U.S. Fish & Wildlife Service

Tishomingo National Wildlife Refuge

Draft Comprehensive Conservation Plan and Environmental Assessment

United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 1306
Albuquerque, New Mexico 87103

Dear Reader:

Enclosed is the Draft Comprehensive Conservation Plan and Environmental Assessment for the Tishomingo National Wildlife Refuge. The Plan identifies the role that this refuge will play in support of the mission of the National Wildlife Refuge System. The final version of this Plan will guide management of the Refuge for the next 15 years.

The Plan has been sent to you because public involvement in the planning process is essential for development of an effective plan. Please review and provide comment on the plan's contents by **March 8, 2010**. Comments should be specific, addressing merits of the alternatives and adequacy of the environmental analysis. We will consider your comments as we prepare the Final Plan.

All public comments received, including respondent names and addresses will be included in the planning record which will be available for public review. If you, as an individual, wish us to withhold your name or address, state this prominently at the beginning of your comments. We will honor your request to the extent allowed by law. All comments from organizations, businesses, and from individuals identifying themselves as representative or officials of organizations and businesses, will be available for public inspection. Anonymous comments will not be considered.

Comments should be mailed, e-mailed, or provided orally by **March 8, 2010** to:

Joseph Lujan, Tishomingo Planning Team Leader
U.S. Fish and Wildlife Service
National Wildlife Refuge System
Division of Planning
P.O. Box 1306
Albuquerque, NM 87103

Phone: (505) 248-7458
Email: Joseph_Lujan@fws.gov

Thank you for your participation in our planning process. Your comments will help us prepare a better plan for the future of the Refuge.

Sincerely,

Robert M. Campellone
Chief of Planning

Tishomingo

National Wildlife Refuge

Draft
Comprehensive Conservation Plan
and
Environmental Assessment

Prepared by:

Tishomingo National Wildlife Refuge
12000 Refuge South Road
Tishomingo, Oklahoma 73625

U.S. Fish and Wildlife Service
National Wildlife Refuge System
Div. of Planning

500 Gold Avenue Southwest
Albuquerque, New Mexico 87103

January 2010

Comprehensive Conservation Plans provide long term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the Services best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service, strategic planning and program prioritization purposes. The plan does not constitute commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

Refuge Vision Statement

Tishomingo National Wildlife Refuge (Tishomingo NWR, Refuge) will continue to provide high quality habitats for a variety of native flora and fauna, with an emphasis on migratory birds and threatened and endangered species, for the benefit of present and future generations. It will provide interpretation of biological management practices and historical significance of the area. It also will provide a place where people can learn about wildlife and their habitats and enjoy wildlife-dependent recreational activities that are compatible with Refuge purposes. Whenever possible, habitats and populations will be managed in partnership with local and regional organizations, and with local State and Federal agencies to achieve regional conservation goals. These efforts will result in greater protection of wildlife and plant resources throughout the Arkansas/Red River Ecosystem.

The future holds a progression of planning and land management activities that will protect, maintain, enhance, or restore native grassland, riparian forests, and wetland communities in the Arkansas/Red River Ecosystem for migrating waterfowl, Neotropical migrants, other migrating birds, threatened and endangered species, and other species of concern. The Refuge will continue to protect these resources from development or other forms of encroachment to the level allowed by the U.S. Fish and Wildlife Service's secondary jurisdiction. The U.S. Army Corps of Engineers continues to hold primary jurisdiction of the Refuge lands. Through implementation of innovative management practices, the natural biological mechanism inherent to grassland and riparian communities prior to agricultural influences will be restored.

Through coordinated and well planned water management activities with Oklahoma Water Resources Board and other applicable water quality organizations, the Refuge's annual water allotments of 400 acre-feet will irrigate marshes for the production of natural foods for winter waterfowl forage. The Service will work in cooperation with local Friends Groups to protect the primary sources of water, including Pennington Creek. Moist soil management strategies will be refined to provide quality habitat components, ensuring optimal quantities of natural forage for wetland birds and undisturbed habitat for nesting species. Through management activities, the Refuge will be able to sustain waterfowl, wading birds, and shorebirds for over three million use days annually.

Public outreach programs will be expanded, dependent on additional staff and increased funding. Refuge visitation and participation by volunteers will increase in the next 15 years. During a 15-year period, the staff will develop a Refuge curriculum guide for outdoor education that targets intermediate and middle school students, hopefully resulting in better environmental stewardship by the youth of the community. Much of the Refuge's success will be a result of increased support and interest by the local community as well as the Service's regional office. The outdoor recreation planner will provide public presentations to the community on resource topics and relevant ecosystem issues.

