest have been altered drastically over the last century. Agreeable topography, soil fertility, and settlement patterns (if not climate) have rendered such habitats far more vulnerable to modification by humans and machines than other parts of the country that are more remote or rugged. In most instances, it is agriculture that has replaced native plant communities. Restoration is the process, science and art of trying to recreate some semblance of the living communities that once were.

DeSoto staff work on wetland and upland habitat restoration projects both on and off-refuge. The DeSoto NWR Private Lands Program embraces an 18-county management district. In 1999, a total of 358 acres of wetland and upland habitat were restored.

Wetlands Restoration — Off Refuge

In a partnership with a host of agencies and individual landowners known as Partners for Fish and Wildlife, DeSoto NWR carries out wetlands restoration on private lands. In 1998 ten habitat projects in seven different counties totaling 264 acres were completed. Some of these were joint wetland/upland projects, such as the 130-acre Kirby Robert's habitat project. This one consisted of approximately 25 acres of palustrine emergent and open water wetland, 100+ acres of native grasses, and nesting structures for Canada geese and wood ducks.

Upland Restoration — Off Refuge

DeSoto staff also restore upland habitat off-refuge, seeding native grasses on private lands under easement. In 1998, six projects totaling 124 acres were completed.

Upland Restoration — On Refuge

As croplands on the refuge are retired, those lands are reverted to managed grasslands emphasizing native prairie plants. Refuge staff restored 63 acres in 1997 and 60 acres in 1998. The major categories planted are sandy warm-season, mesic warm-season, and cool-season grassland communities. The grass seed mix used for sandy warm-season consists of sand lovegrass, sand bluestem, switchgrass, and sideoats grama. For mesic warm-season it includes big bluestem, little bluestem, Indiangrass, switchgrass, needlegrass, and Virginia wildrye. The cool season mix is intermediate wheatgrass and tall wheatgrass.

Warm-season grasses are planted in the summer months and cool-season grasses in the spring and fall. Mechanical tilling is used to prepare the seedbed and control emerged vegetation, which is then controlled with periodic mowing. When grass stands do not become well-established or decline over time, staff may attempt to renovate them through a combination of prescribed burning, herbicide treatment, and interseeding.

Fish and Wildlife Management

Monitoring and Studies

DeSoto NWR's *Wildlife Inventory Plan* provides guidance on monitoring the refuge's wildlife. Refuge staff and volunteers currently monitor wildlife numbers and activity throughout the year through a number of surveys. Some species are counted daily while others perhaps only biannually. The surveys provide information for refuge management, and they support state and national efforts. Data from the surveys are maintained in the refuge files and forwarded to others when appropriate. Regular surveys and samples are conducted for:

- Bald eagles

- Snow geese
- Canada geese
- Ducks (broken down by species)
- White-tailed deer (pre-hunting season spotlight count and yearly aerial surveys)
- DeSoto Lake fish populations

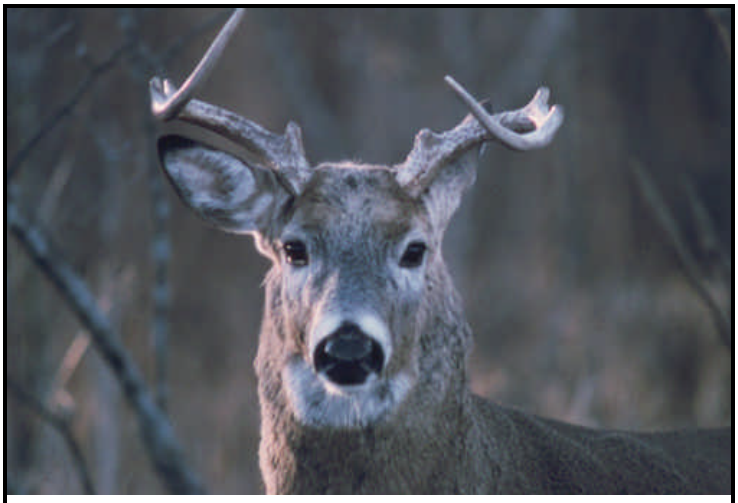
In addition, staff monitor for the presence of rarer visitors, such as least terns, piping plovers, trumpeter swans and golden eagles. Also, the refuge cooperates with the Omaha Chapter of the Audubon Society to conduct annual Christmas and Spring Bird Counts. The 1997 Spring Bird Count, for instance, observed 102 bird species on the refuge in a single day. Refuge staff occasionally conduct or participate in other surveys, such as a 1997 national census checking for deformities in amphibians (no deformed frogs were found on the refuge).

Surveys and monitoring are also conducted for fish populations in DeSoto Lake, including sportfish and rough-fish. Electroshocking surveys provide estimates of species composition, age class, diversity, size and health indicators. In recent years, these surveys have tracked a dramatic increase in the gizzard shad population of the lake.

Over the years, DeSoto NWR has also been the site of a number of studies and investigations related to fish and wildlife populations. These have been carried out both by refuge staff and college-affiliated researchers. One mentioned previously concerned the response of grassland bird communities to different management techniques. Other recent studies include a seven-year telemetry study of white-tailed deer movement and vulnerability in and around the refuge and a three-year survey gauging the response of waterfowl foraging to fall tillage of corn residue.

Game Management

Controlled hunting is conducted on DeSoto NWR for white-tailed deer, ducks and geese. Two step-down management plans — the *Refuge Hunting Plan* and the *Snow Goose Hunting Plan* — provide guidance to staff for managing these hunts. Objectives specified in the *Refuge Hunting Plan* are to manage game animals as a renewable resource with sound management principles, provide high-quality hunting opportunities to refuge participants, promote the value of hunting as a sound wildlife management technique, and promote hunter education and ethics.



White-tailed deer at DeSoto NWR
credit: John Jave

There are actually three deer hunts — one muzzleloader and one archery hunt in the Nebraska portion of the refuge, and one archery hunt in the Iowa portion. The muzzleloader, bows and arrows are considered primitive weapons that present more of a challenge to hunters but are also safer in a heavily-visited refuge. An earlier high-powered rifle hunt was allowed for seven years but was discontinued in 1975 due to the hazards it presented. The muzzle-loader hunt began in 1976 and is conducted on the "Center Island" portion of the refuge in cooperation with Nebraska Game and Parks. Approximately 200 permits are issued each year. The Iowa archery hunt began in 1968 on 660 acres of cropland and timber in the southeastern portion of the refuge. Bow-hunting in the Nebraska portion of the refuge west of the Missouri River started in 1972. These three hunts have successfully met the population management objective of maintaining a post-hunt, winter herd of between 330 and 380 deer on DeSoto Refuge.

DeSoto's controlled waterfowl hunt was established in 1974 in cooperation with the State of Iowa. The hunt aimed to fulfill a demand for quality snow geese field shooting that was not readily available in the area. Other migratory waterfowl, such as mallards, wood ducks, and Canada geese are also occasionally harvested during this hunt, but the numbers tend not to be large.

Snow geese over DeSoto Refuge
Credit: staff photo

The original hunting plan was part of a snow goose corridor plan that included coordination with Sand Lake, DeSoto and Squaw Creek National Wildlife Refuges. The controlled hunt was planned so that it would be compatible with three state-run programs along the Missouri River south of DeSoto Refuge. DeSoto serves as a mid-latitude staging area for about half-a-million fall-migrating lesser snow geese. In the 1970's and 1980's the annual snow goose harvest at DeSoto averaged several hundred birds, a small fraction of the total kill through its range. In the 1990's the annual harvest declined for several reasons.

The *Snow Goose Hunting Plan*, prepared in 1998, set the following objectives:

- Maximize the on-refuge harvest of adult, mid-continent snow geese.
- Disrupt historic refuge feeding patterns and disturb the snow geese enough to force them afield off-refuge, hopefully, increasing that harvest as well.
- Provide quality snow goose hunting not readily available in this portion of the Midwest.
- Promote hunter education, hunter ethics, and value of hunting as a wildlife management tool.

In response to the growing urgency of the mid-continent snow goose overpopulation problem — and the hope of DeSoto staff to contribute to solutions — the refuge adopted a change of strategy in the fall 1999 hunt. The snow goose hunt became a guided hunt. Staff believe that the presence of expert guides will enable hunters to kill more geese. The fall '99 guided hunt had a modest beginning with a harvest of 60 snow geese. While this take was not any better than the fixed blind hunts of previous years, it was on a par with generally poor waterfowl hunting throughout the region, which biologists attribute in large part to mild weather.

1984-85 Duck Stamp — American wigeon
Credit: W.C. Morris

DeSoto wildlife biologists strategically coordinate hunting to minimize conflicts with the high level of non-consumptive public use (primarily viewing snow geese and touring the Visitor Center) that occurs at the same time on the refuge. In order to minimize potential conflicts between refuge waterfowl hunters and the visiting public, areas open to hunting are physically separated from areas open to the general public.

Only rarely have confrontations between anti-hunting groups and hunters occurred over the years.

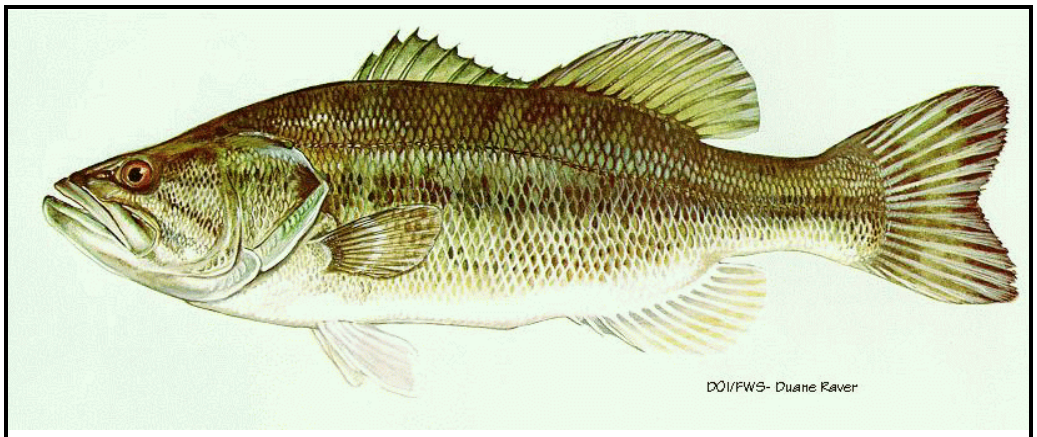
DeSoto Lake Fishery Management

DeSoto Lake can be extremely productive and fishery biologists believe it has the potential to sustain a quality, warmwater sport fishery. Yet at present, as well as throughout most of the lake's history, it has not approached that potential. Extensive fish stocking, surveys, regulatory restrictions, and even a massive chemical renovation in 1985 have failed to establish a stable recreational fishery of outstanding quality. Game fish do not seem to be able to hold their own in competition with the large biomass of prolific rough-fish (i.e. species undesirable as sportfish).

A *Fishery Management Plan* guides DeSoto Lake management efforts. DeSoto staff cooperate with the Iowa Department of Natural Resources, Nebraska Game and Fish, and the Columbia Fisheries Resource Office to manage fish populations in DeSoto Lake. Since there are no known threatened, endangered or rare species of fish in the lake, the thrust of management efforts is directed exclusively toward managing a long-standing oxbow lake recreational fishery. Techniques employed include stocking sportfish, monitoring populations and harvests by means of periodic electroshocking and creel censuses, controlling surging rough-fish populations through commercial harvesting, adding structures (i.e. trees, rocks, and pallets) to the lake, an electric fish barrier to prevent the intrusion of undesirable species from the Missouri River, and various kinds of aquatic habitat and water quality improvement initiatives.

Over the years, it is no exaggeration to say that millions of sportfish have been stocked in DeSoto Lake — 36-38 million since the 1985 lake renovation. In 1998 alone, for example, 400 twelve-inch white bass, 3,000 seven-inch channel catfish, and 2,000 six-inch walleye were stocked. These benefit recreational fishing and are intended to help control the increasing population of the rough-fish gizzard shad.

From April to October, permits are granted to private commercial harvesters to net buffalofish and carp, two of the rough-fish species that have come to dominate the lake. Recent harvests have ranged from about 7,000 pounds to 18,000 pounds a year.



Largemouth Bass
credit: Duane Raver, USFWS

Bird Banding

Bird banding means attaching a small, numbered metal ring to one leg of a bird. Banding has been used for decades by wildlife managers and scientists across North America to understand and track the movements of migratory birds. DeSoto staff cooperate with the Iowa Department of Natural Resources to band Canada geese during the summer. In 1997 and 1998, for example, 37 and 56 geese were trapped, respectively. Recaptures were noted and new bands were attached.

Disease Monitoring and Treatment

The large concentrations of waterfowl at DeSoto during the fall months expose huge numbers of ducks and geese to potential disease outbreaks, particularly avian cholera. A step-down management plan, the *Disease Plan*, outlines procedures for disease monitoring and treatment on the refuge. Rapid response is necessary to control the extent of an epidemic. One of the most critical procedures during a disease outbreak is to collect bird carcasses to prevent their accumulation and the spread of disease.

In 1997 a new bird carcass incinerator was purchased to safely destroy dead, disease-contaminated birds. That same year, an avian cholera outbreak began on December 11, lasting a week and a half, until lake freezing forced the flocks to move. A total of 75 birds, mostly snow geese, were incinerated.

Nest Structures

For years the refuge has mounted and maintained nest boxes for wood ducks. In recent years there have been about 60 such boxes that have been only moderately successful in attracting nesting pairs and hatching nestlings. The boxes have also proved very attractive to breeding screech owls. With the high mortality of DeSoto's soft-wooded, cavity-prone cottonwoods, there is at present an abundance of natural cavities in trees on the on the refuge. Evidently the wood ducks prefer these.

Other Wildlife Management Activities

Two other kinds of wildlife management efforts carried out at DeSoto on a less frequent basis are species reintroductions and control of exotic animal species and pests. Staff stay informed of the prospective threats from non-native or alien animal species such as the zebra mussel.

Resource Protection

The staff of DeSoto NWR recognize fully the obligation that has been entrusted to them — the care of valuable natural, cultural, and human resources — and they take this responsibility very seriously.

Law Enforcement

Law enforcement on the refuge is both a protection and a prevention function. Protection is safeguarding the visiting public, staff, facilities and natural and cultural resources from criminal action, accidents, negligence and acts of nature such as storms. Prevention of incidents from occurring is the best form of protection and it requires a law enforcement presence established by frequent patrol and other visible activities of the law enforcement staff.

Incidents that require law enforcement responses include occasional poaching, runaways, and drug use, to vandalism and auto accidents. In any given year numerous violations occur resulting in hundreds of verbal warnings, scores of written notices, and several warrant arrests that have led to serious fines totaling as much as $10,000 in a single year.

Four step-down management plans -- the *Law Enforcement Plan, Safety Plan, Crowd Control Plan,* and *Traffic Control Plan* -- constitute the law enforcement guidelines at DeSoto. The latter two pertain primarily to the spectacular fall waterfowl migration and auto tour, which usually produces crowded conditions on refuge roads and at the Visitor Center. Traffic control during this time of very high visitation presents a special problem due to limited road and parking capacity. People want to enjoy the geese and observe the eagles. Some visitors become frustrated when the visitor parking lot is full; their reactions can complicate traffic flows to a point of chaos.

The DeSoto law enforcement staff consists of one full-time officer assisted by several other staff who have collateral law enforcement duties. Collateral law enforcement duty is assigned via a three-month rotation schedule to cover the off-duty times of the full-time officer. Other collateral law enforcement assignments are made during heavy public use periods. This level of law enforcement staffing does not provide adequate protection and prevention, in that most of the time only one officer is on duty per 24 hours; there are even some periods when no officer is on duty. Collateral law enforcement duty is assigned to various staff specialists whose primary duties are slighted while they perform law enforcement duty.

A second full-time law enforcement officer is needed to provide dual coverage during parts of the work schedule and to allow other staff to focus more on their primary duties.

Cultural Resource Management

The Cultural Resource Management program at DeSoto NWR focuses primarily on the nationally-significant *Bertrand* Collection. Documentation, curation and preservation of the *Bertrand* Collection in the Visitor Center are not only major, long-term undertakings but a legal responsibility of the U.S. government through the Fish and Wildlife Service. Under Section 106 of the National Historic Preservation Act and regulations of the Advisory Council on Historic Preservation (Council), in 1991 the Service signed a Programmatic Agreement with the Council, the Iowa State Historic Preservation Officer (SHPO), and the Nebraska SHPO. The agreement stipulated a number of conditions, including implementation of a (museum) Comprehensive Conservation Plan (not to be confused with this CCP) for the *Bertrand* Collection, which guides all preservation efforts and initiatives, and the submission of annual progress reports to the Council and the two SHPOs.

Bertrand Collection management is guided by the Scope of Collections Document and also in part by the *Disaster Preparedness Plan for The Bertrand Collection* and the *Bertrand Laboratory Safety Plan*. These two step-down management plans specify a number of preventive measures and response procedures to protect this unique collection in the event of fires, storms, chemical spills, tornados and earthquakes. Yet the *Bertrand* artifacts also face more mundane threats, including insects, mice and the general, long-term "ravages of time." Much of the *Bertrand* Collection, especially those items of organic origin, are in a constant state of deterioration, be it ever so slow. Application of evolving management and preservation techniques can nevertheless substantially extend the life of the collection, allowing it to yield perpetual dividends of appreciation and knowledge of our nation's Western settlement history.

Museum staff utilize the services of both volunteers and qualified professionals under contract to ensure the proper documentation and preservation of *Bertrand* artifacts. A wide variety of objects continue to be treated and conserved. In 1998, for example, 536 objects were rehoused in

Bertrand Collection artifacts
credit: Leon Kolankiewicz

improved permanent storage conditions. In 1997, over 14,000 objects were treated. In recent years, the services and expertise of Dana College microbiology professor Larry Stone have been used to survey and treat foodstuffs and liquors. Housekeeping chores of cleaning and dusting exhibits and windows and rotating objects are also practiced routinely and diligently.

Environmental monitoring is a constant chore. Temperature, relative humidity and light levels are all closely regulated. Integrated Pest Management is practiced to control biological threats to the collection. This includes bug traps and mice traps, as well as ongoing efforts to identify and block ports of entry for mice. In general, catch numbers are low and there is no systemic infestation of the collection — a sign that preventive efforts are paying off.

Documentation efforts include upgrades to the museum's management software, cross-indexing the 12,000 photographs and negatives of *Bertrand* objects, inventorying information in the catalog archives, and continually adding relevant historic information to the files. In recent years for example, staff obtained copies of the journal of the captain of the steamboat that rescued *Bertrand* passengers and cargo at the time of the accident, and also established contact with a purported descendant of a Steamboat *Bertrand* passenger. The Museum Curator also works with visiting researchers, loans artifacts to other museums, writes articles for publication, and provides technical assistance in response to inquiries from government agencies, museums, journalists and individuals researchers from many states and Canada. In recent years, she has cooperated with the Mystic Seaport Museum in Mystic, Connecticut, the Western Heritage Museum in Omaha, and the Mark Twain Museum in Hannibal, Missouri on requests for artifact loans.

Compatibility Determinations — Through this CCP, the Service has determined that archeological research is an appropriate use on the Refuge and that issuing Archaeological Resources Protection Act (ARPA) permits and Antiquities Act permits by the Regional Director is compatible with the purposes for which the Refuge was established and acquired. A formal compatibility determination covering archaeological research and the issuance of related permits will be completed prior to the issuance of such permits in the future. The Refuge Manager will issue special use permits for permitted research to prevent conflict with Refuge management activity and with wildlife-dependent recreational use. Archeological collecting, testing, or excavation on Refuge land without a permit is not an appropriate use and is illegal.

Historic Preservation Procedures and Associated Concerns — Undertakings, that is projects or activities conducted by Service employees, contractors, volunteers, concessioners, or permittees that could affect historic properties, are subject to Sections 106 and 110 of the National Historic Preservation Act and 36 CFR Part 800. Undertakings include ground-disturbing activities, changes or neglect to buildings and structures older than 50 years, and divesting land.

The Refuge Manager considers potential impacts of management activities on cultural resources. During project planning, and in any event prior to initiating an undertaking, the Refuge Manager will inform the Regional Historic Preservation Officer in a timely manner to allow analysis, evaluation, consultation, and mitigation as necessary. The Refuge Manager informs local government officials and the general public about planned undertakings.

The refuge has a museum as part of the Visitor Center for preservation and exhibition of the *Bertrand* collection, as described elsewhere in this document. In addition to these archeological materials, the refuge museum collection includes art, historical items, and zoological specimens. The majority of the zoological specimens are of endangered species and is on long-term loan to the Henry Doorly Zoo in Omaha, NE.

Refuge Cultural Resources Management Objective — The *Bertrand* Collection is the most important cultural resources management issue at the refuge. Existing guidance for the collection is the *Bertrand Collection Management Plan*, the Scope of Collection Statement, and the *Comprehensive Conservation Plan*.

The Programmatic Agreement between the Iowa and Nebraska State Historic Preservation Officers, the Advisory Council on Historic Preservation, and the U.S. Fish and Wildlife Service was accepted on October 22, 1991. The Agreement specifies alternative number 4 of the *Comprehensive Conservation Plan* that was proposed to reverse years of inadequate funding and staffing necessary to preserve the collection. The requirements of the Programmatic Agreement will be implemented in order for the Service to be in compliance with Section 106 of the National Historic Preservation Act and to protect the collection from continuing deterioration.

A cultural resources management plan is needed for the cultural resources on the Refuge. The bulk of the plan would address the *Bertrand* Collection and its discovery site. It would also establish a plan to fulfill requirements of Section 14 of the Archaeological Resources Protection Act for surveying lands to identify archeological resources; and Section 110(a)(2) of the National Historic Preservation Act for a preservation program. And it would address long-term problems identified by the Iowa State Historic Preservation Officer: (1) A good history of the *Bertrand* needs to be written, the archeological field notes having been lost by the refuge. (2) Two homestead sites within the refuge are known. (3) Blakeslee's 1978 report lacks maps and sufficient coring sampling. While the river has meandered substantially, recent coring (geomorphological surveys) indicates potential for buried cultural resources strata.

Consultation with Interested Parties — Prior to final approval, the Comprehensive Conservation Plan will be made available to identified parties that could have an interest in cultural resources on the refuge. These parties include the ten Indian tribes listed in Chapter 3 (which must be contacted by the Regional Director), the Iowa and Nebraska State Historic Preservation Officers, and the

three local county historical and preservation organizations, and the Advisory Council on Historic Preservation (because of the *Bertrand* Collection).

Facilities Maintenance

Maintenance, repair, and upgrading of the Visitor Center and other refuge facilities like roads, the headquarters building, and equipment require constant diligence and expenditures. As the saying goes, "Rust Never Sleeps." Recent activities in the Visitor Center alone include replacing the HVAC (heating, ventilation, air conditioning) units in 1999, fixing plumbing and water supply problems, and ensuring proper functioning of the fire suppression system and building security system through evaluations and semi-annual checks.

Safety

Safety is important both for DeSoto's staff and visitors. Monthly safety meetings for staff and quarterly Safety Committee meetings are held. The intent of these meetings is to update and train personnel as well as to resolve any safety concerns that arise. Safety meetings are assigned to individual staff members who are then responsible for providing programs. Sample topics include stress management, defensive driving, CPR, RCRA, slips and falls, chain saws, methamphetamine, confined spaces, railroad crossing safety, hypothermia, and hazard communication.

Other safety-related activities at DeSoto include: an Annual Station Safety Inspection of equipment and facilities, an annual evacuation drill for the nearby Fort Calhoun Nuclear Power Plant (only 1.3 miles from the western edge of the refuge), checking, and if necessary, replacement of fire extinguishers, testing drinking water samples, and physical exams for fire and law enforcement personnel.

Public Education and Recreation

The National Wildlife Refuge System Improvement Act of 1997 (see Appendix F) requires all public use activities on national wildlife refuges to be justified and approved in accordance with an updated procedure.

The six priority public uses of National Wildlife Refuges established by this statute are wildlife observation and photography, hunting, fishing, environmental education, and interpretation. All six uses are provided at DeSoto Refuge. In addition, the public is allowed to gather edible mushrooms on portions of the refuge during spring.

All public use activities at DeSoto Refuge are justified through the compatibility determination (CD) process. These CD's were reviewed and revised in the preparation of this CCP and are presented in Appendix D.

Refuge visitation numbers were provided in Chapter Three. Each year, DeSoto welcomes hundreds of thousands of visitors to its Visitor Center, viewing galleries, lake, woods, trails, and

picnic tables. Extensive efforts are made to ensure they get the most out of their visits.

DeSoto's public use facilities are depicted on Figure 4.

Visitor Center Programs

DeSoto NWR's educational and interpretive missions were significantly enhanced with the 1981 opening of the Visitor Center on the northwest shore of DeSoto Lake. The Visitor Center is the permanent home of the *Bertrand* Collection. The five-million-dollar, 26,000-square-foot building contains exhibits interpreting the importance of the Steamboat *Bertrand* and the historical development and ecological changes that occurred within the Missouri River Basin during the steamboat era, and more broadly, the wave of western expansion in the 19th century.

The Visitor Center also provides exhibits depicting the natural history of the area and its wildlife. Expansive glass, indoor viewing galleries overlooking DeSoto Lake provide excellent opportunities to observe waterfowl and bald eagles during the spring and fall migration periods. Binoculars and spotting scopes are available free of charge. A theater and a variety of audiovisual equipment offer interpretation to an average of 134,000 visitors who pass through the Visitor Center every year.

DeSoto Refuge Visitor Center beside DeSoto Lake
credit: David Menke

FIGURE 4 INSERTED HERE

A large, multi-purpose room provides space for meetings and exhibits of art, photography, and educational materials. The information desk at the entrance to the Visitor Center is staffed by a knowledgeable and enthusiastic receptionist.

The various interpretation facilities and exhibits in the Visitor Center undergo continual renovation and rehabilitation to maintain their high visual appeal, accuracy, and relevance. In 1998, a Tallahassee, Florida-based company, Wilderness Graphics, Inc. was contracted to upgrade interpretive facilities, including a redesigned information desk, three life-sized dioramas,

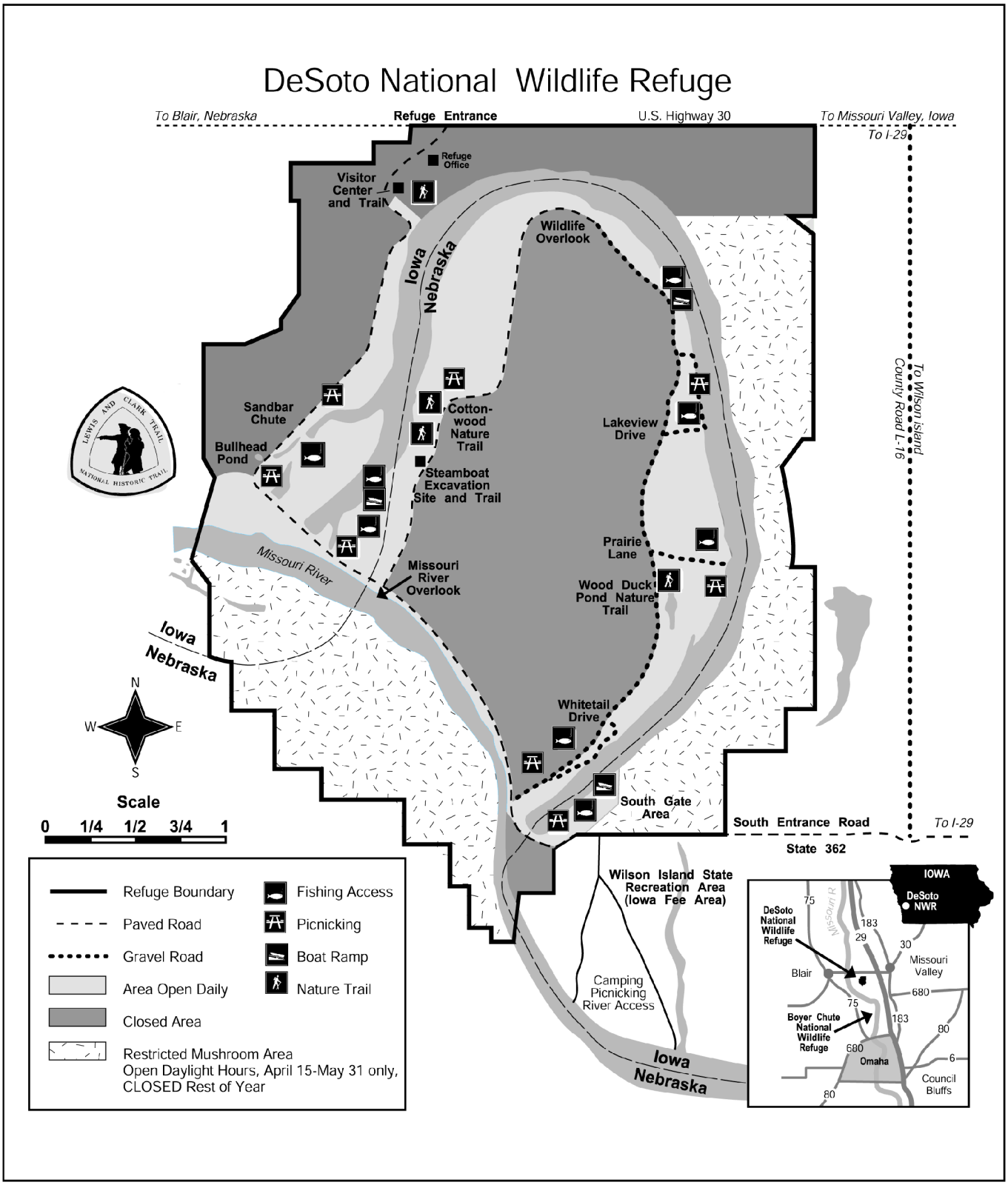


Figure 4 — DeSoto National Wildlife Refuge Public Use Facilities

reconfigured steamboat exhibits, and an enlarged sales area. They also upgraded the audio interpretive system.

Either of two orientation films — "Seeds of Change" or "Off the Beaten Path" — are shown hourly during the week in the theater, and every half-hour on weekends and other heavy-use periods. The theater is also the site of the Weekend Wildlife Film Series, with showings on Saturday and Sunday during most of the year. The series includes special programs for Earth Day, Prairie Appreciation Week, and Lewis and Clark weekends. Two short videos of the Steamboat *Bertrand* excavation and DeSoto's wildlife (produced by volunteer Bob Horton) are viewed 15 to 20 times daily by visitors.

Each year a number of special events and exhibits are hosted in the DeSoto Visitor Center multi-purpose room. These include the Student Wildlife Art Show, Landscape Art of Jim Fox, National Wildlife Week Exhibit ("Suitcase for Survival"), Outdoor Writers of America Exhibit, Fantasy Insects, Prairie Appreciation Week, and Iowa's Wild Places Photo Exhibit. Other recent exhibits have included the Federal Junior Duck Stamp Exhibit, Lewis and Clark Exhibit Panels, Gary Tonhouse Photo Exhibit, and Wildlife Art Exhibit & Sale.

In addition to exhibits, the Visitor Center also sponsors occasional lectures and performances by local and nationally-known wildlife enthusiasts, scientists, and artists. Visitor Center staff give presentations and programs both to classes of students and a variety of organized groups. In 1999, for example, a total of 163 groups and bus tours, including almost 4,900 persons, visited the refuge. Groups such as these were the beneficiaries of programs presented by staff and volunteers on such topics as endangered species, wetlands, wildlife management, and the Steamboat *Bertrand*.

Entrance Fees and Permits

Entrance fees were implemented in 1987. The daily fee of $3 per vehicle is collected at convenient self-registration stations near both entrances to the refuge and the Visitor Center. A 12-month annual pass sells for $10. Compliance appears to be high, based on cursory checks. Other permits are also sold at the Visitor Center, such as Federal Duck Stamps and Golden Eagle Passports. Since its inception, an average of about $70,000 in entrance fees and permits has been collected annually. All entrance fees are remitted to the Service finance center and are then redistributed to the refuge to be used to pay administrative costs and to improve facilities and services for the public.

Interpretive Programs and Non-Consumptive Uses

Four nature trails are used by tens of thousands of visitors every year. Volunteers perform "trail patrol" — picking up litter, pruning intrusive branches, and periodically restocking interpretive brochures for the Wood Duck Pond and Cottonwood trails. Volunteers also provide guided tours for groups that request them ahead of time.

The Wildlife Auto Tour runs each year from October 15 to November 30. This coincides with the peak of the snow goose migration through DeSoto. The current route ends at the Bob Starr

Wildlife Overlook and motorists return on the same seven miles of paved road. At this time of year, visitors are excluded from the unpaved gravel portion of the road that loops around Center Island, a restriction they generally seem to accept.

Other facilities include the Cottonwood Picnic Ground and other picnic sites and grills in several locations, Bertrand Excavation Site and Trail, Missouri River Overlook, Prairie Lane, Whitetail Drive, Lakeview Drive, and a number of interpretive signs aimed at motorists. In addition, boats may be launched into DeSoto Lake from several boat ramps. Motors are permitted, but boating is limited to no-wake speeds, not to exceed five miles per hour.

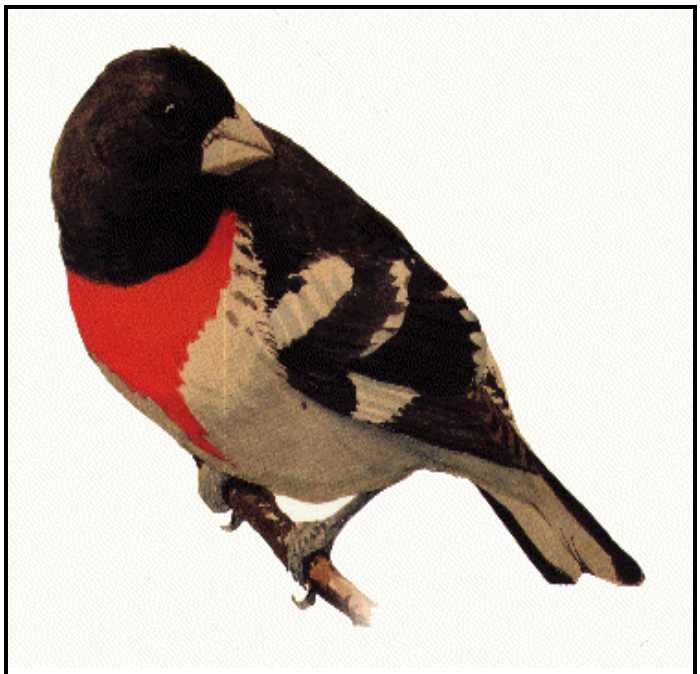
Environmental Education

Hundreds of area teachers utilize DeSoto NWR as an environmental education resource. In 1999 over 8,200 students from 475 classes visited DeSoto. Teachers supervise many of their own classes at the refuge and borrow films, slide shows, and videos to use back in their classrooms. The busiest months tend to be May and November. In the spring, most visiting classes work on the "Artifacts and Lifestyles" cultural resources packet provided by DeSoto. In the fall, most learn about "Birds in Migration." A number of students also participate in fall's "Prairie Appreciation Week." Colleges and universities in the region also use the refuge for educational purposes, including Creighton College, Clarkson College, Drake University, Dordt College, Westmar College, the University of Nebraska, Iowa State University, Iowa Western Community College, the University of South Dakota, Morningside College, Hastings College, and Northwestern College.

Consumptive Uses

Several consumptive uses take place on DeSoto National Wildlife Refuge: hunting for deer and waterfowl, fishing, and mushroom collection. Collecting morel mushrooms in designated areas of the refuge attracts several thousand visits in the spring.

Most of the white-tailed deer harvested at DeSoto are taken by the muzzleloader deer hunt, with much smaller numbers taken by bow hunters. In all, several hundred deer hunters participate. The annual waterfowl hunt attracts 250-300 hunters. In 1998, these outdoorsmen and women demonstrated the patience and persistence for which their pastime is famous by logging 28 hours and 18 shots for each bird harvested!



Rose-breasted Grosbeak painting
Louis Agassiz Fuertes (1874-1927)

DeSoto staff help conduct sport fishing tournaments and clinics on the refuge. In 1999 for example, six bass tournaments, one catfish tournament, and one archery fishing tournament were conducted. Fifty-two participating bow hunters in the 1999 annual "Carp-O-Rama" archery fishing tournament harvested 268 carp and buffalofish weighing 596 pounds. In recent years, in partnership with African-American churches in Omaha, Nebraska and the Omaha Indian Tribe, clinics have also been held to provide fishing opportunities for inner-city youth and Native American youngsters. A number of adult volunteers have assisted these events.

The sport fishing tournaments conducted on DeSoto Refuge help build an appreciation and understanding of fishery resources, and are conducted so that they do not unreasonably interfere with other refuge visitors. Only prizes of nominal value are awarded during these events.

Outreach

DeSoto staff are very active in a wide variety of outreach efforts. In a typical year, staff respond to 16,000 public inquiries over the phone and in writing. They send dozens of news releases to 225 newspapers, television and radio stations in Iowa, Nebraska, Kansas, Missouri, and South Dakota. They grant two dozen or more interviews to reporters, producers, and journalists. Most of the coverage, as might be expected, focuses on waterfowl.

Staff also assist and participate in special media events, such as a segment about DeSoto on the South Carolina Public TV program "Nature Scene," broadcast nationally in December, 1998, and a recent documentary film by Bruce Batt of Ducks Unlimited entitled "Snow Geese in Peril."

Staff respond to requests for programs and videos by civic clubs and organizations whenever asked. In recent years, DeSoto's staff have spoken to the Rotary Club, National Association of Retired Federal Employees in Omaha, the Grange in Blair, and career days at Blair and Fort Calhoun High Schools. Staff have also presented an environmental education program at the Winnebago Indian Reservation for Earth Day.

Several members of the DeSoto staff are very actively engaged in Scouting both on and off the job, organizing and conducting orientations, fishing clinics, refuge projects, and nature badge activity. Two DeSoto biologists have each volunteered more than 500 hours a year with two

separate Boy Scout troops in Iowa, doing camping trips, fundraisers, summer camps, and merit badge training.

Coordination and Partnering

The preceding pages have mentioned many instances of DeSoto Refuge's cooperative efforts with individuals and groups, both private and public, in pursuing the refuge mission. At the national and regional level, the Fish and Wildlife Service has a number of formal and informal relationships with scores of agencies and groups. With regard to DeSoto NWR in particular, over the years refuge staff themselves have forged a number of mutually beneficial working relationships and agreements.

Interaction with other federal, state, county, and local governments continues to grow each year. Programs like the Private Lands Program, law enforcement coordination, land acquisition and operations for Boyer Chute National Wildlife Refuge, fishing clinics, research programs, and the farming program are some major examples that offer opportunities for productive interaction and cooperation.

DeSoto NWR maintains informal partnerships with the Iowa office of the Natural Resources Conservation Service, Midwest Regional Office of the National Park Service, the Iowa Department of Natural Resources, Nebraska Department of Game and Parks, Harrison County Conservation Board and other County Conservation Boards, Iowa State University Extension, Papio-Missouri River NRD, Midwest Interpretive Association, Ducks Unlimited, Pheasants Forever, Omaha Chapter of the National Audubon Society, local chapters of the Boy Scouts of America and Girl Scouts of America, certain African-American churches in Omaha, the Omaha and Winnebago Indian Tribes, and 4-H Clubs. Staff also cooperate with scores of educational institutions.

Also mentioned earlier was a Memorandum of Understanding between DeSoto and the national Advisory Council on Historic Preservation, and the State Historic Preservation Officers for Iowa and Nebraska regarding the preservation of the Steamboat *Bertrand* Collection. The Museum Curator has cooperated with museums from around the country exchanging information and providing loans of *Bertrand* artifacts.

DeSoto's partners in the Private Lands and Partners for Fish and Wildlife programs include dozens of private landowners, the Pottawattamie, Harrison, Woodbury, Sioux, Carroll, and Monona County Conservation Boards, Golden Hills Resource Conservation and Development, Glenwood State Hospital, the federal Natural Resources Conservation Service, the Iowa Department of Natural Resources, and the conservation group Ducks Unlimited. Staff's work with each of these parties helps ensure that wildlife habitats are not confined strictly to National Wildlife Refuges.

DeSoto enjoys a special connection with the non-profit Midwest Interpretive Association (MIA), which operates its $110,000 business from a 361-square foot sales area in the DeSoto Visitor

Center. From its DeSoto office, MIA also administers outlets at Mingo, Squaw Creek, Swan Lake, and Horicon National Wildlife Refuges, as well as Lewis and Clark Lake, an Army Corps of Engineers facility. MIA's annual sales of educational books, artwork, photographs, T-shirts, postcards, and posters from the DeSoto Visitor Center run about $80,000. In exchange for the space the refuge provides, MIA offers DeSoto visitors educational souvenirs and resources for purchase. It has also sponsored wildlife art shows at the Visitor Center, donated books to the Refuge library, and provided awards for a student art show. MIA's business manager also contributes to DeSoto's operational programs such as computer operations and interpretation.

Any discussion of partnering at DeSoto would be incomplete without commending its dedicated corps of volunteers. In recent years, 80-100 volunteers of all ages have helped refuge staff with tasks that include environmental education, wildlife surveys, trail maintenance, Visitor Center support, and library and museum conservation. Recruiting, training, and scheduling volunteers is challenging. In order to honor and encourage our volunteers, DeSoto Refuge has begun holding an annual volunteer recognition luncheon, at which highlights of the year and awards are presented. In a very real sense, DeSoto's volunteers and others like them across the country represent the conservation spirit of America.

SUITCASE FOR SURVIVAL.
U.S. Fish and Wildlife Service/Tami Heilemann

Chapter 5
Planned Refuge Management and Programs

Introduction

As DeSoto National Wildlife Refuge embarked on its fifth decade, a team of staff members, Region 3 officials and biologists, consultants, academics, local farmers, representatives of other state and federal agencies, and other interested parties began a planning process intended to guide the refuge's management and programs into the new century. That planning process has led to the present document — DeSoto's Comprehensive Conservation Plan (CCP) — that will help orient, oversee and prioritize the refuge's activities over the next 15 years.