This vision can only be realized with a clear national and regional direction for management priorities, adequate base funding and staff, and innovative outreach to encourage the public's involvement as stakeholders in protecting the natural resources of our public lands.

Table of Contents

Table of Contents v
1. Introduction and Background 1-1
1.1 Purpose and Need for Action 1-1
1.2 Refuge Overview 1-2
1.2.1 Establishment of Tishomingo NWR 1-2
1.2.2 Historical Context 1-2
1.2.3 Relationship with the U.S. Army Corps of Engineers 1-4
1.2.3.1 Cooperative Agreement between the United States Army Corps of Engineers and the United States Fish and Wildlife Service 1-4
1.2.3.2 Cooperative Agreement between Oklahoma Department of Wildlife Conservation, U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service for Management of the Wildlife Management Unit 1-8
1.2.4 Refuge Setting 1-9
1.3 Planning Context 1-14
1.3.1 The U.S. Fish and Wildlife Service 1-14
1.3.2 The National Wildlife Refuge System 1-14
1.3.2.1 Legal and Policy Guidance 1-15
1.3.2.2 Principles of Refuge Management 1-15
1.3.2.3 Landscape Level Considerations in Planning 1-16
1.3.2.4 Coordination with Other Entities, including the State of Oklahoma 1-20
2. The Planning Process 2-1
2.1 Description of the Planning Process 2-1
2.1.1 Preplanning 2-1
2.1.2 Initiate Public Involvement and Scoping 2-2
2.1.3 Determine Significant Issues 2-3
2.1.4 Develop and Analyze Alternatives 2-3
2.1.5 Prepare Draft Plan and EA 2-3
2.1.6 Prepare and Adopt Final Plan 2-3
2.1.7 Implement Plan, Monitor, and Evaluate 2-3
2.1.8 Review and Revise Plan 2-3
2.2 Issues 2-4
2.2.1 Issue 1. Habitat Management 2-4
2.2.1.1 Water Resources 2-4
2.2.1.2 Grassland Management 2-5
2.2.1.3 Baseline Biological Inventories 2-5
2.2.2 Issue 2. Public Use and Recreational Opportunities 2-6
2.2.3 Issue 3. Cultural Resources Management 2-7
2.2.4 Issue 4. Interagency Coordination and Relationships 2-7

3. Refuge Resources 3-1
3.1 Geographic/Ecosystem Setting 3-1
3.1.1 The Arkansas/Red River Ecosystem 3-1
3.1.2 Location 3-2
3.1.3 Area of Ecological Concern 3-2
3.2 Physical Environment 3-3
3.2.1 Climate 3-3
3.2.2 Geology 3-3
3.2.3 Soils 3-3
3.2.4 Topography 3-4
3.2.5 Hydrology 3-4
3.3 Biological Environment 3-4
3.3.1 Vegetation 3-4
3.3.1.1 Forest 3-9
3.3.1.2 Prairie 3-9
3.3.1.3 Riparian/Wetland 3-9
3.3.1.4 Agriculture 3-9
3.3.1.5 Exotic, Invasive, and Invading Plants 3-9
3.3.2 Wildlife 3-10
3.3.2.1 Mammals 3-11
3.3.2.2 Birds 3-11
3.3.2.3 Reptiles and Amphibians 3-12
3.3.2.4 Fish and Invertebrates 3-12
3.3.2.5 Species of Special Interest 3-13
3.3.2.6 Federal and State Endangered, Threatened, and Proposed Species 3-13
3.3.2.7 Species of Concern 3-15
3.3.2.8 Status of State Species of Concern 3-19
3.3.2.9 Other Species of Concern 3-19
3.3.2.10 NABCI/PIF Priority Species 3-20
3.3.2.11 Strategic Habitat Conservation “Focal Species” 3-21
3.4 Socioeconomic Environment 3-23
3.4.1 Archaeological, Cultural, and Historical Resources 3-23
3.4.1.1 Chickasaw Manual Labor Academy 1851–1885 3-24
3.4.1.2 Washita (Chapman) Farm 1920–1943 3-24
3.4.1.3 Other historical sites 3-25
3.4.2 Population and Economic Profiles 3-25
3.4.2.1 Population 3-25
3.4.2.2 Regional Economic Profile 3-26
3.4.2.3 Economic Profile 3-26
3.4.3 Wildlife-Dependent Recreational Opportunities 3-26
3.4.3.1 Hunting 3-27