In the four decades since DeSoto's establishment, many things have changed: the natural and manmade worlds, conservation priorities, the science and practice of game and wildlife management, information technologies, and the Fish and Wildlife Service's orientation, to name a few. Forty years ago, there was no Endangered Species Act, no legal protection for wetlands, little or no emphasis on ecosystem management, no awareness of the plight of neotropical migrants. Rachel Carson had not yet written *Silent Spring* and DDT and its chemical relatives were seen as godsends by most Americans even as bald eagle, peregrine falcon, brown pelican, and osprey populations were mysteriously dwindling. Wildlife managers and biologists emphasized habitat edges and ecotones for their higher species diversity. The birth of Island Biogeography and Conservation Biology — two fields very much in the scientific vanguard nowadays — was still many years away.

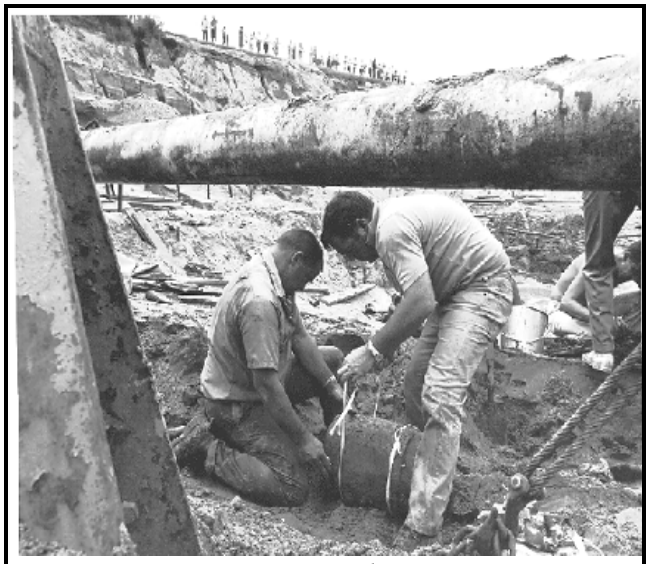
In light of all that has changed, the CCP planning process at DeSoto furnished an opportunity for some fundamental reassessment of the refuge's priorities and programs. The goals, objectives and strategies that emerged from that reassessment are presented in this chapter.

DeSoto National Wildlife Refuge, DeSoto Lake
and the Missouri River (land uses not current)

A total of seven meetings and work sessions were held at DeSoto NWR and the Service's Region 3 headquarters in Fort Snelling, Minnesota from the summer of 1999 through the winter of 2000 to explore issues and alternatives and hash out the goals, objectives and strategies which should guide management and programs at DeSoto.

The planning team formulated goals for DeSoto NWR and then devised and evaluated four management alternatives that represent different ways of meeting those goals: A) No Action (Current Management), B) Maximize Restoration and Conservation of Historical Natural Resource Conditions, C) Maximize Compatible Public Use Potentials, and D) Optimize Natural Resource Conditions and Public Use Potentials. The planning team opted for the last of these (D) as the Preferred Alternative, and then developed detailed objectives and strategies to go along with it. Both the form and the substance of the goals, objectives and strategies were the subject of considerable discussion, debate, and revision among DeSoto and Region 3 staff and officials.

The primary substantive issue was the role and extent of croplands on the refuge and how far to go in phasing them out. One of many organizational questions dealt with fish and wildlife population management versus habitat management. Because of the inseparability of habitat management from wildlife population management, ultimately the team decided to combine these two into one goal area: "Wildlife Population and Habitat Management." Because fisheries management at DeSoto Lake revolves around the recreational fishery rather than conserving native aquatic biodiversity, fish population management was placed under the "Public Education and Recreation" heading.



Excavating the *Bertrand* in the late 1960s
Credit: USFWS

In brief, our plans call for reversion of three-quarters of existing cropland on the refuge to grassland and woodland habitats over the next 15 years. Some cropland will be maintained in order to provide food for migrating waterfowl and game animals (particulary snow geese and white-tailed deer), especially in places that the public might see them. The retention of some cropland will help minimize habitat damage and crop depredation from deer. A more concerted effort will be made to hunt and otherwise disrupt snow geese during their fall migration, because of the severity of the mid-continent overpopulation problem, but taking precautions not to drive them out of the refuge altogether. The objective is to reduce snow goose numbers by approximately half.

Greater emphasis will be accorded non-game Trust bird species, including neotropical migrants and residents. Restoration of larger blocks of grassland and woodland habitat will be the primary means of accomplishing this goal. Water quality and physical changes in DeSoto Lake will be closely monitored and the option of reconnecting the lake or a portion of it to the Missouri River will be the subject of a feasibility study. The *Bertrand* Collection will continue to be preserved and studied, making even greater contributions to our understanding and interpretation of 19th century Western history. We will attempt even more than at present to maximize the potential of partnering on and off the refuge.

Figure 5 on the next page shows future desired land use conditions on DeSoto National Wildlife Refuge. The goals that follow are general statements of what we want to accomplish in the next 15 years. The objectives are specific statements of what will be accomplished to help achieve a goal. Objectives describe the who, what, when, where and why of what is to be accomplished. Strategies listed under each objective specify the activities that will be pursued to realize an objective. Strategies may be refined or amended as specific tasks are completed or new research and information come to light.

In the numbering scheme that follows, the first digit represents the number of the goal group. The second digit represents the goal within that group. The third digit represents an objective within that goal. The fourth digit represents a strategy within an objective. Thus, 3.2.1.4 represents the fourth strategy for the first objective within the second goal of the third goal group. This numbering scheme is used to index Refuge Operating Needs Projects in Appendix C and personnel needs in Chapter 6.

Beaver
Credit: Randy Lennon, USFWS National Image Library

Figure 5 --
DESIRED FUTURE LAND USE CONDITIONS MAP
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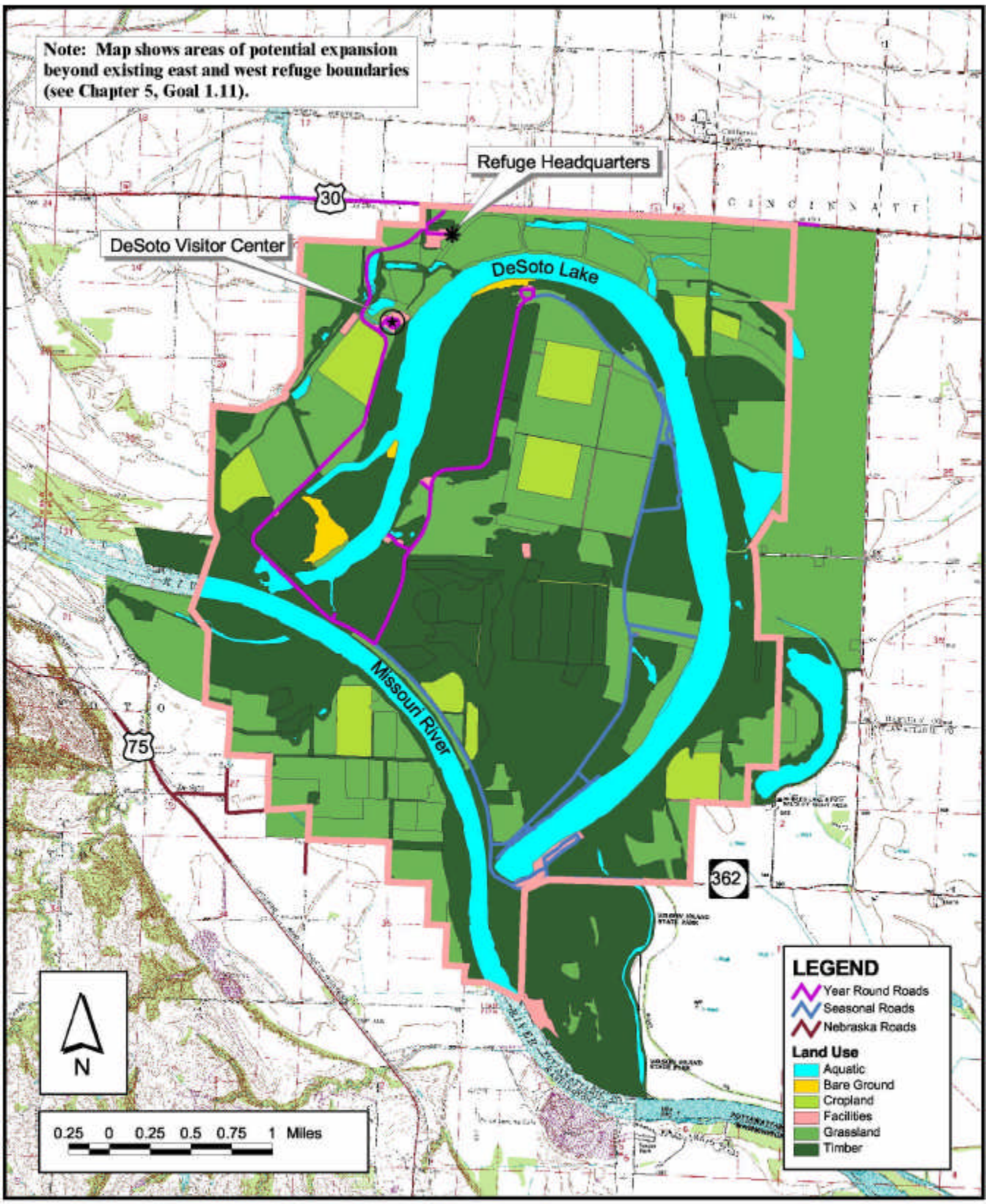


Figure 5 - Proposed Future Land Uses on DeSoto National Wildlife Refuge

DESOTO NATIONAL WILDLIFE REFUGE

Goals, Objectives & Strategies

1. WILDLIFE POPULATIONS AND HABITAT MANAGEMENT

Vision: Contribute to conservation of the natural biological diversity and integrity of the Lower Missouri River Ecosystem through the active management of wildlife populations and their habitats. Restore, maintain, and protect a mosaic of habitat types representative of this ecosystem, benefitting non-game and neotropical migratory birds, waterfowl, and other Federal trust species. Increase "naturalness" as much as possible in the wider context of a heavily modified ecosystem by means of establishing the largest feasible blocks of native plant communities in order to minimize the negative effects of habitat fragmentation. Intervene in and manipulate natural processes such as plant community succession, lake evolution, and encroachment by established exotic species to achieve a mix of habitats and populations that best conserves native biological diversity.

1.1 ***Goal: Manage DeSoto Refuge habitat to be attractive and beneficial to migratory waterfowl, especially during migration seasons.***

1.1.1 Objective: Manage a diversity of habitats that provide sanctuary, open water, exposed shoreline and mudflats, shallow wetlands, and upland types traditionally preferred by geese, ducks and other waterfowl.

Strategies:

1.1.1.1 Manipulate DeSoto Lake levels to continue to attract migratory waterfowl in the fall, winter and spring seasons for social, feeding, and resting needs.

1.1.1.2 Maintain specific units of grasslands and croplands (grain fields) on the refuge to provide nearby food sources for waterfowl. By 2015, 475 acres of croplands and 2780 acres of grasslands will furnish on-refuge feeding opportunities for waterfowl.

1.1.2 Objective: Maintain current waterfowl use day levels, based on the most recent five-year average of 1,245,000 use days annually, excluding snow geese, which are specifically addressed in a subsequent goal.

Strategies:

1.1.2.1 Monitor arrivals and concentration buildups in accordance with the Wildlife Inventory Plan, with the specific intent to witness and record annual peak numbers, and date of occurrence, of special interest species.

1.1.2.2 Monitor waterfowl activity during migration periods in order to evaluate the use of various habitat types.

1.1.2.3 Monitor waterfowl concentrations for indications of disease and stress and be prepared to implement the Disease Plan.

1.1.2.4 When concentrations exceed objective levels to the extent the welfare of the waterfowl is at risk, implement sanctuary disturbance measures that result in concentration reductions.

1.2 ***Goal: Actively assist international efforts to reduce the mid-continent population of snow geese by at least 5% each year from the 1998 population of about 3 million, down to an eventual level of about half of that, in accordance with recommendations of the Arctic Goose Habitat Working Group.***

1.2.1 **Objective**: Attain and then maintain an average annual peak population of 150,000 to 250,000 snow geese (e.g. 4,000,000 goose use days) stopping temporarily at the refuge during the fall migration.

Rationale: Enhanced food supplies and winter survival have led to a mid-continent snow goose population exploding by 5% annually in recent years. Their numbers now far exceed the carrying capacity of their summer breeding range in the Arctic tundra of northern Canada. Consequently, the birds are causing extensive, long-term damage to tundra vegetation and soils, taking a toll on the entire ecosystem. The targeted numbers for DeSoto correspond to approximately a proportional reduction from recent peaks at the refuge. Through close monitoring, caution will be taken not to *drive snow geese out of the refuge altogether. Snow geese flocks every fall, after all, are DeSoto NWR's most spectacular wildlife phenomenon.*

Strategies:

1.2.1.1 Reduce acreage of cropland in increments down to 475 acres (from about 1990 acres in the year 2000) by 2015, in accordance with habitat management objectives, to reduce attractiveness of DeSoto as a feeding station.

1.2.1.2 Until overall population objective is achieved, increase number of snow geese harvested by at least 500% from the 1999 take of 60 birds through a guided hunt, larger bag limits, and use of liberalized hunting measures, in accordance with relevant laws. *Rationale for guided hunt: these are better received by the public than an open hunt, in addition to having a higher success rate.*

1.2.1.3 Until overall mid-continent population target is achieved, allow for greater access by visitors to concentrations of snow geese, reducing the sense of sanctuary they obtain in the refuge, in order to help destabilize and disperse them.

1.2.1.4 Intensify participation in public education campaign that communicates there are too many snow geese for their own good and the good of their tundra habitat and fellow Arctic wildlife. DeSoto and other Central and Mississippi Flyway wildlife refuges can play a key role in returning the snow goose population to an ecologically sustainable level.

1.2.1.5 Monitor the flock(s) very closely on a daily basis when snow geese are passing through DeSoto, to evaluate stress levels and avoid excessive disturbances.

1.3 ***Goal: Monitor the health, viability, and size of fish and wildlife populations on the refuge with enough accuracy to detect significant changes and take appropriate management actions.***

1.3.1 **Objective:** Obtain annual peak population counts and use days for bald eagles, snow geese, other waterfowl, piping plovers, interior least terns and other key species, as outlined in the Wildlife Inventory Plan. Ascertain nesting status of plovers and terns.

Rationale: Accurate information on wildlife populations and trends is a critical element of wildlife management and decision-making. Yet as the Fish and Wildlife Service Manual (Part 620 on habitat management practices) states: "The collection of survey data is usually so time-consuming that it is only worthwhile if the results have long-term significance. Survey data are useful only if the method of collection is clearly defined and repeatable and the methods are consistent. Too often, surveys are conducted in a haphazard manner and count or measure parameters of little significance to key species objectives."

Strategies**:**

1.3.1.1 Utilize procedures identified in the Wildlife Inventory Plan.
1.3.1.2 Strive to maintain consistency between survey methods; utilize the most efficient, state-of-the-art technologies and methods available.
1.3.1.3 Maintain a high level of disease monitoring of waterfowl and readiness to deal with a major outbreak.
1.3.1.4 Closely monitor any encroachment by non-native wildlife species to be able to effective implement control measures promptly.
1.3.1.5 Document the utilization of different habitats by key species to better predict effects of future natural and induced habitat changes on populations.
1.3.1.6 Conduct breeding bird surveys on an annual basis.
1.3.1.7 Revise Wildlife Inventory Plan every five years or as necessary.
1.3.1.8 Utilize skills and knowledge of local qualified volunteers to update the 1985 DeSoto bird list and inventory of avian populations within and around the refuge.

1.4 ***Goal: Augment opportunities on the refuge for nesting, resting and foraging of non-game and Trust bird species, in particular those songbird and neotropical species listed in Region 3's*** **Resource Conservation Priorities,** ***by gradually reverting cropland into other more natural habitats.***

1.4.1 **Objective**: Increase opportunities for woodland-dependent species such as the wood thrush, ovenbird, northern oriole, ruby-throated hummingbird, and American redstart by increasing woodlands from 3345 acres in 2000 to approximately 3700 acres by 2015.

Rationale: A number of woodland-dependent, migratory songbirds are rare or declining as a result of insufficient or fragmented habitat, both in their North American nesting grounds as well as in their wintering ranges in Mexico, Central America, the Caribbean, or South America. Protecting, restoring and

managing suitable habitat is one of the principal strategies for attaining more abundant populations of these birds.

Strategies:

1.4.1.1 Revert selected croplands to managed woodlands in such a manner as to maximize size of woodland blocks and minimize edge effect and fragmentation. Sites contiguous with existing woodlands would receive highest consideration.

1.4.1.2 Grasslands that require constant intervention to prevent succession to woodlands should be considered for reversion to woodlands.

1.4.1.3 Utilize a combination of natural or passive reforestation and active regeneration as appropriate. When planting or seeding, use species of native trees, shrubs and herbs that offer high habitat value to key species.

1.4.1.4 Add two seasonal field technicians to assist with restoration (0.7 FTE).

1.4.1.5 Update Forest Management Plan every five years.

1.4.2 Objective: Increase opportunities for grassland-dependent species such as the grasshopper sparrow, Henslow's sparrow, dickcissel, bobolink, eastern meadowlark, and loggerhead shrike by increasing grasslands from 1642 acres in 2000 to approximately 2780 acres by 2015. Maintain all native tall grass prairie species, including forbs, in a healthy, vigorous condition to increase overall biodiversity, indigenous bird nesting, and soil conservation.

Rationale: A number of grassland-dependent, migratory songbirds are rare or declining as a result of insufficient or fragmented habitat, both in their North American nesting grounds as well as in their wintering ranges in Mexico, Central America, the Caribbean, or South America. Protecting, restoring and managing suitable habitat is one of the principal strategies for attaining more abundant populations of these birds.

Strategies:

1.4.2.1 Revert selected cropland units, as designated in the cropland and grassland management plans, to managed cold and warm season grasslands, so that grassland blocks are maximized, and edge effects and fragmentation minimized. Sites contiguous with existing grasslands would receive highest consideration.

1.4.2.2 Study soil types and unit history to determine best mix of grassland species and seed application rates on any given unit. Use appropriate mixes of native tall grass prairie grass and forb species indigenous to this locality to re-seed areas and re-establish healthy stands, utilizing proven methods of site and seedbed preparation and planting.

1.4.2.3 In compliance with applicable Nebraska and Iowa burning laws, employ prescribed burns in the early spring or fall to help control encroaching woody vegetation and invasive exotics, release nutrients, and reinvigorate native, fire-dependent grasses.

1.4.2.4 Conduct haying, mowing, prescribed burns, and all other habitat management practices, so that nesting and reproduction are interfered with as little as possible.

1.4.2.5 Add one seasonal (4-month) field technician to assist with grassland restoration (0.35 FTE).

1.4.2.6 Update DeSoto Grassland Management Plan as needed, but no less frequently than every five years. Incorporate changes in management practices into the plan.

1.4.3 Objective: Increase opportunities for wetland or wet meadow-dependent species such as the sedge wren, American woodcock, rails, waterfowl, and to some extent, shorebirds and wading birds, by increasing wetlands through restoration from 101 acres in 2000 to 115 acres by 2015.

Rationale: Regionally and nationally, the area of wetlands has been reduced drastically over the past century. As a direct result of habitat loss, many wetland-dependent species are rare or declining. Wetland losses are due to a combination of draining, dredging and filling by agricultural, industrial and land development interests. At DeSoto, emphasis is on restoring wetland characteristics to low-lying sites that are believed to have been wetlands historically rather than creating new artificial wetlands out of uplands. Such sites are more likely to be low-maintenance and sustainable over the long run. The relatively modest increase of 14 acres targeted over the next 15 years represents the maximum acreage obtainable using this approach.

Strategies:

1.4.3.1 Utilize GIS in conjunction with field inspections and surveying to determine best location for new units.

1.4.3.2 Investigate sites where a modest amount of excavation to lower the grade could restore wetlands.

1.4.3.3 Switch from labor-intensive mobile mechanical water pumps to fixed-site electrical or diesel power wellheads.

1.4.3.4 Manipulate water depths to benefit targeted wildlife species and control aquatic plant growth – per Wetland Management Plan.

1.4.3.5 Update Wetland Management Plan every five years.

1.5 ***Goal: Manage refuge croplands in a manner compatible with refuge purpose, mission, and identified wildlife habitat needs. Ensure that cropland acreage is at the minimum necessary to accomplish habitat and wildlife food objectives.***

1.5.1 Objective: Continue phased reductions in acreage of cropland on refuge from 1989 acres in 2000 down to 475 acres by 2015.

Rationale: In an effort to provide on-refuge food sources for migrating geese and ducks and economic benefits to the surrounding community and refuge system (via inter-elevator grain transfers), in the 1960s and 1970s the acreage of farmland on DeSoto NWR was expanded to the point where it encompassed almost half the area of the refuge. Now the situation has changed. There are too many, not too few, snow geese. Moreover, years of observation have revealed that most waterfowl feeding is done off-refuge anyway. Refuge

management now believes that, because DeSoto Lake is the primary attractant, the refuge will still serve as a temporary stopover and sanctuary for migrating waterfowl. Finally, reversion of cropland to more natural habitats will help Federal trust species, particularly those Region 3 non-game birds listed as "conservation priorities," that are dependent on native grasslands, woodlands, and wetland habitats.

Strategies:

1.5.1.1 To minimize impact on participating farmers, continue current practice of phase-outs through voluntary attrition of participating farmers. Nevertheless, keep all participants advised that their leases are short-term and will eventually be phased out.

1.5.1.2 Utilize the refuge cropland evaluation matrix (Appendix I, which rates the value of all cropland units as such) to decide the order of phase-out and which specific units should remain as cropland.

1.5.2 Objective: Manage 475 acres of cropland (6% of the refuge's total acreage) in a biological crop rotation which includes corn, soybeans, sweet clover, winter wheat and milo.

Rationale: Refuge habitat and adjoining private cropland will benefit by the refuge maintaining a portion of land in crops commonly grown in the Missouri River valley. This is needed for foraging activity by resident wildlife, particularly white-tailed deer. The refuge currently supports a white-tailed deer population of 330 to 380 animals (e.g., 30-35 deer per square mile). University and USDA deer biologists, with extensive research experience at DeSoto, have stated this population will not likely change significantly whether or not crops are grown within the refuge. The refuge is still within an agricultural landscape capable of supporting 30 to 35 deer per square mile or more regardless of the agricultural component within the refuge. Eliminating refuge cropland will increase browsing of other refuge habitat, particularly in the winter, and cause crop depredation along refuge boundaries during the summer growing season. The result will be a browse line and suppression or loss of some plant species due to preferential foraging, altering biological diversity within the refuge's timber understory. Also, adjoining landowners and farmers will suffer economic damage to their crops.

White-tailed deer consume an average of 2.2 lbs. of forage per animal per day. Crops, when available, compose up to 80 or 90 percent of the daily intake. The winter bottleneck (i.e., first killing frost in the fall to the last killing frost in the spring) is the most critical season relative to energy demand experienced by deer, increasing the intensity of their feeding activity on available forage. Some cropland needs to be maintained within the refuge to entice deer foraging away from non-cropland habitats during the winter to the greatest extent possible, and minimize summer foraging in crops along the refuge boundary. Accomplishing this will require 140 to 185 acres of crops strategically distributed throughout the refuge.

Additional crop acres will be needed to support the snow goose hunting program per Goal 1.2. The DeSoto staff's experience with snow geese feeding in refuge corn fields indicates geese will readily land and forage in corn fields as small as 25 acres provided the adjoining vegetation consists of other crops or grasslands, but not timber. Fields can be configured to maximize attractiveness to snow geese. The snow goose hunting program requires a minimum of three crop management units of 75 acres each totaling 225 acres.

Crop acreage can likely be reduced from 1989 acres to 475 acres without affecting Goals 1.2 or 1.9. Monitoring for habitat degradation due to excessive deer browse, by using exclosures in areas of high deer density, can provide insight for additional reduction in crop acres. All cropland will be managed as a 3-year biological crop rotation per U.S. Fish and Wildlife Service Refuge Manual under cooperative farming agreements with local farmers.

Strategies:

1.5.2.1 Select for management those units which have the highest intrinsic value as cropland (according to evaluation matrix), particularly those which have the greatest value for migratory waterfowl and research and extension purposes.

1.5.2.2 Continue annual cooperative farming agreements with local farmers to provide share-crop grain for wildlife and prepare refuge lands for reversion to grasslands.

1.5.2.3 Monitor utilization of croplands by all wildlife species to assess habitat benefits/costs of maintaining some refuge acreage in crops.

1.5.2.4 By means of seminars, workshops, conferences and publications, as well as one-on-one contacts, communicate results of research on low-input farming to agricultural extension agents, university agricultural departments and individual farmers.

1.5.2.5 Update Cropland Management Plan every five years.

1.6 ***Goal: Enhance the survival of indigenous threatened and endangered species.***

1.6.1 **Objective**: Maintain and enhance riparian habitat for **bald eagles** during the fall/winter seasons, in particular tall cottonwoods that stand out above the forest canopy and provide a view of the lake and the river, or other trees with snags, within 100 yards of the shoreline and at least 100 yards from intensive human disturbances (e.g. agricultural operations, roads, heavily used trails).

Rationale: While there is some disagreement among biologists as to the degree of disturbance from manmade structures, moving cars, or humans on foot bald eagles will tolerate at nest and roost sites, there is widespread consensus on the value of large trees with snags or exposed limbs located near water. Even though the Service may soon remove the bald eagle from the threatened list, its welfare will continue to be a special interest at the refuge.

Strategies:

1.6.1.1 Manage riparian forests to ensure survival of older cottonwoods and encourage

regeneration of these trees in designated areas.

1.6.1.2 Plan and manage people activities, projects, and facilities to minimize potential disturbances to areas of concentrated eagle utilization.

1.6.1.3 Manage DeSoto Lake's physical characteristics and water quality in a manner to be attractive to waterfowl and supportive of ample fish biomass; waterfowl and fish are major food sources for bald eagles.

1.6.2 Objective: Maintain approximately 40 acres of sand beaches and sandbars that have historically been attractive nesting environments for **least terns** and **piping plovers.**

Strategies:

1.6.2.1 Disc Sandbar Chute (about 35 acres) annually to prevent encroaching vegetation and maintain approximately 1,800 lineal feet (about 5 acres) of the former north beach in a sandy state..

1.6.2.2 Respond to and comply with any applicable conditions of species recovery plans.

1.6.2.3 Consult with specialists in the Service and other sources to obtain expert guidance on habitat requirements of the terns and plovers.

1.6.3 Objective: Identify any habitat restoration sites on the Missouri River within the boundaries of the Refuge, where modifications to an existing stream structure or shoreline may provide potential habitat for the **pallid sturgeon**, **sturgeon chub** and **sicklefin chub**.

Rational: Fisheries biologist have evidence that suggests that side-channels and scour holes with low velocity flows in the Missouri River *are attractive to these and other riverine species. Such areas can be created by modifying existing in-stream structures to divert sufficient flows into currently protected low areas. The Service's 2000 Biological Opinion on Missouri River Operations has recommended there be 30 acres per mile of this type of habitat*.

Strategies:

1.6.3.1 Consult with fisheries biologists to determine the characteristics of such potential sites.

1.6.3.2 Search for candidate sites along the river within the refuge boundary. One such site (though not within the Refuge boundary) might be Wilson Island Chute which is proposed to be studied as a possible high water outlet for DeSoto Lake in Goal **1.7** below.

1.6.3.3 Consult with the U.S. Army Corps of Engineers on the feasibility of implementing restoration on any candidate sites that might be identified.

1.6.3.4 Prepare a project plan for any sites that are determined to be feasible and submit for approval and funding for implementation.

1.7 ***Goal: Manage DeSoto Lake so that it makes the highest possible contribution to the Refuge's mission to "...preserve and restore indigenous biological communities..."***

1.7.1 Objective: Initiate by September, 2002, a comprehensive study to thoroughly examine the fish and wildlife benefits, with emphasis on trust resources, of the existing oxbow lake compared to the potential benefits of a lake reconnected to the Missouri River.

Rationale: DeSoto Lake is both a natural and manmade creation. The Missouri River originally fashioned DeSoto Bend, an oxbow on the river, in the natural fluvial process of meandering back and forth across its floodplain. The U.S. Army Corps of Engineers constructed a levee that cut off DeSoto Bend from the river in 1960 – forming an oxbow lake – as part of its larger re-engineering and realignment of the Missouri, for the sake of navigation, flood control, and reclamation. In keeping with basin-wide, inter-jurisdictional efforts at restoring wildlife and fisheries habitat on the river, it is worth examining closely the costs, benefits, and risks of reconnecting DeSoto Lake to the Missouri River.

Strategies:

1.7.1.1 Using an interdisciplinary team of experts, develop a decision matrix that compares critical biological properties and the probable aquatic community composition under each scenario. Examine how those factors relate to such trust resources as waterfowl, herons and other wading birds, pelicans, and cormorants; and to public use opportunities such as wildlife observation and recreational fishing.

1.7.1.2 Consult with Service engineers and biologists, the U.S. Army Corps of Engineers, and other sources of expertise in the areas of hydrology, hydraulics, sediment transport, floodplain management, and fish and wildlife management to develop a hypothesis on the predicted natural succession of each scenario.

1.7.1.3 Study environmental impacts and costs of alternative configurations of dikes/levees, inlet and outlet structures, and physical division of lake into two or more compartments.

1.7.1.4 Thoroughly examine the implications of reconnection on: Missouri River navigation, future habitat conditions of DeSoto Lake, future habitat conditions and opportunities throughout the refuge, and impacts on refuge facilities (in particular the Visitor Center), public use, Wilson Island State Park, and adjacent private lands.

1.7.1.5 Prepare a Refuge Operations Needs (RONS) project to implement a development/management program that supports the preferred scenario.

1.7.2 Objective: **Unless or until a decision is made in the future to reconnect DeSoto Lake with the Missouri River,** maintain its present size (788 acres) and configuration (shape and depth profile) in order to conserve this valuable aquatic habitat as a unique oxbow lake (jointly created by nature and man) indefinitely.

Rationale: Until a decision has been made on the advisability of reconnecting the lake to the Missouri River in some manner, it is important to conserve and enhance the existing features of this oxbow lake for fisheries, waterfowl, aesthetics and recreation. While the natural process of lake succession would ultimately lead to the filling-in of DeSoto Lake over a period of decades or

centuries with sediments and organic matter, refuge management will attempt to arrest this process at the current stage of succession in order to pursue DeSoto NWR's primary purpose and mission as a sanctuary for migratory waterfowl.

Strategies:

1.7.2.1 Conduct an engineering study of the most feasible, affordable methods of reducing agricultural runoff carrying silt and contaminants into the lake. These may include diversion of one or more channels into Wilson Island chute or the Missouri River, sediment traps, small detention basins, etc.

1.7.2.2 Continue armoring lakeshore with riprap where appropriate, to prevent bank erosion, which causes turbidity and reduces lake depth.

1.7.2.3 If lake depths decrease to unsatisfactory levels, or if shoreline encroaches as a result of ongoing sedimentation, consider dredging portions of lake in a phased fashion over the long-term to maintain depth, size, volume and lacustrine character of DeSoto Lake.

1.7.3 Objective: Maintain or improve water quality in DeSoto Lake by raising dissolved oxygen, reducing turbidity and sedimentation, reducing eutrophication from nutrients and organic compounds, and reducing toxins (primarily pesticide residues) in the water column and lake sediments.

Rationale: Clear, clean, well-oxygenated water is both helpful to fish and wildlife and aesthetically attractive to people. Excessive turbidity and low oxygen levels have both been problematic at one time or another over the years. Turbidity, caused primarily by bottom fish stirring up and resuspending sediments and secondarily by drainage ditch inflows, is believed responsible for the virtual disappearance of submerged and emergent aquatic vegetation from DeSoto Lake. (In the 1980's, for several years after the lake's renovation, water clarity was excellent and vegetation covered an estimated 700 acres of the lake bottom.) In turn, the loss of aquatic vegetation has harmed the lake's habitat structure and reduced dissolved oxygen levels. Low dissolved oxygen has been responsible for fish kills, which are now prevented by an artificial aeration system installed in 1985.

While there is some evidence from recent monitoring that water quality in DeSoto Lake may be improving (decline in algal populations and more favorable nitrogen to phosphorus ratios), it is still considered eutrophic. Furthermore, the presence of upstream agricultural land uses and such practices as spreading sewage sludge on lands within the drainage basin suggest a need for continual vigilance and monitoring.

Strategies:

1.7.3.1 Experiment with various methods for improving lake habitat structure for sport fish and improving water quality, such as re-establishing stands of submerged and emergent vegetation in designated sites.

1.7.3.2 Maintain existing aeration system (which includes 16 helixers) and utilize as needed to bolster dissolved oxygen levels.

1.7.3.3 Continue to communicate water quality concerns to all parties involved with non-point and point sources of pollution in the DeSoto Lake drainage basin, as well as recognize some wildlife conservation practices may also contribute to degradation of DeSoto Lake water quality.

- Reduce snow goose use of DeSoto Lake per Goal 1.2.
- Educate and encourage local farmers, generators of biomass waste (grain processing and sewage treatment plant byproducts), and land treatment contractors to use optimum crop fertilization practices (i.e. avoiding excessive fertilization) and land treatment techniques to reduce nutrient loading of cropland soils and off-target movement of nitrogen and phosphorus.

1.7.3.4 Carry out water quality monitoring at regular intervals in cooperation with local colleges or other qualified personnel. Monitoring should be carried out according to a sampling procedure identified in the DeSoto Lake Monitoring Plan, which will identify parameters to be monitored, locations, and frequency. Parameters monitored include at a minimum dissolved oxygen, orthophosphate, total phosphate, chlorophyll A, nitrates, ammonia, and organic nitrogen. Periodic sampling may also be conducted for pH, turbidity, BOD (biochemical oxygen demand), and pathogens (i.e. total and fecal coliform bacteria). Additionally, occasional sampling of the water column, bottom sediments, or fish tissue may also be conducted for selected toxic organic compounds (e.g. pesticides, PCBs), heavy metals (e.g. lead, mercury, cadmium, selenium), and any new substances of concern that may appear on the scene (e.g. endocrine disruptors).

1.7.3.5 Update DeSoto Lake Monitoring Plan every five years or more frequently if needed.

1.7.3.6 Assist Natural Resource Conservation Service and Extension programs encouraging establishment and maintenance of filter strips along ditches within the DeSoto Lake drainage area. This will reduce the transport of sediment from privately held cropland into these ditches and eventually DeSoto Lake.

1.7.4 Objective: Improve ability to manipulate DeSoto Lake water level from a minimum elevation of 986.5 ft. msl to a not-to-exceed level of 989.5 ft. msl. These elevations are consistent with bank protection and access to facilities.

Rationale: The ability to regulate the lake's water level seasonally is crucial to it's being able to serve different functions. Excessive lake levels in the summer months sharply interfere with fishing, boating, certain parking lots and use of lakeside trails. Fall drawdown is made to provide for waterfowl use, growth of littoral vegetation, and enhance predation on forage fish. Full pool elevations in winter are needed to reduce the probability of fish winterkills. Early spring drawdown is made to accommodate spring runoff from the refuge's contributing drainage area. At present, the ability to regulate water level is seriously limited both by Missouri River water levels, governed by releases from Gavins Point Dam upstream, and inflows from four drainage ditches carrying water from the

approximately 12,000 acres of largely agricultural lands in the watershed.

Strategies:

1.7.4.1 Study the possibility of modifying the lake outlet structure. (The existing outlet can only lower the lake level by 0.5 inch per day.) However, the function of any structure, regardless of design will likely be reduced when the Missouri River is higher than the lake.

1.7.4.2 Conduct a feasibility/engineering study evaluating opening Wilson Island chute and installing a water control structure in its lower end. Since the river is somewhat lower at the chute outlet downstream, this could potentially lower DeSoto Lake more than a larger outlet at the existing structure site.

1.7.4.3 Conduct a feasibility and cost study of re-routing lake inflows from the agricultural drainage ditches – Young, Rand, Cutoff, and Brown's – directly into the Missouri River, bypassing DeSoto Lake.

1.8 ***Goal: Control and reduce the presence of exotic, invasive, and nuisance species of plants and animals on the refuge.***

1.8.1 **Objective**: Over time, gradually reduce the presence of non-native or undesirable plants on the refuge, as measured by extent of acreage or habitat infested, severity of infestation, numbers of exotic or undesirable species, and estimated population sizes. For most problematic species, aim for 50% reduction in acreage infested in year 2000 by the year 2015.

Rationale: Control of exotic plants is a long-term challenge. Methods used will depend on particular species, severity of impact, and overall circumstances. Currently these plant species include common reed, purple loosestrife, musk thistle, Chinese elm, and roughleaf dogwood. Roughleaf dogwood, while a native species, so thickly dominates the forest understory that it may be choking out other more desirable species, such as the cottonwood. Even though Eurasion water millfoil has not been observed on the refuge it will be monitored.

Strategies:

1.8.1.1 Utilizing GIS (Arc-View) technology and visual field inspections, establish the year 2000 baseline against which to measure future levels of infestation. Develop a plot or grid system for assessing the magnitude of the problem using GIS technology.

1.8.1.2 Design a monitoring protocol incorporating most appropriate means of measuring or estimating infestation; this may use transects, plots, or some other sampling method, since it is not feasible to survey each and every acre. This "Invasive Species Monitoring and Control Plan" should be updated every five years, or less frequently, as appropriate.

1.8.1.3 Use appropriate integrated pest management techniques such as prescribed burning, judicious use of safe herbicides, mechanical controls and biological controls in a discriminating manner. Avoid making "the cure worse than the disease."

1.8.1.4 Involve volunteers, both individuals, and groups such as Boy Scouts, Girl Scouts, and local school classes, in habitat enhancement days. Under appropriate supervision, such groups can provide substantial labor in removing certain weedy species.

1.8.1.5 Fire is an important weapon in the arsenal for fighting weedy species. It will be used in compliance with local and state laws, in conjunction with habitat management efforts, and in such a manner as to avert any collateral damage.

1.8.1.6 Continue active monitoring to be able to: a) detect invasions promptly and prevent alien plants from becoming established, b) take preventive measures, and c) exercise damage control at an early stage of infestation.

1.8.1.7 Prepare and implement an invasive species monitoring and control plan.

1.8.2 Objective: Detect, monitor, report and control non-native, invasive, undesirable, or nuisance terrestrial and aquatic animal species before they become established on the refuge.

Rationale: Although non-native animal species are not a significant problem on DeSoto NWR at present, threats are looming on the horizon, such as the zebra mussel, that will require vigilance. Certain native wildlife, such as the cowbird, might someday require control because of their adverse effects on other priority species (in the case of cowbirds, parasitism of nesting songbirds).

Strategies:

1.8.2.1 Actively communicate with other state and federal resource agencies, as well as non-governmental conservation organizations to stay abreast of emerging exotic threats, as well as management strategies and techniques.

1.8.2.2 Coordinate control strategies with Regional Office and other state and federal agencies.

1.8.2.3 Prepare and implement an invasive species monitoring and control plan.

1.9 ***Goal: Manage the size of the white-tailed deer herd on the refuge through controlled hunts to minimize over-browsing and complaints of crop damage while continuing wildlife-dependent, compatible uses of hunting and wildlife observation.***

1.9.1 Objective: Maintain a refuge deer herd at a post-hunt January population of 330 to 380.

Rationale: According to University of Nebraska deer biologists, 30-35 deer per square mile is the approximate carrying capacity of the kind of habitat found at DeSoto NWR. Thus, given the refuge's 12.2 square miles, 330 to 380 is considered a reasonable range for a sustainable winter population.

Strategies:

1.9.1.1 Continue muzzle-loader and archery hunts. Consider disabled and youth hunts.

1.9.1.2 Issue a specific number of permits, set length of season commensurate with need, and define method of take necessary to control population size.

1.9.1.3 Monitor size of herd through annual aerial survey and spotlight survey.

1.9.1.4 Monitor for signs of habitat damage such as browse lines and crop depredation on adjoining private land.
1.9.1.5 Evaluate health of animals and herd using standard techniques at hunter check stations.
1.9.1.6 Update sections related to deer of Refuge Hunting Plan every five years, or less frequently, as appropriate.

1.10 ***Goal: Conserve cottonwood dominance in the canopy of DeSoto NWR riparian forests for wildlife habitat value.***

Rationale: Cottonwoods are valuable both for bald eagles (as perches) and for cavity-nesting birds and mammals such as wood ducks, screech owls, woodpeckers, and squirrels. The goal is not necessarily to establish stands that are pure cottonwood, but to have this species well-represented along with other trees like hackberry, silver maple and ash.

1.10.1 Objective: Through active management efforts, increase recruitment of cottonwood seedlings and saplings over the next 15 years. In 2025 the overstory of DeSoto forests should still be dominated by cottonwood.

Rationale: The year 2025 is chosen as a benchmark rather than 2015 because 25 years is a significant portion of a cottonwood's lifetime. If the strategies below are succeeding in maintaining cottonwood dominance, by 2025 it should be quite evident (whereas by 2015 it still might not be).

Strategies:
1.10.1.1 Experiment with controlled flooding of tracts to aid cottonwood germination and regeneration.
1.10.1.2 Experiment with selective thinning of rough-leaf dogwood or other understory species that may crowd out cottonwood saplings.
1.10.1.3 Plant cottonwood seedlings or saplings

1.11 ***Goal: Evaluate opportunities and needs to acquire additional lands that would enhance accomplishment of refuge goals and objectives.***

1.11.1 Objective: Evaluate the potential contribution to the CCP goals and objectives of adding approximately 1,100 acres of private land and 850 acres of public land adjacent to the refuge.

Rationale: Adjoining private and public lands could substantially contribute to the Service's mission of restoring lands to more natural conditions and preserving natural habitats. Acquisition of adjacent lands, or interests in those lands, by the Service might be an acceptable alternative for the owners.

Strategies:
1.11.1.1 Review and define possible opportunities to improve or expand refuge habitat restoration programs by extending refuge boundaries.
1.11.1.2 Prepare a preliminary project proposal for acquiring interest in lands from willing sellers to include fee title, or less than fee title, as appropriate.