3.4.3.2 Fishing 3-27
3.4.3.3 Wildlife Observation and Photography 3-28
3.4.3.4 Environmental Education and Interpretation 3-28
3.4.4 Public Access and Transportation Management 3-31
3.4.5 Law Enforcement 3-31
3.4.6 Land Use/Current Management 3-31
3.4.6.1 Croplands 3-32
3.4.6.2 Forest Lands 3-32
3.4.6.3 Grasslands 3-33
3.4.6.4 Water Management and Quality 3-33
3.4.6.5 Fire Management 3-34
3.4.6.6 Research 3-34
3.4.6.7 Sanctuary Areas 3-34
3.4.6.8 Wilderness Potential 3-34
3.4.6.9 Other State and Federal Managed Lands 3-35
4. Refuge Management Direction: Goals, Objectives, and Strategies 4-1
4.1 Habitat Conservation (Protection and Restoration) 4-1
4.2 Habitat Management 4-7
4.3 Visitor Services: 4-11
4.4 Address ecosystem threats to the Washita River Basin: 4-16
4.5 Partnerships and Interagency Cooperation: 4-19
5. Plan Implementation 5-1
5.1 Funding and Personnel Needs 5-1
5.1.1 Current Staff and Funding 5-1
5.1.1.1 Current Funding 5-1
5.1.2 Proposed Staff 5-1
5.2 Existing Partnerships 5-2
5.2.1 Governmental Entities 5-2
5.2.2 Educational Institutions 5-3
5.2.3 Private Organizations 5-3
5.3 Step-Down Management Planning 5-4
5.3.1 Completed Step-Down Management Plans: 5-4
5.3.1.1 Visitor Service Management Plan 5-4
5.3.1.2 Fire Management Plan 5-5
5.3.1.3 Hunt Plan 5-5
5.3.2 Future Step-Down Management Plans 5-6
5.3.2.1 Habitat Management Plan 5-6
5.3.2.2 Integrated Pest Management Plan 5-7
5.3.2.3 Inventory and Monitoring Plan 5-8
5.4 Compatibility Determinations 5-8
5.4.1 Recently Completed Compatibility Determinations 5-8

5.4.1.1 Wildlife Observation, Photography, and Access (Walking, Jogging, and Bicycling) 5-8
5.4.1.2 Rock Creek Lake Trotlines 5-8
5.4.2 Draft Compatibility Determinations 5-8
5.5 Resource Projects 5-9
5.5.1 Project 1. Habitat Management 5-9
5.5.2 Project 2. Biological Program 5-9
5.5.3 Project 3. Complete Implementation of Public Use Management Plan 5-9
5.6 Partnership Opportunities 5-9
5.7 Monitoring and Evaluation 5-10
5.8 Plan Amendment and Revision 5-11
Glossary of Terms 1
Abbreviations and Acronyms 1
List of Preparers 1

Appendices

Appendix A References
Appendix B Applicable Laws and Executive Orders
Appendix C Environmental Assessment
Appendix D Draft Compatibility Determinations
Appendix E RONS and SAMMS Projects
Appendix F Intra-Service Section 7, Consultation

Figures

Figure 1-1. Tishomingo NWR Area 1-5
Figure 1-2. Tishomingo NWR Contour and Elevation Map 1-11
Figure 1-3. Proximity Map 1-13
Figure 1-4. Oaks and Prairies BCR 1-19
Figure 2-1. The Planning Process 2-1
Figure 3-1. Arkansas/RedRiver Ecosystem Boundary 3-1
Figure 3-2. Area of Ecological Concern 3-3
Figure 3-3. Soil Map 3-5
Figure 3-4. Vegetation Map 3-7
Figure 3-5. Recreation Facilities and Buildings Map 3-29
Figure 3-6. Other State and Federal Managed Land Maps 3-37

Tables

Table 3-1. Exotic, Invasive, and Invading Plants 3-10
Table 3-2. List of Threatened and Endangered Species 3-15
Table 3-3. State Species of Special Concern 3-19
Table 3-4. NABCI/PIF Priority Species 3-21
Table C-1. Known or suspected federally listed threatened and endangered fauna species of the Refuge. C-18

1. Introduction and Background

This Comprehensive Conservation Plan (Plan) describes the proposed action for management of the Tishomingo National Wildlife Refuge. The environmental assessment (EA) associated with it identifies, describes, and compares the consequences (or impacts) of implementing three management alternatives (including current management) on the physical, biological, and socioeconomic environments described in the Plan. This Plan will replace current management direction when it is finalized.

Chapter 1 provides background information that establishes the framework used to develop this Plan. Section 1.1 describes why the Service is developing the Plan, and Section 1.2 provides an overview of the Refuge, including its establishment and authorizing legislation. Section 1.3 provides information on the National Wildlife Refuge System and the laws, policies, and guidance that set the stage for management direction.

1.1 Purpose and Need for Action

Tishomingo National Wildlife Refuge was established to "provide refuge and breeding grounds for migratory birds and other wildlife." The purpose of this Plan is to fulfill the goals identified for the Refuge through this planning process, in part, to:

- Preserve and restore habitat for migrating waterfowl, Neotropical migrants, other migrating birds, threatened and endangered species, and other species of concern.
- Protect the area's resource values through land protection strategies and a comprehensive biological program.
- Further the public's interest and involvement through wildlife interpretation and quality wildlife-dependent recreation opportunities.
- Work to ensure the long-term health of streams, riparian corridors, and wetlands.
- Maintain, strengthen, and establish partnerships to cooperate on mutually beneficial programs for improving wildlife and habitat resources.

This Plan, with its clear management direction laid out in specific objectives and strategies, is needed to provide a vision for the Refuge and provide management direction for conducting scientific research, restoration, maintenance, and management of compatible public uses of Refuge resources for the next 15 years. More specifically, the plan is needed to:

- Provide a clear statement of Refuge management direction.
- Provide Refuge neighbors, visitors, and government officials an understanding of Service management actions on, and where applicable, around the Refuge.
- Ensure that the Service's management actions are consistent with the mandates of the National Wildlife Refuge System (System).
- Provide a basis for the development of budget requests for operations, maintenance, and capital improvements.

The Plan is also needed to ensure that the Refuge continues to conserve fish, wildlife, and habitat in the face of climate change and related stressors. By preparing this Plan, documenting our goals and objectives, and involving our partners and the public in the process, we can gain a better understanding of the Refuge. Sustaining the nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens. This Plan will help explain how the Tishomingo NWR fits into the larger landscape and our role in protecting our natural resources for present and future generations.

1.2 Refuge Overview

The following text provides a brief history of the establishment of the refuge, its historic significance, and relationships with partners.

1.2.1 Establishment of Tishomingo NWR

On January 24, 1946, President Harry S. Truman, under Public Land Order 312, authorized and established Tishomingo NWR. The purpose of the Refuge is to:

> "Provide refuge and breeding grounds for migratory birds and other wildlife," and
>
> "... shall be administered by him (Secretary of the Interior) directly or in accordance with cooperative agreements... And in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife resources thereof, and its habitat thereon...16 U.S.C. (Fish and Wildlife Coordination Act)."

The Refuge Recreation Act (16 U.S.C. 460-1) states that the Refuge is "suitable for incidental fish and wildlife-oriented recreational development, the protection of natural resources, and the conservation of endangered or threatened species" by the authority of the Migratory Bird Conservation Act (16 U.S.C. 712d) "for use as an inviolate sanctuary...for any other management purposes...for migratory birds."

Although originally established to provide habitat for migratory ducks and geese, through land and water management, it now provides a diversity of habitats for a wide range of migratory and resident species, including the interior least tern (*Sternula antillarum athalassos*) and piping plover (*Charadrius melodus)*, both of which are federally listed as threatened or endangered species.

The Refuge represents a successfully restored waterfowl habitat area in south central Oklahoma that partially fills a large gap along the central flyway. The Refuge's farming program serves the objectives for the establishment of the Refuge by providing adequate grain and browse to meet the feeding requirements of waterfowl and other wildlife. In addition to waterfowl, other wildlife species are benefiting from the Refuge's habitat restoration efforts. Habitat management to maintain populations of Neotropical migrants and shorebirds associated with the Arkansas/Red River Ecosystem have become major objectives. The region's value to waterfowl and other wildlife species and their habitats has increased since the Refuge's development.