.2. RESOURCE PROTECTION

Vision: *In order for DeSoto National Wildlife Refuge to achieve its purpose and mission, its natural and cultural resources must be protected. To the extent practicable, certain natural forces, both catastrophic disasters such as fire, flooding and tornados, and long-term processes like decomposition, weathering and erosion, will be controlled or mitigated to maximize the durability and life of valuable assets and irreplaceable artifacts. Finally, refuge facilities will be maintained in good operating condition to be safe for use by staff and visitors.*

2.1 ***Goal: Adequately protect all natural and cultural resources, staff and visitors, equipment, facilities, and other property on the refuge from those of malicious intent in an effective, professional manner.***

2.1.1 **Objective**: Employ two full-time Natural Resource Law Enforcement Officers and supplement their duty schedules with collateral duty officers.

Strategies:

2.1.1.1 Ensure that all officers are fully trained, equipped, and prepared to perform preventative refuge law enforcement duties. Officers should receive in-service training on a regular basis.

2.1.1.2 Maintain an adequate law enforcement presence on a daily basis to ensure that violations are deterred or successfully detected and the violator(s) apprehended, charged, and prosecuted; all Visitor Center security and fire alarms are answered in a timely manner; and all persons on the refuge are reasonably protected from illegal activity and unsafe conditions; obtain one additional FTE.

2.1.1.3 Review the Law Enforcement Plan; update as needed.

2.2 ***Goal: Maintain and preserve, in perpetuity, the entire* Bertrand *Collection and associated records*.**

2.2.1 **Objective**: Minimize effects of natural processes of deterioration and degradation of the *Bertrand* Collection.

Rationale: The Steamboat Bertrand *Collection is a national treasure. It comprises a unique time capsule of mid-nineteenth century objects and is the finest collection in the nation today. The Collection serves as a unique resource for national and international scholars, researchers, and historical interpreters. It is an unavoidable fact that the* Bertrand *Collection will deteriorate and degrade. Our purpose is to minimize and slow these processes as much as possible, to prolong the life of the collection.*

Strategies:

2.2.1.1 The programmatic agreement (PA) with the Advisory Council on Historic Preservation and the Nebraska and Iowa State Historic Preservation Officers has not been fully implemented due to shortages of staff and funds. The PA will be

revised in cooperation with those original parties to the agreement cited above. This will be done by 2003 to realistically reflect the Service's capabilities to preserve and maintain the *Bertrand* Collection.

2.2.1.2 Continue active conservation of *Bertrand* objects including condition surveys and treatments, as deemed necessary.

2.2.1.3 Control temperature, relative humidity, light levels, UV, and air quality in cargo storage areas to create uniform, stable environmental conditions at all times.

2.2.1.4 Upgrade storage conditions for *Bertrand* objects through replacement of acidified materials with new archival materials and encapsulation of individual objects.

2.2.1.5 Continually monitor, maintain, and upgrade environmental control and monitoring equipment as necessary. Work closely with refuge maintenance mechanic to ensure proper working condition of HVAC units.

2.2.1.6 Upgrade storage conditions for archival materials (paper and photographic) by removing acidic materials and rehousing objects.

2.2.1.7 Document condition of collection through continual monitoring and compile in annual reports.

2.2.1.8 Review and update "*Bertrand* Conservation Laboratory Safety Plan," "Disaster Preparedness Plan for the *Bertrand* Collection," and other management plans every two years and conduct plan familiarity and review workshops annually with refuge VC and LE employees.

2.2.1.9 Replace current Halon 1220 (an ozone-depleting gas), used in the fire suppression system with FM200, an environmentally-friendly product.

2.2.2 Objective: Maintain and expand documentation of *Bertrand* Collection and other closely associated topics.

Rationale: New information pertaining to the Steamboat Bertrand *and its cargo is constantly coming to light. This information should be actively gathered, curated, and made available to researchers. While maintaining and expanding documentation of the* Bertrand *Collection is important, priority must be given to maintenance and preservation of the Collection. Reflecting that priority, strategies under this objective will rely primarily upon non-museum staff for implementation. This can include other refuge staff, volunteers, cooperating organizations, and to some extent contractors.*

Strategies:

2.2.2.1 Continue research on the Steamboat *Bertrand*, its cargo and passengers, object manufacturers, consignors, and other associated topics.

2.2.2.2 Expand library holdings to include personal archives of individuals who have significant *Bertrand*-related research.

2.2.2.3 Expand *Bertrand* archives through reproduced or donated photographs, newspaper, and historic or other ephemera.

2.2.2.4 Transfer slide library into digital format to facilitate responding to research requests and in-house use.

2.2.2.5 Continue to catalog library holdings and create finding-aids for significant materials.

2.2.2.6 Upgrade *Bertrand* Collection management database to Re:discovery collections management software, the current standard for the FWS.

2.3 ***Goal: Provide for the safety of staff and visitors.***

2.3.1 Objective: Provide refuge facilities that are safe for public use through annual inspections and routine maintenance.

Strategies:

2.3.1.1 Administer and monitor required permits, licenses, and inspections on an annual basis under the Federal Facility Compliance Act and U.S. Fish and Wildlife Service policy.
2.3.1.2 Promptly replace, upgrade, or temporarily close any facility that through damage or long-term wear and tear compromises public safety.
2.3.1.3 Utilize temporary and permanent signage to inform public of any hazards.
2.3.1.4 Update Traffic Control Plan every five years.
2.3.1.5 Comply with the Crowd Control Plan, as outlined in the Law Enforcement Plan.

2.3.2 Objective: Through preventive measures, minimize injuries to staff and visitors, and be prepared to respond to injuries if they do occur.

Strategies:

2.3.2.1 Ensure that safety procedures, designated personnel, equipment, and supplies (e.g. first aid kits, fire extinguishers) are in place and kept current.
2.3.2.2 Conduct monthly safety meetings for DeSoto staff covering pertinent topics.
2.3.2.3 Train and refresh staff in CPR and first aid techniques.
2.3.2.4 Train selected personnel in boat operation.
2.3.2.5 Circulate annually, review and update refuge Safety Plan at a minimum of every two years.

3. PUBLIC EDUCATION AND RECREATION

Vision: *Furnish opportunities for outstanding, compatible, wildlife-dependent public use and recreation, including environmental education, interpretation, observation, photography, hunting, and fishing. Keep local communities and officials aware of refuge events and activities.*

3.1 ***Goal: Provide a variety of educational and interpretive opportunities for an increasing number and broad diversity of on-site visitors – including those from local communities, the region, the nation, and the world – about the natural and cultural resources of DeSoto NWR, the Lower Missouri River ecosystem, and the mission of FWS.***

3.1.1 Objective: Attract an increasing number of visitors by providing high-quality interaction with wildlife and nature, history and education. Aim to restore visitation so that it averages approximately 400,000 by 2015.

Rationale: In recent years, visitation at DeSoto NWR has declined appreciably, from a high of 473,000 in 1982 to approximately 263,000 in 1998. The earlier peak was realized during an era when the Visitor Center was a new regional attraction and when highly popular activities like swimming, water-skiing and high-speed boating were permissible on DeSoto Lake. These intensive uses were originally allowed because of commitments and compromises made at the time of the refuge's establishment. After a grace period, however, in the early 1980's, they were banned because of their essential incompatibility with the refuge purpose and mission. Nor are these uses wildlife-dependent, which is a new legal mandate for National Wildlife Refuges established by the National Wildlife Refuge System Improvement Act of 1997. Thus, several of the recreational activities that led to such high visitation figures are no longer permissible. Nevertheless, the refuge has the facilities and resources to support a moderate increase in public use over current levels, particularly if visitation can be increased at times other than the fall peak.

To some extent, the volume of visitation is influenced by external factors beyond the control of DeSoto managers, staff, and programs, such as weather and flooding of the river or the lake. In addition, it appears that the entrance fee system, implemented in 1987, caused a decline.

Strategies:

3.1.1.1 Provide interpretation for exhibits in the Visitor Center that is readable, up-to-date, factually accurate, and concise. Upgrade Visitor Center exhibits and texts as new techniques, technologies and interpretations become available.

3.1.1.2 Maintain Visitor Center audio-visual equipment using appropriate technology and keep it in workable condition. Review, remodel, and upgrade systems and messages as needed.

3.1.1.3 Provide visitor-interactive computer media in Visitor Center for the topics of "*Bertrand*" and "DeSoto activities."

3.1.1.4 Provide special exhibits and programs in the Visitor Center on regional natural history and cultural events, endangered plant and animal species, and the U.S. Fish and Wildlife Service's conservation mission.

3.1.1.5 Provide facilities and space in the Visitor Center for the Midwest Interpretive Association to sell educational and interpretive materials about the region and its natural history, and utilize profits to enhance DeSoto's interpretive programs.

3.1.1.6 Provide changing special exhibits in the multi-purpose room of the Visitor Center to encourage return visitation. Actively solicit loans of informative, graphic, and artistic materials from artists, photographers, museums, parks, other refuges, and institutions.

3.1.1.7 Maintain wayside exhibits along refuge roads and two trail fliers that answer principal questions people ask about refuge resources.

3.1.1.8 Provide personal interpretation using paid or volunteer staff in instances where

groups require special guidance, and where written interpretation alone is not adequate.

3.1.1.9 Develop interpretive and educational opportunities for an increasingly culturally diverse clientele. This includes bilingual, English-Spanish, printed and electronic interpretive aids of U.S. Fish and Wildlife Service and refuge information sources. Information sources could include U.S. Fish and Wildlife Service mission, refuge public-use regulations, interpretive pamphlets, interactive video display(s), and website.

3.1.1.10 Revise the RONS to add one full-time custodian, one museum technician and one environmental education specialist to the Visitor Center-based staff (3.0 FTE's).

3.1.2 Objective: Provide environmental education opportunities in the form of tours and written materials to a minimum of 8,000 school children annually, so they know of DeSoto's significance in the Central and Mississippi Flyways, the Missouri River watershed, and the Lower Missouri River ecosystem.

Rationale: Environmental education is one of the six primary, wildlife-dependent public uses of National Wildlife Refuges. There is a large school-age population within one hour of the refuge, including K-12 schools in Omaha.

Strategies:

3.1.2.1 Respond promptly and courteously to requests for tours.

3.1.2.2 Continually welcome teachers to encourage their colleagues to bring their classes to the refuge.

3.1.2.3 Existing written materials are dated; revise lesson outlines within two years of the approval of this CCP.

3.1.2.4 Utilize cadre of trained volunteers to provide tours.

3.1.2.5 Contact schools alerting them to refuge's facilities, resources and educational opportunities by means of fliers or letters to individual teachers. In the higher grades, science and history teachers should be targeted.

3.1.2.6 Develop written agreements with schools to provide more in-depth teacher training and internship opportunities.

3.1.3 Objective: Provide each refuge visitor with a variety of educational opportunities to learn about the history of the Steamboat *Bertrand*, its cargo, and its larger significance.

Rationale: Not all visitors learn in the same manner. Providing several different types of interpretation, aimed at difference levels, will increase the number of on-site visitors who grasp the basic significance of the Steamboat Bertrand *and its cargo.*

Strategies:

3.1.3.1 Through continued efforts and upgrades as necessary, interpret the *Bertrand* Collection at the Visitor Center through a variety of engaging media and exhibits in such a manner as to increase visitation and encourage repeat visitation. Expand interpretive themes to emphasize role of steamboats (and later, railroads,

which run very close to the refuge) in initial Westward expansion and subsequent, irreversible ecological and cultural impacts (e.g. decimation of bison herds and Native American way of life; wildlife impacts of engineering the Missouri River for the sake of navigation, irrigation, flood control, lake recreation, and power generation).

3.1.3.2 Increase availability of books and other related materials on the *Bertrand* at the Midwest Interpretive Association facility in the Visitor Center.

3.1.3.3 Upgrade trail, bridge, boardwalk, and parking area at the *Bertrand* Excavation
Site. Add additional interpretive signage along trail about the *Bertrand*, the Missouri River, and its impact on steamboating.

3.1.3.4 Create new educational materials focused at three separate levels of sophistication (primary, middle and high school) to tell the *Bertrand* story and associated history.

3.1.3.5 Edit the rough areas and improve overall quality of touch-screen kiosk program.

3.2 ***Goal**: Provide and maintain a variety of sites and facilities, at a number of locations throughout the refuge, that encourage visitors to observe and photograph wildlife and other refuge resources and features, from their vehicles or on foot.*

3.2.1 Objective: Provide and maintain viewing and interpretive facilities and opportunities directed specifically at motorists and users venturing short distances from their vehicles.

Strategies:

3.2.1.1 Maintain the Visitor Center in top condition, by keeping windows clean and clear, spotting scopes and binoculars in working order, signage functional and informative, and encroaching outside vegetation pruned back to not interfere with viewing.

` 3.2.1.2 Maintain Bob Starr Wildlife Overlook in good condition.

3.2.1.3 Maintain Missouri River overlook and signs in good condition.

3.2.1.4 Provide at least six locations from which motorists can see DeSoto Lake without having to venture far from their autos.

3.2.1.5 Maintain all roads and signs so visitors can explore the refuge easily and find its major attractions.

3.2.1.6 Provide and maintain wildlife viewing overlooks so professional photographers and other visitors can observe the waterfowl without disturbing them.

3.2.1.7 Continue to provide a seasonal auto-tour route, with accompanying brochure, that interprets refuge resources and management practices. On an annual basis, consider appropriate expansions of auto-tour length and dates.

3.2.1.8 Provide boating facilities, such as ramps, so visitors can see and experience wildlife, signs of wildlife, and the natural environment from the vantage point of DeSoto Lake itself.

3.2.1.9 Maintain sufficient picnic tables on the refuge and provide for trash pickup.

3.2.1.10 Monitor wildlife-dependent recreational programs to ensure minimal disturbance to refuge wildlife populations.

3.2.1.11 On January 1, 2001, the price of a DeSoto annual pass rose from $10 to $15.

(Daily fees remain unchanged.) At a minimum of once every five years, evaluate the refuge entrance fee to determine if it should be lowered, raised, or left unchanged.

3.2.2 **Objective**: Maintain four, 6 to 8 foot-wide mowed or paved walking interpretive trails, which are debris and litter-free. These include the Missouri Meander Trail, Wood Duck Pond Trail, Cottonwood Trail, and Bertrand Trail.

Rationale: These trails furnish the opportunity for more "adventuresome" visitors to leave their cars behind and plunge into the natural habitats of DeSoto. Two of these trails have an interpretive pamphlet and stations with small wooden, numbered posts corresponding to numbers on the pamphlet, explaining some facet of natural history or ecology. At present, due to the inability to adequately control water levels in the lake, one or more trails can be rendered inaccessible for extended periods due to flooding. If water levels in the lake could be lowered more readily, these facilities could be used to their potential.

Strategies:

3.2.2.1 Ensure that pamphlets are always available in holder.

3.2.2.2 Ensure that trailhead signs along roads are prominent.

3.2.2.3 If inability to lower lake levels continues to be a problem, consider placing boardwalks on trail segments that are regularly flooded or re-routing particular segments to higher ground.

3.2.2.4 Ensure at least one refuge trail complies with the Americans with Disabilities Act in respect to appropriate grade, width, paving, interpretation and benches.

3.3 ***Goal: Protect, restore, and manage sport fish habitat and populations in DeSoto Lake to provide quality recreational fishing opportunities for refuge visitors as long as the oxbow lake environment is maintained (See Objective 1.7.2).***

3.3.1 **Objective**: Provide 35,000 angler visits annually to DeSoto Lake over the next 15 years.

Rationale: Although sport fishery management may be considered a wildlife population program, its impetus at DeSoto is based on its value as a wildlife-dependent public recreation program. After the renovation of DeSoto Lake in the mid-1980s, the recreational sport fishery was substantially improved. For the last decade or more however, it has gradually declined to a comparatively mediocre level, in spite of substantial efforts on the part of refuge management and fisheries biologists to maintain the fishery by a variety of means. Refuge managers and fishery biologists believe that the lake is not performing at its productive potential, and that it may take rather drastic and expensive measures, such as lake renovation on a regular basis (once every 10 to 20 years) to restore a prime sport fishery to DeSoto Lake.

Strategies:

3.3.1.1 Monitor existing fish habitat structures in DeSoto Lake to determine extent

of use and future habitat enhancement requirements.

3.3.1.2 Continue existing stocking programs, using "adaptive management" and experimentation in cooperation with state and federal fisheries scientists to find what works best. Stocking will take place, as needed, for white bass, largemouth bass, black and white crappie, northern pike, walleye, catfish, and other suitable species.

3.3.1.3 Develop accurate map of DeSoto Lake bottom using GIS/GPS technology for use in future management decisions.

3.3.1.4 Undertake a renovation of the lake every 10 to 20 years, funds permitting. Such renovation may include use of approved chemicals and temporary drawdown to enable eradication of undesirable species and re-stocking of desirable species.

3.3.1.5 Continue experimenting with a variety of fish habitat enhancement techniques.

3.3.1.6 Maintain "no-wake" restriction on all power boats in lake to avoid shoreline erosion and resuspension of sediments, thereby reducing turbidity.

3.3.1.7 Implement additional size and harvest limit regulations of sport fish.

3.3.1.8 Add one additional summer temporary position to help manage recreational fishery (0.35 FTE).

3.3.2 Objective: Remove approximately 50,000 pounds of rough-fish (principally gizzard shad and buffalofish) from DeSoto Lake annually to reduce competition with sport fish.

Rationale: Harvesting the annual increase in biomass of rough-fish reduces competition for scarce space and resources with sport fish.

Strategy:

3.3.2.1 Continue current permits for commercial harvesting of rough-fish.

3.3.2.2 Promote sport angling for rough-fish.

3.4 ***Goal: Provide opportunities for compatible consumptive uses of natural resources such as hunting waterfowl and deer.***

3.4.1 Objective: Provide quality recreational hunting opportunities for white-tailed deer and waterfowl (as populations permit) to help maintain healthy wildlife populations. Measure quality through 1) informal interviews with hunters and/or responses to questionnaire developed to facilitate feedback, 2) number of participating hunters, and 3) stable or increasing annual harvests.

Rationale: Hunting is one of the six wildlife-dependent public uses of National Wildlife Refuges and an important game management tool.

Strategies:

3.4.1.1 See strategies for white-tailed deer at 1.9.1 and snow geese at 1.2.1.

3.4.1.2 As refuge pheasant, turkey, and small game populations permit, consider youth/mentor waterfowl and/or pheasant hunts, and waterfowl and/or wild turkey hunts for disabled constituents.

3.4.1.3 Consider increasing areas available to hunters.

3.4.1.4 Manage hunts to minimize conflicts with other uses and resources.

3.5 ***Goal**: To raise the profile and visibility of DeSoto National Wildlife Refuge locally, regionally and nationally by maintaining an active public affairs program that keeps local communities and officials aware of refuge events and activities.*

3.5.1 **Objective**: Provide at least 25 news releases annually to newspapers, radio and television stations in time for them to publicize events; respond to queries from researchers, writers, and news media in a timely manner so they may accurately write about the refuge and the U.S. Fish and Wildlife Service.

Rationale: Frequent news releases familiarize the news media with the existence of this newsworthy resource of national and international significance. In order to be covered by the news media, it is critical to be very timely in responding to queries or requests for interviews.

Strategies:

3.5.1.1 Maintain current list of newspaper, radio and TV station addresses, fax numbers and e-mail addresses.

3.5.1.2 Maintain current list of addresses, fax numbers, and e-mail addresses of reporters and editors at newspapers and producers at radio and TV stations. Update list continually because of rapid turnover in the news media. News releases are more likely to be read when addressed to individuals.

3.5.1.3 Cultivate relationships with reporters, which can help interest them in covering the refuge.

3.5.1.4 Consider holding news conferences on the refuge for particularly newsworthy or noteworthy events.

3.5.1.5 Report significant events to the Regional public affairs staff promptly, so they may become involved or provide follow-up information.

3.5.2 **Objective**: By 2002, implement additional means of publicizing the refuge using broadcast and electronic technologies.

Strategies:

3.5.2.1 Enhance refuge website from a static display to a dynamic display to provide current public use information.

3.5.2.2 Develop updated version of "Off the Beaten Path" video.

3.5.3 **Objective**: Participate actively in regional initiatives commemorating the national bicentennial of the Lewis and Clark expedition, which has particular relevance for DeSoto NWR, since the expeditioneers camped on what is now the refuge in August, 1804.

Strategies:

3.5.3.1 Develop or obtain educational materials such as brochures and audio-visuals for dissemination to visitors.

3.5.3.2 Invite speakers or develop program to present in the Visitor Center auditorium.

3.5.3.3 Seek exhibits that could be displayed in the Visitor Center multi-purpose room.
3.5.3.4 Prepare and send press releases highlighting connection between DeSoto NWR and the Lewis and Clark Expedition.
3.5.3.5 Encourage the Midwest Interpretive Association to stock publications and merchandise commemorating the expedition over the next 5-10 years.

4. PARTNERSHIPS

Vision: *Foster mutually beneficial partnerships with individuals, researchers, private land-owners, other governmental agencies, and non-governmental organizations that can help DeSoto management with manpower, funding and education assistance, as well as in pursuing our larger, long-term goal of conserving biodiversity in the Lower Missouri River Ecosystem.*

4.1 ***Goal: Augment DeSoto staff productivity through participation of volunteers in a variety of capacities at the refuge.***

4.1.1 **Objective**: Increase the number of volunteer hours by 50% above the year 1999 level of 4100 hours over the next ten years to serve both in the Visitor Center and around the refuge as interpretive and educational guides and in supervised habitat management projects.

Rationale: A dedicated corps of volunteers can significantly increase effects of refuge programming in a number of different areas, as well as foster positive interaction with the surrounding community and provide an additional pillar of support and pride.

Strategies:
4.1.1.1 Increase efforts at recruitment and training of volunteers through Visitor Center promotions, news releases, public service ads, the DeSoto website, and outreach to civic and educational groups.
4.1.1.2 Encourage formation of a "Friends of DeSoto" group that would serve as a nucleus for projects and provide organization and impetus for interested volunteers.
4.1.1.3 Create full-time volunteer coordinator position to pro-actively recruit, train, and mentor volunteers, and to work with supervisors to incorporate volunteers into all aspects of refuge programming (1.0 FTE).

4.2 ***Goal: Actively encourage and provide assistance and logistical support to qualified researchers to support ongoing cooperative investigations of long-term management importance to the refuge, such as lake management, renovation and water quality, Missouri River issues, habitat utilization by wildlife, snow geese population management, grassland ecology, sustainable agriculture, Steamboat*** **Bertrand** ***artifacts preservation, and so forth.***

4.2.1 **Objective**: Encourage utilization of the refuge for wildlife and land management research

by public and private institutions.

Strategies:

4.2.1.1 Prepare letter describing research opportunities at DeSoto for distribution to wildlife, natural resources, environmental engineering, and biology departments of universities in the region and around the country.

4.2.1.2 Promote DeSoto research opportunities in a number of other forums and media, including the DeSoto website, conferences, and presentations to college and university faculty/student meetings, Wildlife Society and Fisheries Society chapters, etc.

4.2.1.3 If available, provide temporary housing for researchers conducting projects on the refuge.

4.3 ***Goal: Increase acreage of new and restored privately-owned wetland and upland habitat within the 18-county management district of the DeSoto NWR Private Lands program. This involves actively providing technical assistance to private landowners and habitat-related interagency coordination with other state and federal agencies and non-governmental organizations.***

4.3.1 **Objective**: Within the 18-county management district, increase the acres of off-refuge wetland and upland restoration by 20%, from 358 acres in 1999 to 430 acres by 2015. Continue to provide technical assistance to private landowners, and increase efforts by 20% over the next 15 years.

Strategies:

4.3.1.1 Approach farmers directly or with personal letters describing program and benefits they could realize from participation.

4.3.1.2 Learn of potential participants through word-of-mouth.

4.3.1.3 Work closely with Natural Resources Conservation Service CRP staff and state agencies to identify feasible sites for restoration projects and to improve surface water runoff quality into DeSoto Lake.

4.3.1.4 Increase inter-agency coordination with regard to swampbuster violations, Wetland Reserve Program, Conservation Reserve Program and any other habitat-related concerns where the U.S. Fish and Wildlife Service can assist.

4.3.1.5 Continue to work with non-governmental organizations for matching funds to restore and enhance wetland and upland habitat.

4.3.1.6 Interpret success and opportunities of the Private Lands program.

4.3.1.7 Add summer temporary position to assist with program (0.35 FTE).

4.4 **Goal:** ***Seek opportunities to partner with federal, state, and local resource management agencies to develop ecosystem protection and restoration projects that complement the programs of involved partners.***

4.4.1 **Objective:** Arrange at least one roundtable discussion per year for partners and other stakeholders to share status reviews of ongoing ecosystem projects and involvements.

Strategies:
4.4.1.1 Maintain good relations and open communication with partners.
4.4.1.2 Stay abreast of trends in ecosystem management.
4.4.1.3 Pursue opportunities to cost-share projects with other organizations.

4.5 ***Goal: Increase level of active cooperation with NGO's (Non-Governmental Organizations) on different aspects of on-refuge and off-refuge management and educational efforts, both with greater number of NGO's as well as a greater level of effort.***

4.5.1 **Objective**: Increase level of effort at cooperating with NGO's in 2000 by 50% over the next 15 years.

Strategies:
4.5.1.1 Continue to work with Omaha Audubon adopt-a-refuge program.
4.5.1.2 Work with Boy Scouts and Girl Scouts on camporees and work projects that enhance the refuge, educate youth and their leaders.
4.5.1.3 Continue partnership with Midwest Interpretive Association and support growth of the association's activities.
4.5.1.4 Enhance cooperation with Nebraska and Iowa Historical Societies, specifically as it relates to the Steamboat *Bertrand* Collection.
4.5.1.5 Establish ventures with the Lewis and Clark Heritage Trail Foundation related to the bicentennial commemoration.
4.5.1.6 Actively look for partnering opportunities with local and regional hunting and fishing clubs, conservation groups, service organizations and educational institutions.
4.5.1.7 Continue to actively support the Loess Hills Alliance and its efforts to preserve Iowa's Loess Hills.
4.5.1.8 Cooperate with 4-H Club chapters, African-American churches in Omaha, and the Omaha Indian Tribe in providing fishing clinics for disadvantaged and minority youth.
4.5.1.9 Follow Marquardt Pond Environmental Learning Site Management Plan, which provides a 1.5 acre pond for environmental education including a catch-and-release fishing program.

4.6 ***Goal: Assist outside parties interested in research and study of the* Bertrand *Collection*.**

4.6.1 **Objective**: Provide technical assistance and research support to individuals, agencies, and other institutions interested in the *Bertrand* Collection, museum curation, or conservation issues in a timely and professional manner.

Rationale: The Bertrand *Collection is a unique public resource, and responses to outside requests deserve high priority. Quality customer service will result in increased demand for research services.*

Strategies:
4.6.1.1 Through diligent attention to "customer satisfaction" provide responses to

researchers within five working days or commensurate with the request.

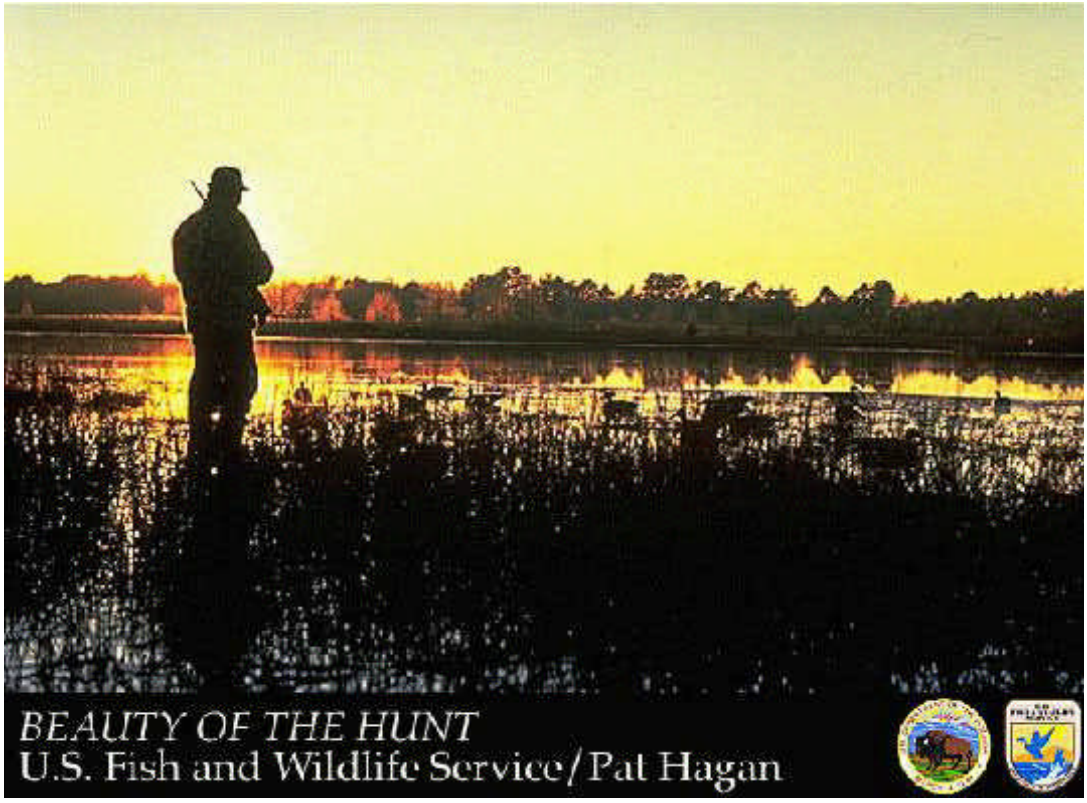
4.6.1.2 Within curatorial guidelines and discretion, provide object loans to qualifying institutions.

4.6.1.3 Place interactive program and searchable database of *Bertrand* Collection on Internet.

4.6.1.4 Transfer all paper-based catalog records into computerized database, which will enable better quality and faster research responses.

4.6.1.5 Purchase equipment to produce and develop protocol for creating a digital image library of *Bertrand* images.

Spigot from *Bertrand* Collection


BEAUTY OF THE HUNT
U.S. Fish and Wildlife Service/Pat Hagan

Chapter 6
Plan Implementation

Personnel Needs

In FY 1999 the staff of DeSoto NWR consisted of 19 full- and part-time positions equal to 18.6 FTE's (Full-Time Equivalents):

- refuge manager (1)
- wildlife biologist (1)
- refuge operations specialist (2)
- park ranger (chief of visitor services and protection) (1)
- outdoor recreation planner (1)
- museum curator (1)
- museum technician (1)
- full-time park ranger (1)
- part-time park ranger (2)
- full-time law enforcement ranger (1)
- administrative officer (1)
- administrative technician (1)
- maintenance leader (1)
- engineering equipment operator (1)
- automotive worker (1)
- tractor operator (1)
- maintenance mechanic (1)

While the Refuge currently enjoys a fully staffed organization chart, achieving the goals and objectives of this CCP will require the following additional staff which will be reflected in an updated RONS database:

Position	Strategy Number	RONS Project #	FTE's
Biological technician (2 seasonal positions for woodland restoration)	1.4.1.4	00001	0.75
Biological technician (1 seasonal position for grassland restoration)	1.4.2.5	97011	0.35
Custodian (1 full-time position for Visitor Center)	3.1.1.10	98001	1.00
Museum technician (1 full-time position for Visitor Center)	3.1.1.10	00007	1.00

Position	Strategy Number	RONS Project #	FTE's
Environmental education specialist (1 full-time position)	3.1.1.10	00004	1.00
Biological technician (1 seasonal position in sport fishery)	3.3.1.8		0.35
Volunteer coordinator (1 full-time position)	4.1.1.3		1.00
Biological technician (1 seasonal position in Private Lands Program)	4.3.1.7		0.35
Law enforcement ranger (1 full-time position)	2.1.1.2		1.00
		TOTAL FTE's	6.80

Funding

Currently, a backlog of maintenance and equipment needs exists. Under current conditions the needs, which are recorded in the deferred Maintenance Management System (MMS), total $3,708,000 (see Appendix C). These needs will continue under this plan.

The Refuge Operating Needs (RONS) projects identified in this plan describe new projects and total $4,063,000 in the first year, of which $3,046,000 are one-time expenses and $1,016,000 are recurring (see Appendix C). These projects are in addition to the base operating budget of the refuge, which was approximately $1.2 million in fiscal year 1999.

Step-down Management Plans

At present, DeSoto NWR has 21 step-down management plans. The following plans require no revision to implement the CCP, although they may require periodic updates as indicated in the CCP or elsewhere:

- ADP Security Plan
- Bertrand Conservation Laboratory Safety Plan
- Crowd Control Plan
- Headquarters Shelterbelt Management Plan
- Disaster Preparedness Plan for the Bertrand Collection
- Disease Plan
- Law Enforcement Plan
- Safety Plan
- Search and Rescue Plan
- Strategic Plan for Accessibility
- Traffic Control Plan

Existing step-down plans that do need some level of modification or updating to implement the direction of the CCP, or that require periodic review and revision under the CCP, include the following:

	Plan	Completion Date
<	Bottomland Reforestation Plan	FY 2003
<	Cropland Management Plan	FY 2001
<	DeSoto Lake Monitoring Plan	FY 2002
<	Fishery Management Plan	FY 2001
<	Forest Management Plan	FY 2003
<	Grassland Management Plan	FY 2002
<	Habitat Management Plan for Endangered Species	FY 2003
<	Refuge Hunting Plan	FY 2001
<	Snow Goose Hunting Plan	FY 2001
<	Wildlife Inventory Plan	FY 2002
<	Moist Soil-Water Management Plan	FY 2003

In addition, three new step-down management plans are needed:

	Plan	Completion Date
<	Invasive Species Monitoring and Control Plan	FY 2002
<	CCP Inventory and Monitoring Plan	FY 2001
<	Cultural Resources Management Plan	FY 2003

Partnership Opportunities

We plan to maintain and amplify our existing partnerships with the Iowa office of the Natural Resources Conservation Service, Midwest Regional Office of the National Park Service, the Iowa Department of Natural Resources, Nebraska Department of Game and Parks, Harrison County Conservation Board and other County Conservation Boards, Iowa State University Extension, Papio-Missouri River NRD, Midwest Interpretive Association, Ducks Unlimited, Pheasants Forever, Omaha Chapter of the National Audubon Society, local chapters of the Boy Scouts of America and Girl Scouts of America, certain African-American churches in Omaha, the Omaha Indian Tribe, and 4-H Clubs.

In a partnership with a host of agencies and scores of private landowners known as Partners for Wildlife, DeSoto NWR carries out wetlands restoration on private lands in an 18-county area through our Private Lands Program. We are fully committed to maintaining and expanding these joint endeavors.

We have worked with cooperative farmers implementing innovative approaches to farming on the refuge for four decades. Although most farming within DeSoto's boundaries will be phased out over the next 15 years, we will continue to cooperate with area farmers on sustainable agricultural practices and to resolve issues of mutual concern between the refuge and the local farming community.

DeSoto Refuge also cooperates with students, teachers, professors, and researchers from a number of educational institutions ranging from elementary school through university graduate programs. In addition to the hundreds of K-12 classes that visit DeSoto every year, we have partnered in one way or another with the following institutions of higher learning: Creighton College, Clarkson College, Drake University, Dordt College, Westmar College, the University of Nebraska, Iowa State University, Iowa Western Community College, the University of South Dakota, Morningside College, Hastings College, and Northwestern College. We have cooperated with researchers from Dana College, Northwestern College, and the University of Nebraska on research projects conducted on the refuge.

The *Bertrand* Collection is the basis for partnership and cooperation with a number of individuals and institutions. We have a Programmatic Agreement covering preservation of the collection with the national Advisory Council on Historic Preservation, the Iowa State Historic Preservation Officer, and the Nebraska State Historic Preservation Officer. We loan *Bertrand* artifacts to other museums around the country. Recent requests have come from the Mystic Seaport Museum in Connecticut, the Western Heritage Museum in Omaha, and the Mark Twain Museum in Hannibal, Missouri. The Museum Curator also helps visiting researchers and provides technical assistance in response to inquiries from government agencies, museums, journalists and individual researchers from many states and Canada.

In a wider context, DeSoto staff have worked with and supported the Iowa Archaeological Society, Nebraska Historical Society and the Loess Hills Alliance in their respective efforts. We also look forward to cooperating with the Lewis and Clark Heritage Trail Foundation in the upcoming bicentennial commemoration of that pioneering expedition.

All in all, DeSoto NWR's partnering efforts well exemplify the mission of the U.S. Fish and Wildlife Service: "*Working with others* to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of the American people" [italics added].

Monitoring and Evaluation

Monitoring is critical to successful implementation of this plan. Monitoring is necessary to evaluate the progress toward objectives and to determine if conditions are changing.

Accomplishment of the objectives described in this CCP will be monitored annually by the Refuge Manager's supervisor. Successful performance will be tied to the accomplishment of objectives that are scheduled for that year. The public will be informed about the activities of the refuge staff through an annual report that will be mailed to all persons on DeSoto NWR's mailing list and published on the refuge's website. In addition, the annual report's availability will be announced through news releases to the media. The annual report will be published each year in February.

The techniques and details for monitoring related to specific objectives will be specified in the Inventory and Monitoring Step-down Plan.

Substantial changes are likely to occur within the Service and the DeSoto community during the next 15 years. The Comprehensive Conservation Plan and its objectives will be examined at least every five years to determine if any modifications are necessary to meet these changing conditions.

In the interim, for planning and budgeting purposes, it will be necessary to measure pursuit of this plan's goals and objectives at intervals less than every five years. Therefore, DeSoto Refuge staff will assess the progress/status of each objective on at least an annual basis. Such assessments will be briefly recorded (100 words or less) and filed with the CCP. As appropriate, both qualitative and quantitative descriptions are recommended. These records might also be used in preparation of the Annual Narrative Reports.

Lamps in the *Bertrand* Collection
DeSoto NWR Visitor Center

Appendix A
Environmental Assessment

Abstract

The U.S. Fish and Wildlife Service is proposing to implement a Comprehensive Conservation Plan (CCP) for the DeSoto National Wildlife Refuge (Refuge) in Harrison and Pottawattamie Counties, Iowa, and Washington County, Nebraska. This plan will specify a management direction for DeSoto National Wildlife Refuge for the next 15 years, as described in detail through a set of goals, objectives, and strategies. This Environmental Assessment (EA) considers the biological, environmental and socioeconomic effects that implementing the CCP (the preferred alternative) and three other management alternatives will have on the most significant issues and concerns identified during the planning process.

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Chapter 1
Purpose and Need for the Proposed Action

Purpose and Need for Action

The purpose of the proposed action is to specify a management direction for DeSoto National Wildlife Refuge for the next 15 years. This management direction will be described in detail through a set of goals, objectives, and strategies in a Comprehensive Conservation Plan.

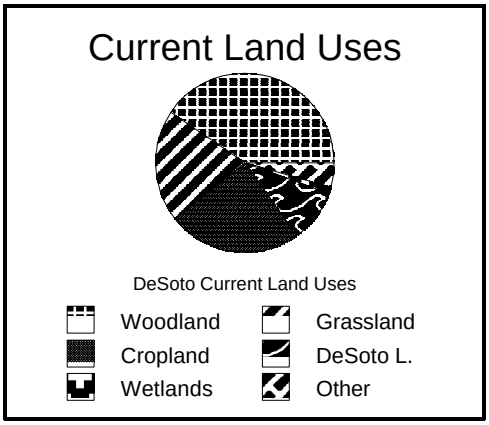
The action is needed to address current management issues and to satisfy the legislative mandates of the National Wildlife System Improvement Act of 1997, which requires the preparation of a Comprehensive Conservation Plan for all national wildlife refuges.

We prepared this Environmental Assessment (EA) using guidelines of the National Environmental Policy Act of 1969. The Act requires us to examine the effects of proposed actions on the natural and human environment. In the following sections we describe four alternatives for future Refuge management, the environmental consequences of each alternative, and our preferred management direction. We designed each alternative as a reasonable mix of fish and wildlife habitat prescriptions and wildlife-dependent recreational opportunities, and then we selected our preferred alternative based on their environmental consequences and their ability to achieve the refuge's purpose.

Background

DeSoto National Wildlife Refuge was established in 1958 with the purpose of providing an "inviolate sanctuary" for migratory birds. Land acquisition began that same year. The new refuge's mission statement elaborated on its purpose: *"To preserve and restore indigenous biological communities, with emphasis on wetland and riverine flora and fauna, and to provide both cultural and natural history interpretations for environmental education; and wildlife-dependent recreation, where and when such uses are compatible with the primary purposes of the refuge."*

At present, DeSoto Refuge encompasses 7,823 acres, 3,499 of which are in Harrison and Pottawattamie counties, Iowa and 4,324 in Washington County, Nebraska. The refuge manages a variety of habitats that provide resting, foraging, and nesting opportunities for nearly 250 species of resident and migratory birds. Major habitat types at the start of the year 2000 are woodlands (3,345 acres), freshwater aquatic (900 acres), croplands (1,990 acres), and native grasslands (1,640 acres). DeSoto Lake is a seven-mile long oxbow lake, which contributes 788 acres of aquatic area to the refuge's rich habitat mix. This diversity of habitats supports an abundance of resident plant, mammal, bird, reptile, amphibian, and fish species.



DeSoto Current Land Uses

Category	Percent*
Woodland	42%
Grassland	20%
Cropland	25%
DeSoto Lake	10%
Wetlands	1%
Other	2%
TOTAL	100%

* approximate

Management techniques currently used on the refuge include control of water levels in DeSoto Lake and in wetlands and moist soil units; some biological, chemical and mechanical control of invasive plant species; mowing, haying and prescribed burning of grasslands; biological rotations on cropland; food plots; some tree planting, grass seeding, and hunting of white-tailed deer, snow geese, and other waterfowl.

Adequate long-term management direction does not currently exist for DeSoto National Wildlife Refuge. Management is now loosely guided by general policies and shorter-term plans. A Comprehensive Management Plan written in 1997 is outdated and does not satisfy the requirements of the Refuge System Improvement Act of 1997. A Comprehensive Conservation Plan is needed to address current management issues and propose a plan of action which the Fish and Wildlife Service and its partners can use to achieve the future vision for the Refuge.

Decision Framework

The Regional Director for the Great Lakes-Big Rivers Region (Region 3) of the U. S. Fish and Wildlife Service will use this Environmental Assessment to select one of four alternatives and determine whether the alternative selected will have significant environmental impacts requiring preparation of an Environmental Impact Statement (EIS).

It is recommended that the reader refer to the preceding Comprehensive Conservation Plan for DeSoto National Wildlife Refuge when reviewing this Environmental Assessment. The most relevant information in the CCP is contained in the refuge's proposed "Goals, Objectives and Strategies" as presented in Chapter Five.

A Comprehensive Conservation Plan is needed to address current management issues and propose a plan of action which the Fish and Wildlife Service and its partners can use to achieve the future vision for the Refuge.

Authority, Legal Compliance, and Compatibility

The National Wildlife Refuge System includes federal lands managed primarily to provide habitat for a diversity of wildlife species. National wildlife refuges are established under many different authorities and funding sources for a variety of purposes. The purpose(s) for which a particular refuge is established are specified in the authorizing document for that refuge. These purposes guide the establishment, design, and management of the Refuge. The enabling legislation for DeSoto National Wildlife Refuge can be found in Chapter One of the Comprehensive Conservation Plan.

Additional authority delegated by Congress, federal regulations/guidelines, executive orders and several management plans guide the operation and the management of the Refuge and provide the framework for the Fish and Wildlife Service's proposed action. The key statutes and orders that guide the refuge are summarized in Appendix F of the CCP.

Scoping of the Issues

Scoping is the process of identifying opportunities and issues which would be used to develop various strategic alternatives, one of which will become the proposed action. The Fish and Wildlife Service publicly announced it was preparing a CCP for DeSoto National Wildlife Refuge in December 1997 by publishing a notice in the *Federal Register*.

Scoping involved:

- Issuing news releases
- Conducting a session with a focus group
- Holding a public information and input meeting using the informal Open House approach
- Accepting written comments and concerns

For additional detail on these activities see Chapter Two of the Comprehensive Conservation Plan.

Issues and Concerns

From public involvement activities, the Service received a number of comments that identified issues and concerns people had related to management of the Refuge. These "scoping" issues have been considered in the CCP decision-making process and several have been directly integrated into the Comprehensive Conservation Plan.

This EA informs the public of the impact the proposed action (implementing the CCP) will have on each of four major issue categories. All issues are described in the CCP and many of the goals and strategies contained in the CCP relate to one or more of the issue categories. The four issue categories are listed below along with summaries of the more salient issues under each:

1. Wildlife Populations and Habitat Management

Cropland and Upland Habitats — Initial management at Desoto Refuge emphasized farming grain crops to attract migrating waterfowl and to minimize adverse impacts by these migratory birds on neighboring farms. While this strategy was successful, it may have served to unduly concentrate migrating flocks. Gradually, management emphasis has evolved more toward biodiversity and interest in supporting a broader diversity of flora and fauna. Two thousand acres of refuge land remain in cropland production. The issue facing DeSoto resource managers is whether conversion of cropland acreage to native plant communities should be continued until a well-defined balance of habitat types is achieved. What is the appropriate ratio of habitat types for this particular National Wildlife Refuge?

Cottonwoods and Riparian Forests — A riparian forest of cottonwood trees currently lines one side of DeSoto Lake. The forest structure is threatened because the cottonwoods are not regenerating. The periodic flooding they need for regeneration is prevented by a levee constructed in 1960. The issue facing DeSoto NWR managers is this: Should they attempt to circumvent the process of forest succession now underway (through man-made alterations) in an effort to save the cottonwoods or allow this "unnatural" succession to unfold on its own even of it leads to a less attractive, less ecologically functional forest?

DeSoto Lake and the Missouri River – DeSoto Lake is an oxbow lake created in 1960 by construction of a cut-off levee, separating it from the Missouri River except for gravity flows through inlet and outlet structures within the levee. The effectiveness of these structures is limited by their size and more importantly by the magnitude of river flows. Both low and high lake levels cause problems. The lake also serves as a connection for surface drainage ditches from private land to the river. These ditches carry significant loads of silt and chemicals which jeopardize the long-term life of this oxbow lake environment. When the lake level is too high, these ditches also back up, flooding adjacent private farmlands outside the refuge, which is a strong concern of the affected farmers, as expressed in public scoping and at other times.

Two issues confront DeSoto management: Should DeSoto Lake be reconnected with the Missouri River to restore natural riverine habitat to benefit trust species and riverine fishes? If not, and recognizing that current management practices could ultimately lead to the demise of the oxbow lake environment, should a strong, long-term commitment be made to stabilize DeSoto as a high-quality, unique oxbow lake, even if it means that extraordinary measures must be taken to provide desired lake level and water quality controls?

Snow Geese – In recent years, the mid-continent snow goose population has been growing at 5-8 percent a year (a "doubling time" of just 9-14 years), and now stands at 3 million or more. More geese can be supported in their wintering range, due to expanded refuges and vast areas of cultivated grains, than can be supported in their breeding habitat in the tundra of northern Canada. As a result, snow geese are causing long-term (if not permanent) damage to slow-growing tundra plant communities and other wildlife that depend on these communities.

DeSoto Refuge annually hosts roughly half a million snow geese migrating southward. Over the years, management has successfully attempted to make the refuge an attractive sanctuary for migratory waterfowl, to the enjoyment of hundreds of thousands of visitors. Now, managers must effect a change of course and the public must face the fact that this may be "too much of a good thing." Deliberate population reductions and sanctuary disturbance must be carefully orchestrated along the migration corridors to avoid out-of-control results. What role should DeSoto National Wildlife Refuge play in the international effort to reduce snow geese numbers?

2. Resource Protection

Refuge Facilities – Like all institutions, DeSoto Refuge must live within a budget, and doing so necessitates prioritizing a number of programs and projects that compete for funding and staffing. These include managing endangered species, biodiversity, aquatic and upland habitat, fish and wildlife populations, cultural resources, and public use. DeSoto's unique role as conservators of the artifacts from the Steamboat *Bertrand* is expensive and perpetual. These artifacts are on display in the Visitor Center, which also provides exhibits on natural history and an outstanding view of DeSoto Lake and its migratory waterfowl. The Center and its exhibits and artifacts are costly to maintain. In fact, the backlog of artifact and display problems is growing. How do the Visitor Center and its exhibits relate to high priority wildlife management activities?

Invasive (Unwanted) Species and Animal Damage Control – Exotic organisms increasingly encroach upon the habitats of DeSoto Refuge. These harm the refuge's native flora and fauna by preying on them or competing with them for limited food, space, and resources. Generally, invasive plants are not utilized by native animals for food or shelter as effectively as the native flora. Other wildlife species, although native to the refuge, may be able to cause damage both on and off-refuge. Should DeSoto Refuge managers actively and aggressively combat the ongoing invasion of exotic species by diverting scarce budgetary resources to this mission, or should the refuge adopt a "let nature take its course" approach to all species? How should wildlife populations be controlled to limit their impact on habitat and facilities?

3. Public Education and Recreation

DeSoto Lake Recreational Fishery – DeSoto Lake originally enjoyed a good sport fishery. After years of decline, by the early 1980s, rough-fish (non-game fish) had largely taken over the lake from sportfish. In an effort to restore the sport fishery, refuge managers and state agencies carried out a number of measures to improve aquatic habitat and control rough-fish, including a major renovation in 1985. Since then, more than 35 million sport fish have been stocked in the lake. For a few years, the sport fishery was improved. Yet once again, rough-fish have come to dominate the lake. Should DeSoto Lake fish populations be aggressively managed to maintain a good sport fishery, or should other alternatives be considered, such as the "hands off" approach of allowing the fish species complex to be self-controlled, or even re-connecting DeSoto Lake to the Missouri River, so that riverine species may also utilize the lake? If another intensive, expensive renovation is to take place, what will be the methods used and what will be the source of funding?

4. Partnerships

Role in the Community and Relations with Neighbors – DeSoto National Wildlife Refuge does not exist as an island unto itself. The management actions undertaken on its 7,823 acres affect surrounding landowners, residents, and jurisdictions, the interests of other Federal, state, and local agencies, the public in general, and the larger natural ecosystems of which the refuge is a part. In turn, the actions of these entities have a pronounced effect on wildlife populations, habitat and environmental quality within the refuge.

Over the years, refuge staff have built working relationships and conducted a number of cooperative ventures with stakeholders in the wider community. Still, the refuge is sometimes viewed by its immediate neighbors as wasted area that would be better used as productive cropland. In scoping for the Comprehensive Conservation Plan, both neighbors and representatives of the other Federal and state agencies with which DeSoto staff interact emphasized the importance of the refuge being responsive to their needs and perspectives. Can the refuge find ways to be more accommodating of these other interests without compromising its basic mission?

Chapter 2
Alternatives for Management

Introduction

Four proposed management alternatives were developed during the course of planning the Comprehensive Conservation Plan and complementary Environmental Assessment. These alternatives are discussed within this chapter and summarized in the Alternatives Matrix. Chapter Four of this EA evaluates the alternatives based on issues raised during the planning process.

Formulation of Alternatives

The four alternatives that were developed for this Environmental Assessment range from "No Action" (that is, no change to current management) to "Optimize Natural Resource Conditions and Public Use Potentials." All four alternatives would serve the primary purpose for which the Refuge was established but the end results would vary, in some ways substantially. Refuge and Service goals and objectives play an important role in the variances that would result from implementation of any one of the alternatives. These alternatives also respond in different ways to the concerns voiced by stakeholders in the focus group and public scoping meetings.

The four alternatives are:

Alternative A: No Action — Current management practices would continue.

Alternative B: Maximize Restoration and Conservation of Historical Natural Resource Conditions — Under this alternative, management would aim to restore pre-settlement, natural resource conditions on the refuge.

Alternative C: Maximize Compatible Public Use Potentials — Refuge management would emphasize the six compatible, priority wildlife-dependent uses.

Alternative D: Optimize Natural Resource Conditions and Public Use Potentials (Preferred) — Management would seek the best or optimal balance between the competing ideals of natural resource conservation and public use.

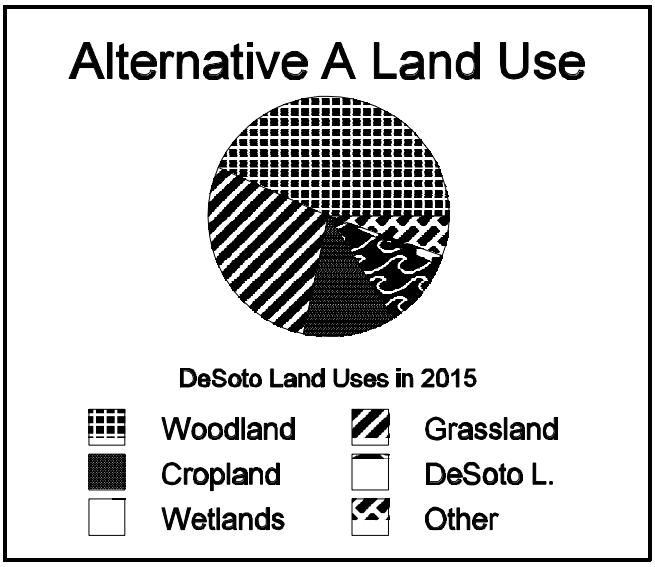
Descriptions of Alternatives

The four alternatives discussed below were the only ones considered and developed.

Alternative A – No Action (Current Management)

This alternative assumes no major changes in existing management goals and objectives. Realization of the defined goals and objectives has been significantly limited by shortages of staffing and funding. The previously approved Comprehensive Management Plan would be developed as the CCP. No programs would be expanded.

It should be emphasized that No Action does not mean static conditions nor static management. For example, current management calls for gradual reduction in the acreage of farmland from about 1990 acres to approximately 1000 acres with proportional increases in managed native grasslands, woodlands, and wetlands.



Alternative A -- Land Uses in 2015

Category	Percent*
Woodland	45%
Grassland	30%
Cropland	12%
DeSoto Lake	10%
Wetlands	1%
Other	2%
TOTAL	100%

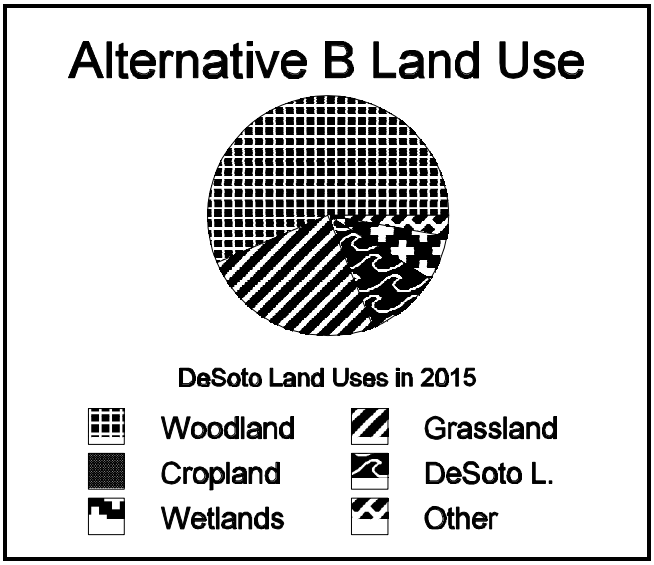
*approximate

Alternative B – Maximize Restoration and Conservation of Historical Natural Resource Conditions

Alternative B emphasizes management strategies to restore and conserve fish and wildlife populations, species and habitat diversity, composition and abundance to levels and conditions existing in the pre-development era (that is, to about the mid-1800's). Actions would be taken to conserve existing Missouri River floodplain and riparian habitats and restore them to historic conditions where they are absent, degraded or declining. Renewed emphasis would be placed on maintenance and restoration of native flora and fauna, particularly threatened and endangered species.

Levees along the Missouri River would be modified to re-connect the river to its floodplain within the refuge and re-establish hydrologic and geomorphological conditions (flooding, scouring, erosion, deposition, early successional stages, etc.) to the maximum extent possible in a highly altered and extensively developed and regulated river ecosystem. Existing compatible public uses would continue, but would be de-emphasized or limited in areas or situations where these activities conflict with developing maximum mid-1800's resource values.

It should be emphasized that the future land use percentages under this alternative are highly speculative. The only one known with certainty is 0% cropland. The percentages of other land use and habitats types depend not only on unpredictable floods along the Missouri River but also on particulars of how the river's fluvial processes would interact with DeSoto Lake and adjacent floodplain habitats once flows were restored. This is extremely difficult to predict at this scale, which is why selecting this alternative would necessitate a detailed feasibility study of the engineering, hydrological, and environmental repercussions of reconnecting the lake to the river.



Alternative B -- Land Uses in 2015

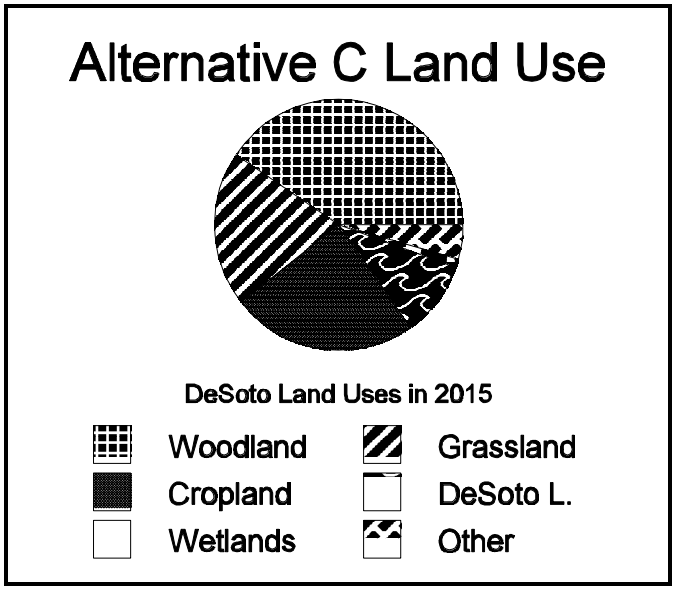
Category	Percent*
Woodland	57%
Grassland	25%
Cropland	0%
DeSoto Lake	10%
Wetlands	6%
Other	2%
TOTAL	100%

*approximate and highly speculative

Alternative C – Maximize Compatible Public Use Potentials

Under this alternative, the six priority wildlife-dependent uses originating with the Refuge Improvement Act (interpretation, education, observation, photography, hunting, fishing) would be promoted and enhanced. Public use and environmental education efforts and outreach would be stepped up considerably. Additional public use opportunities would be encouraged while attempting to minimize impacts to other refuge programs such as habitat management, fish and wildlife populations, and resource protection. Additional facilities would be developed on the refuge to accommodate increased public use.

Management, conservation, and interpretation of the *Bertrand* Collection would be enhanced and maximized. Additional staff and funding would be necessary to promote additional interpretation and conservation. The current exhibit would be dramatically changed and would emphasize the role of the steamboat era to the Westward expansion, thus changing the ecology, land use, and wildlife populations of the American West forever. Additional focus on the importance of National Wildlife Refuges after the expansion and its subsequent changes would be promoted. Other refuge facilities would continue to be protected at current levels. Current management practices would continue or in some cases be decreased as funding, staffing, and resources were shifted toward maximizing public use.



Alternative C -- Land Uses in 2015

Category	Percent*
Woodland	42%
Grassland	20%
Cropland	25%
DeSoto Lake	10%
Wetlands	1%
Other	2%
TOTAL	100%

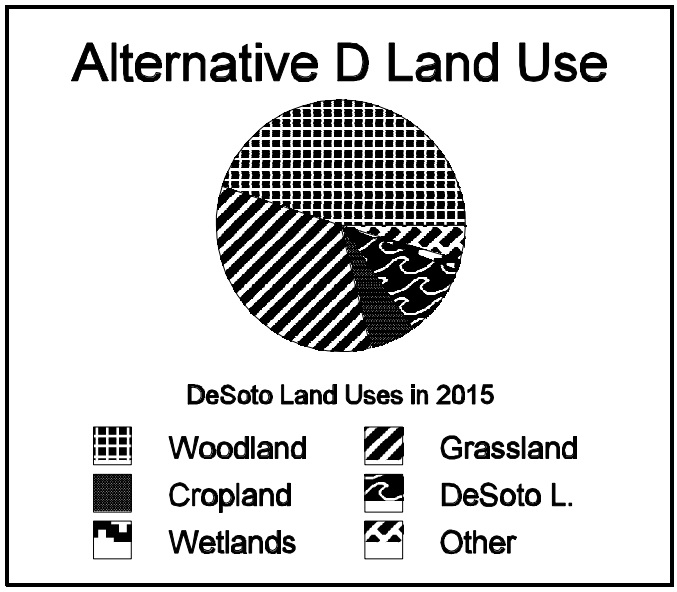
*approximate

<u>Alternative D – Optimize Natural Resource Conditions and Public Use Potentials</u>
(Preferred Alternative)

This alternative seeks neither to maximize natural resource conservation nor compatible public uses. Rather, it recognizes that maximization of either of these may interfere with the other. Thus, Alternative D – the Preferred Alternative — seeks the best or optimal balance between the sometimes competing ideals of wildlife conservation, habitat restoration, and public use.

In terms of habitat management, a more concerted effort than at present would be made to conserve and restore a mosaic of habitat types representative of the Missouri River ecosystem in the mid-1800's. Greater reduction in refuge cropland would be achieved than in Alternative A (acreage would be reduced by 75%, down to 475 acres). Habitat manipulation on behalf of threatened and endangered species would continue and be intensified, as opportunities permit. In general, large blocks of like habitat would be preferred over patches and fragments. In contrast to Alternative B, DeSoto Lake would be maintained as a unique, oxbow lake environment, unless a decision is made to reconnect DeSoto Lake with the river; its water quality would be improved and its physical attributes preserved over time. A feasibility study would be conducted of re-routing agricultural drainage ditches now emptying into the lake; the alternative of constructing sediment traps would also be investigated. To address the problem of excessive water levels in the lake, the possibility of a new outlet toward Wilson Island Chute would be studied, as would the effectiveness of enlarging the lake outlet.

With regard to fish and wildlife population management, commercial fishing for lake rough fish would continue, as would stocking of sport fish. Bald eagles and other threatened and endangered species would be actively promoted through a variety of direct and indirect means. Populations of all species, particularly sensitive ones, would be monitored regularly. Snow geese populations would be actively managed, which for the foreseeable future, means participation in mid-continent efforts at reduction.



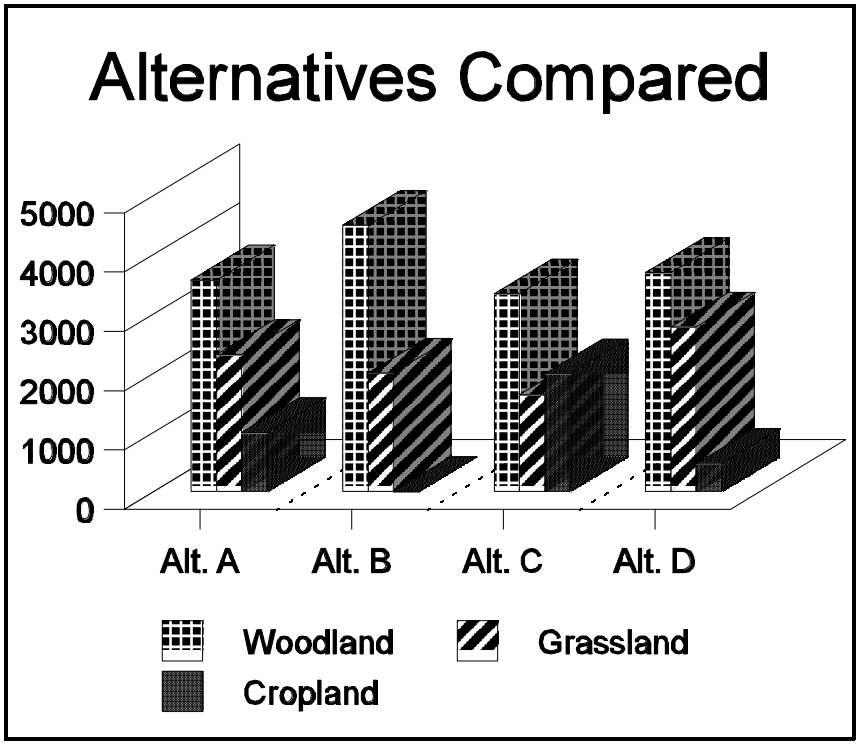
Alternative D -- Land Uses in 2015

Category	Percent*
Woodland	46%
Grassland	35%
Cropland	6%
DeSoto Lake	10%
Wetlands	1%
Other	2%
TOTAL	100%

* approximate

With regard to resource protection, greater support than at present would be given to protecting natural and cultural resources, including the natural history exhibits and the *Bertrand* collection. All six priority public uses would be encouraged to an even greater extent than at present. Other compatible uses would be seriously considered. Cooperation with partners would increase.

The chart below compares the three major land uses/habitats --woodlands, grasslands, and croplands -- that vary from one alternative to another. The ratios of these three habitats in Alternative A diverge somewhat from the present. The ratios in B vary sharply from the present, especially because there is no cropland. Alternative C habitats are the same as those at present. Alternative D has greater amounts of woodlands and grasslands than the current mix.



Chapter 3
Affected Environment

The following discussion summarizes more detailed information found in the attached CCP.

General

Surrounded by a landscape dedicated primarily to growing corn and soybeans, DeSoto National Wildlife Refuge is dedicated to managing semi-natural habitat for the benefit of waterfowl and other wildlife. With its unique Steamboat *Bertrand* Collection, it is also a place "where wildlife and history meet." Each autumn the refuge hosts hundreds of thousands of migratory waterfowl, particularly snow geese but many other species as well, on their way south for the winter. The refuge also contains DeSoto Lake, a 7-mile long oxbow lake that provides boating, fishing, and wildlife viewing opportunities. The Missouri River itself bisects the refuge. DeSoto embraces a diversity of habitats, including riparian or floodplain woodlands, managed native grasslands, wetlands, and low-input croplands on a "biological rotation."

Climate

The climate of DeSoto National Wildlife Refuge is characteristic of mid-latitude, mid-continental regions. Annual precipitation (rainfall and snowfall combined) is approximately 30 inches; average snowfall is 29.5 inches. As typical of areas with continental climates, there are wide temperature fluctuations between the seasons.

Geology, Hydrology and Soils

DeSoto NWR is situated entirely within the historic floodplain of the Missouri River. Although the refuge is now separated from the river by a levee, DeSoto's landforms, its soils and its oxbow lake are all a direct result of the natural fluvial processes of meandering, deposition and scouring carried out by the Missouri over the millennia.

As a consequence of the historic cycle of annual floods as well as the Missouri's tendency to carve new river channels, DeSoto Refuge soils were formed from coarse to fine-textured recent alluvium (river-deposited sediments). These soils are generally low to moderate in organic matter, calcareous, ranging from neutral to moderately alkaline. Available phosphorus is generally low, while the supply of available potassium is generally high. Permeability (ability of water to percolate through) ranges from rapid to slow. In some areas, clays and loams form the upper layer of the soil and are underlain by fine sand and sandy loams. Loams are generally fertile soils, usually containing a significant amount of organic matter.

Some areas on the refuge contain soils consisting entirely of clay, and some all of sand. Still other sites have sandy loams over clay or clay loams. Most refuge fields do not have consistent soil types throughout, requiring varying management strategies.

Wetlands

The National Wetlands Inventory has identified approximately 1,560 acres of 32 different types of wetlands on DeSoto Refuge. DeSoto Lake and the Missouri River together comprise about 60 percent of this total wetland acreage. Temporarily flooded riparian forests adjacent to the river are also included. (Due to the levees along the river banks these forests may no longer flood with any regularity.) At present, staff are actively managing 101 acres of marsh-like wetlands and moist soil units on the refuge.

Vegetation

Woodlands — It is likely that most of what is now DeSoto National Wildlife Refuge was once covered with bottomland forest, although the continual shifting and meandering of the river channel probably removed the forest cover periodically and maintained some areas in prairie grass.

Currently, DeSoto contains approximately 3,345 acres of riparian woodlands and brushlands. Cottonwood (*Populus deltoides*) is the predominant canopy tree in this forest type. Reaching 100 feet or more in height, it towers above all other trees in the floodplain. These stands were likely established when the Missouri River was actively flooding, scouring and depositing soils in natural processes that are no longer occurring on a regular basis. Today, in the absence of this dynamic force, proper conditions for the regeneration of cottonwood stands rarely occur.

Concerns have been raised regarding minimal regeneration of this species (at DeSoto and wherever else floodplains are no longer flooded). Old cottonwoods are currently being replaced by more shade-tolerant species that do not depend on flooding, such as hackberry (*Celtis occidentalis*), red mulberry (*Morus rubra*), and green ash (*Fraxinus pennsylvanica*), which may result in improved mast (fruit and nut) production as these species become dominant. However, at the present time, the most obvious successional change is a dense midstory of roughleaf dogwood (*Cornus drummondii*), averaging 10-12 feet in height.

Other common trees of DeSoto Refuge′s floodplain woodlands include black willow, sandbar willow, black walnut, boxelder, eastern red cedar, and the exotic Chinese elm.

Native Grasslands — The exact extent to which the lands that are now DeSoto Refuge were covered by native prairie grasslands (versus floodplain woodlands) prior to modern settlement and agriculture is unknown. What is known is that DeSoto now supports native grass species found in both the tallgrass and shortgrass prairie. The refuge is located in the transition zone between the two, with the true tallgrass prairie to the east and the shortgrass prairie further to the west. At present, managed grasslands dominated by native species occupy approximately 1640 acres at DeSoto in units scattered throughout the refuge.

The native grasses found at DeSoto NWR include sideoats grama *(Bouteloua curtipendula*),

little bluestem (*Andropogon scoparius*), swwitchgrass (*Panicum virgatum*), Canada wild rye (*Elymus canadensis*), big bluestem (*Andropogon gerardi*), sand lovegrass (*Eragrostis trichodes*), eastern gramagrass (*Tripsacum dactyloides*), Indiangrass (*Sorghastrum nutans*), buffalo grass (*Buchloe dactyloides*), and blue grama (*Bouteloua gracilis*).

Croplands — At one time almost half the refuge was cultivated. The rationale for cropland was that it provided food and loafing areas for migrating waterfowl, and food, cover, and edge for other wildlife species. Since the 1970s the acreage devoted to cropland has gradually been reduced. At present approximately 1990 acres (about one-quarter) of the refuge are maintained in a low-input (minimal fertilizers and no insecticides) "biological rotation." The principal crops are corn, soybeans, sweet clover, milo, alfalfa, and grass hay.

Fish and Wildlife

Birds, Mammals, Reptiles, Amphibians, and Other Wildlife — DeSoto NWR's mosaic of habitats support a number of vertebrate species, which are listed in Appendix E of the attached CCP. Although wildlife habitats and populations on the refuge have been drastically altered by human activities ranging from channelization of the Missouri River to agricultural cultivation, DeSoto still contains significant wildlife resources due to its proximity to the Missouri, its location along principal migratory flyways, and as a result of the Service's management and conservation efforts.

In typical years, hundreds of thousands of snow geese utilize the refuge as a resting and feeding area during their fall migration between Arctic nesting grounds and Gulf Coast wintering areas. These spectacular concentrations are generally seen in November and December; smaller concentrations occur in March and early April. Canada geese show up at DeSoto as well, though in much smaller numbers. Peak populations of 70,000 or more ducks, mostly mallards, but also more than 20 other species, utilize the refuge during fall migration. Peak duck populations are significantly down in recent years.

Each fall, numerous bald eagles follow the geese into the refuge and out of it again, as the migration proceeds south. As many as 143 have been observed at one time. Eagles are often found perched in cottonwoods along DeSoto Lake when waterfowl are present.

DeSoto's woods and fields attract a variety of songbirds, including neotropical migrants, and other resident wildlife. During migration periods, warblers, gulls, herons, and egrets abound. White pelicans and cormorants usually stop in the area for several weeks during their migrations. Owls, pheasants, and bobwhite quail are common too, and remain on the refuge year around. Overall, almost 250 different avian species have been reported on the refuge.

Approximately 300 white-tailed deer make the refuge their home. Many local visitors drive the auto-tour loop at dusk to see the deer grazing in the fields. Other mammals found in woods and fields include cottontail rabbits, raccoons, skunks, badgers, coyotes, opossums, and fox squirrels. Coyotes are often seen resting on the ice-covered lake on sunny winter days. Backwater areas of DeSoto Lake and several wetlands serve as habitat for beaver, muskrat, and mink. Foxes, weasels

and other animals also occur on the refuge. Overall, about 40 species of mammals have actually been identified on DeSoto, or are strongly suspected to be present, including two species of shrew, eight bats, eight carnivores, seventeen rodents, and two species of rabbits.

The presence of about 30 reptile species is known or inferred at DeSoto, including seven turtles, three skinks, and 21 species of snakes. At least ten species of amphibians have been observed on the refuge, including two species of salamanders, three toads, and five species of frogs. Appendix E provides species lists.

Fish – There are two main communities of fish that occur on DeSoto Refuge – those species that live in DeSoto Lake, many of which are stocked for their sport-fishing qualities, and the naturally-occurring riverine species that are found in the Missouri River where it cuts across the refuge. DeSoto Lake contains a number of stocked game fish species, including largemouth and white bass, black and white crappie, channel and flathead catfish, bluegill, green sunfish, walleye, and northern pike. Among the rough-fish whose populations have grown in recent years are carp, buffalofish, and gizzard shad. Gizzard shad dominate the lake's biomass and are undoubtedly providing a considerable food source for predator fish.

More than 80 species of fish are found in the lower Missouri River and may possibly occur within the reach that bisects DeSoto Refuge, including one or more species of sturgeons, gars, chubs, carp, shiners, catfishes, basses, crappies and minnows. These are listed in Appendix E of the CCP.

Threatened and Endangered Species — There are no year-round resident federally threatened or endangered species at DeSoto NWR. However, three federally threatened/endangered bird species do visit the refuge ranging from regularly to infrequently: the bald eagle, least tern, and piping plover. A fourth federally-listed species — the endangered peregrine falcon — is a rare visitor to the refuge.

- The **bald eagle** (*Haliaeetus leucocephalus*), a threatened species that the Service plans to de-list, is a common visitor in the fall and spring months but has never successfully nested on the refuge.

- The **least tern** (*Sterna antillarum*) interior population is an endangered species. Least terns used to nest on the refuge as recently as the 1970s but are now observed only sporadically. Dams, reservoirs, and other changes to river systems, including the Missouri, have eliminated most historic least tern habitat in the Mid-West.

- The **piping plover** (*Charadrius melodus*) is also a federally listed endangered species. It too used to nest at DeSoto Refuge until the 1970s. As many as 100 individuals and 20 plover nests were documented in the mid-1960's. The last piping plover observed at DeSoto was in 1977. It is in trouble throughout its range because of habitat loss/degradation and nest disturbance and predation.

In addition to the above three federally protected birds, one endangered fish — the **pallid sturgeon** *(Scaphirhynchus albus*) — is found within the Lower Missouri ecosystem, though it is scarce. Extensive riverine habitat modification has led to its decline. Its presence within the short reach of the Missouri flowing through the refuge is unlikely, but possible. Two other fish, the **sicklefin chub** (*Macrhybopsis meeki*) and the **sturgeon chub** (*Macryhbopsis gelida*) have declined for the same reasons and are candidates for listing.

Land Use and Zoning

DeSoto NWR is located in one Nebraska and two Iowa counties with primarily agricultural land use. The portion of the refuge (4,615 acres, or 59%) in Washington County, Nebraska, is zoned A-1, agriculture/farming, a category which includes forest and conservation areas as well as public parks and certain other outdoor recreation facilities. The portion (2,582 acres, or 33%) in Harrison County, Iowa, is zoned C-1, Conservation District, a category which includes parks, outdoor recreation areas and conservation reserves. Finally, the portion (626 acres, or 8%) in Pottawattamie County, Iowa, is zoned A-1, open space and conservation. The Zoning Departments of all three counties consider the refuge to be consistent with their land use plans.

Within the 7,823-acre refuge itself, at present, approximately 40 percent of the refuge is wooded, 25 percent is cultivated cropland (including fallow areas), 20 percent is grassland, 10 percent is DeSoto Lake, and the remaining five percent a combination of the Missouri River, wetlands, and developed sites (roads, parking lots, buildings, etc). In the coming years, as cropland is retired, the percentage of that land use will decline and those of woodlands and grasslands will increase.

Contaminants and Water Quality

DeSoto Lake has had ongoing problems with water quality, both because of runoff laced with fertilizers, sediments, and pesticides from the agricultural land uses that predominate in the 12,000-acre upstream drainage basin of the lake and because of the high concentrations of fish and waterfowl that live in or use the lake. High inputs of organic substances and nutrients push the lake toward eutrophication, two symptoms of which are low dissolved oxygen (DO) and summer algal blooms. Low DO in DeSoto Lake has caused fish kills occasionally (though less frequently in recent years). Algal blooms also reduce oxygen, interfere with other more desirable aquatic organisms, and are aesthetically unattractive in and of themselves. Fish kills from low DO led to the installation of an artificial aeration system in 1985, which has helped reduce the severity of the problem.

In addition to low DO, the lake has also suffered from high turbidity (poor water clarity), believed to be a function primarily of rough-fish stirring up and re-suspending bottom sediments.

As well as the very tangible, visible problems with dissolved oxygen and turbidity, there are more hypothetical concerns over whether toxins — primarily residues of pesticides used in agriculture — could be contaminating the lake's water and sediments, and through the phenomenon of bio-

magnification, accumulating to even higher concentrations in fish and the creatures that feed on fish. A limited amount of sampling and testing for pesticides in the lake has been conducted, which has detected chronic concentrations at low levels.

Socioeconomic Environment

Because it straddles the present Missouri River channel as well as the historic one, DeSoto NWR is located in three counties and two states: Harrison and Pottawattamie counties, Iowa and Washington County, Nebraska. The refuge is located about midway between Missouri Valley, Iowa, and Blair, Nebraska along U.S. Highway 30, which abuts its northern edge. Interstate 29, five miles to the east, is a major route from central Canada to Omaha, Nebraska and Kansas City, Missouri. Interstate 80/680, a trans-continental route, is eight miles southeast.

Harrison County, Iowa is a largely rural county with a substantial farming presence. Its 1998 population was estimated at about 15,360, up 4.3 percent from the 1990 population of 14,730. The population is about 99 percent white. Washington County, Nebraska is also a largely rural county with a large farming presence. It's 1998 population was estimated at about 18,660, up 12.4 percent from the 1990 population of 16,600. The population is about 99 percent white.

About eight percent of DeSoto Refuge, the southeastern corner, falls into Pottawattamie County, Iowa. This county includes the town of Council Bluffs, directly across the Missouri River from Omaha, Nebraska. The 1999 estimated population of Pottawattamie County was 86,425, about two-thirds of whom live in Council Bluffs, where the largest employers are casinos, an insurance company, and two hospitals. Over 95 percent of the county is non-Hispanic white. Agriculture is a much smaller part of the economy and way of life in Pottawattamie County than in either Harrison or Washington counties.

Spending associated with wildlife observation, hunting, and fishing generates a substantial amount of economic activity across the United States, and DeSoto National Wildlife Refuge is no exception. Total annual expenditures related to DeSoto visitation are approximately $6.8 million, of which about 98% is from wildlife-watching. This spending in turn generates economic activity — increased output, jobs, income, and tax revenue — throughout the local and regional economy. The total annual industrial output from DeSoto is estimated at $11.7 million; this is associated with approximately 190 jobs, $3.2 million in annual job income, $340,000 in state sales tax revenue, and $121,000 in state income tax revenue. Other economic benefits accrue from DeSoto's payroll, equipment and supply purchases, and income to cooperating farmers.

Cultural Resources

Cultural Resources Background and Potential — As of May 1, 2000, Harrison and Pottawattamie counties in Iowa and Washington County in Nebraska contain 27 properties on the National Register of Historic Places. One is the *Bertrand* site and collection on DeSoto Refuge. The others are not in the vicinity of the refuge and are likely not representative of cultural resources on the refuge.

DeSoto Refuge contains 13 reported or surmised cultural resources sites, all of which are historic period Western culture sites. Just under 200 acres of the refuge have been subjected to archaeological survey. Historical and geological evidence and assumptions indicate the shifting Missouri River has erased all prehistoric and most historic period archeological sites that may have existed within the Refuge boundaries, although the Iowa State Historic Preservation Officer criticized the 1978 Blakeslee survey for not including subsurface testing for buried occupation layers.

Steamboat *Bertrand* Collection — DeSoto NWR's Visitor Center is home to a premier archaeological collection of 200,000 artifacts excavated from the buried hull of the Steamboat *Bertrand*, which sank in 1865 on what is now the refuge. The Visitor Center houses these artifacts, which include not only the necessities of clothing, tools, and food, but also comparative luxuries like olive oil and mustard from France, bottled tamarinds and a variety of canned fruits, several varieties of alcoholic beverages called bitters, powdered lemonade in a can, and brandied cherries.

A state-of-the-art, collection storage area protects the cargo of the boat. Visitors may view this area through a glass wall, 150 feet in length. A conservation lab for artifact preservation, collection research area and library, are staffed by museum professionals. The center also contains a theater and exhibition galleries. Permanent exhibits discuss the impact steamboat cargoes and passengers had on the frontier through town-building, farming, logging and mining.

Public Use

Visitation and recreation by the public are encouraged on national wildlife refuges for activities that are compatible with the refuge purpose and mission. There are six priority, wildlife-dependent public uses: wildlife observation, photography, environmental education, interpretation, hunting, and fishing. DeSoto National Wildlife Refuge has all of these.

DeSoto NWR is one of the more heavily visited national wildlife refuges. In the 1960's visitation averaged about 197,000 per year. In the 1970s the annual average climbed to 341,000 per year, and in the 1980's it rose yet again to 396,000, with a single year peak of 473,038 visitors in 1982. From 1990 to 1999 (the most recent year for which figures are available), visitation dropped somewhat to an annual average of 295,000.

The great preponderance of visitors to DeSoto come to observe wildlife and to partake of the interpretive opportunities in the Visitor Center, with smaller numbers coming for environmental education, hiking/walking, fishing, and hunting. November is usually the busiest month of the year, coinciding with the fall snow goose and waterfowl migration. Visitor Center staff estimate that about 50 percent of visitors are non-resident, that is, they come from more than an hour's drive away.

Chapter 4
Environmental Consequences

Effects Common to All Alternatives

The four alternatives were developed to address most of the issues, concerns, and opportunities identified during the planning process. The specific consequences for each alternative are depicted in the following Alternatives Matrix. The alternatives share a few dimensions that are discussed together here.

Cultural Resources

The potential for any given project to affect prehistoric and historic resources and Native American human remains and cultural objects will be determined early in the planning phase of a project. The procedures in 36 CFR 800 implementing Section 106 of the National Historic Preservation Act, the Iowa/Nebraska Programmatic Agreement, the requirements of the Native American Graves Protection and Repatriation Act, and the policies and standards specified in the Fish and Wildlife Service Manual 614 FW 1-5 will be followed in all cases.

Other Topics

The topics of air and noise pollution, waste management, and environmental justice were not raised as issues during scoping. None of the alternatives discussed below and displayed in the Alternatives Matrix would generate impacts of concern in these areas.

Effects that Vary Between Alternatives

The Alternatives Matrix following the alternatives summaries below evaluates the four alternatives according to their differential effects on 30 issues/concerns/opportunities. This matrix was developed during a three-day workshop held in October, 1999 with refuge staff, regional staff, and a consultant. The major differences are summarized briefly below:

Alternative A – No Action (Current Management)

Under current management, acreage of cropland will be reduced by about half over the coming 15 years. Most reverted cropland will be converted to managed, native prairie grasslands, and some will be converted to bottomland forest both by active planting and/or seeding and passive, successional reforestation. This additional habitat will benefit most indigenous resident and migratory birds that depend on grassland or woodlands for nesting, resting, and foraging.

However, certain game animals like white-tailed deer, quail, and turkey that feed on grains may see their refuge carrying capacity reduced. Snow geese are unlikely to be affected.

Phasing out approximately 50% of the current refuge cropland acreage will cut in half the estimated gross annual receipts of $206,000 earned by eight cooperative farmers. However, this reduction will take place by means of voluntary attrition and over a 15-period, minimizing any economic hardship. Moreover, those farmers who have three-year leases with DeSoto have known for many years that croplands are being cut back. This reduction has now been underway for more than a decade and has already removed more than 1,000 acres of cropland from DeSoto.

Other refuge programs and activities will continue as they have, including monitoring of DeSoto Lake water quality, managing the sport fishery, preserving the *Bertrand* Collection, the deer and waterfowl hunts, and visitor programs. Funding will continue to be a constraint. Most of the outstanding issues and concerns cited earlier and in the CCP would linger.