1.2.2 Historical Context

The region known today as Oklahoma was incorporated into the United States when the Louisiana Territory was purchased from France in 1803. Between 1830 and 1906, Oklahoma

served the nation as the Indian Territory. After being moved from east of the Mississippi River, both Choctaws and Chickasaws settled in the Indian Territory along the Washita River. In 1837, Chickasaw and Choctaw leaders signed the Treaty of Doaksville. This agreement permitted the Chickasaws to settle in the Choctaw Nation. In 1855, Choctaw and Chickasaw leaders signed a treaty of separation. The Chickasaws received their own territory west of the Choctaw Nation in south central Oklahoma. The Chickasaw capital was located at Tishomingo. Both the town and the Refuge took their names from Tishomingo, who was the last war chief of the Chickasaw Nation.

Once the settlement was established, there was a need to develop a school system to help Chickasaw students learn about the changing world before them. In 1851, the Chickasaw Manual Labor Academy was opened on present day Refuge lands. Funded almost entirely by the Chickasaw Legislature, it was the first boarding school for tribal youth established in the Chickasaw Nation. A more detailed history of the academy can be found at Section 3.4.1. In 1885, the academy was moved to a new location north of Tishomingo, Oklahoma. Most of the main structures from the original academy site were located in what is now the Refuge headquarters area.

After the relocation of the academy, the former site was converted to farming operations. Starting in 1920, the Washita (Chapman) Farm prospered at the site. According to Earl W. Craven, the first Refuge manager, this enterprise "was a very elaborate installation with 53 poured concrete residences; a brick school, frame church, steam-heated chicken house of concrete and tile; a large concrete building used as a store, office, and equipment storage and repair shop; another large concrete building of similar architecture with an additional wing and running water throughout, used as a hog barn; a hatchery building capable of producing thousands of chickens and turkeys; numerous chicken and turkey houses; a battery of fourteen concrete silos; and a few other small buildings" (Craven, 1946). A more detailed history of the Washita Farm can also be found at Section 3.4.1. Ultimately, the Washita Farm property was acquired by the Federal government to be incorporated into the Lake Texoma project.

Denison Dam and Lake Texoma were authorized by Congress for construction under the Flood Control Act approved 28 June 1938 (Public Law No. 761, 75th Congress, 3d Session), for flood control and generation of hydroelectric power. Construction of the dam, spillway, and outlet works began in August 1939. Denison Dam is a rolled earthfill embankment, which formed what is now known as Lake Texoma. Prior to the construction of Denison Dam, the Corps bought the project impacted parcels. Abandonment and evacuation of the residences was completed by 1943. The dam was completed and placed in operation for full flood regulation in February 1944. Upon completion, Denison Dam was America's largest rolled earthfill dam. The dam is now the 12th largest in volume in the United States (United States Army Corps of Engineers, 2009). Many of the historic residences now lie beneath Lake Texoma. There are still silos standing on the north shoreline of the pool, as well as some of the old concrete structures that housed the farm laborers. The Corps has primary jurisdiction of and manages Lake Texoma for flood control, public water storage, recreational use, and wildlife. Cumberland Pool was developed by the Corps for use as a siltation pond impoundment for Lake Texoma.

Water levels of Lake Texoma greatly affect the water levels of Cumberland pool. Due to the properties behind water cohesion, water levels at Cumberland Pool are one to two feet higher in elevation than that of the levels at Denison Dam. The normal conservation level for Denison Dam is between 617 feet above mean sea level (MSL) to 620 feet above MSL. Ten-year flood events (frequent flood events) will bring the water levels of Cumberland Pool up to 630 feet

above MSL. A 100-year flood event brings the water levels of Cumberland Pool up to 640 feet above MSL, inundating approximately 82 percent of the Refuge. The Corps used a water level elevation exceeding the 100-year flood level to determine the necessary land acquisition during the development of Lake Texoma. The Corps determined the inundated areas at a water level of 645 feet above MSL, which determined the boundaries of land acquisition. The Refuge is located within the Corps acquisition elevation limit. Since the completion of Denison Dam in 1944, there have been three 100-year flooding events. The quantity of 100-year flooding events is not uncommon since the elevation for a 100-year flood is taken on previous averages for a 100-year time frame from known historical data. When flood events happen, the Washita River transports large amounts of silt and sediments from upstream. Cumberland Pool was designed by the Corps to slow floodwater, allowing the suspended silt and sediment to settle prior to reaching Lake Texoma. Cumberland Pool has well exceeded its anticipated project life of 50 years.