Alternative B – Maximize Restoration and Conservation of Historical Natural Resource Conditions

Alternative B emphasizes the restoration of fish and wildlife populations, species and habitat diversity, composition and abundance to levels and conditions existing in the pre-development era. All cropland would be phased out over the coming 15 years, and natural succession would be allowed to run its course on both croplands and native grasslands. The only intervention in the plant community succession process would be to control non-native, invasive plant species. This being the case, not only would croplands revert to grasslands, but some managed grasslands now kept free of woody plants by mowing and prescribed burning are likely to return to bottomland forests, especially if seasonal flooding is permitted. Cottonwoods, which are now in decline in the refuge's forests as a result of the lack of flooding, would likely continue to do so. Rough-leaf dogwood (*Cornus drummondii*) would likely take over.

Phasing out all refuge cropland acreage would eliminate the estimated gross annual receipts of $206,000 earned by eight cooperative farmers. This phaseout would not be voluntary, as under Alternative A, but it would occur over a 15-year period, which would provide time for farmers to adjust. Moreover, those farmers who have three-year leases with DeSoto have known for many years that croplands are being cut back. This reduction has now been underway for more than a decade and has already removed more than 1,000 acres of cropland from DeSoto. Also eliminated would be surplus grains and inter-elevator grain transfers to other field stations.

DeSoto Lake would be reconnected to the Missouri River, so that the natural, fluvial processes of flooding, deposition, scouring, and erosion would once again occur within DeSoto Bend — to the extent possible in a river whose discharges are heavily regulated by dams. Levees would have to be built around the refuge, to prevent possible flood damage to adjoining properties. However, refuge facilities including the Visitor Center, headquarters, roads, and trails would remain at risk to flooding, erosion, and sedimentation. The consensus of participants in the three-day Alternatives Workshop at DeSoto in October, 1999 was that DeSoto Bend would eventually silt

in or be cut off, as oxbows eventually are. In any case, in the near term, DeSoto Lake would cease to exist as a hydrologically and biologically separate entity. The managed sport fishery would cease to exist and would be replaced by an opportunistic fishery oriented toward riverine species. However, certain riverine species, including the endangered pallid sturgeon, may find more suitable habitat in the sloughs and backwaters that could conceivably develop in what is now DeSoto Lake.

Eliminating the still waters of DeSoto Lake would probably make the refuge much less attractive as a sanctuary and stopover for migratory waterfowl. Water courses with currents do not lend themselves to resting and sleeping by migrating ducks and geese. The replacement of adjacent croplands with bottomland forest and native grasslands would also tend to attract fewer waterfowl. However, native resident and migratory songbirds and other vertebrate species dependent on or with a preference for woodlands, wetlands, and grasslands would benefit from additional habitat.

Public use and recreation would be significantly altered under this alternative. Hunting and fishing opportunities would almost certainly diminish because of the loss of cropland and the lake. For most refuge visitors who now come to observe and photograph the annual snow goose spectacle every fall, in all probability there would be fewer geese and waterfowl in general to observe. As mentioned above, the Visitor Center and other public use facilities would also be at greater risk to damage from flooding, which would have adverse repercussions on visitation. The *Bertrand* Collection, which DeSoto NWR has a legal obligation to preserve, could be forced to move to a more secure facility. On the other hand, with the refuge converted into a large "natural laboratory" for native habitat restoration, there would be ample, perhaps even expanded, opportunities for environmental education, interpretation, and research.

This alternative represents a radical departure from the traditional management of the refuge; careful analysis of its potential impacts, as proposed in Chapter 5, Objective 1.7.1 will be necessary to determine its feasibility.

Alternative C – Maximize Compatible Public Use Potentials

Under this alternative, the six priority wildlife-dependent uses originating with the Refuge System Improvement Act (interpretation, education, observation, photography, hunting, fishing) would be promoted and enhanced. Public use and environmental education efforts and outreach would be stepped up considerably.

Wildlife population and habitat management would be oriented toward embellishing DeSoto's natural assets and attractions in such a way as to draw more visitors to the refuge and give them even more rewarding and informative experiences than they currently enjoy. To some extent, funding priorities would also be shifted away from land and resource management per se in the direction of providing more and better facilities and programs for the public.

Croplands would be kept at their current level (almost 2,000 acres) because they help attract and feed deer, wild turkey, snow geese, and other waterfowl, all of which have high visual appeal,

thus providing enjoyment to the viewing public. Food plots would be placed and maintained in locations accessible to public viewing. By maintaining cropland acreage, cooperative farmers could continue cultivating the refuge indefinitely, maintaining their income from refuge farming. DeSoto would continue to share excess grains with other refuges via inter-elevator transfers.

Maintaining cropland on DeSoto may also help decrease depredation by deer and other game animals on adjacent private farmland by providing an ample food source within the refuge. It would also likely help maintain the deer herd, and populations of other game birds like turkey, pheasant, quail, ducks and geese at current levels, which will maintain or even augment current hunting opportunities on the refuge. However, native non-game birds dependent on grasslands and woodlands would not benefit from increased habitat for nesting, feeding and cover under Alternative C, as they would (to different degrees) under the other three alternatives.

Bottomland forests would continue to change in tree composition, notably with the continued loss of cottonwoods, the dominant canopy species at present. Accompanying the decline of cottonwoods are a projected decline in tree cavities valuable to many species and perches favored by bald eagles. The extent to which the affected species could “make do” with less ideal nesting, resting, and cover structures is unknown.

DeSoto Lake would be managed intensively as a stabilized, manmade oxbow lake supporting a recreational fishery with tremendous potential. The lake would be renovated on a regular basis, depending on trends in aquatic habitat, water quality, and the species composition of its fish biomass. Once rough-fish reached a certain level of sustained dominance, a renovation would be undertaken, which could include a lake drawdown and/or chemical treatment with Rotenone or whatever substitute is permissible. Plantings would be carried out with submerged aquatic plants that improve both aquatic habitat and water quality. The lake shore would be further stabilized with riprap to prevent erosion. Lake water quality, habitat, and fish populations would be monitored intensively through a variety of means. The means would be sought to lower the water level in the lake, which is critical to achieving its recreational potential.

Maintaining abundant fish populations in DeSoto Lake would help continue to attract bald eagles, some species of water birds, shorebirds and wading birds to the lake.

Under Alternative C, the possibility of constructing a campground near the South Gate entrance in conjunction with Iowa DNR and Wilson Island State Park would be seriously considered. If a campground were built, it would augment DeSoto’s recreational value to the public. However, the compatibility of camping with the refuge purpose and mission would have to be determined. Greater activity in that area would certainly necessitate greater law enforcement efforts and expenditures on the refuge. It would likely concentrate and intensify fishing, canoeing, and boating in that reach of the lake.

Overall, this alternative would satisfy those concerns related to public use and recreation, being a “good neighbor,” and maintaining refuge facilities. However, except for promoting several “photogenic” wildlife species, it would generally give short shrift to wildlife, habitat and broader ecological concerns such as enhancing biodiversity and engendering freer rein to ecosystem processes.

Alternative D – Optimize Natural Resource Conditions and Public Use Potentials (Preferred Alternative)

This alternative would neither maximize natural resource conservation nor compatible public uses at DeSoto. Rather, it seeks the best or optimal balance between the sometimes conflicting objectives of wildlife conservation, habitat restoration, and public use.

Alternative D would reduce the current acreage of cropland by about three-quarters over the coming 15 years, down to about 6% of the total refuge area (from 25% today). Most reverted cropland would be converted to managed, native prairie grasslands (more than 1,100 acres, bringing total grasslands up to 2780 acres), and some would be converted to bottomland forest (about 350 acres, bring total woodlands up to 3700 acres), both by active planting and/or seeding and passive, successional reforestation. This additional habitat would benefit those indigenous resident and migratory birds, and other native species, that depend on grasslands or woodlands for nesting, resting, and feeding. However, certain resident game animals that prefer to feed on grains may see their refuge carrying capacity reduced. Snow geese are unlikely to be affected.

Under Alternative D, there might be somewhat fewer hunting opportunities for white-tailed deer if reductions in cropland lead to a reduced deer population. However, the projected mix of grassland and woodland habitats should also be very favorable to the refuge deer herd, so it is by no means certain that the population would decline. For the foreseeable future, snow goose and waterfowl hunting, especially the former, could increase, not because of habitat changes but because of increased management emphasis and support, especially on controlling snow goose numbers. However, increasing the take of snow geese has proven much more difficult in practice than simply increasing the number of hunting hours and changing hunting techniques.

Phasing out approximately 75% of the current refuge cropland acreage would cut by three-quarters the estimated gross annual receipts of $206,000 earned by eight cooperative farmers. However, this reduction would take place primarily by means of voluntary attrition and would be drawn out over a 15-year period, which should minimize most potential economic hardship. Furthermore, participating farmers have known for years that their leases are short-term and that croplands are being retired. This reduction has now been underway for more than a decade and has already retired more than 1,000 acres of cropland from DeSoto.

DeSoto Lake would continue to be managed much as it has, but with greater emphasis on enhancing water quality and aquatic habitat and especially, investigating the feasibility of various means of controlling lake water level. The inability to prevent excessive water levels during the summer, the most active season for lake-based recreation, has seriously interfered with fishing, boating, and even hiking adjacent trails. While Alternative D would not reconnect DeSoto Lake to the Missouri River (as would Alternative B), it would call for the completion of a preliminary study investigating the feasibility, implications, impacts (both beneficial and adverse) of the reconnection option.

A more concerted effort than under current management would be made to encourage cottonwood regeneration in DeSoto woodlands by means of a combination of planting and

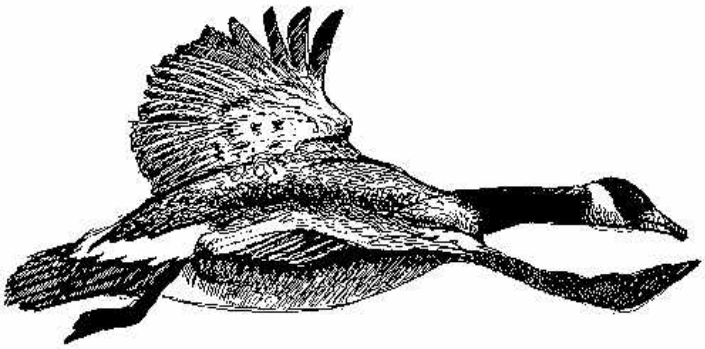
controlled flooding and pumping to encourage seed germination. If successful, these efforts would maintain a species which benefits wildlife by providing perches and nesting cavities.

Other refuge programs would not vary significantly from those envisioned under Alternative A (current management), but would be stepped up, improved, or augmented. The successful implementation of these programs, projects and initiatives is predicated on receiving the requisite funding.

It is difficult to predict the effects of Alternative D on sport hunting and fishing opportunities. While these two activities would continue to be encouraged, and disabled and youth hunts may be made available, habitat changes (i.e. less grain-producing cropland) could lead to a smaller deer herd. If lake renewal and fishery management efforts succeed, there could more anglers and larger creels. Opportunities for other uses — hiking, observation, and education — would increase.

In sum, this alternative addresses all issues raised in scoping. It acknowledges that certain concerns are in fact opposing or competing, and thus require a balancing of interests and values. It will increase forest and grassland acreage, attempt to rejuvenate declining cottonwoods, aggressively manage DeSoto Lake, and address snow geese overpopulation. It will also seek to improve protection of refuge resources and interact more effectively with stakeholders and partners. Refuge staff believe this alternative is the most realistic, feasible, and responsive to the list of issues and concerns facing DeSoto, and for that reason they selected it as the Preferred Alternative.

The matrix on the following pages compares the approach and/or outcome of each of the four alternatives to 30 issues, concerns and opportunities at DeSoto National Wildlife Refuge.



DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 1
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
HABITAT MANAGEMENT				
Croplands	Gradual reduction from 2000 to 1000 acres	Eliminated altogether; reduced to zero acres	Maintain present acreage and plant small food plots to maximize public viewing	Gradual reduction from 2000 to 475 acres
Woodlands	Continual decline of mature bottomland forest (cottonwoods) in spite of opportunistic efforts at regenertion	Significant increase in bottomland forests and cottonwoods	Continual decline of mature bottomland forest (cottonwoods) in spite of opportunistic efforts at regeneration	Active regeneration of bottomland forests, including cottonwoods; increase opportunistic efforts
Wetlands	Modest increase in acreage (up to 15 acres); additional wetland restoration off-refuge	Likely significant increase in permanent and ephemeral wetlands (natural wetlands)	Modest increase in-increase in acreage on refuge and private lands off-refuge present	Modest increase in managed wetlands from 101 acres at to 115 acres
Grasslands	Proportional increase of appox. 680 acres to about 2320 acres with gradual reduction in cropland; ongoing renovation and maintenance to prevent encroachment by woody vegetation	Significant increase in wet prairie (e.g. prairie cordgrass)	Maintain grasslands at current level of about 1640 acres	Gradual increase in grassland acreage from 1640 acres at present to 2780 acres by 2015

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 2
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
HABITAT MANAGEMENT				
Lake Management	Limited ability to regulate water levels during wet cycles; maintain a stabilized man-made oxbow lake	Allow normal, natural successional processes to occur, likely leading to eventual loss of DeSoto Lake; feasibility study needed	High ability to manage lake level during both wet and dry cycles; extend public use season; increase artificial structures; increased bank stabilization	Same as Alt. C, but not necessarily extend public use season; feasibility study needed
Riverine	Ongoing monitoring	Increase in floodplain and riverine aquatic habitat; initiate feasibility studies for increasing riverine habitat	Ongoing monitoring	Accelerate riverine habitat restoration, thereby increasing compatible boating and fishing opportunities; feasibility study for installing water control structure on Wilson Island chute and re-routing agricultural drainage ditches
Research Natural Area	No active management	No active management	No active management	No active management

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 3
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
FISH AND WILDLIFE POPULATIONS MANAGEMENT				
DeSoto Lake Fisheries	Continue stocking native game fish; monitor fish populations; permit commercial rough fish harvest; a continued decline of quality sport fishing can be anticipated due to invasion of undesirable species, and lack of funds for adequate controls	Fishing would change from an intensively managed lake sport fishery to an opportunistic riverine fishery; long-term population monitoring	Renovate lake every 10 years & intensively restock with native sport fish; upgrade aeration and fish barriers; increase population monitoring/ inventory; more restrictive size and limit on sport harvest; increase law enforcement	Less frequent renovation than in Alt. C; otherwise, similar to Alt. C: restock intensively with native sport fish; permit commercial harvest as necessary; upgrade aeration & fish barriers; increase population monitoring; more restrictive size and limit on sport harvest; increase law enforcement
Resident Wildlife	Continue management practices to support populations; potential reduction of on-refuge use of cropland-dependent wildlife as they move off-refuge; decrease in local turkey, pheasant, and quail numbers because of reduced farmland	Decrease in resident wildlife of many species due to termination of intensive management; some species, however, will increase, such as grassland and woodland birds; decrease in turkey, pheasant, and quail numbers; long-term population monitoring	Emphasize land management to support wildlife; attract wildlife to increase public viewing opportunities; population numbers remain at status quo; hunting programs continue or increase; conduct feasibility study into building viewing platform off Hwy. 30	Native grassland and woodland species of birds and other vertebrates will benefit with the addition of more acreage of these habitats as croplands are reverted; may be decline in refuge game populations (deer, turkey, quail and pheasant) that depend more on croplands

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 4
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
FISH AND WILDLIFE POPULATIONS MANAGEMENT				
Migratory Wildlife	No change from current population numbers due to refuge actions; increase in neotropical migrant utilization, in particular, increased nesting opportunities in grassland areas	Gradual loss of snow goose population; wood ducks may increase; temporary improvement for waterfowl with increasing wetlands, then decline as wetlands gradually fill in; probable increase in numbers and diversity of neotropical migrants over time; increase of fish-eating birds; long-term population monitoring	Same as Alt. A: no change from current population numbers; neotropical birds stable at current levels or increase; conduct feasibility study into building viewing platform off Hwy. 30 for increased viewing	Neotropical birds benefit as a result of increased breeding habitat (forests and grasslands) over the present and over Alts. A & C. Fewer snow geese from more hunting and other control efforts; other waterfowl will increase, as will wading birds
Threatened and Endangered Species	Status quo in management, but ongoing ecological succession and processes continue: historic eagle roost may be lost as cottonwoods thin and die	Increased potential for pallid sturgeon; increased potential habitat for piping plover and least tern; lose bald eagles as lake silts in but roost sites may increase with cottonwoods; long-term monitoring	Likely increased disturbance of eagle roosts with increased public use; theatened trumpeter swans may be disturbed	Similar to Alt. A in many respects, but more aggressive effort to regenerate cottonwoods may positively impact future bald eagle use, expected to decline in Alt. A as cottonwoods dwindle
Snow Geese	Follow recommendations of Mid-continent Snow Goose Management Team; step up hunting in interim	Reduced attractiveness to snow geese by eliminating cropland and eventual elimination of oxbox lake; monitoring	Same as Alt. A: follow recommendations of Mid-continent Snow Goose Management Team; step up hunting	Same as Alt. A: follow recommendations of Mid-cont. Snow Goose Management Team; step up hunting

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 5
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
RESOURCE PROTECTION				
Bertrand Collection	Continue to support minimum requirements of *Bertrand* artifacts; comply with Scope of Collections Statement and Comprehensive Collection management Plan; continue monitoring, research and object loans	May jeopardize building (Visitor Center) by flooding; need to assure collection preservation, but consider other locations for storage of bulk of collection; retain core collection for interpretation purposes	Increase outreach, traveling exhibits and interpretation; more support to research and publication, educational materials, etc. expand interpretive themes to emphasize role of steamboats in Westward expansion & subsequent impacts	Similar to Alt. C: periodic refurbishing of exhibits; expand interpretive themes; greater outreach and traveling exhibits
Facilities/ Infrastructure	Ongoing decline of facilities with temporary closure of certain facilities likely; appropriate facilities protection constrained by 97% of budget going to fixed costs	Probable closure of public use facilities (Visitor Center, roads, trails) due to flooding and sedimentation; investigate facilities relocation options	Increase public use potential; upgrade and add to public use facilities, e.g. photo blind, viewing platform off Hwy. 30, roads, trails, exhibits	Similar to Alt. C but emphasis will complement natural resource protection even more; funding increased to meet 80/20% budgetary goals

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 6
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
RESOURCE PROTECTION				
Invasive/ Exotic Species	Continue monitoring; some mechanical, chemical, biological, controls; continue commercial fishing; undesirable organisms include phragmites, musk thistle, purple loose-strife, gizzard shad, Chinese elm; overall, undesirable species likely to continue to increase or become dominant in spite of present efforts	Full-scale assault on all invasive and exotic species in pur-suit of pre-develop-ment floral and faunal communities	Intensive management of selected species in publicly visible areas; intensify actions to control non-indigenous aquatic species; over-all, less emphasis on exotic control, espec-ially among lesser-known, inconspicuous species	More aggressive efforts than at present to control non-natives
Law Enforcement (fish & wildlife as is protection)	Continue efforts; maintain program	Decrease efforts as public use declines	Increase full-time law enforcement effort	Potential modest increase in law enforcement effort

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 7
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
PUBLIC EDUCATION AND RECREATION				
Environmental Education	Passive education effort; school groups use DeSoto; public school teachers conduct most actual education	Passive education would continue, but with a different theme, that of ecological restoration and natural succession	Increase staff and more active education effort; education would be conducted on-site as well as off-site in an intensified program of outreach	More emphasis on environmental education than in Alt. A, but less than Alt. C.
Interpretation	Relatively non-personal — consists of interpreted fall auto tour route, nature trails, & Visitor Center exhibits; demand deficit continues	Relatively non-personal — consists of nature trails and exhibits at the Visitor Center	A more staff-conducted interpretive program would be undertaken, including more trails, exhibits, and programs	A more staff-conducted interpretive program would be undertaken, including more trails, exhibits, and programs
Hunting	Hunting would not be expanded from present levels, which include 3 deer hunts (1 muzzleloader & 2 archery) with a take of about 100/year, and 1 guided snow goose hunt	Deer hunting would probably decline; snow goose hunting would definitely decline; possible increase in other waterfowl hunting opportunities at least in near-term future	Shotgun, disabled & youth hunts would be added & bow hunts increased; snow goose hunt would continue or increase; turkey & pheasant would be added; increase accessible acreage	In general, same as Alt. A.; possible increases in some hunts (disabled and youth), although reduction in cropland acreage may reduce numbers of some game animals

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 8
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
PUBLIC EDUCATION AND RECREATION				
Fishing	Continual slow decline in desirable sport fish; overall level of fishing continues to decline; possible future lake renovation could improve fishing	Sport fishing would decline and eventually disappear altogether as the lake silted in; composition of catch would shift to riverine species in near to medium term	Aggressive efforts on part of refuge leading to increased level of fishing and higher quality experience; greater harvests; lake renovation	The level of effort to restore a higher-quality sport fishery would be between Alt. A and Alt. C
Photography	Existing low level of dedicated photography would continue	Existing low level of dedicated photography would continue	Add blinds to accommodate more photography; encourage photographers by holding more workshops	Accommodate a modest level of special photography permits; hold workshops; level of effort between Alt. A and Alt. C
Wildlife Observation	Very high level seasonally at Visitor Cen- and around refuge, especially Bob Starr Observation Deck	Highly likely to decline due to less accessibility; changing habitat will attract fewer snow geese and visitors	Install viewing deck on Hwy. 30; expand auto tour length and dates; more roadside turnouts	Conduct feasibility study on Hwy. 30 deck, examining traffic & safety issues; tour dates, signs & turnouts expanded

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 9
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
PUBLIC EDUCATION AND RECREATION				
Outreach	Media outreach (about 40 news releases per year); about a dozen off-refuge talks a year; occasional broadcasts	A different message would need to be crafted to explain refuge changes to a perhaps skeptical public	Outreach programs to schools, civic groups, and the community would be vastly expanded	Level of effort would be greater than Alt. A and less than Alt. C
Other Compatible or Established Uses	Mushroom and berry picking permitted in limited areas	Access would decline; use may also be discouraged to maximize habitat values	Allow existing uses & open more areas; consider State campground at South Gate; build bicycle lanes	Consider accommodating any activity compatible with mission; allow but control existing uses

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 10
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
PARTNERSHIPS				
Individual Volunteers	Medium level of volunteer support	Use more volunteers to enhance and maintain habitats	Increase effort to actively recruit and train volunteers (e.g. volunteer coordinator position)	Increase level of volunteer hours to enhance and maintain habitat; actively recruit and train volunteers through a volunteer coordinator position
Research	Continue existing cooperative agreements with universities for biological research; cooperate with research organizations when approached with viable projects; staff conduct research on their own intiative (e.g. wildlife utilization of cropland and other habitats); ongoing *Bertrand* Collection research, on/ off refuge	Continue all of efforts in Alt. A; in addition, monitor and research effects of habitat changes as they occur; conduct long-term studies to document changes and impacts; DeSoto could be promoted as a "natural laboratory"	Same as Alt. A; in addition, increase *Bertrand* Collection research as well as research into public use impacts on refuge habitat and wildlife	Would be a combination of Alt. A, Alt. B and Alt. C; in addition, the refuge would actively recruit researchers for targeted projects

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 11
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
PARTNERSHIPS				
Private Lands Program	Maintain program at existing level, producing a modest increase in wetland and upland habitat on private land, through cost share initiatives; program administers areas in 18 counties in western Iowa; cost share with Ducks Unlimited, Pheasants Forever, Iowa DNR, NRCS, and County Conservation Boards	Continue with program in Alt. A; in addition, monitor and increase funding base for developing new agreements and monitoring	Combination of Alts. A & B as well as provide public forums to maximize public knowledge and participation in private lands program	Combination of Alts. A & B: maintain existing private lands programs and partnerships and increase funding base for developing new agreements and monitoring
NGO's (Non-Governmental Organizations)	Partnership with Midwest Interpretive Association continues; partner with Omaha Chapter of the Audubon Society; informal cooperative efforts with Boy & Girl Scouts and other groups; Ducks Unlimited matching funds	Same as Alt. A: partnership with MIA continues; partner with Omaha Chapter of the Audubon Society; informal cooperative efforts with Boy & Girl Scouts and other groups; D.U. matching funds	An enhanced version of Alt. A; continue all existing partnerships and actively seek others; encourage formation of "Friends of DeSoto" or similar group; more DeSoto & *Bertrand*-themed materials for sale in Visitor Center	An enhanced version of Alt. A; continue all existing partnerships and actively seek others; encourage formation of "Friends of DeSoto" or similar group; more DeSoto & *Bertrand*-themed materials for sale in Visitor Center

DeSoto National Wildlife Refuge

Comprehensive Conservation Plan / Environmental Assessment
Alternatives Matrix — Page 12
Summary of Actions and Effects of Management Alternatives

ISSUES/ CONCERNS /OPPOR-TUNITIES --	Alternative A - No Action (Current Mmgt.)	Alternative B - Historical Habitat Restoration	Alternative C - Maximize Public Use Potentials	Alternative D - Optimize Resources and Public Use
PARTNERSHIPS				
Government Agencies (Federal State, Tribal)	Continue all existing partnerships, including new cooperation with NRCS	Continue all existing partnerships, including new cooperation with NRCS	Increase partnering; work with IA DNR on providing improved camping facilities; more cooperation with NE Historical Society	Combination of Alts. A & C; however, consider feasibility study of camping on south end of refuge

Chapter 5
List of Preparers

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Development of alternatives, matrix, and editing of EA

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Development of alternatives and matrix

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Chapter 6
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Steve Rothe, Army Corps of Engineers
Lester Rurup, Nebraska resident
Rich Scebold, Iowa resident and neighboring farmer
Rick Schneider, Nebraska Game and Parks
Jeff Schuckman, Nebraska Game and Parks
Bob Seitz, Iowa Department of Natural Resources, Wilson Island State Park
Tim Sproul, Harrison County Conservation Board
Shawn Stevens, Pottawattamie County (IA) Office of Planning and Development
Bruce Thomas, Nebraska resident and neighboring farmer
Kent Thomas, Nebraska resident and neighboring farmer
William Thomas, Nebraska resident and neighboring farmer
Ed Tuttle, Iowa bow hunter
Fred Van Dyke, Northwestern College, Department of Biology
Fred Wupper, Nebraska resident
John Wupper, Nebraska resident

Chapter 7
References

See Appendix G.

Appendix B
Glossary

Alternative: A set of objectives and strategies needed to achieve refuge goals and the desired future condition.

Biological Diversity or Biodiversity: The variety of life forms and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Compatible Use: A wildlife-dependent recreational use, or any other use on a refuge that will not materially interfere with or detract from the fulfillment of the mission of the Service or the purposes of the refuge.

Comprehensive Conservation Plan (CCP): A document that describes the desired future conditions of the refuge, and specifies management actions to achieve refuge goals and the mission of the National Wildlife Refuge System.

Ecosystem: A dynamic and interrelated complex of plant and animal communities and their associated non-living environment.

Ecosystem Approach: A strategy or plan to protect and restore the natural function, structure, and species composition of an ecosystem, recognizing that all components are interrelated.

Ecosystem Management: Management of an ecosystem that includes all ecological, social and economic components that make up the whole of the system.

Endangered Species: Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register.

Environmental Assessment: A systematic analysis to determine if proposed actions would result in a significant effect on the quality of the environment.

Goals: Descriptive statements of desired future conditions.

Issue: Any unsettled matter that requires a management decision. For example, a resource management problem, concern, a threat to natural resources, a conflict in uses, or in the presence of an undesirable resource condition.

National Wildlife Refuge System: All lands, waters, and interests therein administered by the U.S. Fish and Wildlife Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish, wildlife and plant resources.

Objectives: A specific statement that describes a desired outcome.

Preferred Alternative: The Service's selected alternative identified in the Draft Comprehensive Conservation Plan.

Scoping: A process for determining the scope of issues to be addressed by a comprehensive conservation plan and for identifying the significant issues. Involved in the scoping process are federal, state and local agencies; private organizations; and individuals.

Species: A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. A category of biological classification.

Strategies: A general approach or specific actions to achieve objectives.

Trust Species: Species over which the Service has legal authority or managerial responsibility, such as threatened and endangered species and migratory birds.

Wildlife-dependent Recreational Use: A use of refuge that involves hunting, fishing, wildlife observation and photography, or environmental education and interpretation, as identified in the National Wildlife Refuge System Improvement Act of 1997.

Threatened Species: Those plant or animal species likely to become endangered species throughout all of or a significant portion of their range within the foreseeable future. A plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.

Vegetation: Plants in general, or the sum total of the plant life in an area.

Vegetation Type: A category of land based on potential or existing dominant plan species of a particular area.

Watershed: The entire land area that collects and drains water into a stream or stream system. Similar in meaning to *drainage area* or *drainage basin*.

Wetland: Areas such as lakes, marshes, and streams that are inundated by surface or ground water for a long enough period of time each year to support, and that do support under natural conditions, plants and animals that require saturated or seasonally saturated soils.

Wildlife Diversity: A measure of the number of wildlife species in an area and their relative abundance.

Appendix C
Refuge Operations Needs (RONS), and Maintenance Management System (MMS) Lists

(An example of a RONS project sheet follows this summary list of RONS projects)

Refuge Operations Needs (RONS)

RONS Project #	Strategy Number(s)	Project Description	First Year Need	Recurring Annual Need
99011	3.2.1.1	Visitor Center operating expenses	$368,000	$368,000
98001	3.1.1.10	Visitor Center custodial services	$110,000	$45,000
97022	2.1.1.2	Increased law enforcement coverage	$123,000	$58,000
99001	2.1.1.1	Provide law enforcement equipment	$25,000	$25,000
99007	1.4.2.5 & 4.3.1.7	Biological technician assistance in habitat restoration & maintenance	$97,000	$38,000
00005	various	Construct addition to HQ complex	$187,000	$3,000
97014	1.4.3.1-1.4.3.5; 1.4.2.1-1.4.2.2	Develop 15 acres of high-quality wetlands and 100 acres of native warm-season grasslands	$41,000	$2,000
99012	3.5.3.1-3.5.3.6	Prepare for and accommodate increased visitation for Lewis & Clark commemoration	$493,000	$233,000
97012	1.4.2.1-1.4.2.6	Provide 120-hp. tractor, mower & misc. equipment to maintain grassland acreage	$107,000	$6,000
97011	1.4.2.1-1.4.2.6	Revert 650 acres of cropland to warm-season native grassland over 5 years	$64,000	$16,000
97018	various	Construct storage building for expensive equipment now exposed to elements	$165,000	$6,000
99010	1.4.3.1; 1.8.1.1; 1.3.1.1-1.3.1.8	Wildlife and habitat surveys utilizing GIS	$133,000	$58,000
99009	4.3.1.1-4.3.1.4	Upland habitat restoration on 200 acres of private land off-refuge	$25,000	

00002	1.4.3.3-1.4.3.4	Install wells and electric pumps at 7 wetland sites to control water levels	$165.000	$11,000
00001	1.4.1.1-1.4.1.3	Reforest 350 acres of cropland to native bottomland timber & shrubs	$63,000	$33,000
00004	4.1.1.1	Provide environmental education outreach off-refuge in Omaha and Council Bluffs	$123,000	$58,000
97007	2.1; 3.1; 3.1.3.1	Create a cultural resources map of refuge through surveys and site investigations	$858,000	
97001	3.2.2	Construct 3 observation platforms with interpretive panels on Cottonwood, Wood Duck Pond, and Missouri Meander trails	$62,000	$2,000
00003	3.1.1.1-3.1.1.2	Create new 12-minute refuge orientation video to replace outdated one now used	$100,000	
00004	3.1.1.1-3.1.1.3	Install touch-screen computers in Visitor Center for interpretive purposes	$51,000	$6,000
00006	1.2.3.1-1.2.3.4 4.3.1.1-4.3.1.4	Restore and maintain wetlands on and off-refuge	$456,000	$14,000
00007	3.1.1.10	Employ museum technician to perform necessary conservation treatment & preventive maintenance without supervision	$114,000	$49,000

Unfunded Operating Needs - Listed by Station Rank

DeSoto NWR

Orgcode: 33510 Type: NWR State(s): IA, NE District: 2

1 **PUBLIC EDUCATION & RECREATION : Provide Visitor Services**

MEASURES: 200000 new visitors will be served; 300000 existing visitors will be served; 100 % will support the top 6 priority public uses

The project will provide funds to operate the refuge visitor center including expenses for heating, air conditioning, required safety inspections, electrical expenses, daily repairs, and health and safety improvements. The project will also allow for upkeep and maintenance of parking lots, interpretive kiosks, interpretive trails, maintenance facilities and water control structures. Operation and preventative maintenance of equipment will be accomplished.

ADDITIONAL FUNDS NEEDED ($000):	One-Time	Recurring Base	First Year Need
Operations: Personnel Costs			
Equipment Cost			
Facility Cost			
Services/Supplies			
Miscellaneous Costs		368	
TOTAL Operations Cost		368	368

ADDITIONAL RECURRING STAFF NEEDS:	FTEs	Cost ($000)
Managers		$0
Biologists		$0
Resource Specialists		$0
Education/Recreation Staff		$0
Law Enforcement		$0
Clerical/Administrative		$0
Maintenance/Equipment Operation		$0
TOTAL FTEs Needed		$0

EMPHASIS: 25% Critical health & safety; 25% Critical resource protection; 25% Critical mission; 25% Other important needs

OUTCOMES*:	ES	WF	OMB	HEC	IAF	SDA	RW	PED	FAR	PRC	TOT
	20	20		20				20		20	100

PLANNING LINKS: Station Goal/Objective; Station Step-down Mgmt Plan

PROJECT #: 99011 **RANK - STATION:** 1 **GEOAREA:** 999 **REGION:** 999 **NATIONAL:** 999

Refuge Management Information System - Refuge Operating Needs System
DeSoto NWR - 4/19/2000 - Page 1

Needs Printout #3

DeSoto National Wildlife Refuge

Deferred Maintenance & Equipment Needs (MMS)

Proj. No.	Project	Funding Year	Backlog	
98344	Replace non-compliant water supply system at VC. **Priority #1**	DM	2003	$400
	Replace deficient Refuge shooting range, current range is contaminated with lead & is in a flood plain. Real PN: 192 **Priority #4**	DM	2002	$75
99295	Replace deficient HVAC system in the Visitor Center. (Install DDS automation system) **Priority #5**	DM	2001	$200
96181	Retrofit non-accessible Visitor Center sidewalk entrance to meet ADA standards. **Priority #6**	DM	2002	$50
	Resurface asphalt parking lot at VC parking lot & employee parking. This has been periodically torn up & not restored to its previous condition. (Dimensions: 845 sq. yds. at 4" depth. 190 tons Asphalt=$7,500 material, plus $5,000 blading & laying=$13,500. Real PN: 155. **Priority #7**	DM	2004	$14
93062	Replace worn-out 1975 truck tractor. **Priority #8**	DM	2999	$84
90055	Rehabilitate Visitor Center displays & structures **Priority #9**	DM	2999	$190
95121	Replace worn-out 1978 JD-750 dozer **Priority #11**	DM	2999	$252
93056	Replace worn-out 1981 Champion road grader **Priority #14**	DM	2999	$89
00070	Replace rotting deck/overlook at the Bertrand Site. **Priority #19**	DM	2004	$25
95107	Replace Halon fire suppression system in VC. **Priority #21**	DM	2005	$84

96183	Replace worn-out moist soil mgmt. unit pump eq. **Priority #22**	DM	2999	$63
95093	Replace deficient Bertrand collection environmental monitoring equipment & failing photocopier **Priority #23**	DM	2999	$10
99475	Replace remaining 2/3's of worn-out carpet in the Visitor Center. **Priority #24**	DM	2999	$50
95103	Repair deficient insulation on VC north wall. **Priority #27**	DM	2999	$75
	Repair rock jetties & shoreline riprap Real PN: 193, 203-207. **Priority #28**	DM	2002	$50
	Replace broken & deteriorated cabinets in Bertrand Cargo Storage Areas, as well as, disintegrating gasketry with new. Real PN: 155 **Priority #29**	DM	2999	$15
	Resurface four nature trails & five parking lots w/ This needs to be done every five yrs. To reduce muddy walking surface for visitors. (Dimensions: 8,800 yds. x 4 yds. wide x 3" thick). Need 1400 tons at $7/ton=$10,000. Real PN: 114, 173, 153, 176, & 179. **Priority #30**	DM	2003	$10
93058	Replace worn-out International 856 tractor **Priority #36**	DM	2999	$53
99474	Replace worn-out 1985 Dump Truck. (Was Proj. No. 99003). **Priority #37**	DM	2999	$85
99481	Replace worn-out 1974 Inter. 966 agricult. tractor (Was Proj. No. 99010). **Priority #41**	DM	2999	$55
99482	Replace worn-out JD utility tractor & mower **Priority #42**	DM	2999	$55
99473	Replace Reverse Osmosis System at Visitor Center **Priority #47**	DM	2999	$25
98037	Replace worn-out International 886 tractor. **Priority #48**	DM	2002	$59

95115	Repair deteriorated fishing pier at Bullhead pond. **Priority #49**	DM	2003	$12
	EQUIPMENT NEEDS			
	Replace antiquated VC fire monitoring/warning system w/ system that meets ADA & fire code stds. Real PN: 155. **Priority #2**	EQ	2002	$30
	Replace Bertrand Collection walk-in cooler - replace aging cooling mechanism with improved humidity regulated system for long term storage & conservation of Bertrand Collection foodstuffs & sensitive samples. Real PN: 155. **Priority #3**	EQ	2999	$20
99477	Replace '86 Chevy Blazer 4x4 w/ 185,885 mls. (Was Proj. No. 99006) **Priority #10**	EQ	2002	$27
95094	Replace worn-out '82 Ply. Reliant w/ 63,167 mls. **Priority #12**	EQ	2001	$17
99476	Replace '90 Chevy 1500 4x2 PU truck w/ 142,000 **Priority #13**	EQ	2002	$25
96179	Replace '91 Chevy S-10 4x4 PU w/ 79,337 mls. **Priority #15**	EQ	2004	$19
99479	Replace '85 Dodge 4x4 PU truck w/ 73,249 mls. **Priority #16**	EQ	2003	$27
96184	Replace worn-out flail mower tractor attachment **Priority #17**	EQ	2004	$14
96188	Replace worn-out '85 Dodge Caravan w/ 87,000 mls. PN: 365827. **Priority #18**	EQ	2005	$22
	Replace portable fishing piers, Real PN: 69,& 91. **Priority #25**	EQ	2002	$10
90051	Replace Crisafulli pump hoses. **Priority #26**	EQ	2001	$12

cont.

	Replace worn-out '87 Jeep Cherokee PN: 368475, w/ 156,553 mls. **Priority #31**	EQ	2003	$20
	Replace worn-out '89 Jeep Cherokee w/ 113,070 PN: 373275. **Priority #32**	EQ	2004	$20
	Replace worn-out '81 IHC Backhoe loader PN: 361307. **Priority #33**	EQ	2002	
	Replace worn-out '81 JD 301A tractor, PN: 361413. **Priority #34**	EQ	2002	
	Replace worn-out '81 JD 302 tractor, PN: 361412. **Priority #35**	EQ	2003	
	Replace worn-out '97 Ford Ranger 4x4 PU PN: 389938, w/ 99,400 mls. **Priority #38**	EQ	2003	$22
99480	Replace '88 Dodge Dakota 4x2 PU truck w/ 91,000 **Priority #39**	EQ	2003	$22
99478	Replace '90 Dodge 4x4 PU truck w/ 82,000 mls. **Priority #40**	EQ	2003	$27
	Replace worn-out '92 Ford Taurus station wagon w/ 72,000 mls., PN: 379800. **Priority #43**	EQ	2002	$20
	Replace '88 Dodge Dakota 4x2 PU w/ 70,000 PN: 370916. **Priority #44**	EQ	2005	$20
95105	Replace worn-out fire pumper attachment **Priority #46**	EQ	2004	$16

Construction Needs

Proj. No.	Project	Funding Year	Backlog
97038	Waterline connection to Missouri Valley	RONS 2999	$554
97018	Construct equipment storage building	RONS 2999	$171

TEA 21 - Refuge Roads

Proj. No.	Project	Funding Year	Backlog
97205	Repair & resurface 10 mls. deteriorated asphalt rd.	DM 2999	$525

Appendix D
Compatibility Determinations

A compatibility determination documents the formal procedure used to determine if proposed and existing uses of national wildlife refuges are compatible with the purpose and mission of each refuge and the National Wildlife Refuge System.

The following draft Compatibility Determinations were revised after the 30-day review and comment period (ending 09/25/00) for the draft Environmental Assessment document and have not had the benefit of public input. The reader is invited to submit written comments on these documents in accordance with the procedures and schedule described in the front of this document.

COMPATIBILITY DETERMINATION
Environmental Education and Interpretation

I STATION NAME: DeSoto National Wildlife Refuge

II ESTABLISHED: March 12, 1958

III ESTABLISHING and ACQUISITION AUTHORITY:

Migratory Bird Conservation Act of 1969 (16 U.S.C. , 715d)
Refuge Recreation Act of 1962 (16 U.S.C. , 460k-1)

Federal duck stamp funds were used for acquiring refuge lands.

IV PURPOSE FOR WHICH ESTABLISHED:

DeSoto National Wildlife Refuge was originally established to provide sanctuary for migratory birds, with emphasis on waterfowl, as authorized by the Migratory Bird Conservation Act, which provides the lands are:

> " ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."

The Refuge Recreation Act provides that refuge lands may be suitable and used for:

> " ... (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

DeSoto's stated mission is: *"To preserve and restore indigenous biological communities, with emphasis on wetlands and riverine flora and fauna; to provide both cultural and natural history interpretations and environmental education opportunities for the general public; and to provide wildlife-dependent recreation; where and when such uses are compatible with the primary purposes of the refuge."*

The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

V NATURE AND EXTENT OF USE:

What is the use? Environmental education and interpretive presentations.

Where is the use conducted? Environmental education and interpretation are conducted at the visitor center, designated trails and other selected sites , on- and off-site.

When is the use conducted? This use occurs year-round with some seasonal variances.

How is the use conducted? Environmental education activities are provided by the refuge staff, volunteers, teachers, or leaders of the visiting group. Interpretation is a self-guided format with additional information being provided by refuge staff, volunteers, exhibits, signs and brochures.