1.2.3 Relationship with the U.S. Army Corps of Engineers

Tishomingo NWR is an overlay on the U.S. Army Corps of Engineer's (USACE, the Corps) Denison Dam and Lake Texoma Project. USACE retained primary jurisdiction of Denison Dam and Lake Texoma reservoir lands, including the lands on which the Refuge is located, under a cooperative agreement with the Service (Figure 1-1). The Refuge was formed at the Washita River arm of Lake Texoma and encompasses the Cumberland Pool. USACE manages Lake Texoma for flood control, public water storage, recreational use, and wildlife. The management practices of the Corps at Lake Texoma will inevitably affect the water availability on the Refuge, primarily Cumberland Pool. Originally developed by the Corps as a siltation pond, Cumberland Pool has become a major asset to the Refuge for waterfowl, shorebirds, and other wildlife dependent on this water supply. The Refuge is subject to the effects of the Corps' future management of Cumberland Pool and associated Refuge lands.

1.2.3.1 Cooperative Agreement between the United States Army Corps of Engineers and the United States Fish and Wildlife Service

The USFWS entered into a cooperative agreement with USACE on April 29, 1957—a "General Plan for Use of Project Land and Waters for Wildlife Conservation and Management of Denison Dam and Reservoir, Red River, Oklahoma and Texas" (48 Stat. 401, as amended; U.S.C. 661 et seq., approved August 14, 1946, amended in 1968). This document encompasses the agreement and roles of USACE and the Service on the lands and waters of Tishomingo NWR. USFWS is referred to in this document as the Service and the Corps is referred to in this document as the Department of the Army.

This agreement states:

> *"THE DEPARMENT OF THE ARMY herby makes available to the Service the land and water areas of the Denison Dam and Lake Texoma as shown as Exhibit "A" (Tishomingo NWR), for the purpose of development, conservation and management of wildlife resources thereon in accordance with said General Plan…This Cooperative Agreement shall be subject to provisions and conditions of the said General Plan and to the following additional conditions:*
>
> 1. *The Department of the Army reserves all rights, in and to the lands above described, which are not specifically granted, and the right to use existing roads as a means of ingress and aggress to and from the Red River and to any areas which the*