VI ANALYSIS OF COSTS:

Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $98,000 of staff time and $11,000 of overhead is required to administer this use. With the attainment of CCP Goals 1.7, 2.1, 2.3, 3.1, 3.4, and 4.2 (Chapter 5) and their EA Preferred Alternative D, in 15 years, we anticipate an associated increase in public use resulting in an approximate 45% cost increase requiring $142,000 of staff time and $16,000 in overhead.

VII ANTICIPATED IMPACTS OF EXISTING AND PROPOSED USE ON REFUGE'S MAJOR PURPOSES AND NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

Anticipated impacts from this use are minor damage to vegetation, littering, increased maintenance activity, potential conflicts with other visitors, and minor disturbances to wildlife. Careful management of time and space for this activity avoids any major conflicts with the Refuge's primary purpose.

VIII EFFECT OF USE ON FULFILLING THE REFUGE'S PURPOSES AND THE NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

Environmental education and interpretation are priority public uses listed in the National Wildlife Refuge System Improvement Act. By providing for these uses on the refuge, the participant's knowledge and appreciation of fish and wildlife ecology will be enhanced, which will lead to increased public awareness of how healthy wildlife populations and their habitats are a benefit to them and to future generations. Increased public awareness of their natural and cultural environments contributes to the efforts of the Service to achieve the refuge's purposes and the mission of the National Wildlife Refuge System.

IX OPPORTUNITY FOR PUBLIC REVIEW AND COMMENT:

This compatibility determination is presented for public review and comment as part of the Final DeSoto National Wildlife Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment. Implementation will not occur for 30 days following approval of the CCP.

X STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Environmental education and interpretation activities and facilities will be reviewed annually to ensure the quality of their contributions and the associated impacts are at acceptable levels.

XI DETERMINATION AND NEPA COMPLIANCE:

Environmental education and interpretation are compatible uses at DeSoto National Wildlife Refuge. This determination was made in association with the environmental assessment within the comprehensive conservation planning process.

Larry Klimek 9-19-00
Larry Klimek, Refuge Manager Date

Jon Kauffeld 9-25-00
Reviewed by Date

Nita M. Fuller 1-12-01
Concurred by Date

COMPATIBILITY DETERMINATION
Farming and Haying

I STATION NAME: DeSoto National Wildlife Refuge

II ESTABLISHED: March 12, 1958

III ESTABLISHING and ACQUISITION AUTHORITY:

Migratory Bird Conservation Act of 1969 (16 U.S.C. , 715d)
Refuge Recreation Act of 1962 (16 U.S.C. , 460k-1)

Federal duck stamp funds were used for acquiring refuge lands.

IV PURPOSE FOR WHICH ESTABLISHED:

DeSoto National Wildlife Refuge was originally established to provide sanctuary for migratory birds, with emphasis on waterfowl, as authorized by the Migratory Bird Conservation Act, which provides the lands are:

> " ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."

The Refuge Recreation Act provides that refuge lands may be suitable and used for:

> " ... (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

DeSoto's stated mission is: *"To preserve and restore indigenous biological communities, with emphasis on wetlands and riverine flora and fauna; to provide both cultural and natural history interpretations and environmental education opportunities for the general public; and to provide wildlife-dependent recreation; where and when such uses are compatible with the primary purposes of the refuge."*

The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

V NATURE AND EXTENT OF USE:

What is the use? Farming and haying.

Where is the use conducted? Just under 2,000 acres are included in the approved Refuge Cropland Management Plan which are interspersed throughout the refuge.

When is the use conducted? The planting, growing and harvest season is from May through October. Haying is permitted between July 15 and September 5, timed to protect bird nesting and to allow time for regrowth valuable as winter cover.

How is the use conducted? The farming is accomplished via three-year cooperative agreements with neighboring farmers. It involves using a biological crop rotation of corn, soybean, milo and sweet clover. Winter wheat is used as a nurse crop. Haying is accomplished by cooperators via a three-year cash rent agreement. This involves brome grass and alfalfa, both used for grazing and nesting cover. The cooperator gets two-thirds of the crop, while the refuge receives one-third, or an equivalent value in services.

VI ANALYSIS OF COSTS:

Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $35,000 of staff time and $4,000 of overhead is required to administer this use. With the attainment of CCP Goals 1.1, 1.2, 1.4, 1.5, 1.9 and 4.4, (Chapter 5) and their EA Preferred Alternative D, in 15 years, we anticipate an approximate 45% cost decrease requiring $13,000 of staff time and $2,000 in overhead.

VII ANTICIPATED IMPACTS OF EXISTING AND PROPOSED USE ON REFUGE'S MAJOR PURPOSES AND NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

Some crop lands will be used for natural habitat development such as grassland and wetland. Haying is an accepted method for removal of annual growth and is considered compatible with the purpose of DeSoto Refuge and mission of the Refuge System.

VIII EFFECT OF USE ON FULFILLING THE REFUGE'S PURPOSES AND THE NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

While restoration of indigenous habitats is common to the stated missions of both DeSoto and the National Wildlife Refuge System, lands used for farming have contributed to decades of successful management for the welfare of migratory waterfowl, other migratory birds, and many species indigenous to the area. However, the dynamics of continental waterfowl populations and the dominance of farmland in the Missouri River flood plain have diminished the need for farming on the refuge. The CCP calls for the retired farmlands to be restored to indigenous biological communities. Haying complements the refuge management efforts to develop and maintain flora and fauna diversity.

IX OPPORTUNITY FOR PUBLIC REVIEW AND COMMENT:

This compatibility determination is presented for public review and comment as part of the Final DeSoto National Wildlife Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment. Implementation will not occur for 30 days following approval of the CCP.

X STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

All farming and haying is accomplished under the guidance of the Cropland Management Plan, Cooperators are guided by three-year agreements with annual addendums. The refuge uses biologically based crop rotation and integrated pest management. No insecticides are used and only Service approved, biologically friendly herbicides are used. Haying dates are regulated to avoid conflicts with nesting birds and to allow maximum late season growth for winter cover.

XI DETERMINATION AND NEPA COMPLIANCE:

Farming and haying are compatible uses at DeSoto National Wildlife Refuge. This determination was made in association with the environmental assessment within the comprehensive conservation planning process.

Larry Klimek 9-19-00
Refuge Manager Date

Jon Kauffeld 9-25-00
Reviewed by Date

Nita M. Fuller 1-12-01
Concurred by Date

COMPATIBILITY DETERMINATION
Fishing

I STATION NAME: DeSoto National Wildlife Refuge

II ESTABLISHED: March 12, 1958

III ESTABLISHING and ACQUISITION AUTHORITY:

Migratory Bird Conservation Act of 1969 (16 U.S.C. , 715d)
Refuge Recreation Act of 1962 (16 U.S.C. , 460k-1)

Federal duck stamp funds were used for acquiring refuge lands.

IV PURPOSE FOR WHICH ESTABLISHED:

DeSoto National Wildlife Refuge was originally established to provide sanctuary for migratory birds, with emphasis on waterfowl, as authorized by the Migratory Bird Conservation Act, which provides the lands are:

> " ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."

The Refuge Recreation Act provides that refuge lands may be suitable and used for:

> " ... (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

DeSoto's stated mission is: *"To preserve and restore indigenous biological communities, with emphasis on wetlands and riverine flora and fauna; to provide both cultural and natural history interpretations and environmental education opportunities for the general public; and to provide wildlife-dependent recreation; where and when such uses are compatible with the primary purposes of the refuge."*

The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

V NATURE AND EXTENT OF USE:

What is the use? Sport and commercial fishing. Sport fishing is a priority public use of the Refuge System. Commercial fishing is a management action to improve long term health of DeSoto Lake's aquatic resources.

Where is the use conducted? Angling is most active in DeSoto Lake and Bullhead Pond. Marquardt Pond is designated for organized fishing clinics. Fishing is permitted from boats, developed bank fishing piers, the lake shoreline and the banks of the Missouri River.

When is the use conducted? Fishing is permitted April 15 through October 14, plus during the winter if conditions are safe for ice fishing.

How is the use conducted? Public and commercial fishing opportunities are the result of an approved Fishery Management Plan.

Several tournaments are coordinated and regulated by Iowa DNR. Marquardt Pond is a 1.5 acre basin that has been improved to support a sustained fishery and used only for organized fishing clinics. These tournament fishing events do not unreasonably interfere with other refuge users. Up to 43,000 activity hours of sport fishing in a single season have been recorded.

Launching ramps, docks, handicapped-access fishing piers, picnic areas, fishing jetties, an electrical aeration system to avoid summer and winter stagnation, and a sophisticated electrical fish barrier on the lake's outlet structure to minimize rough fish intrusion have been developed .

Commercial fishing, by a Special Use Permit, annually removes approximately 50,000 pounds of rough fish.

VI ANALYSIS OF COSTS:

Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $25,000 of staff time and $3,000 of overhead is required to administer this use. With the attainment of CCP Goals 1.7, 2.1, 3.1, 3.2, 3.3 and 4.2 (Chapter 5) and their EA Preferred Alternative D, in 15 years, we anticipate an associated increase in public use resulting in an approximate 45% cost increase requiring $36,000 of staff time and $5,000 in overhead.

VII ANTICIPATED IMPACTS OF EXISTING AND PROPOSED USE ON REFUGE'S MAJOR PURPOSES AND NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

The major adverse impact of the fishing use is littering. There are minor wildlife conflicts when fishermen inadvertently disturb duck broods and shore birds and other wildlife in and around the water. No other associated impacts were considered to be significant constraints to achieving the Refuge Purpose and the mission of the National Wildlife Refuge System.

VIII EFFECT OF USE ON FULFILLING THE REFUGE'S PURPOSES AND THE NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

Fishing is a priority public use and those participating in this activity are exposed to the National Wildlife Refuge System and its mission. Fishing is a great way to introduce young people to the outdoors and to the values of our natural resources.

IX OPPORTUNITY FOR PUBLIC REVIEW AND COMMENT:

This compatibility determination is presented for public review and comment as part of the Final DeSoto National Wildlife Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment. Implementation will not occur for 30 days following approval of the CCP.

X STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Only day-use activities are permitted on DeSoto Refuge. Sport fishing seasons are set to avoid conflicts with migratory bird concentrations and waterfowl hunting. Commercial fishing is controlled by state and refuge-specific regulations.

XI DETERMINATION AND NEPA COMPLIANCE

Fishing is a compatible use at DeSoto National Wildlife Refuge. This determination was made in association with the environmental assessment within the comprehensive conservation planning process.

Larry Klimek 9-19-00
Larry Klimek, Refuge Manager Date

Jon Kauffeld 9-25-00
Reviewed by Date

Nita M. Fuller 1-12-01
Concurred by Date

COMPATIBILITY DETERMINATION
Hunting Waterfowl

I STATION NAME: DeSoto National Wildlife Refuge

II ESTABLISHED: March 12, 1958

III ESTABLISHING and ACQUISITION AUTHORITY:

Migratory Bird Conservation Act of 1969 (16 U.S.C. , 715d)
Refuge Recreation Act of 1962 (16 U.S.C. , 460k-1)

Federal duck stamp funds were used for acquiring refuge lands.

IV PURPOSE FOR WHICH ESTABLISHED:

DeSoto National Wildlife Refuge was originally established to provide sanctuary for migratory birds, with emphasis on waterfowl, as authorized by the Migratory Bird Conservation Act, which provides the lands are:

> " ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."

The Refuge Recreation Act provides that refuge lands may be suitable and used for:

> " ... (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

DeSoto's stated mission is: *"To preserve and restore indigenous biological communities, with emphasis on wetlands and riverine flora and fauna; to provide both cultural and natural history interpretations and environmental education opportunities for the general public; and to provide wildlife-dependent recreation; where and when such uses are compatible with the primary purposes of the refuge."*

The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

V NATURE AND EXTENT OF USE:

What is the use? Guided snow goose hunting according to the approved Snow Goose Hunting Plan.

Where is the use conducted? In designated cropland fields on the refuge.

When is the use conducted? Guided snow goose hunting is permitted within the snow goose hunting season framework.

How is the use conducted? The plan provides for two guides, contracted via cash bid by the refuge, to take up to ten hunters each to the designated fields each day. A fee, not to exceed $75 per day, is collected by the guides. The guides are responsible for selecting the hunters, determining their legal eligibility and conduct while on the refuge. A refuge staff person serves as "snow goose hunt coordinator" to monitor the activities and functions of the guides and to ensure the provisions of the Snow Goose Hunting Plan are being followed.

VI ANALYSIS OF COSTS:

Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $5,000 of staff time and $1,000 of overhead is required to administer this use. With the attainment of CCP Goals 1.1, 1.2, 1.3, 2.1, 2.3, 3.1, 3.4, (Chapter 5) and their EA Preferred Alternative D, in 15 years, we anticipate an associated increase in public use resulting in an approximate 45% cost increase requiring $7,000 of staff time and $3,000 in overhead.

VII ANTICIPATED IMPACTS OF EXISTING AND PROPOSED USE ON REFUGE'S MAJOR PURPOSES AND NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

Up to 80,000 visitors come to DeSoto in November to see the snow goose concentrations. The most used point for snow goose watching is the visitor center's glass-enclosed vistas. Potential conflicts between the watchers and the hunters are minimized by controlling the timing and location of each group. Hunting fields are not within site of the visitor center; and ends at noon. Most watchers come in the afternoon, on weekends.

Snow goose hunting is stopped during the muzzle loader deer hunts.

No other impacts were considered to be significant constraints to achieving the Refuge Purpose and the mission of the National Wildlife Refuge System.

VIII EFFECT OF USE ON FULFILLING THE REFUGE'S PURPOSES AND THE NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

Providing public hunting opportunities is a priority use of national wildlife refuges. This hunt provides an opportunity to promote hunter education, hunter ethics, and the value of hunting as a wildlife population management tool. This hunt also provides an opportunity to educate the non-hunting public on the need to control the over-abundant snow goose population.

IX OPPORTUNITY FOR PUBLIC REVIEW AND COMMENT:

This compatibility determination is presented for public review and comment as part of the Final DeSoto National Wildlife Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment. Implementation will not occur for 30 days following approval of the CCP.

X STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

This use is conducted in accordance with the provisions of the approved Snow Goose Hunting Plan. The activity of the guides are controlled by the conditions of the Special Use Permit and the hunters and guides are bound to comply with a set of refuge-specific regulations included in the plan.

XI DETERMINATION AND NEPA COMPLIANCE:

Waterfowl hunting is a compatible use at DeSoto National Wildlife Refuge. This determination was made in association with the environmental assessment within the comprehensive conservation planning process.

Larry Klimek 9-19-00
Larry Klimek, Refuge Manager Date

Jon Kauffeld 9-25-00
Reviewed by Date

Nita M. Fuller 1-12-01
Concurred by Date

COMPATIBILITY DETERMINATION
Hunting White-tailed Deer

I STATION NAME: DeSoto National Wildlife Refuge

II ESTABLISHED: March 12, 1958

III ESTABLISHING and ACQUISITION AUTHORITY:

Migratory Bird Conservation Act of 1969 (16 U.S.C. , 715d)
Refuge Recreation Act of 1962 (16 U.S.C. , 460k-1)

Federal duck stamp funds were used for acquiring refuge lands.

IV PURPOSE FOR WHICH ESTABLISHED:

DeSoto National Wildlife Refuge was originally established to provide sanctuary for migratory birds, with emphasis on waterfowl, as authorized by the Migratory Bird Conservation Act, which provides the lands are:

> " ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."

The Refuge Recreation Act provides that refuge lands may be suitable and used for:

> " ... (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

DeSoto's stated mission is: *"To preserve and restore indigenous biological communities, with emphasis on wetlands and riverine flora and fauna; to provide both cultural and natural history interpretations and environmental education opportunities for the general public; and to provide wildlife-dependent recreation; where and when such uses are compatible with the primary purposes of the refuge."*

The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

V NATURE AND EXTENT OF USE:

What is the use? White-tailed deer hunting with primitive weapons.

Where is the use conducted? In designated areas compatible with other public uses activities.

When is the use conducted? Generally, September through January.

How is the use conducted? Primitive weapon deer hunting is conducted in accordance with an approved Refuge Hunting Plan and in compliance with state regulations. Refuge personnel conduct an orientation session preceding the muzzle loading hunt and operate a check station to gather hunter and deer data. For safety reasons the hunt area is closed to the public during this time.

VI ANALYSIS OF COSTS:

Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $5,000 of staff time and $1,000 of overhead is required to administer this use. With the attainment of CCP Goals 1.3, 1.5, 1.8, 1.9, 1.10, 2.1, 2.3, 3.1 and 3.4 (Chapter 5) and their EA Preferred Alternative D, in 15 years, we anticipate an associated increase in public use resulting in an approximate 45% cost increase requiring $7,000 of staff time and $3,000 in overhead.

VII ANTICIPATED IMPACTS OF EXISTING AND PROPOSED USE ON REFUGE'S MAJOR PURPOSES AND NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

Up to 80,000 visitors come to DeSoto in November to see the snow goose concentrations. Potential conflicts between the goose watchers and deer hunters are minimized by controlling the timing and location of each group. Snow goose hunting is stopped during the muzzle loader deer hunts in December. No other associated impacts were considered to be significant constraints to achieving the Refuge Purpose and the mission of the National Wildlife Refuge System.

VIII EFFECT OF USE ON FULFILLING THE REFUGE'S PURPOSES AND THE NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

Providing public hunting opportunities is a priority use of national wildlife refuges. This hunt provides an opportunity to promote hunter education, hunter ethics, and the value of hunting as a wildlife population management tool.

IX OPPORTUNITY FOR PUBLIC REVIEW AND COMMENT:

This compatibility determination is presented for public review and comment as part of the Final DeSoto National Wildlife Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment. Implementation will not occur for 30 days following approval of the CCP.

X STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

This use is conducted in accordance with the provisions of the approved Refuge Hunting Plan and in compliance with state and refuge-specific regulations.

XI DETERMINATION AND NEPA COMPLIANCE:

Hunting white-tailed deer is a compatible use at DeSoto National Wildlife Refuge. This determination was made in association with the environmental assessment within the comprehensive conservation planning process.

Larry Klimek 9-19-00
Larry Klimek, Refuge Manager Date

Jon Kauffeld 9-25-00
Reviewed by Date

Nita M. Fuller 1-12-01
Concurred by Date

COMPATIBILITY DETERMINATION
Mushroom Gathering

I STATION NAME: DeSoto National Wildlife Refuge

II ESTABLISHED: March 12, 1958

III ESTABLISHING and ACQUISITION AUTHORITY:

Migratory Bird Conservation Act of 1969 (16 U.S.C. , 715d)
Refuge Recreation Act of 1962 (16 U.S.C. , 460k-1)

Federal duck stamp funds were used for acquiring refuge lands.

IV PURPOSE FOR WHICH ESTABLISHED:

DeSoto National Wildlife Refuge was originally established to provide sanctuary for migratory birds, with emphasis on waterfowl, as authorized by the Migratory Bird Conservation Act, which provides the lands are:

> " ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."

The Refuge Recreation Act provides that refuge lands may be suitable and used for:

> " ... (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

DeSoto's stated mission is: *"To preserve and restore indigenous biological communities, with emphasis on wetlands and riverine flora and fauna; to provide both cultural and natural history interpretations and environmental education opportunities for the general public; and to provide wildlife-dependent recreation; where and when such uses are compatible with the primary purposes of the refuge."*

The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

V NATURE AND EXTENT OF USE:

What is the use? Gathering mushrooms.

Where is the use conducted? Only designated areas.

When is the use conducted? Mushroom seasons vary from year to year depending on temperatures and moisture. Gathering is permitted April 15th through May 31st.

How is the use conducted? The refuge brochure shows the areas open to mushroom gathering. Spot checks of mushroom pickers are made to assess the harvest success and compliance with the rules.

VI ANALYSIS OF COSTS:

Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $5,000 of staff time and $1,000 of overhead is required to administer this use. With the attainment of CCP Goals 1.10, 2.1, 2.3, 3.1, 3.2 and 3.4 (Chapter 5) and their EA Preferred Alternative D, in 15 years, we anticipate an associated increase in public use resulting in an approximate 45% cost increase requiring $7,000 of staff time and $3,000 in overhead.

VII ANTICIPATED IMPACTS OF EXISTING AND PROPOSED USE ON REFUGE'S MAJOR PURPOSES AND NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

While there is some wildlife disturbance resulting from people being in the wooded areas, it is considered minor and not at all limiting toward the achievement of the Refuge Purpose or the National Wildlife Refuge Mission.

VIII EFFECT OF USE ON FULFILLING THE REFUGE'S PURPOSES AND THE NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

The attraction of gathering mushrooms leads to public enjoyment of getting outside and into the woods. It is practical and applied environmental education.

IX OPPORTUNITY FOR PUBLIC REVIEW AND COMMENT:

This compatibility determination is presented for public review and comment as part of the Final DeSoto National Wildlife Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment. Implementation will not occur for 30 days following approval of the CCP.

X STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Only designated areas and dates are open to mushroom gathering. Refuge staff will monitor this activity to ensure gathering is in modest amounts for personal consumption.

XI DETERMINATION AND NEPA COMPLIANCE:

Mushroom gathering is a compatible use at DeSoto National Wildlife Refuge. This determination was made in association with the environmental assessment within the comprehensive conservation planning process.

Larry Klimek 9-19-00
Larry Klimek, Refuge Manager — Date

Jon Kauffeld 9-25-00
Reviewed by — Date

Nita M. Fuller 1-12-01
Concurred by — Date

COMPATIBILITY DETERMINATION
Wildlife Observation and Photography

I STATION NAME: DeSoto National Wildlife Refuge

II ESTABLISHED: March 12, 1958

III ESTABLISHING and ACQUISITION AUTHORITY:

Migratory Bird Conservation Act of 1969 (16 U.S.C. , 715d)
Refuge Recreation Act of 1962 (16 U.S.C. , 460k-1)

Federal duck stamp funds were used for acquiring refuge lands.

IV PURPOSE FOR WHICH ESTABLISHED:

DeSoto National Wildlife Refuge was originally established to provide sanctuary for migratory birds, with emphasis on waterfowl, as authorized by the Migratory Bird Conservation Act, which provides the lands are:

> " ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."

The Refuge Recreation Act provides that refuge lands may be suitable and used for:

> " ... (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

DeSoto's stated mission is: *"To preserve and restore indigenous biological communities, with emphasis on wetlands and riverine flora and fauna; to provide both cultural and natural history interpretations and environmental education opportunities for the general public; and to provide wildlife-dependent recreation; where and when such uses are compatible with the primary purposes of the refuge."*

The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

V NATURE AND EXTENT OF USE:

What is the use? Wildlife observation and photography, both priority public uses of the Refuge System, will be allowed on DeSoto NWR. These uses occur as people drive or bicycle along the auto tour route, hike the refuge nature trails, and boat on DeSoto Lake. Picnic tables are provided to facilitate day-long participation in wildlife observation and photography.

Where is the use conducted? Wildlife observation and photography opportunities generally begin at the visitor center and associated trails and continue along an auto tour route which leads to road-side observation sites, as well as 4 other walking trails with special observation and photo points. Canoe and boat launch facilities are provided. Motorized vehicles and bicycles are confined to the designated auto route. Three designated picnic areas are available. Most facilities are accessible to people with disabilities.

When is the use conducted? The uses occur year-round with some seasonal variances depending on the weather and disturbances of wildlife.

How is the use conducted? These activities are mostly self-guided. Staff-led interpretive programs are available throughout the year. Boating is limited to canoeing and no-wake boating.

VI ANALYSIS OF COSTS:

Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $292,000 of staff time and $32,000 of overhead is required to administer this use. With the attainment of CCP Goals 1.1, 1.4, 1.5, 1.6, 1.9, 1.10, 2.1, 2.3, 3.1,3.2 and 3.4 (Chapter 5) and their EA Preferred Alternative D, in 15 years, we anticipate an associated increase in public use resulting in an approximate 45% cost increase requiring $423,000 of staff time and $46,000 in overhead.

VII ANTICIPATED IMPACTS OF EXISTING AND PROPOSED USE ON REFUGE'S MAJOR PURPOSES AND NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

Potential impacts from visitors engaged in wildlife observation and photography, and the other associated uses, are: damage to vegetation, littering, increased maintenance activity, potential conflicts with other visitors, and disturbances to wildlife. Because visitor access is controlled, this activity does not detract from the primary purposes of the Refuge. All potential impacts are considered minor.

VIII EFFECT OF USE ON FULFILLING THE REFUGE'S PURPOSES AND THE NATIONAL WILDLIFE REFUGE SYSTEM MISSION:

Wildlife observation and photography are priority public uses listed in the National Wildlife Refuge System Improvement Act. By providing for these uses on the refuge we will increase visitors' knowledge and appreciation of fish and wildlife, which will lead to increased public stewardship of wildlife and their habitats at the refuge and in general. Increased public stewardship will support and complement the Service's actions in achieving the refuge's purposes and the mission of the National Wildlife Refuge System.

IX OPPORTUNITY FOR PUBLIC REVIEW AND COMMENT:

This compatibility determination is presented for public review and comment as part of the Final DeSoto National Wildlife Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment. Implementation will not occur for 30 days following approval of the CCP.

X STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Public access for wildlife observation and photography, and ancillary uses, will be in designated areas and with time restrictions to ensure minimal disturbance to wildlife and minimal conflict between user groups. Wildlife observation and photography activities will be reviewed annually to ensure this compatibility determination still applies.

XI DETERMINATION AND NEPA COMPLIANCE:

Wildlife observation and photography and the described ancillary uses of auto touring, walking, jogging, bicycling and picnicking are compatible uses at DeSoto National Wildlife Refuge. This determination was made in association with the environmental assessment within the comprehensive conservation planning process.

Larry Klimek — 9-19-00
Larry Klimek, Refuge Manager — Date

Jon Kauffeld — 9-25-00
Reviewed by — Date

Nita M. Fuller — 1-12-01
Concurred by — Date

Appendix E
Species Lists

Amphibians of DeSoto National Wildlife Refuge

Salamanders:

Tiger Salamander (*Ambystoma tigrinum*)
Plains Spadefoot (*Scaphoipus bombifrons*)

Toads:

Great Plains Toad (*Bufo cognatus*)
Common American Toad (*Bufo americanus*)
Woodhouse's Toad (*Bufo woodhousei*)

Frogs:

Cricket Frog (*Acris crepitans*)
Gray Treefrog (*Hyla versicolor*)
Chorus Frog (*Pseudacris triseriata*)
Bullfrog (*Rana catesbeiana*)
Leopard Frog (*Rana pipiens*)

One or more specimens were observed from each of the species listed.

Mammals of DeSoto National Wildlife Refuge

Marsupials:

Opossum (*Didelphis marsupialis*) +

Insectivores:

Shorttail Shrew (*Blarina brevicauda*) +
Eastern Mole (*Scalopus aquaticus*) +

Bats:

Northern Myotis (*Myotis septentrionalis*) *
Little Brown Myotis (*Myotis lucifugus*) +
Silver-haired Bat (*Lasionycteris noctivagans*) *
Eastern Pipistrel (*Pipistrellus subflavus*) *
Big Brown Bat (*Eptesicus fuscus*) *
Hoary Bat (*Lasiurus cinereus*) *
Evening Bat (*Nycticeius humeralis*) *
Eastern Red Bat (*Lasiurus borealis*) *

Carnivores:

Raccoon (*Procyon lotor*) +
Mink (*Mustela vison*) +
Badger (*Taxidea taxus*) +
Striped Skunk (*Mephitis mephitis*) +
Longtail Weasel (*Mustela frenata*) +
Coyote (*Canis latrans*) +
Red Fox (*Vulpes fulva*) +
Gray Fox (*Urocyon cinereoargenteus*) *

Rodents:

Woodchuck (Groundhog, Marmot) (*Marmota marmox*) +
Thirteen-lined Ground Squirrel (*Spermophilus tridecemlineatus*) +
Franklin Ground Squirrel (*Spermophilus franklinii*) +
Eastern Fox Squirrel (*Sciurus niger*) +
Plains Pocket Gopher (*Geomys bursarius*) +
Plains Pocket Mouse (*Perognathus flavescens*) *
Beaver (*Castor canadensis*) +
Western Harvest Mouse (*Reithrodontomys magalotis*) +
Deer Mouse (*Peromyscus maniculatus*) +
White-footed Mouse (*Peromyscus leucopus*) +
Northern Grasshopper Mouse (*Onychomys leucogaster*) +
Prairie Vole (*Microtus ochrogaster*) +
Meadow Vole (*Microtus pennsylvanicus*) +
Muskrat (*Ondatra zibethicus*) +
Norway Rat (*Rattus norvegicus*) +

House Mouse (*Mus musculus*) +
Meadow Jumping Mouse (*Zapus hudsonius*) +

Rabbits:

Eastern Cottontail (*Sulvilagus floridanus*) +
Whitetail Jackrabbit (*Lepus townsendi*) +

Hoofed Mammals:

Whitetail Deer (*Odocoileus virginianus*) +

+ one or more specimens actually observed * possible occurrence (within range)

Coyote pup
credit: John Jave

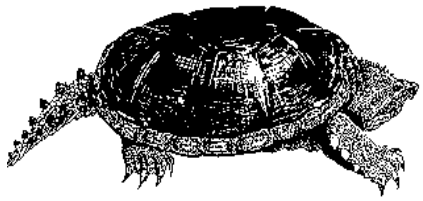
Reptiles of DeSoto National Wildlife Refuge

Turtles:

Snapping Turtle (*Chelydra serpentina*) +
Ornate Box Turtle (*Terepene ornata*) +
False Map Turtle (*Graptemys pseudogeographica*) +
Painted Turtle (*Chrysemys picta*) +
Blandings Turtle (*Emydoidea blandingi*) *
Smooth Softshell (*Trionyx muticus*) +
Spiny Softshell (*Trionyx spiniferus*) +

Skinks:

Six-lined Racerunner (*Cnemidophorus sexlieaus*) *
Five-lined Skink (*Eumeces fasciatus*) *
Prairie Skink (*Eumeces septentrionalis*) *



Snapping Turtle
drawing by Robert Savannah

Snakes:

Common Water Snake (*Natrix sipedon*) *
Graham's Water Snake (*Natrix grahami*) *
Brown Snake (*Storeria dekayi*) +
Garter Snake (*Thamnophis sirtalis*) +
Plains Garter Snake (*Thamnophis radix*) +
Ribbon Snake (*Thamnophis sauritus*) *
Lined Snake (*Tropidoclonion lineatum*) *
Eastern Hognose Snake (*Heterodon platyrhinos*) +
Western Hognose Snake (*Heterodon nasicus*) *
Ringneck Snake (*Diadophis punctatus*) *
Yellow-bellied Racer (*Coluber constrictor*) *
Smooth Green Snake (*Opheodrys vernalis*) *
Fox Snake (*Elaphe vulpina*) +
Black Rat Snake (*Elaphe obsoleta*) *
Bull Snake (*Pituophis melanoleucus*) +
Common King Snake (*Lampropeltis getulus*) *
Red Milk Snake (*Lampropeltis triangulum*) *
Prairie King Snake (*Lampropeltis calligaster*) *
Massasauga Rattlesnake (*Sistrurus catenatus*) *
Timber Rattlesnake (*Crotalus horridus*) *
Prairie Rattlesnake (*Crotalus viridis*) *

+ one or more specimens actually observed
* possible occurrence (within species' range)

Butterflies of DeSoto National Wildlife Refuge

Black Swallowtail
Giant Swallowtail
Tiger Swallowtail
Clouded Sulphur
Common Sulphur
Orange Sulphur
Cloudless Sulphur
Little Sulphur
Cabbage White
Northern Pearly Eye
Monarch
Little Wood-Satyr
Common Wood-Nymph
Variegated Fritillary
Regal Fritillary
Pearl Crescent
Questionmark Anglewing
Eastern Comma
Buckeye
Red Admiral
Painted Lady
Mourning Cloak
Viceroy
Red spotted Purple
Hackberry
Tawny Emperor
Olive Hairstreak
Bronze Copper
Spring Azure
Harvester

Eastern Tailed Blue
Reakirt's Blue
Checkered Skipper
Common Sootywing
Silver-spotted Skipper
Northern Cloudy Wing
Tawny-edged Skipper
Gray Hairstreak
Purplish Copper
Queen
Checkered White
Dogface Sulphur
Ottoe Skipper
Pawnee Skipper
Peck's Skipper
Gorgone Checkerspot
Silvery Checkerspot
Gray Copper
Gray Hairstreak
White checkered Skipper
Fiery Skipper
Snout
Goatweed
Milbert's Tortoise Shell
Pipevine Swallowtail
Spicebush Swallowtail
Dogface
Sleepy Orange
Little Yellow
Little Copper Flame

Lower Missouri River Fish Species List*

Chestnut Lamprey	*Icthyomyzon castaneus*
Lake Sturgeon (S)	*Acipenser fulvescens*
Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
Pallid Sturgeon (E)	*Scaphirhynchus alba*
Paddlefish (S)	*Polyodon spathula*
Shortnose Gar	*Lepisosteus platostomus*
Longnose Gar	*Lepisosteus osseus*
Bowfin	*Amia calva*
American Eel	*Anguilla rostrata*
Rainbow Smelt (N)	*Osmerus mordax*
Skipjack Herring	*Alosa chrysochloris*
Alabama Shad	*Alosa alabamae*
Gizzard Shad	*Dorosoma cepedianum*
Goldeye	*Hiodon alosoides*
Mooneye	*Hiodon tergisus*
Northern Pike	*Esox lucius*
Carp (X)	*Cyprinus carpio*
Goldfish (X)	*Carassius auratus*
Grass Carp (X)	*Ctenopharyngodon idella*
Bighead Carp (X)	*Hypophthalmicthys nobilis*
Silver Carp (X)	*Hypophthalmicthys molitrix*
Golden Shiner	*Notemigonus crysoleucas*
Creek Chub	*Semotilus atromaculatus*
Silver Chub	*Hybopsis storeriana*
Speckled Chub	*Hybopsis aestivalis*
Flathead Chub (S)	*Hybopsis gracilis*
Sicklefin Chub (C)	*Macrhybopsis meeki*
Sturgeon Chub (C)	*Macrhybopsis gelida*
Suckermouth Minnow	*Phenacobius mirabilis*
Emerald Shiner	*Notropis atherinoides*
Silverband Shiner	*Notropis shumardi*
Redfin Shiner	*Notropis umbratilis*
Striped Shiner	*Notropis chrysocephalus*
River Shiner	*Notropis blennius*
Bigmouth Shiner	*Notropis dorsalis*
Spotfin Shiner	*Notropis spilopterus*
Red Shiner	*Notropis lutrensis*
Sand Shiner	*Notropis stramineus*
Mimic Shiner	*Notropis volucellus*
Ghost Shiner	*Notropis buchanani*
Rosyface Shiner	*Notropis rubellus*
Channel Shiner	*Notropis wickliffi*
Central Silvery Minnow	*Hybognathus nuchalis*
West. Silvery Minnow (S)	*Hybognathus argyritis*
Plains Minnow (S)	*Hybognathus placitus*
Brassy Minnow	*Hybognathus hankinsoni*
Bluntnose Minnow	*Pimephales notatus*
Fathead Minnow	*Pimephales promelas*
Central Stoneroller	*Campostoma anomalum*
Blue Sucker (S)	*Cycleptus elongatus*
Bigmouth Buffalo	*Ictiobus cyprinellus*
Black Buffalo	*Ictiobus niger*
Smallmouth Buffalo	*Ictiobus bubalus*
River Carpsucker	*Carpiodes carpio*
Quillback	*Carpiodes cyprinus*
White Sucker	*Catostomus commersoni*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Black Bullhead	*Ictalurus melas*
Yellow Bullhead	*Ictalurus natalis*
Channel Catfish	*Ictalurus punctatus*
Blue Catfish	*Ictalurus furcatus*
Freckled Madtom	*Noturus nocturnus*
Flathead Catfish	*Pylodictus olivaris*
Burbot	*Lota lota*
Plains killifish	*Fundulus kansae*
Mosquitofish	*Gambusia affinis*
White Bass	*Morone chrysops*
Striped Bass (N)	*Morone saxatilis*
Hybrid Striped Bass (N)	*Morone chrysops * saxatilis*
Largemouth Bass	*Micropterus salmoides*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Longear Sunfish	*Lepomis megalotis*
Bluegill	*Lepomis macrochirus*
White Crappie	*Pomoxis annularis*
Black Crappie	*Pomoxis nigromaculatus*
Walleye	*Stizostedion vitreum*
Sauger	*Stizostedion canadense*
Logperch	*Percina caprodes*
Johnny Darter	*Etheostoma nigrum*
Orangethroat Darter	*Etheostoma spectabile*
Freshwater Drum	*Aplodinotus grunniens*

E - Endangered species C - Candidate species X - Exotic species
S - Species of concern N- NonIndigenous species

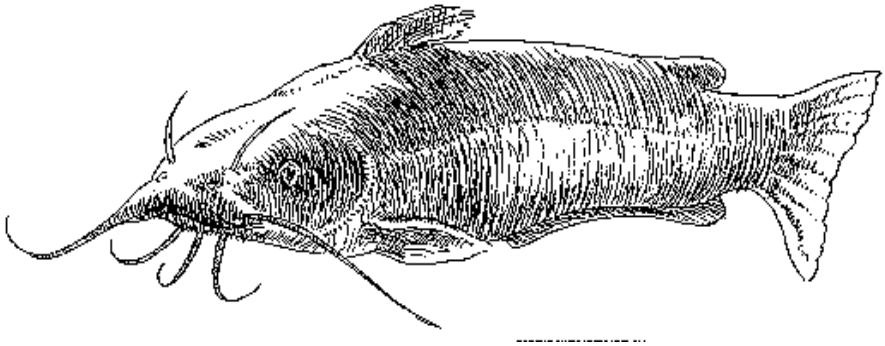
* Any of these species may possibly occur in the reach of the Missouri River that runs through DeSoto National Wildlife Refuge; list courtesy Jim Milligan, USFWS Columbia Fisheries Resources Office

Fish found in the DeSoto Bend reach of the Missouri River*

Common Name	Scientific Name
Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Paddlefish	*Polyodon spathula*
Longnose gar	*Lepisosteus osseus*
Shortnose gar	*Lepisosteus platostomus*
Goldeye	*Hiodon alosoides*
American eel	*Anguilla rostrata*
Skipjack herring	*Alosa chrysochloris*
Gizzard shad	*Dorosoma cepedianum*
Speckled chub	*Macrhybopsis aestivalis*
Silver chub	*Macrhybopsis storeriana*
Flathead chub	*Platygobio gracilis*
Creek chub	*Semotilus atromaculatus*
Red shiner	*Cyprinella lutrensis*
Spotfin shiner	*Cyprinella spiloptera*
Emerald shiner	*Notropis athernoides*
River shiner	*Notropis blennius*
Bigmouth shiner	*Notropis dorsalis*
Spottail shiner	*Notropis hudsonius*
Sand shiner	*Notropis stramineus*
Western silvery minnow	*Hybognathus argyritis*
Fathead minnow	*Pimephales promelas*
Goldfish	*Carassius auratus*
Grass carp	*Ctenopharyngodon idella*
Common carp	*Cyprinus carpio*
Bighead carp	*Hypophthalmichthys nobilis*
River carpsucker	*Carpiodes carpio*
Quillback	*Carpiodes cyprinus*
White sucker	*Catostomus commersoni*
Blue sucker	*Cycleptus elongatus*
Smallmouth buffalo	*Ictiobus bubalus*
Bigmouth buffalo	*Ictiobus cyprinellus*
Black buffalo	*Ictiobus niger*
Shorthead redhorse	*Moxostoma macrolepidotum*
Black bullhead	*Amerius melas*
Yellow bullhead	*Amerius natalis*
Blue catfish	*Ictalurus furcatus*
Channel catfish	*Ictalurur punctatus*
Flathead catfish	*Pylodictis olivaris*
Stonecat	*Noturus flavus*

Northern pike	*Esox lucius*
Rainbow smelt	*Osmerus mordax*
White bass	*Morone chrysops*
Green sunfish	*Lepomis cyanellus*
Orangespotted sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Smallmouth bass	*Micropterus dolomicu*
Largemouth bass	*Micropterus salmoides*
White crappie	*Pomoxis annularis*
Black crappie	*Pomoxis nigromaculatus*
Johnny darter	*Etheostoma nigrum*
Yellow perch	*Perca flavescens*
Sauger	*Stizostedion canadense*
Walleye	*Stizostedion vitreum*
Freshwater drum	*Aplodinotus grunniens*

* Courtesy Gerald Mestl, Missouri River Program Manager, Nebraska Game and Parks; based on 30 years of survey data.