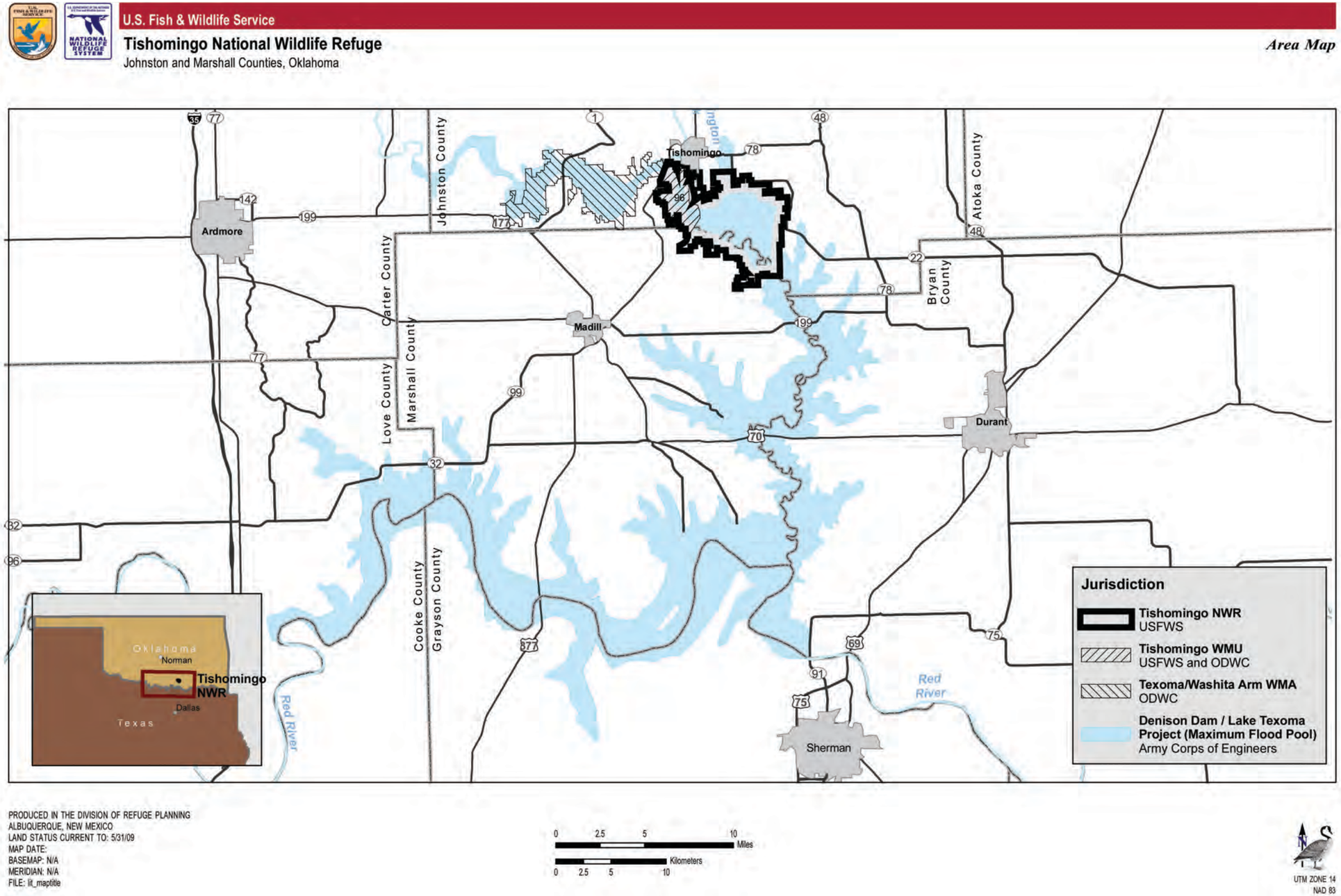

Figure 1-1. Tishomingo NWR Area

Department of the Army administers. In those cases where no roads exist, the Department of the Army reserves the right to designate, construct, maintain, and use roads or routes across said lands. No part of the forgoing shall be construed as a commitment by the Department of the Army to construct, improve, or maintain any road or route.

2. *The use and occupation of the said premises shall be without cost or expense to the Department of the Army... and subject also to such rules and regulations in the interest of navigation and flood control as be may from time to time prescribe, and subject also to the rules and regulations which have been prescribed and which may in the future be prescribed by the Secretary of the Army to govern the public use of the said reservoir area.*
3. *Any damage to the property above described which results as an incident to the exercise of the privileges herein granted, shall be promptly corrected by the Service to the satisfaction of the District Engineer.*
4. *The exercise of the privileges herein granted shall be subject at all times to use by the Department of the Army for flood control and all other related purposes, including, but not limited to, change in water surface elevations, drudging and deposition of spoil therefrom and construction of training works, bank protection, and navigation aids. Notice shall be sent to the District Engineer to the Service if such activities will substantially affect the premises covered by the agreement.*

...

6. *No additions to or alterations of the premises shall be made without prior written consent of the said District Engineer.*
7. *The Department of the Army reserves unto itself the right to grant easements, leases and licenses for any purpose whatsoever... The Department of the Army will give full consideration to any adverse effect any proposed grant may have upon the wildlife management program prior to the execution of any such easement, lease or license. Nothing in this Condition 7 is intended to prevent the Service from authorizing the head of the State agency, exercising administration over the wildlife resources within the State... nor to prevent the Service or said State agency from using said land, either directly or through Service contracts, for the production of feed for the wildlife on said land or water areas... and to collect and utilize the proceeds of any sales of such timber and crops in the development, conservation, maintenance and utilization of said land and water areas for the purpose of this agreement; provided, that any balance of proceeds not so utilized shall be paid to the District Engineer...*

...

10. *The Service shall administer and maintain the premises made available for wildlife conservation and management in accordance with an annual management program prepared and submitted to the District Engineer each year on or before 1 March. Such annual management shall include information as to all areas designated for public hunting, wildlife refuges, the production of food for wildlife, or other purposes; nature site, and layout of proposed construction of planned improvements; and plans for other such activities, on lands made available under this agreement... The Service will also furnish statistical data and other information to the District Engineer relative to the magnitude of benefits being realized by the public from operation of the premises as a wildlife management area."*

Under this agreement, the Corps reserves primary jurisdiction of the project lands, including the Refuge lands and Cumberland Pool. The Corps may exercise their right to affect project lands for flood control and all other project purposes. Moreover, the Corps reserves the right to grant easements for any purpose. The potential adverse impacts to wildlife are supposed to be evaluated prior to establishment of easements. This cooperative agreement provides the Service the authority to administer and maintain habitat within the Refuge boundaries for the purpose of wildlife protection. A letter of consent from the Corps is necessary prior to initiating any substantial Service or Oklahoma Department of Wildlife Conservation (ODWC) action.