Yellow bullhead catfish by Robert Savannah, USFWS

DeSoto Lake Fish

Common Name	Scientific Name
Largemouth bass	*Micropterus salmoides*
White bass	*Morone chrysops*
Bluegill	*Lepomis macrochirus*
Green sunfish	*Lepomis cyanellus*
Paddlefish	*Polyodon spathula*
Fathead minnow	*Pimephales promelas*
Black crappie	*Pomoxis nigromaculatus*
White crappie	*Pomoxis annularis*
Golden shiner	*Notemigonus crysoleucas*
Freshwater drum	*Aplodinotus grunniens*
Northern pike	*Esox lucius*
Gizzard shad	*Dorosoma cepedianum*
Walleye	*Stizostedion vitreum*
Common carp	*Cyprinus carpio*
Bighead carp	*Hypophthalmichthys nobilis*
Grass carp	*Ctenopharyngodon idella*
Channel catfish	*Ictalurur punctatus*
Flathead catfish	*Pylodictis olivaris*
Blue catfish	*Ictalurus furcatus*
Black bullhead	*Amerius melas*
Yellow bullhead	*Amerius natalis*
Bigmouth buffalo	*Ictiobus cyprinellus*
Smallmouth buffalo	*Ictiobus bubalus*
White sucker	*Catostomus commersoni*
Quillback	*Carpiodes cyprinus*
Goldeye	*Hiodon alosoides*

* All species listed have been collected in fish surveys or caught commercially in the lake since 1990 (courtesy Jim Milligan and Steve Van Riper)

Birds of DeSoto National Wildlife Refuge		Status On DeSoto Refuge a - abundant: a common species that is very numerous c - common: usually found in suitable habitat u - uncommon: present, but not certain to be seen o - occasional: seen at intervals of 2 to 5 years r - rare: seen less often than every five years				Potential Benefit by Habitat Objectives (Habitat used regularly for **f**ood, **n**esting, or **c**over)						Status In Region, State, & Nation
Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Federally Endangered, Threatened												
Piping plover *(Charadrius melodus)*		r									f,c	R3, SMC, ST, E, T*
Least tern-interior population *(Sterna antillarum)*		r	r	r							f,c	R3, SE, E
Bald eagle *(Haliaeetus leucocephalus)*		c		c	c	f,c				f,c		R3, SE, T
Rare/Declining Concerns												* Endangered in Great Lakes basin, Threatened in the rest of its range
Loggerhead shrike *(Lanius ludovicianus)*		r		o			f,c					R3, SMC
Wood thrush *(Hylocichla mustelina)*	y	u	u			f,c,n						R3
Grasshopper sparrow *(Ammodramus savannarum)*	y	c	c				f,c,n					R3, SMC

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Sedge Wren *(Cistothorus platensis)*	y	o	r						f,c,n			R3, SMC
Henslow's Sparrow *(Ammodramus henslowii*)				r			f,c					R3, SMC, ST
Dickcissel (*Spiza americana)*	y	c	c				f,c,n	f,c,n				R3, SMC
Recreational/Economic Value												
Canada goose--giant population *(Branta canadensis*)	y	c	c	c	c		f,c,n	f,c	n	f,c		R3
Canada goose— eastern prairie population *(Branta canadensis)*		c		c			f,c	f,c		f,c		R3
Greater White-fronted Goose *(Anser albifrons)*		r		r	r			f,c		f,c		
Ross' Goose *(Chen rossii*)		o		c	c			f,c		f,c		
Green-winged Teal *(Anas crecca)*		c		c					f,c	f,c		
Northern Pintail *(Anas acuta)*		c		c				f,c	f,c	f,c		R3
Blue-winged Teal *(Anas discors)*	y	c	u	c					f,c,n	f,c		
Northern Shoveler *(Anas clypeata)*		c		c					f,c	f,c		
Gadwall *(Anas strepera)*		c		c	o				f,c	f,c		
American Wigeon *(Anas americana)*		c		c	o				f,c	f,c		

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Mallard (*Anas platyrhynchos)*	y	c	u	c	u				f,n	f,c		R3
Wood duck (*Aix sponsa*)	y	c	u	c	o	c,n				f		R3
Canvasback *(Aythya valisineria)*		u		u	r					f,c		R3
Redhead *(Aythya americana)*		u		u	r					f,c		
Ring-necked Duck *(Aythya collaris)*		c		c	o					f,c		
Greater Scaup *(Aythya marila)*		o		r						f,c		
Lesser Scaup *(Aythya affinis)*		c		c	o					f,c		R3
Common Goldeneye *(Bucephala clangula)*		c		c	c					f,c		
Bufflehead *(Bucephala albeola)*		u		c	c					f,c		
Hooded Merganser *(Lophodytes cusullatus*)		u		u						f,c		
Common Merganser *(Mergus merganser)*		c		c	c					f,c		
Red-breasted Merganser *(Mergus serrator*)		o		o						f,c		
Ruddy Duck *(Oxyura jamaicensis*)		u		u	o					f,c		
Recreational/economic value; "Nuisance Concerns"												

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Snow goose (*Chen caerulescens)*		o		a	c		f,c	f,c		f,c		R3
Other Birds found on Refuge												
Common Loon *(Gavia immer)*		r		r						f,c		R3, SMC
Pied-billed Grebe *(Podilymbus podiceps)*	y	c	u	c						f,c		
Horned Grebe *(Podiceps auritus)*		o		o						f,c		
Eared Grebe *(Podiceps nigricollis*)		o		o						f,c		
American White Pelican *(Pelecanus erythrorhynchos*)		c	r	c						f,c		
Doubled-crested Cormorant *(Phalacrocorax auritus*)		c	u	c						f,c		R3
American Bittern *(Botaurus lentiginosus*)		u	u	u					f,c			R3, SMC
Least Bittern *(Ixobrychus exilis)*		u	u	u					f,c			R3, SMC
Great Blue Heron *(Ardea herodias*)		c	u	c	r				f,c			
Great Egret *(Casmerodius albus)*		u		u					f,c			
Snowy Egret *(Egretta thula*)		r						f,c	f,c			
Little Blue Heron *(Egretta caerulea)*		r							f,c			

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Cattle Egret *(Bubulcus ibis)*		r		r			f,c	f,c	f,c			NN
Green-backed Heron *(Butorides striatus)*		u	u	u		c			f,c			
Black-crowned Night-Heron *(Nycticorax nycticorax)*		u	r	u		c			f,c			
Yellow-crowned Night-Heron *(Nyctanassa violacea)*		r	r						f,c			
Tundra Swan *(Cygnus columbianus)*		o		r	r					f,c		
Trumpeter Swan *(Cygnus buccinator)*				o	o					f,c		R3, SMC
Turkey Vulture *(Cathartes aura)*		u	u	o		f,c	f	f	f			
Osprey *(Pandion haliaetus)*		o		o		c				f		
Northern Harrier *(Circus cyaneus)*		u	o	u			f,c		f,c			R3, SMC, SE
Sharp-shinned Hawk *(Accipter striatus)*		u		u	u	f,c						
Cooper's Hawk *(Accipiter cooperii)*		u		u	u	f,c						
Broad-winged Hawk *(Buteo platypterus)*		o		r		f,c						
Swainson's Hawk *(Buteo swainsoni)*		o		o			f,c					

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Red-tailed Hawk *(Buteo jamaicensis)*	y	c	u	c	u	f,c,n	f,c	f,c				
Rough-legged Hawk (*Buteo lagopus*)		o		o	o		f,c	f,c				
Golden Eagle *(Aquila chrysaetos)*		r		r			f,c					
American Kestrel (*Falcon sparverius*)	y	u	u	u	u		f,c,n	f,c				
Merlin *(Falco columbarius)*		o		o	o	f,c	f,c	f,c				
Peregrine Falcon *(Falco peregrinus)*		r		r			f,c		f,c	f,c	f,c	R3, E, SE
Prairie Falcon *(Falco mexicanus*)					r		f,c					
Gray Partridge *(Perdix perdix)*		r					f,c	f,c				NN
Ring-necked Pheasant *(Phasianus colchicus)*	y	a	a	a	a	f,c,n	f,c,n	f,c,				NN
Wild Turkey (*Meleagris gallopavo*)	y	c	c	c	c	f,c,n						
Northern Bobwhite (*Colinus virginianus*)	y	c	c	c	c	f,c,n	f,c,n					
Virginia Rail *(Rallus limicola*)	y	u	u	u					f,c			
Sora (*Porzana carolina*)	y	u	u	u				f,c	f,c			
American Coot *(Fulica americana)*		c		c					f,c	f,c		

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Sandhill Crane *(Grus canadensis)*		r		r			f,c		f,c			
Killdeer *(Charadrius vociferus*)	y	c	c	c			f,c,n	f,c,n	f,c		f,c,n	
American Avocet *(Recurvirostra americana)*		o	r	o					f,c		f,c	
Greater Yellowlegs *(Tringa melanoleuca)*		c		c					f,c		f,c	
Lesser Yellowlegs *(Tringa flavipes*)		c		c					f,c		f,c	
Solitary Sandpiper *(Tringa solitaria)*		o		o					f,c		f,c	
Willet *(Catoptrophorus semipalmatus*)		o		o					f,c		f,c	
Spotted Sandpiper *(Actitis macularia*)	y	c	c	u					f,c,n		f,c	
Upland Sandpiper *(Bartramia longicauda*)		o	o	o			f,c					R3, SMC
Hudsonian Godwit *(Limosa haemastica)*		o							f,c		f,c	
Marbled Godwit *(Limosa fedoa*)		r							f,c		f,c	
Ruddy Turnstone *(Arenaria interpres)*		r					f,c		f,c		f,c	
Pectoral sandpiper *(Calidris melanotos*)		r							f,c		f,c	

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Semipalmated Sandpiper *(Calidris pusilla*)		o							f,c		f,c	
Western Sandpiper *(Calidris mauri*)		r							f,c		f,c	
Least Sandpiper *(Calidris minutilla*)		u		u					f,c		f,c	
White-rumped Sandpiper *(Calidris fuscicollis)*		o		o					f,c		f,c	
Baird's Sandpiper *(Calidris bairdii)*		u		u					f,c		f,c	
Dunlin *(Calidris alpina)*		r							f,c		f,c	
Short-billed Dowitcher *(Limnodromus griseus)*		r		r					f,c		f,c	
Long-billed Dowitcher *(Limnodromus scolopaceus*)		o		o					f,c		f,c	
Common Snipe *(Gallinago gallinago*)		u		u					f,c			
American Woodcock *(Scolopax minor*)	y	u	u	u		f,c,n			f,c			R3
Wilson's Phalarope *(Phalaropus tricolor*)		o		o					f,c	f,c		
Franklin's Gull *(Larus pipixcan*)		u		u						f,c	f,c	
Bonaparte's Gull *(Larus philadelphia*)		o		o						f,c	f,c	

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Ring-billed Gull *(Larus delawarensis)*		c	o	c	r					f,c	f,c	
Herring Gull *(Larus argentatus)*		u		u						f,c	f,c	
Forster's Tern *(Sterna forsteri)*			o	o						f,c	c	
Black Tern *(Chlidonias niger)*		o	o	o						f,c	c	R3, SMC
Mourning Dove (*Zenaida macroura*)	y	a	a	c	u	f,c,n	f,c,	f,c				
Rock Dove *(Columba livia)*		o	o	o	o		f,c	f,c	f,c			
Yellow-billed Cuckoo *(Coccyzus americanus)*	y	u	u	o		f,c,n						R3, SMC
Eastern Screech-Owl *(Otus asio)*	y	u	u	u	u	f,c,n	f	f,c				
Northern Saw-whet Owl *(Aegolius acadicus)*					r	f,c						
Great Horned Owl *(Bubo virginianus)*	y	u	u	u	u	f,c,n	f	f,c				
Snowy Owl *(Nyctea scandiaca)*					r		f,c					
Barred Owl *(Strix varia)*	y	u	u	u	u	f,c,n						
Long-eared Owl *(Asio otus)*					r	f,c	f		f			ST
Short-eared Owl *(Asio flammeus)*					r		f,c		f			R3, SMC, SE
Common Nighthawk *(Chordeiles minor)*	y	u	u	u		f,c,n	f,c,n					

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Whip-poor-will *(Caprimulgus vociferus*)	y	u	u			f,c,n						
Chimney Swift *(Chaetura pelagica)*		u	u			f,c	f		f	f		
Ruby-throated Hummingbird *(Archilochus colubris)*		o	o			f,c	f,c					
Belted Kingfisher*(Ceryle alcyon)*	y	u	u	u	r	c,n			f	f		
Red-headed Woodpecker *(Melanerpes erythrocephalus)*	y	c	a	u		f,c,n		f,c				R3, SMC
Red-bellied Woodpecker *(Melanerpes carolinus*)	y	c	c	c	c	f,c,n						
Yellow-bellied Sapsucker *(Sphyrapicus varius)*		r		r	r	f,c,n						
Downy Woodpecker *(Picoides pubescens*)	y	c	c	c	c	f,c,n						
Hairy Woodpecker (*Picoides villosus)*	y	u	u	u	u	f,c,n						
Northern Flicker *(Colaptes auratus)*	y	c	a	c	c	f,c,n						R3, SMC
Eastern Wood-Pewee *(Contopus virens)*	y	u	u			f,c,n						
Acadian Flycatcher *(Empidonax virescens)*	y	o	o			f,c,n						
Alder Flycatcher *(Empidonax alnorum)*		a	o			f,c			f			

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Willow Flycatcher (*Empidonas traillii)*	y	o	o			f,c,n	f,c					
Least Flycatcher *(Empidonx minimus)*		c				f,c	f,c					
Eastern Phoebe *(Sayornis phoebe)*	y	u	u	o		f,c,n	f,c	f,c				
Great Crested Flycatcher *(Myiarchus crinitus)*	y	u	u			f,c,n						
Western Kingbird *(Tyrannus verticalis)*	y		u			f,c,n	f,c		f,c			
Eastern Kingbird *(Tyrannus tyrannus)*	y	c	a	o			f,c,n	f,c				
Horned Lark *(Eremophila alpestris)*	y	u	u	u	u		f,c,n	f,c			f,c	
Purple Martin *(Progne subis)*	y	u	u			f,c,n	f					
Tree Swallow *Tachycineta bicolor*	y	c	u	c		f,c,n	f		f			
Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*		u	u	u		f	f		f			
Bank Swallow *(Riparia riparia)*	y	c	c	c		f,c,n	f		f	f		
Cliff Swallow *(Hirundo pyrrhonota)*		u	u	u			f		f	f		
Barn Swallow *(Hirundo rustica)*	y	c	c	c		f,c,n	f	f,c	f	f		

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Blue Jay *(Cyanocitta cristata)*	y	c	c	c	c	f,c,n	f	f,c				
American Crow *(Corvus brachyrhynchos)*	y	c	c	c	c	f,c,n	f	f,c				
Black-capped Chickadee *(Parus atricapillus)*	y	c	c	c	c	f,c,n						
Tufted Titmouse *(Parus bicolor)*		o	o	o		f,c,n						
Red-breasted Nuthatch *(Sitta canadensis)*		o		u	u	f,c						
White-breasted Nuthatch *(Sitta carolinensis)*	y	c	c	c	c	f,c,n						
Brown Creeper *(Certhia americana)*		o		o	o	f,c						
House Wren *(Troglodytes aedon)*	y	c	c	u		f,c,n		f,c				
Winter Wren *(Troglodytes troglodytes)*					r	f,c						
Marsh Wren *(Cistothorus palustris)*		o		o					f,c,n			
Golden-crowned Kinglet (*Regulus satrapa)*		o		o		f,c						
Ruby-crowned Kinglet *(Regulus calendula)*		u		u		f,c						
Eastern Bluebird *(Sialia sialis)*	y	u	u	o	o	f,c,n	f,c	f,c				
Gray-cheeked Thrush *(Catharus minimus)*		r				f,c						

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Swainson's Thrush *(Catharus ustulatus)*		u		u		f,c						
Hermit Thrush *(Catharus guttatus)*		r		r		f,c						
American Robin *(Turdus migratorius)*	y	c	c	c		f,c,n	f,c	f,c				
Gray Catbird *(Dumetella carolinensis)*	y	c	c	u		f,c,n						
Northern Mockingbird *(Mimus polyglottos)*		r				f,c	f,c					
Brown Thrasher *(Toxostoma rufum)*	y	c	c	u		f,c,n	f,c					
Water Pipit *(Anthus spinoletta)*		r		r			f,c		f,c		f,c	
Cedar Waxwing *(Bombycilla cedrorum)*	y	o	o	o	u	f,c,n	f,c					
Northern Shrike *(Lanius excubitor)*					r		f,c					
European Starling *(Sturnus vulgaris)*	y	c	c	c	c	f,c,n	f,c					NN
Bell's Vireo *(Vireo bellii)*	y	u	u	u		f,c,n						R3, SMC
Solitary Vireo *(Vireo solitarius)*		u	u	u		f,c						
Warbling Vireo *(Vireo gilvus)*	y	c	c	c		f,c,n						
Philadelphia Vireo *(Vireo philadelphicus)*		r				f,c						

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Red-eyed Vireo *(Vireo olivaceus)*		o	o	o		f,c						
Tennessee Warbler *(Vermivora peregrina)*		u		u		f,c						
Orange-crowned Warbler *(Vermivora celata)*		u		u		f,c						
Nashville Warbler *(Vermivora ruficapilla)*		o		o								
Northern Parula *(Parula americana)*		r				f,c						
Yellow Warbler *(Dendroica petechia)*	y	c	c			f,c,n						
Chestnut-sided Warbler *(Dendroica pensylvanica)*		r				f,c						R3, SMC
Yellow-rumped Warbler *(Dendroica coronata)*		c	o	c		f,c						
Palm Warbler *(Dendroica palmarum)*		u				f,c			f,c			
Blackpoll Warbler *(Dendroica striata)*		u				f,c						
Black-and-white Warbler *(Mniotilta varia)*	y	u	o			f,c,n						
American Redstart *(Setophaga ruticilla)*	y	c	c			f,c,n						
Ovenbird *(Seiurus aurocapillus)*	y	u	u			f,c,n						

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Northern Waterthrush (*Seiurus noveboracensis)*		o				f,c			f,c			
Common Yellowthroat *(Geothlypis trichas)*	y	c	c	o			f,c,n		f,c			
Wilson's Warbler *(Wilsonia citrina)*		o		o		f,c						
Northern Cardinal *(Cardinalis cardinalis)*	y	c	c	c	c	f,c,n	f,c					
Rose-breasted Grosbeak *(Pheucticus ludovicianus)*	y	c	c			f,c,n						
Blue Grosbeak *(Guiraca caerulea)*			r			f,c						
Indigo Bunting *(Passerina cyanea)*	y	u	u			f,c,n	f,c					
Eastern Towhee *(Pipilo erythrophthalmus)*	y	c	c	c	u	f,c,n						
Spotted Towhee *(Pipilo maculatus)*		o			r							
American Tree Sparrow *(Spizella arborea)*		o		c	a	f,c	f.c	f,c				
Chipping Sparrow *(Spizella passerina)*	y	c	c		o	f,c	f,c					

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Clay-colored sparrow *(Spizella pallida)*		u				f,c	f,c					
Field Sparrow *(Spizella pusilla)*	y	c	c	u		f,c,n	f,c					R3, SMC
Vesper Sparrow *(Pooecetes gramineus)*	y	u	u	u			f,c,n	f,c				
Lark Sparrow *(Chondestes grammacus)*	y	u	u			f,c,n	f,c,n					
Savannah Sparrow *(Passerculus sandwichensis)*		u	u	u			f,c		f,c			
Le Conte's Sparrow *(Ammodramus leconteii)*		r		u		f,c	f,c		f,c			
Fox Sparrow *(Passerella iliaca)*		o		o	u	f,c						
Song Sparrow *(Melospiza melodia)*	y	c	c	c	u	f,c,n	f,c					
Lincoln's Sparrow *(Melospiza lincolnii)*		u		u	o	f,c	f,c					
Swamp Sparrow *(Melospiza georgiana)*		u		u	r	f,c	f,c		f,c			
White-throated Sparrow *(Zonotrichia albicollis)*		c		u	u	f,c						
White-crowned Sparrow *(Zonotrichia leucophrys)*		u		o	o	f,c	f,c					

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Harris' Sparrow *(Zonotrichia querula)*		c		c	c	f,c						
Dark-eyed Junco *(Junco hyemalis)*		c		c	a	f,c	f,c					
Lapland Longspur *(Calcarius lapponicus)*		r			r		f,c	f,c			f,c	
Snow Bunting *(Plectrophenax nivalis)*					r		f,c	f,c				
Red-winged Blackbird *(Agelaius phoeniceus)*	y	a	a	a	a		f,c,n		f,c,n			
Eastern Meadowlark *(Sturnella magna)*	y	c	c	c	c		f,c,n					R3, SMC
Western Meadowlark *(Sturnella neglecta)*	y	c	c	c	c		f,c,n					
Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)*	y	u	u	u	r		f,c,n	f,c,	f,c,n			
Rusty Blackbird *(Euphagus carolinus)*		o		u	r	f,c						
Brewer's Blackbird *(Euphagus cyanocephalus)*		o		o	r		f,c					
Common Grackle *(Quiscalus quiscula)*	y	c	c	c	o		f,c,n		f,c			

Species Common name *(Scientific name)*	Nested on refuge recently	Spring	Summer	Fall	Winter	Woodland	Grassland	Cropland	Wetland	Open Water (Lacustrine)	Barren land (beaches & mud) flats)	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered NN- Non-Native species
Brown-headed Cowbird *(Molothrus ater)*	y	c	c	c	o	f,c,n	f,c	f,c				
Orchard Oriole *(Icterus spurius)*	y	u	u			f,c,n	f,c					
Northern Oriole *(Icterus galbula)*	y	c	c			f,c,n						
Purple Finch *(Carpodacus purpureus)*		o		o	r	f,c						
House Finch *(Carpodacus mexicanus)*		r			o	f,c	f,c	f,c				
Common Redpoll *(Carduelis flammea)*					r	f,c	f,c					
Pine Siskin *(Carduelis pinus)*					r	f,c	f,c					
American Goldfinch *(Carduelis tristis)*	y	c	c	c	u	f,c,n	f,c					
House Sparrow *(Passer domesticus)*	y	a	a	a	a			f,c				NN

Accidental Birds *(recorded on the refuge but considered outside normal range*): White-faced Ibis, Whooping Crane, Bean Goose, Brant, Oldsquaw, King Rail, Common Moorhen, Red-necked Phalarope, Sanderling, Caspian Tern, Common Tern, Northern Goshawk, Red-shouldered Hawk, Summer Tanager, Black-billed Cuckoo

Appendix F
Compliance Requirements

Rivers and Harbor Act (1899) (33 U.S.C. 403): Section 10 of this Act requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States.

Antiquities Act (1906): Authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Migratory Bird Treaty Act (1918): Designates the protection of migratory birds as a Federal responsibility. This Act enables the setting of seasons, and other regulations including the closing of areas, Federal or non-Federal, to the hunting of migratory birds.

Migratory Bird Conservation Act (1929): Establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Migratory Bird Conservation Commission.

Fish and Wildlife Coordination Act (1934) as amended: Requires that the Fish and Wildlife Service and State fish and wildlife agencies be consulted whenever water is to be impounded, diverted or modified under a Federal permit or license. The Service and State agency recommend measures to prevent the loss of biological resources, or to mitigate or compensate for the damage. The project proponent must take biological resource values into account and adopt justifiable protection measures to obtain maximum overall project benefits. A 1958 amendment added provisions to recognize the vital contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs. It also authorized the Secretary of Interior to provide public fishing areas and accept donations of lands and funds.

Migratory Bird Hunting and Conservation Stamp Act (1934): Authorized the opening of part of a refuge to waterfowl hunting.

Historic Sites, Buildings and Antiquities Act (1935) as amended: Declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. Provides procedures for designation, acquisition, administration, and protection of such sites.

Refuge Revenue Sharing Act (1935) as amended: Requires revenue sharing provisions to all fee-title ownerships that are administered solely or primarily by the Secretary through the Service.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act (1948): Provides that upon a determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred without reimbursement to the Secretary of Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.

Federal Records Act (1950): Directs preservation of evidence of the government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Fish and Wildlife Act (1956): Established a comprehensive national fish and wildlife policy and broadened the authority for acquisition and development of refuges.

Refuge Recreation Act (1962): Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient funds are available to manage the uses.

Wilderness Act (1964) as amended: Directed the Secretary of Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The Secretary of Agriculture was directed to study and recommend suitable areas in the National Forest System.

Land and Water Conservation Fund Act (1965): Uses the receipts from the sale of surplus Federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities.

National Wildlife Refuge System Administration Act (1966) as amended by the National Wildlife Refuge System Improvement Act (1997)16 U.S.C. 668dd668ee. (Refuge Administration Act): Defines the National Wildlife Refuge System and authorizes the Secretary to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation and photography, or environmental education and interpretation); establishes a formal process for determining compatibility; established the responsibilities of the Secretary of Interior for managing and protecting the System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

National Historic Preservation Act (1966) as amended: Requires the Federal Government to provide leadership in the preservation of the nation's prehistoric and historic resources.

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

National Environmental Policy Act (1969): Requires the disclosure of the environmental impacts of any major Federal action significantly affecting the quality of the human environment.

Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970) as amended: Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.

Endangered Species Act (1973): Requires all Federal agencies to carry out programs for the conservation of endangered and threatened species.

Rehabilitation Act (1973): Requires programmatic accessibility in addition to physical accessibility for all

facilities and programs funded by the Federal government to ensure that anybody can participate in any program.

Archaeological and Historic Preservation Act (1974): Directs the preservation of historic and archaeological data in Federal construction projects.

Clean Water Act (1977): Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

Surface Mining Control and Reclamation Act (1977) as amended (Public Law 95-87) (SMCRA): Regulates surface mining activities and reclamation of coal-mined lands. Further regulates the coal industry by designating certain areas as unsuitable for coal mining operations.

Executive Order 11988 (1977): Each Federal agency shall provide leadership and take action to reduce the risk of flood loss and minimize the impact of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Executive Order 11990: E.O. 11990 directs Federal agencies to (1) minimize destruction, loss, or degradation of wetlands and (2) preserve and enhance the natural and beneficial values of wetlands when a practical alternative exists.

Executive Order 12372 (Intergovernmental Review of Federal Programs): Directs the Service to send copies of the Environmental Assessment to Iowa State Planning Agencies for review.

American Indian Religious Freedom Act (1978): Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Fish and Wildlife Improvement Act (1978): Improves the administration of fish and wildlife programs and amends several earlier laws including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out a volunteer program.

Archaeological Resources Protection Act (1979) as amended: Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

Federal Farmland Protection Policy Act (1981) as amended: Minimizes the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

Emergency Wetlands Resources Act (1986): Promotes the conservation of migratory waterfowl and offsets or prevents the serious loss of wetlands by the acquisition of wetlands and other essential habitats.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other Federal and State agencies.

Native American Graves Protection and Repatriation Act (1990): Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

Americans With Disabilities Act (1992): Prohibits discrimination in public accommodations and services.

Executive Order 12898 (1994): Establishes environmental justice as a Federal government priority and directs all Federal agencies to make environmental justice part of their mission. Environmental justice calls for fair distribution of environmental hazards.

Executive Order 12996 Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the System.

Executive Order 13006 Locating Federal Facilities on Historic Properties in Our Nation's Central Cities: Directs Federal agencies to select, utilize and maintain historic properties and districts, especially those located in cities' central business districts, whenever operationally appropriate and economically prudent.

Executive Order 13007 Indian Sacred Sites (1996): Directs Federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

National Wildlife Refuge System Improvement Act (1997): Considered the "Organic Act" of the National Wildlife Refuge System. Defines the mission of the System, designates priority wildlife-dependent public uses, and calls for comprehensive refuge planning.

National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act (1998): Amends the Fish and Wildlife Act of 1956 to promote volunteer programs and community partnerships for the benefit of national wildlife refuges, and for other purposes.

National Trails System Act: Assigns responsibility to the Secretary of Interior and thus the Service to protect the historic and recreational values of congressionally designated National Historic Trail sites.

Appendix G
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Documents Specific to DeSoto National Wildlife Refuge

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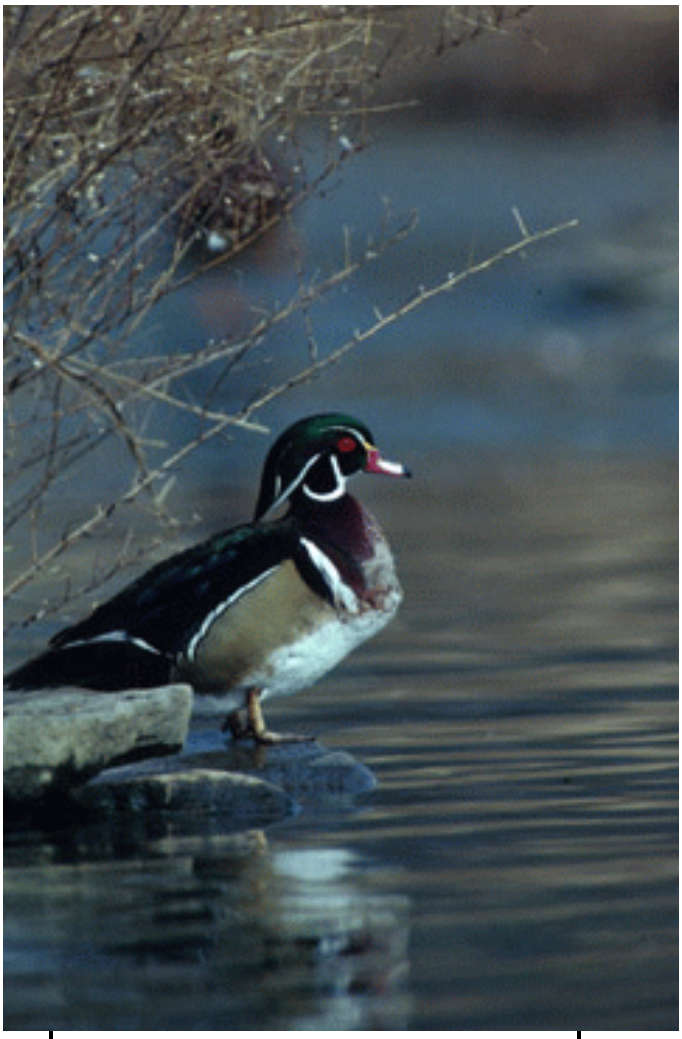

Wood duck
credit: Tim McCabe

Appendix H
CCP Mailing List

Elected Federal Officials

U.S. Senator Chuck Grassley (Iowa)
U.S. Senator Tom Harkin (Iowa)
U.S. Representative Greg Ganske, Iowa Fourth Congressional District

U.S. Senator Chuck Hagel (Nebraska)
U.S. Senator Bob Kerrey (Nebraska)
U.S. Representative Doug Bereuter, Nebraska First Congressional District
U.S. Representative Lee Terry, Nebraska Second Congressional District
U.S. Representative William E. Barrett, Nebraska Third Congressional District

Federal Agencies

USDA/Natural Resource Conservation Service (Pottawattamie County, Iowa)
USDI/Fish and Wildlife Service, Region 1 (Portland, Oregon), Region 2 (Albuquerque, New Mexico), Region 3 (Fort Snelling, Minnesota), Region 4 (Atlanta, Georgia), Region 5 (Hadley, Massachusetts), Region 6 (Denver, Colorado), Region 7 (Anchorage, Alaska), National Conservation Training Center (Shepherdstown, West Virginia)
U.S. Army Corps of Engineers, Omaha District
National Park Service, Midwest Region (Omaha)
Advisory Council on Historic Preservation

Elected State Officials

Iowa Governor Thomas Vilsack
Iowa State Senator Nancy Boettger
Iowa State Senator Michael Gronstal
Iowa State Senator Derryl McLaren
Iowa State Representative Donna Hammitt Barry
Iowa State Representative Jack Drake
Iowa State Representative Bard Hanson
Iowa State Representative Hubert Houser
Iowa State Representative Brent Siegrist
Iowa State Representative Dick Weidman
Nebraska Governor Mike Johanns
Nebraska Lt. Governor Maurstad
Nebraska State Senator Matt Connealy, 16th District (Decatur)

State Agencies

Director, Iowa Department of Natural Resources
Deputy Director, Iowa Department of Natural Resources
Iowa Department of Economic Development
Iowa Natural Resource Conservation Service
Iowa State Historic Preservation Officer

Director, Parks Division, Nebraska Game and Parks Commission
Director, Nebraska Tourism Office
Nebraska State Historic Preservation Officer
Superintendent, Nebraska State Patrol

Tribes

Iowa Tribe of Kansas and Nebraska
Iowa Tribe of Oklahoma
Kickapoo Tribe in Kansas
Omaha Tribe of Nebraska
Otoe-Missouira Tribe of Oklahoma
Prairie Band of Potawatomi
Sac & Fox Nation of Oklahoma
Sac & Fox Tribe of Missouri
Sac & Fox of the Mississippi
Winnebago Tribe of Nebraska

City/County/Local Governments

Mayor, City of Missouri Valley, Iowa
Harrison County Conservation Board
Harrison County Zoning and Sanitation Department
Logan Field Office, Harrison
Executive Director, Missouri Valley Chamber of Commerce
Harrison County Historic Preservation Commission

Chairman, Pottawattamie County Commissioners
Pottawattamie County Office of Planning and Development
Executive Director, Pottawattamie County Conservation Board
Sheriff, Pottawattamie County

Mayor, City of Blair, Nebraska
Washington County Department of Planning and Zoning
Executive Director, Blair Chamber
Chairman, Washington County Board of Supervisors

Public Libraries

Council Bluffs, Iowa	Blair, Nebraska
Missouri Valley, Iowa	Fremont, Nebraska
Sioux City, Iowa	Omaha, Nebraska

Organizations

Animal Protection Institute
Defenders of Wildlife
Ducks Unlimited
Fontenelle Forest Association
Harrison County Historical Society
Historical Society of Pottawattamie County
Hitchcock Nature Center
Midwest Interpretive Association
National Audubon Society
National Audubon Society, Omaha Chapter
National Wildlife Refuge Association
Neale Woods Nature Center
Nebraska Historical Society
Pheasants Forever
Sierra Club, Midwest Office, Madison, WI
The Conservation Fund
The Nature Conservancy
Washington County Historical Society
Wilderness Watch
Wildlife Management Institute

Others

- Individuals who participated in open house session or focus group or who requested to be on the mailing list
- DeSoto National Wildlife Refuge, planning team members, other agencies
- Area newspapers

***Note**: This list includes individuals and organizations who were mailed the Draft and/or Final CCPs upon their release. Others were made aware of these documents' availability through notices, the World Wide Web, word of mouth, etc, and requested copies.*

Appendix I
Cropland Evaluation Matrix

Memorandum
January 12, 2000

To: DeSoto NWR Biological Staff
From: Marco Buske, FWB

Subject: Evaluating Refuge Cropland for CCP Purposes

- Always think in terms of **KISS** ---- Keep It Simple, Stupid ---- when applying evaluation criteria to each crop management unit designated on the accompanying GIS map.

- Individual crop fields were usually combined into crop management units. Each management unit corresponds to a cluster of individual fields that makeup each component of the 3- or 6-year biological crop rotation or 2-year conventional crop rotation. In some instances single fields are designated as management units. This is usually the result of a field's location relative to other fields. The field is relatively isolated either spatially or has characteristics that makes it distinctly different from other nearby crop fields.

- Assess each crop management unit within the context of a temporal "**snap shot**" for the purposes of this evaluation. Do not dwell on future possibilities and permutations. Focus on what exists now and within the context of designated crop management units. Again, **Keep It Simple**.

Conditions Favoring Continued Cropping of Designated Crop Management Units	Evaluation Criteria
Agronomic Value	
Inherent Productivity Score 1 point	Fields predominantly containing soil map units with yield estimates or CSRs in the top quartile are considered highly productive and useful agronomically. Compare modern soil survey crop yield estimates and/or corn suitability ratings of the different soil map units.
Research Score 1 point	Crop management units predominantly containing soil map units with comparable characteristics are useful for field scale research. Assess uniformity of soil map unit characteristics using modern soil survey tables, soil descriptions and aerial photos.

Drainage Score 1 point	Soils with moderate to rapid permeability (i.e., good internal drainage characteristics) are well suited for sweet clover or alfalfa culture, thus the biological crop rotation is well adapted to such sites. Conversely, soils with poor drainage characteristics (i.e., slow permeability) are not well suited. Use modern soil survey to determine soil permeability of soil map units within crop management units.
Depradation Score 2 points	Crop management units on the refuge's boundary will likely reduce white-tail deer crop depradation on adjacent private land.
Public Use Value	
Viewing Wildlife Score 2 points	Crops fields that border or are visually accessible from public use roads within the refuge.
Hunting Score 2 points each for waterfowl and deer hunting	Crop management units that lie within current waterfowl and deer hunting zones. Consider separately waterfowl and deer hunting.
Education Score 2 points	Crop management units easily accessible by tour buses, vans, etc. and are likely to be used by touring groups for guided or self-guided tours.
Wildlife Value	
Wildlife Foraging Score 2 points each for migratory and resident wildlife	Crop Management units with a history of **frequent** migratory or resident wildlife foraging. Consider separately migratory and resident wildlife.
Wetland Potential Score 2 points	Crop management units do not contain soil map units and/or topography conducive to wetland development. Borders of units assessed differently than within the units?
Landscape Fragmentation Score 2 points	Decreasing the edge effect reduces landscape fragmentation. Reverting a crop management unit to an adjacent non cropland habitat does not significantly reduce the amount of edge? Significant reduction would be a 51% decrease of habitat edge in the affected area. Use GIS to measure habitat perimeters.
Wildlife Cover Score 1 point for 6-yr crop rotation	Provides wildlife loafing or nesting habitat at least part of the year. Partial credit given to crop management units containing semi-permanent ground cover such as sweet clover, alfalfa, or milo left standing to support winter foraging.
New Management Units vs. Expanding Existing Units Score 2 points	Conversion of a crop management unit to an alternative habitat would create a new/additional noncrop management unit.

Crop Management Unit	GS2	Bu1	Bu2	Bu3	Bu4	Bu5	Bu6	Jo1	Jo2	Jo3	Jo4	Jo5	Jo6	Jo7	Me6
Unit Acres	33	97	100	54	65	70	183	90	25	51	24	14	31	17	90
Agronomic															
Relatively high inherent productivity	X	X		X	X	X	X	X	X				X		X
Well suited for field scale research							X	X	X		X		X	X	
Moderately well to well drained		X		X	X	X	X	X	X				X		X
May influence depredation in private cropland bordering refuge	X							X		X	X			X	
Public Use															
Borders public use roads aiding wildlife viewing		X	X	X		X									X
Used for hunting.....															
Waterfowl		X	X				X								X
Deer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Good location for educational tours		X	X	X	X	X	X								X
Habitat and/or Wildlife Value															
Wildlife frequently observed feeding in fields.....															
Migratory		X	X				X								X
Resident	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Limited potential for wetland development	X	X	X	X	X	X	X	X	X			X	X		X
Does not contribute substantially to landscape fragmentation	X	X	X			X		X		X					X
Provides wildlife cover					X										
Unit will not add habitat to existing noncrop management units	X	X	X			X		X							X
Unit Score	11	16	14	10	9	14	11	13	7	6	5	4	7	5	16

Crop Management Unit	Sc1	Sc2	Sc3	Sc4	Me1	Me2	Me3	Me4	Me5	Li1	Li2	Li3	RS1	RS2	GS1
Unit Acres	164	36	21	64	35	47	29	36	41	137	88	19	107	161	56
Agronomic															
Relatively high inherent productivity	X	X		X	X	X					X	X		X	
Well suited for field scale research	X	X	X	X	X	X	X						X		X
Moderately well to well drained	X	X		X	X	X		X			X	X		X	
May influence depredation in private cropland bordering refuge	X	X					X	X	X	X	X	X			X
Public Use															
Borders public use roads aiding wildlife viewing	X		X							X			X		
Used for hunting.....															
Waterfowl	X			X	X	X	X			X			X	X	
Deer											X	X	X	X	X
Good location for educational tours	X		X	X	X	X	X			X			X	X	
Habitat and/or Wildlife Value															
Wildlife frequently observed feeding in fields.....															
Migratory	X		X	X	X	X	X			X			X	X	
Resident	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Limited potential for wetland development	X	X	X	X				X	X		X	X	X	X	X
Does not contribute substantially to landscape fragmentation	X	X		X	X	X		X			X	X	X	X	
Provides wildlife cover								X				X			
Unit will not add habitat to existing noncrop management units	X	X		X	X	X		X		X			X	X	
Unit Score	18	12	9	14	12	12	8	11	5	11	10	11	15	14	7

Crop Management Unit	GS2	Bu1	Bu2	Bu3	Bu4	Bu5	Bu6	Jo1	Jo2	Jo3	Jo4	Jo5	Jo6	Jo7	Me6
Unit Acres	33	97	100	54	65	70	183	90	25	51	24	14	31	17	90
Agronomic															
Relatively high inherent productivity	X	X		X	X	X	X	X	X				X		X
Well suited for field scale research							X	X	X		X		X	X	
Moderately well to well drained		X		X	X	X	X	X	X				X		X
May influence depredation in private cropland bordering refuge	X							X		X	X			X	
Public Use															
Borders public use roads aiding wildlife viewing		X	X	X		X									X
Used for hunting.....															
Waterfowl		X	X				X								X
Deer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Good location for educational tours		X	X	X	X	X	X								X
Habitat and/or Wildlife Value															
Wildlife frequently observed feeding in fields.....															
Migratory		X	X				X								X
Resident	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Limited potential for wetland development	X	X	X	X	X	X	X	X	X			X	X		X
Does not contribute substantially to landscape fragmentation	X	X	X			X		X		X					X
Provides wildlife cover					X										
Unit will not add habitat to existing noncrop management units	X	X	X			X		X							X
Unit Score	11	16	14	10	9	14	11	13	7	6	5	4	7	5	16

Crop Management Unit	Sc1	Sc2	Sc3	Sc4	Me1	Me2	Me3	Me4	Me5	Li1	Li2	Li3	RS1	RS2	GS1
Unit Acres	164	36	21	64	35	47	29	36	41	137	88	19	107	161	56
Agronomic															
Relatively high inherent productivity	X	X		X	X	X					X	X		X	
Well suited for field scale research	X	X	X	X	X	X	X						X		X
Moderately well to well drained	X	X		X	X	X		X			X	X		X	
May influence depredation in private cropland bordering refuge	X	X					X	X	X	X	X	X			X
Public Use															
Borders public use roads aiding wildlife viewing	X		X							X			X		
Used for hunting.....															
Waterfowl	X			X	X	X	X			X			X	X	
Deer											X	X	X	X	X
Good location for educational tours	X		X	X	X	X	X			X			X	X	
Habitat and/or Wildlife Value															
Wildlife frequently observed feeding in fields.....															
Migratory	X		X	X	X	X	X			X			X	X	
Resident	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Limited potential for wetland development	X	X	X	X				X	X		X	X	X	X	X
Does not contribute substantially to landscape fragmentation	X	X		X	X	X		X			X	X	X	X	
Provides wildlife cover								X				X			
Unit will not add habitat to existing noncrop management units	X	X		X	X	X		X		X			X	X	
Unit Score	18	12	9	14	12	12	8	11	5	11	10	11	15	14	7

Appendix J
List of Preparers

James Barker, Graphic Artist, The Mangi Environmental Group, Inc.
Prepared DeSoto vicinity map

Marco Buske, Fish and Wildlife Biologist, DeSoto NWR
Developed GIS files, provided input on alternatives, goals, objectives and stratgies, and document editing

George Gage, former DeSoto Refuge Manager
Authored vision statement and provided input on alternatives, goals, objectives and strategies

Leon Kolankiewicz, Environmental Planner, The Mangi Environmental Group, Inc.
Project consultant and primary author

Thomas Larson, Chief of Ascertainment and Planning, Region 3
Provided general oversight, document review, and input on goals, objectives and strategies

Bill Lutz, Acting Refuge Manager and Park Ranger, DeSoto NWR
Provided input on goals, objectives and strategies and document editing

Jim Mangi, President, The Mangi Environmental Group, Inc.
Provided general project oversight and direction

Judy McClendon, Project Leader, Southern Missouri Ascertainment Office, Region 3
Project coordinator and document editor

Jim Milligan, Columbia Fisheries Resource Office
Provided Missouri River fish species list and input on alternatives

Brian Ray, Environmental Planner, The Mangi Environment Group, Inc.
Prepared refuge land use maps from GIS files

Jim Salyer, Wildlife Biologist, Region 3
Project manager and principal editor

John Schomaker, Natural Resources Planner/Regional CCP Coordinator, Region 3
Provided project guidance, document editing, and input on goals, objectives and strategies

List of Preparers (continued)

Melinda Sheets, Refuge Operations Specialist, DeSoto NWR
Provided input on alternatives, goals, objectives, and strategies and document editing

Sarah Tuttle, Museum Curator, DeSoto NWR
Provided information on *Bertrand* Collection and input on alternatives, goals, objectives and strategies, and document editing

Steve Van Riper, Refuge Operations Specialist, DeSoto NWR
Provided input on alternatives, goals, objectives, and strategies and document editing

Bruce Weber, Outdoor Recreation Planner, DeSoto NWR
Provided photographs, DeSoto species lists, input on alternatives, goals, objectives and strategies, and document editing

Belinda Worthy, Southern Missouri Ascertainment Office, Region 3
Helped format bird list in Appendix E

Appendix K

Comments on the Draft Comprehensive Conservation Plan and Environmental Assessment

This appendix is a record of the written comments the Service received on the Draft Comprehensive Conservation Plan and Environmental Assessment (DCCP/EA) made available to the public and affiliated agencies for review and comment.

Over 200 copies of the DCCP/EA were mailed to those listed in Appendix H and to individuals responding to news releases announcing the draft's availability; multiple copies were sent to several of the listed offices.

An Open House for the public to come and visit with Service staff on the proposed plan or to review the plan itself, was held September 7, 2000, from 1:00 p.m. to 8:00 p.m. at the DeSoto NWR Visitor Center. Fourteen people came and of those, four left written comments. Thirteen comment were received by mail. Those comments and the Open House attendance list are presented on the following pages. The Service's response to all these comments are summarized at the end of Chapter 2 of the CCP.

Attendance Sheet
DeSoto CCP Open House
September 7, 2000

Name	Address	City, State, Zip	Phone
Anne Carson	10964 Lariat Lane	Blair, NE 68008	426-0468
Ruth Stroud	10964 Lariat Lane	Blair, NE 68008	426-0468
Gene Beranch	29685 170th	Honey Creek, IA	
George Oliver	314 E. 8th	Logan, IA	644-3799
Brent Olson	P.O. Box 158	Pisgah, IA	456-2924
Dave Borgca	3117 Monroe St.	Omaha, NE	614-1772
Gene Burke	7126 N 7th Ave.	Phoenix, AZ	(602)371-8634
Bill Burke	17857 Badger Ave	Crescent, IA 51526	
Helen Burke	17857 Badger Ave	Crescent, IA 51526	
Mary Klimek	2271 Liberty Ave	Mo. Valley, IA 51555	642-5082
Ken & Bonnie Jensen	2915 Westridge Dr	Blair, NE 68008	(402)533-2065
Hank & Betty Marquardt	1903 Highway 30	Mo. Valley, IA 51555	642-2809

Comment No. 1

Suggestions:

1. Extend public use season — open sooner and close later. Winter and spring fishing should be allowed.

2. Realign auto tour route to include road along river as far as the south boat ramps.

3. Leave enough cropland near auto tour route to be attractive to deer, turkey, etc..

4. Open auto routes so eagles can be seen at south end from far side of the lake.

/s/ Anne Larson
Blair, NE

Comment No. 2

Open the entire blacktop levee road year-round. (Along the river to the south end.) More people would use the refuge if the road was open more.

No name on the comment.

Comment No. 3

– Re-pave roads on refuge

– When reducing farm acres and converting to prairie seedings with grasses and forbs begin a seed harvesting system to help other organizations (i.e., DNR, PF, CCB, etc.)

– Set up demonstration and experiment areas in the cottonwood bottomland timber sites working with your local foresters to set them. Inventory sites.

– Maps look great.

– Allow recreational mushroom hunters, but enforce strongly illegal and commercialization activities of mushroom hunters.

/s/ Brent Olson
Pisgah, IA

Comment No.4

I would favor Alternative D. If this occurs you should start opening up some land to upland bird hunting and more public use.

This would not negatively affect either the deer or upland game. To the contrary it would aid both birds and deer. It is not necessary to grow crops for wildlife. What is needed is more HABITAT.

It would also be beneficial to all outdoor people to get Neb. and Iowa to have reciprocal hunting privilege on DNWR land subject to usual regulations of each state. This would aid law enforcement of each parcel better than is now available.

/s/ Eugene F. Beranch
Honey Creek, Iowa

Comment No. 5

The following comment was received by mail:

(Re-typed as accurately as possible to improve legibility.)

Sept.15/2000

Dear Senator Grassly:

I just finished reading this article in my Democrat. I did not know of the meeting in Missouri Valley or I would have attended it

If this plan entails of opening the Missouri river, as the way it was before the 1952 flood, *I speak in a very negative attitude.*

That year, in April, the river flooded all the bottom land from the river to the Loess hills. The water was up to the top of the wainscoting in all our houses in Blencoe.

Millions & millions of dollars have been spent so as to make our land productive. My farm borders the Missouri river and is one of the most productive in Monona County.

In 965 I was confronted by the wildlife committee to sell or give DNR 5 acres to make a recreation park; which I did.

Now it seems all this is being turned back for wildlife.

The Loess Hills has ponds and low places for wildlife and consists of acres and acres of unproductive land.

I am definitely against this.

Sincerely
/s/ Ethel Huff
Box 164, Blencoe, Ia.
Phone - 712-642-2086

/s/ Ethel Huff
Blencoe, Iowa

Letters from Agencies and Organizations

NEBRASKA STATE HISTORICAL SOCIETY
1500 R STREET, P.O.BOX 82554, LINCOLN, NE 68501-2554
(402) 471-3270 Fax: (402) 471-3100 1-800-833-6747 www.nebraskahistory.org

September 8, 2000

Mr. Jim Salyer
US Fish & Wildlife Service
Southern Missouri Ascertainment Office
24385 State Highway 51
Puxico, MO 63960

RE: draft Comprehensive Conservation Plan and
Environmental Assessment for the DeSoto National Wildlife Refuge
HP #0008-108-01

Dear Mr. Salyer:

We have reviewed the proposed project and have no objections to the plans as they are presented at this time. If there are any changes, please notify our office. Thank you for your cooperation.

Sincerely,

L. Robert Puschendorf
Deputy State Historic Preservation Officer

NOB

ANIMAL
PROTECTION
INSTITUTE

Mailing Address:
PO Box 22505
Sacramento, CA 95822

Street Address:
2831 Fruitridge Road
Sacramento, CA 95820

Ph 916 731 5521
1 800.348.7387
Fx 916 731 4467
antiacap@aol.com
www.apiinimals.org

September 15, 2000

Mr. Jim Salyer
U.S. Fish and Wildlife Service
Southern Missouri Ascertainment Office
243485 State Highway 51
Puxico, Missouri 63960

Re: Draft Comprehensive Conservation Plan and Environmental Assessment for the DeSoto National Wildlife Refuge

To the Planning Team:

On behalf of the 85,000 national members and supporters of the Animal Protection Institute, we thank you for the opportunity to comment on the Revised Draft Comprehensive Conservation Plan (DCCP) and Environmental Assessment for the DeSoto National Wildlife Refuge.

Our organizations are very concerned that management of National Wildlife Refuges (NWRs) has strayed far from Theodore Roosevelt's original intent of protecting public lands to provide sanctuaries for wildlife. Many refuges now allow, and even encourage, activities detrimental to wildlife, including hunting, fishing, trapping, motor boating, and jet skiing. In many instances these recreational uses are permitted in the absence of thorough and accurate biological data on the species inhabiting and migrating through the refuge. However, the 1997 Refuge Improvement Act (Act), while upgrading detrimental wildlife-dependent activities of hunting and fishing to priority uses, more importantly requires refuges to conduct rigorous scientific research into the status of refuge wildlife populations. We hope the U.S. Fish and Wildlife Service will use this organic act to significantly improve management of our nation's NWRs and restore this public land system to its original purpose of providing a safe haven for wildlife.

Our organizations support many of the goals put forth in the DCCP, including the protection and restoration of native habitats. While we agree with the intent Alternative B – Historical Habitat Restoration, we are unable to support the Proposed Action because: 1) biological data required by the Act has not been included for all species, especially those potentially affected by recreation or habitat management; and 2) we oppose the continued emphasis on consumptive use activities, including hunting and fishing. We discuss these points in detail below.

DeSoto NWR 9/15/00

LACK OF WILDLIFE POPULATION DATA IN THE DCCP

The Act mandates that the U.S. Fish and Wildlife Service (FWS) maintain the *biological integrity, diversity and environmental health* of the Refuge System, and that these concepts must guide decisions on all activities at all refuges.

> *In developing each comprehensive conservation plan under this subsection for a planning unit, the Secretary, acting through the Director, shall identify and describe ... the distribution, migration patterns, and abundance of fish, wildlife, and plant populations and related habitats within the planning unit-* Section 7(c)(2)(B)

While some population data are included in the DCCP, there is a lack of specific biological information on many wildlife populations, including the species targeted by trapping programs. The Act mandates such information be included in the CCP. We therefore request that the FWS prepare another Draft CCP with this information, to allow the public time to assess the status of wildlife populations on the refuge complex and consider the impacts of the proposed activities on these populations.

> *Refuge managers often lack adequate scientific data on the effects of public uses on wildlife populations. There is a need to determine 'thresholds' of public use (types and intensity) that can be allowed without adverse effects on wildlife populations. Thresholds for different types of activities could be used to make compatibility determinations that balance wildlife needs and human use needs.* (Fulfilling the Promise: Serving Wildlife, Habitat and People through Effective Leadership 2nd Draft, September 18, 1998: p. 17)

In their publication, *Science-Based Stewardship: Recommendations for Implementing the National Wildlife Refuge System Improvement Act*, Defenders of Wildlife reported on the recommendations of six distinguished scientists for implementation of the Act. These experts suggested a standardized sequence for refuge planning: Biological Inventory→Identification of Plan Goals→Identification of Threats→Choice of Focal Species→Comprehensive Conservation Plan→Monitoring and Implementation→Plan Amendment (according to monitoring results).

They further recommended several steps for implementing a biological inventory:

1. Given the unfeasibility of conducting an inventory for all organisms on a refuge, conduct refuge inventories to obtain, at a minimum, information on the abundance and distribution of vascular plants, vertebrates and all federally threatened and endangered species.
2. In collaboration with the U.S. Geological Survey's Biological Resources Division (BRD) biologists and other scientists, choose "focal" species suitable for monitoring on each refuge or refuge complex. Carefully chosen focal species will convey information about the status of the larger ecological system to which they belong and the integrity of specific habitats or ecosystem processes.
3. Conduct research designed to test whether each focal species does indeed provide information on larger communities and processes. This is essential to the focal species approach.
4. Select focal species and design the monitoring program for each refuge or refuge complex to produce information about internal and external threats to achieving refuge management goals. Management goals should be consistent with maintaining the biological integrity, diversity and

environmental health of each refuge and should be clearly described in the refuge's comprehensive conservation plan.

5. Conduct rigorous, quantitative monitoring that is oriented toward management decisions to ensure that refuge management is scientifically based and as effective as it can be.

We believe these recommendations provide an excellent framework for complying with the letter and intent of the Act.

We strongly suggest that the U.S. Fish and Wildlife Service complete these steps before completing the CCP for the DeSoto National Wildlife Refuge and that it withhold final compatibility determinations until population information is presented and analyzed. To do otherwise may be in violation of the Act.

OPPOSITION TO THE KILLING OF WILDLIFE ON THE DESOTO NATIONAL WILDLIFE REFUGE

Public Opinion

Theodore Roosevelt established the first National Wildlife Refuges in 1903 as "inviolate sanctuaries" for wildlife. The original intent and purpose of the wildlife refuges were clear. It was not until the early 1950s that the FWS began to allow the commercial and recreational killing of wildlife at some refuges. Most Americans still view wildlife refuges as places where wild animals are protected from human interference. That is in fact the common definition of the word "refuge."

The majority of people who visit refuges do so to observe wildlife and enjoy nature. According to a FWS survey of 30 million people who visited refuges, 21 million visited for wildlife observation and "just to experience nature," while only 1.4 million visited to hunt or trap. Clearly, non-consumptive users of the National Wildlife Refuge System (NWRS) far outnumber consumptive users. Hunters and trappers, who compromise less than 6% of the population, already have access to millions of acres of public and private lands outside the refuge system for their activities. The NWRS compromises just 5% of all lands available to hunters. Hikers, birdwatchers, campers, and photographers are entitled to enjoy at least 5% of public land free from the dangers of stray bullets or from witnessing the maiming of wildlife.

The majority of Americans oppose the recreational and commercial killing of wildlife on National Wildlife Refuges. The results of a 1999 national Decision Research public opinion poll support this assertion.

- 79% of those polled opposed allowing trapping on America's National Wildlife Refuges.
- 78% of those polled opposed allowing refuge officials to kill wildlife by trapping, hunting, or poisoning.
- 71% agree that as long as refuge officials can remove dangerous animals, there is no reason to allow any other killing of animals on refuge property.
- 88% of those polled support either a ban on all commercial and recreational trapping for fur or a ban on cruel types of traps, such as leghold or body-gripping traps.

STATE OF IOWA

THOMAS J. VILSACK
GOVERNOR
SALLY J. PEDERSON
LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
Lyle Asell, Interim DIRECTOR

September 20, 2000

Mr. Jim Salyer
Fish and Wildlife Service
Southern Missouri Ascertainment Office
24385 State Highway 51
Puxico, MO 63960

RE: DeSoto Bend National Wildlife Refuge Draft CCP and EA

Dear Mr. Salyer:

Thank you for providing us the opportunity to review the draft Comprehensive Conservation Plan (CCP) for DeSoto National Wildlife Refuge. The following comments specifically address the fish and wildlife issues presented in the Plan.

Water and related fisheries issues: Objective 1.7.1 is to study the possibility of reconnecting the lake with the Missouri River. Although the completion of the study does not necessarily mean the lake will be reconneted, we strongly discourage reconnecting the two water bodies. DeSoto Lake is a unique deep water, high quality oxbow - perhaps the only remnant in the basin resembling former bends associated with the wild river.

Under goal 1.8 dealing with exotics, we encourage the Service to monitor Eurasian water milfoil and implement treatment if found.

We are supportive of Objective 3.3, dealing with sport fish habitat and populations, including renovation. We encourage the Service to emphasize active fish management by moving beyond just monitoring fish population to include renovation as part of the overall process.

Objective 3.3.2 discusses removal of 20,000 pounds of rough fish annually to reduce competition with game fish. This is about 20 pounds per acre and will not accomplish this goal.

Land management and related wildlife issues: The reduction of existing row croplands to native grass and woodland will have impacts on existing resident wildlife populations and snow goose use. We view this as a positive management plan to bring more diversity to the refuge. At the same time it is an avenue for the Service to address the snow goose situation at the refuge. The Department encourages the Service to continue the use of recreation hunting opportunity and expand possibilities to include disabled and youth events.

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There needs to be clarification as to what constitutes "crop" on cropland acres. For instance, are cool season hays (alfalfa, clovers and tame grasses) included in the crop rotation? This is an important forage source for resident refuge wildlife and supplements traditional grain crops.

The Plan references the refuge's Cropland Management Plan and the need to up-date every 5 years. The planed alteration of the habitat acres and the effects on resident wildlife populations may necessitate a review of the plan on a more frequent time schedule. A three year review would permit refuge staff to respond to wildlife issues in a timelier manner.

The native grassland composite list is impressive. A missing grass species being prairie cordgrass. The plan should include adding native forbs for greater plant diversity and also help meet goals set for the neotropical bird community.

In summary, the Department supports the Service preferred Alternative D as the plan of action for DeSoto National Wildlife Refuge.

Sincerely,

ALLEN L. FARRIS, Administrator
Fish and Wildlife Division

DeSoto NWR 9/15/00

> *predators. These include techniques such as electric fencing ... metal barriers ... and wire mesh exclosures ...* [Rimmer and Deblinger 1990: 223]

We request that if the FWS is currently engaged in, or is proposing, predator control in the management of piping plovers, or any other T&E species on the refuge, that a thorough discussion of this issue be included in the CCP, incorporating a review of recent scientific research regarding non-lethal predator management methods for protection of threatened and endangered species, specifically with regards to predator exclusion techniques including fencing and exclosures.

CONCLUSION

The Animal Protection Institute opposes the killing of wildlife on the DeSoto National Wildlife Refuge, especially for recreation.

Further, because the DCCP lacks vital biological data required to assess the impacts of proposed management, we request that the U.S. Fish and Wildlife Service produce another Draft Comprehensive Conservation Plan that includes population data for all species, especially those that could be impacted by human recreation (including hunting, fishing and trapping) or ecosystem management.

Thank you for your consideration of these comments and we look forward to your response on this matter of importance to our organization.

Sincerely,

Christopher M. Papouchis, M.S.
Wildlife Specialist
Animal Protection Institute

Camilla H. Fox
Wildlife Program Coordinator
Animal Protection Institute

Literature Cited

Rimmer, D. W., and R. D. Deblinger. 1990. Use of predator exclosures to protect piping plover nests. Journal of Field Ornithology 61: 217-223.

U.S. Fish and Wildlife Service. 1988. Atlantic Coast Piping Plover Recovery Plan. U.S. Fish and Wildlife Service. Newton Corners, Mass. 77 pp.

Wildlife Management Institute

Rob Manes, Field Representative
10201 South Highway 281 • Pratt, Kansas 67124
Phone/FAX (316) 672-5650
E-mail - wmimanes@prattusa.com

ROLLIN D. SPARROWE
President

RICHARD E. McCABE
Vice-President

September 25, 2000

Mr. Jim Salyer
U.S. Fish and Wildlife Service
Southern Missouri Ascertainment Office
24385 State Highway 51
Puxico, MO 63960

Dear Mr. Salyer:

This letter, on behalf of the Wildlife Management Institute, is to provide comment on the draft Comprehensive Conservation Plan and Environmental Assessment (CCP) for the DeSoto National Wildlife Refuge, distributed with a cover letter dated August 17, 2000.

The Wildlife Management Institute (WMI) is a non-profit scientific and educational organization staffed by experienced professional wildlife managers. Established in 1911, WMI is dedicated to the sound management of wildlife and associated resources.

The Fish and Wildlife Service (FWS) is to be commended for the important effort undertaken in establishing and renewing CCPs for the national wildlife refuges. This draft of the CCP for DeSoto NWR is generally well designed and complete. I offer the following comments, which I believe may be incorporated to further strengthen the plan. Some of these comments are merely to support important components of the draft CCP for inclusion in the final version. This review is based primarily on the goals, objectives and strategies set forth in the draft plan.

It is critical that the state wildlife agencies, the Nebraska Game, Fish and Parks Department and the Iowa Department of Natural Resources, be full partners throughout the planning process; the input of these agencies should carry a preponderance of influence on the CCP's final nature. It is also important to ensure that all public comment received during the planning process receives feedback through the planning process. The open house forum and other public input opportunity announcements are laudable means for engendering input and support for the final plan.

It is appropriate that the first goal (1.1 [assumed highest priority]) of the plan is to manage refuge habitat for waterfowl benefits. This should be retained as the refuge's primary purpose.

I generally support the conversion of croplands to native grasslands, however, strategies1.1.1.1, 1.1.1.2, 1.1.2.2, 1.2.1.1, and 1.3.1.5, as well as others that call for cropland conversion to grassland and monitoring of habitat uses, may be mutually limiting. Waterfowl use may decrease with loss of croplands, which may

OCT-18-00 WED 09:58 AM FAX NO. P. 01

DEFENDERS OF WILDLIFE

October 12, 2000

U.S. Fish and Wildlife Service
Southern Missouri Ascertainment Office
24385 State Highway 51
Puxico, Missouri 63960

Dear Mr. Salyer and Mrs. McClendon,

CC: William F. Hartwig, FWS Regional Director

Defenders of Wildlife is a national non-profit, public-interest organization with approximately 420,000 members and supporters, 5,000 of whom reside in Iowa and Nebraska. Defenders believes that all wildlife has intrinsic value, and that the conservation of all native species should be the primary goal of wildlife conservation programs. Defenders works to preserve the integrity and diversity of natural ecosystems, prevent the decline of native species, and restore threatened habitats and wildlife populations. Defenders has been a long time advocate for the Refuge System and appreciates the opportunity to comment on the draft Comprehensive Conservation Plan (CCP) for the DeSoto National Wildlife Refuge. Although this letter of comment arrives to you past the comment deadline, we hope you will consider our recommendations in drafting the final CCP.

Defenders supports many of the recommendations outlined in the Service's Alternative D. The question of rejoining DeSoto Lake with the Missouri River is indeed complicated and would have profound impacts on the refuge environment and the species that depend on it. This needs much more study and we are encouraged that Alternative D includes a preliminary study of the feasibility, implications, and impacts of the reconnection option. This issue is even more pronounced given the context of the Missouri Valley Improvement Act (S. 2704) which is still pending passage in Congress. This bill would result in sweeping changes to the management and restoration of the Missouri River, including dechannelization, restoration of flow patterns, and acquisition of new national wildlife refuge lands. The bill also includes a study to determine the details of restoration activities. The Service must be intimately involved in this effort, and encourage inclusion of DeSoto NWR in any restoration study and plan. In the absence of river-wide restoration, the refuge must be committed to completing its own study of reconnecting DeSoto Lake to the Missouri River and specify a time-frame for its completion.

FAX TRANSMITTAL

# of pages ▶ 3

To Leon
From Belinda
Dept./Agency
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Fax #
Fax #

GENERAL SERVICES ADMINISTRATION

National Headquarters
1101 Fourteenth Street, NW
Suite 1400
Washington, DC 20005
Telephone 202-682-9400
Fax 202-682-1331
http://www.defenders.org

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We support the refuge's expanded emphasis on a broader range of biodiversity than in the past, the decrease in croplands and the limits on boating times and seasonal usage of the refuge and the lake to preserve the shoreline soils, plants, and wildlife that reside or migrate to the lake.

We do have serious concerns, however. DeSoto lake under current and proposed management is essentially a huge fish tank for anglers, complete with an aerator. The Fish and Wildlife Service and DeSoto NWR are dedicated to the conservation of *all* native fish, wildlife, and plants. Artificially stocking certain species populations to the detriment of others for the benefit of recreation is not appropriate for a national wildlife refuge. Not only is this activity ecologically harmful, but it seriously detracts from the mission of the refuge and the refuge system by giving the public the impression that they cannot overfish an area because the government will always be there to restock. In this way stocking fish instills a poor conservation ethic and emphasizes to the public that game species are more valuable than non-game species, when in fact, the Service values all species ecologically functioning together. In addition to stocking game fish, the Service is removing 20,000 pounds native non-game fish to reduce competition with sport fish. Defenders is not against sustainable sport fishing on refuges when it is compatible with resource protection. Specifically developing a sport fishery, instead of protecting and restoring native aquatic communities, however, is not in-line with Congressional mandates and Service policy. Defenders believes these activities are both inappropriate and incompatible with the refuge and violate the 1997 National Wildlife Refuge System Improvement Act's (NWRSIA) mandate to "ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans" (16 USC §668dd). Fisheries management should be incorporated into the "Wildlife Population and Habitat Management" section of the CCP and removed from the "Public Education and Recreation" section and should be expanded to address the entire native aquatic community.

The second concern we have is in regards to the agricultural runoff the refuge receives from surrounding properties. Instead of "band-aid" solutions like an artificial aeration system to combat eutrofication, the refuge should address the root causes of the problem. Water quality is one of the most important issues for an aquatic-centered refuge. The Service has to do more to use collaborative, incentive-based, and regulatory means to achieve better water quality. The NWRSIA directs the Service to identify "significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants within the planning unit and the actions necessary to correct or mitigate such problems." This includes addressing problems that originate off-refuge. The CCP must contain detailed plans to curb the agricultural chemicals, nutrients, and sediment currently entering the lake.

The endangered species management component of the CCP needs to be expanded. Specifically, the draft plan states that piping plovers and least terns used to nest on the refuge in the 1970's, but since that time, encroaching vegetation in tern and plover habitat has crowded them out. Why has the FWS not removed vegetation to provide habitat for these species which have declined throughout their range? The Service has an obligation under Section 7 of the Endangered Species Act to carry out programs for the conservation of endangered species.

Plovers and terns historically used shifting sand bars in the Missouri and other rivers to nest. These sand bars were relatively free of vegetation and were surrounded by water, offering protection from predators. With the channelization of many of our rivers, these sand bars have dramatically decreased. The Service should consider restoring and maintaining appropriate tern and plover habitat, including the construction of predator exclosures when necessary, to recover these species.

The fourth concern we have is the acquisition of the Wilson's Island State Park. While we normally support refuge acquisitions, the land proposed is already protected by the state. What is the reason for the National Wildlife refuge to acquire this public land? Will the land be converted to woodland or grassland or kept in its current state? The CCP should justify why the refuge would like to acquire additional lands and should be strategic about which lands would be best to use scarce conservation dollars.

Fifth, we are concerned with the collection of fruits, nuts, mushrooms, and fire wood by visitors. Fruits, nuts, and mushrooms are important food sources for wildlife and downed wood provides micro-habitats for small species and retains nutrients in the ecosystem. This activity also gives the public the impression that refuge resources are for people. Yes, ultimately, the protection of wildlife and habitat is for the benefit of the American people, but refuges are some of the last areas in the country where wildlife can find food, shelter, and avoid disturbance from people. Refuges are where "wildlife comes first", and the Service should encourage the public to "tread lightly" at DeSoto NWR.

Finally, the Service should take seriously the threat of an accident introduction of zebra mussels and other invasive species and take proactive measures to prevent future invasions. The Great Lakes and other areas infested with zebra mussels are not far from DeSoto NWR. There is a very real possibility of boaters carrying zebra mussels from those areas to DeSoto Lake. The Service needs to ensure that boats entering the refuge are not a threat to invasives introductions.

Again we appreciate the opportunity to help shape the direction of DeSoto NWR. The preferred Alternative has many positive steps to strengthen and improve refuge management to protect wildlife. We hope you take advantage of the CCP process and chart a bold course for resource protection at DeSoto NWR that protects all native fish, wildlife, and plants.

Sincerely,

Noah Matson

Noah Matson
Refuge Program Manager

not be desirable. Other species' use of the refuge also may decline with replacement of croplands; these changes may dictate alterations in the objectives for cropland reduction or for species diversity, as indicated by monitoring programs and the priority of species' needs. In short, if cropland conversions prove to be deleterious to key species, such as waterfowl, it may be necessary to alter grassland establishment objectives (reflected throughout the plan); this flexibility should be reflected in the plan.

The guided snow goose hunt (Obj. 1.2.1.1) and the accompanying rationale do not seem well founded. If the guiding requirement is to remain in place, it should be supported by documentation that there is a significant increase in public support (over unguided hunts) and that it results in a snow goose harvest greater than could be achieved through more numerous unguided hunts. Also, efforts to eliminate cropland and displace snow geese from the refuge should be coupled with monitoring programs to ensure that crop damage is not displaced disproportionately to nearby private croplands.

Objective 1.4.2 for grassland coverage increases is sound and supportable, with the caveats mentioned above. Emphasis should be on the use of native grass and forb mixes in grassland reestablishment.

The objective and strategies for wetland and wet meadow establishment under 1.4.3 are reasonable. Emphasis should be placed on projects that benefit declining, but under-appreciated species, such as American woodcock.

Again, the cropland reduction strategies under Objective 1.5.1 should be accompanied with a monitoring program to detect displaced depredation on private lands.

I support the action called for in Strategy 1.7.1.3, reconnecting DeSoto Lake to the Missouri River channel. This action could have significant benefits for water quality and terrestrial and aquatic species.

In addition to the actions prescribed in Strategy 1.7.2.1, I strongly recommend development and implementation of a drainage-wide, private lands, grass strip buffer program as a key component of a water quality improvement plan for the lake. Such a program may be best designed around a set of locally specific best management practices for agricultural lands, assembled in cooperation with affected landowners. Water quality monitoring should complement any changes in management of the drainage, in order to evaluate their impacts.

The dredging contemplated in Strategy 1.7.2.3 should be approached with caution, as the involved sediments may contain hazardous materials that could yield dredging impossible or deleterious to fish and wildlife.

I support the aggressive strategies to control invasive species, as outlined under Objective 1.8.1.

The narrative under Objective 1.9.1 implies that modern firearms are not to be allowed for deer hunting on the refuge; verbiage elsewhere in the draft plan document states that this is for safety purposes. Such a restriction should only be retained if it can be supported by objective data (I doubt that such data exists for these circumstances). Even if there is a legitimate concern over conflicting uses involving modern firearms deer hunters, such conflicts can be avoided by management actions the separate hunters from other users.

The strategies and rational cited under Objective 3.1.1, for restricting non-wildlife-associated recreational uses of the refuge are fully supportable. Natural resource interpretation and education are important uses of wildlife refuges. The role of regulated modern hunting in our heritage and in wildlife management should be reflected as a key component of any educational or interpretive program.

The fisheries management objectives, 3.3.1 and 3.3.2, are well supported, and the accompanying strategies are generally sound. Water level manipulation needs for fisheries management should be incorporated control structure designs to benefit waterfowl and wading birds.

The objective and strategies set forth under 3.4.1 support hunting for waterfowl and deer only, with provisions for possible future youth-mentor hunting of pheasant and wild turkey. While youth-mentor hunts certainly are supportable, this position appears to be overly restrictive. Unless merited by sound data and core refuge needs, hunting and trapping regulations for the property should be no more restrictive than those of Iowa and Nebraska. The action set forth in Strategy 3.4.1.3 is commensurate with this. Strategy 3.4.1.4 calls for hunt management to minimize conflicts with other uses; this should be applied conversely as well, with prescriptions for managing other uses to avoid conflicts with hunting activity.

Section 4, on partnerships, is fundamentally sound. I would recommend, however, that staffing needs for volunteer and friends group management be considered before establishing or expanding these programs. Personnel demands for such efforts can be significant.

Increases in private land wetland and upland habitats (Obj. 4.3.1) may be partly achieved through "habitat banking", or allowing crop production, haying, or grazing on certain portions of the refuge in exchange for habitat development or protection on nearby private lands. These strategies are being employed on FWS properties elsewhere.

The goal of acquiring additional refuge lands is fully supportable. This should be done, however, in cooperation with adjacent landowners and their representative organizations. Neither the refuge operation nor the FWS in general should incur the negative relationships associated with land acquisition programs that are not executed in cooperation with private land interests.

Thank you for your work on this plan and on behalf of the affected wildlife resources and the DeSoto National Wildlife Refuge. Thanks too for considering these comments. Please let me know if you have questions or require clarification. I may be contacted at the phone number and address listed on this letterhead.

Sincerely,

Rob Manes
Midwest Regional Representative

c: Jim Douglas, NGFP
Allen Farris, IDNR
Rollie Sparrowe, WMI

STATE OF NEBRASKA

DEPARTMENT OF NATURAL RESOURCES
Roger K. Patterson
Director

Mike Johanns
Governor

September 22, 2000

IN REPLY REFER TO:

Mr. Jim Salyer
U.S. Fish and Wildlife Service
Southern Missouri Ascertainment Office
24385 State Highway 51
Puxico, Missouri 63960

Dear Mr. Salyer:

We have reviewed the draft Comprehensive Conservation Plan and Environmental Assessment for the DeSoto National Wildlife Refuge. Our only comment is:

> It is our understanding that a small tract of original Missouri River floodplain forest is located in the southern part of the Refuge. This area, about 10 acres in size, is somewhat hummocky and contains sycamore, black walnut, and Kentucky coffee tree. The tract is located east of the road approximately one half mile north of the old SCS wildlife habitat planting. Gene Solomon of Blair (426-2048) can provide more information about the tract. We did not find reference to this tract in the plan/EA. Upon verification it should be recognized and the management activities proposed for it included in the plan.

Thank you for the opportunity to review this excellent plan that will guide the future management of DeSoto Bend.

Sincerely,

Steve Gaul, Head
Planning and Assistance Division

mh

Salyer-SGaul&Tom.doc

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The Historical Division of the Department of Cultural Affairs

STATE HISTORICAL SOCIETY OF IOWA

Where past meets future

September 23, 2000

In reply refer to:
R&C#: 000800138

American Gothic House
Eldon

Blood Run NHL
Larchwood

Centennial Building
Iowa City

Matthew Edel Blacksmith Shop
Marshalltown

Abbie Gardner Cabin
Arnolds Park

Iowa Historical Building
Des Moines

Montauk Governor's Home
Union Sunday School
Clermont Museum
Clermont

Plum Grove Governor's Home
Iowa City

Toolesboro Indian Mounds
Toolesboro

Western Historic Trails Center
Council Bluffs

Mr. Jim Salyer
U.S. Fish and Wildlife Service
Southern Missouri Ascertainment Office
24385 State Highway 51
Puxico, Missouri 63960

RE: FWS – USFWS – HARRISON & POTTAWATTAMIE COUNTIES – DESOTO NATIONAL WILDLIFE REFUGE – AUGUST 2000 DRAFT COMPREHENSIVE CONSERVATION PLAN AND ENVIRONMENTAL ASSESSMENT FOR PROPOSED MANAGEMENT OVER THE NEXT 15 YEARS.

Dear Mr. Salyer,

We have received the *August, 2000 Draft Comprehensive Conservation Plan* for the DeSoto National Wildlife Refuge and I have had the opportunity perform a cursory review of its content. It would appear that the long term management plan proposed by the U.S. Fish & Wildlife Service (FWS) for the *Bertrand* collection and other known and unknown cultural resources contained within the boundaries of the DeSoto National Wildlife Refuge is consistent with intention and spirit of sections 106 and 110 of the National Historic Preservation Act of 1966 and the Advisory Council on Historic Preservation's implementing regulations (36 CFR part 800).

The Iowa SHPO has no further comment at this time, but requests that you send a copy of the final draft for our further consideration. Please keep us appraised of any undertakings that may be in the early planning stages and that might warrant our consultation. We would be pleased to assist you in coordinating section 106 review for upcoming projects that would be covered under the proposed management plan.

Please reference R & C #000800138 in future correspondences relating to this document as it will be placed in our active project files under that number. Thank you for providing the Iowa State Historic Preservation Office with the opportunity to review and comment on this version of the *2000 Comprehensive Conservation Plan* for the DeSoto National Wildlife Refuge. If you have any questions or if I can be of further assistance please contact me at (515) 281-8744.

Sincerely,

Daniel K. Higginbottom, Archaeologist
Community Programs Bureau
State Historical Society of Iowa

Cc: Charles Wooley, Acting Regional Director, USFWS

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SEP-25-00 MON 06:37 PM NE GAME & PARKS LINCOLN FAX NO. 4024715528 P. 01

Nebraska Game and Parks Commission
2200 N. 33rd St. / P.O. Box 30370 / Lincoln, NE 68503-0370
Phone: 402-471-0641 / Fax: 402-471-5528 / http://www.ngpc.state.ne.us/

Mr. Jim Salyer/Ms. Judy McClendon
US Fish & Wildlife Service
Southern Missouri Ascertainment Office
24385 State Highway 51
Puxico, MO 63960

Post-it® Fax Note 7671	Date 9-29-00	# of pages ▶ 2
To Jim Salyer/Judy McClendon	From Scott Luedtke	
Co./Dept. Please	▶ sluedtke@ngpc.state.ne.us	
Phone # confirm	Phone # 471-5561	
Fax # receipt of fax.	Fax # 471-5528	

Dear Mr. Slayer/Ms. McClendon,

Following are review comments for the draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for the Desoto National Wildlife Refuge (DeSoto).

First, as an individual with training and experience in land management issues, especially wildlife management in public use situations, I can appreciate how "Alternative D" became the "preferred alternative." However, to "...seek the best or optimal balance between the competing ideals of wildlife conservation and public use.", is realistic, but may not attain DeSoto's Mission "To preserve and restore indigenous biological communities, ..." I believe we must all focus on that mission first, before we can truly support a preferred alternative.

To the credit of the CCP drafters, I believe the conversion of ~75% of the existing croplands is a step toward the DeSoto mission. The value of converting 1,140 acres of croplands into prairie habitats will be magnified, if the "prairie" mixes are high diversity mixtures. The level of diversity of the grass mixes was not apparent to me in my review and can be subjective. There are current efforts to establish high diversity prairie on other specific Missouri River sites. Given the Federal ownership of DeSoto and the 15 year implementation effort of the CCP, you may wish to pursue this option. Please contact me if you would like to talk with someone directly involved in this effort.

I was also pleased to see Objective 1.7.1: By 2005, conduct and complete an assessment of the hydrologic and habitat implications of partially or completely reconnecting DeSoto Lake with the Missouri River. Clearly, this is a pivotal issue for any planning effort at DeSoto, especially given the current climate surrounding Missouri River issues. This was not given adequate attention in the preferred alternatives discussion. Again, DeSoto's Mission "To preserve and restore indigenous biological communities, ..." must come first, with discussion of compatible uses secondary. Discussion on preferred alternatives focused on the management of sport fisheries within DeSoto Lake, with only minor attention paid to Federally listed Threatened & Endangered Species. On pages 33-34, you stated, "DeSoto Refuge staff have practically no opportunity to aid in the recovery of the Pallid Sturgeon short of re-connecting DeSoto Lake with the river." This statement implies the potential "...to aid in the recovery of the Pallid Sturgeon..." if the river is reconnected to DeSoto Lake. You also mentioned the "string-of-pearls" analogy

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for habitat restoration in the Lower Missouri River. Shouldn't DeSoto, as a USFWS holding along the Missouri River, be part of this string-of-pearls? Wouldn't this aid in meeting T & E Species habitat objectives defined by the USFWS in your 1994 and 2000 Biological Opinions?

Given potential modifications to inlet and outlet designs on DeSoto Lake, isn't it possible that an adaptive management plan could be created to manage for T & E Species, provide a sport fishery and resolve some of the nutrient loading problems being experienced within DeSoto Lake. There is significant dollars being put into lake management with limited results. There is discussion of routing waters away from DeSoto Lake, which will be complicated and expensive. There is the practical recognition that the current management system will not overcome these issues. It is imperative that we not squander opportunities for T & E species recovery, in one of the few places we have options, so that we can provide a "preferred" sport fishery.

On another issue, I saw no reference to allowing small game hunting, or why it would not be considered a compatible use. I can appreciate that the proximity to urban populations would create a high demand, but given the lack of public lands within the states of Iowa and Nebraska and the size of the area, this seems like a reasonable opportunity. It would be much easier to support limited small game hunting, then conversion of more area to parkland settings for additional camping, as I saw suggested. Increased development of public use facilities ultimately leads to reduced habitat management options.

Thank you for this opportunity to review the CCP. The Missouri River is a tremendous resource only partially realized and the DeSoto Bend NWR is an important component.

Sincerely,

S. Scott Luedtke

S. Scott Luedtke
Southeast Programs Manager
Wildlife Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102-4978

REPLY TO
ATTENTION OF

November 6, 2000

Planning, Programs, and Project Management

Mr. Jim Salyer
U.S. Fish and Wildlife Service
Southern Missouri Ascertainment Office
24385 State Hwy 51
Puxico, Missouri 63960

Dear Mr. Salyer:

I regret the late submittal of these comments to the Draft Comprehensive Conservation Plan for DeSoto National Wildlife Refuge and appreciate your request for these even at this late date.

We support Objective 1.7.1, an assessment of re-connecting at least a portion of DeSoto Lake to the Missouri River; and we would encourage a decision to re-connect the lake to the river to help in the recovery of that troubled river's ecosystem. DeSoto Lake was created by channelization of the Missouri River at a time when national priorities were different than those today. The impacts from channelization have included major degradation of the Missouri River ecosystem. Today, to restore lost habitat, the Corps is implementing a required Mitigation Project for that channelization project and is conducting environmental modifications of the channelization project with non-Federal partners who are willing to share the costs under our Sec.1135 authority. We are finding our river operations impacted and also finding our operating budget may be increasingly used to assist endangered river species that have declined due to loss of habitat diversity. The Corps is currently in consultation with the U.S. Fish and Wildlife Service (USFWS) relative to the operation of the Missouri River Main Stem Reservoir System, Bank Stabilization Project, and Kansas River Project.

Opportunities for restoration are scarce, particularly in this upstream reach. Reconstruction of backwater conditions is very expensive, as each acre of habitat must often be excavated. DeSoto Lake offers a remarkable opportunity to restore river diversity at low cost. USFWS is in a unique position to make a contribution to river restoration, which virtually all involved agencies recognize as being a need paramount to sport fish management. We would encourage USFWS to join its authorities and programs with those of the Corps and others for Missouri River restoration activities.

Restoring connectivity between the river and its off-channel remnants and flood plain is one of the two main restoration needs frequently sought by river researchers and managers in this region (the other being restoration of a more natural hydrograph). Also, the most frequently recommended strategy for river conservation during at least one symposium of river biologists was the protection and restoration of riparian forests and wetlands. Wetlands, including oxbows, are considered essential to providing the habitat, nutrients, and substrate which support the river fishery and drive the aquatic food chain. And specifically, re-connecting DeSoto Lake to the

-2-

Missouri River was well supported by those attending your office's interagency scoping meetings for this Conservation Plan, as reflected in Chapter 2, "Issues" section.

A re-connection project could still allow your office to achieve other objectives. Proper design could ensure that any lake portion left disconnected from the river would remain structurally segregated for sport fish management. The portion not re-connected would be much cheaper and easier to renovate for rough fish control. A re-connection project could assist flood damage reduction within the refuge.

Under our available authorities, the Corps stands ready to assist you in achieving your refuge objectives, hopefully to include some reconnection of DeSoto Lake to the Missouri River. We may be able to offer assistance under our Federal Mitigation Project, with possible future operation expenditures, or with our cost-shared Sec. 1135 program.

Thank you for considering our recommendations.

Sincerely,

Kenneth S. Cooper
Deputy District Engineer

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