1.2.3.2 Cooperative Agreement between Oklahoma Department of Wildlife Conservation, U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service for Management of the Wildlife Management Unit

The predecessor of today's U.S. Fish and Wildlife Service, the Bureau of Sport Fisheries and Wildlife, entered into a cooperative agreement with the Oklahoma Wildlife Conservation Department, currently known as the Oklahoma Department of Wildlife Conservation and the USACE on November 19, 1957—the "General Plan for Use of Project Land and Water Areas for Wildlife Conservation and Management of Denison Dam and Reservoir, Red River, Oklahoma and Texas." This agreement encompasses cooperative management responsibilities of each agency for the 3,170-acre Wildlife Management Unit (WMU) included within the Refuge. The lands of the WMU are allotted by the Corps to be managed by both the Service and ODWC in accordance with the agreement.

A summary of the cooperative management agreement for the Corps' Denison Dam acquired lands by the Service and ODWC is provided in the following text. The Service is referred to in this document as the *Service*, the ODWC is referred to in this document as the *Department*, and the Corps is referred to in this document as the *Department of the Army*.

This agreement states:

> *"...WHEREAS, in accordance with said act of August 14, 1946, these lands (WMU) have been made available to the Fish and Wildlife Service for administration for wildlife conservation and management purposes through a cooperative agreement between the Service and the United States Department of the Army dated April 9, 1957, and...*
>
> *...WHERAS, in accordance with this transfer, responsibility for the management of different resources will rest with either the Department or the Service;*
>
> *NOW, THEREFORE, the Service and the Department hereby enter into this cooperative agreement and mutually agree:*
>
> *A. To construct, maintain, and operate Tishomingo Wildlife Unit (WMU) in accordance with approved plans, such plans to be approved by both the Director of Oklahoma Wildlife Conservation Department and the Regional Director, Region 2, Bureau of Sport Fisheries and Wildlife of the U. S. Fish and Wildlife Service...*
>
> *B. The Service will assume the initiative for the preparation of the following plans and will be responsible for carrying out such plans:*
>
> *1. A land renovation, development and improvement plan for waterfowl management*
>
> *2. A grazing plan for grazing domestic livestock*
>
> *3. A fur management plan*

4. *A fencing plan for both exterior and interior fences*

C. *The Department will assume initiative for the preparation and the carrying out of the following plans:*
   1. *Upland game management and harvest*
   2. *A fishery management plan*
   3. *A waterfowl hunting plan. After waterfowl hunting on the Management Area has been approved by the Service*
   4. *Habitat improvement for upland game…"*

Within the WMU, the Corps still retains primary jurisdiction of the lands for the operation of its project. The Service and ODWC share secondary jurisdiction and jointly manage the natural resources that occur on the WMU. The cooperative management of the 3,170-acre WMU is based upon the objectives and responsibilities of each agency. Creating quality public hunting opportunities is a main objective for ODWC; therefore, game management, including public hunting and fishing programs, are the primary responsibility of ODWC. Habitat enhancement and restoration for a diversity of species are the main objectives and responsibilities of the Service. The Service and the ODWC complement each other in managing the WMU for quality habitat, cooperatively contributing staff, equipment, and seed for the farming program on the WMU and elsewhere on the Refuge. They also cooperatively conduct prescribed burns on the WMU to abate invasive species, and they jointly share law enforcement responsibility. The joint management by the two agencies contributes to the success of the hunting program and habitat conservation on the WMU. Additionally, other areas on the Refuge play an important role in support of the hunting program on the WMU by providing essential sanctuary habitat for game species.

1.2.4 Refuge Setting

Tishomingo NWR encompasses 16,464 acres of land and lacustrine environment. It is situated on the north side of Lake Texoma and provides valuable sanctuary for the natural resources of the southern Oklahoma/Texas plains (Figure 1-2). The Refuge is located on the Washita River arm of Lake Texoma and encompasses the Cumberland Pool. The south and east sides of the Refuge are steep, rocky, and generally heavily wooded. The north and west sides are gentle to sloping in topography and include sections suitable for cropping, wildlife, and recreational use. Grassland and forest habitats are intermingled and extend along the periphery of the Refuge. Except for about 120 acres of cropland and 500 acres of woodlands, lands are subject to flooding at high water levels.

The Refuge is located at the heart of a culturally diverse community in rural southern Oklahoma with increasing influences from the nearby urban areas of Dallas and Oklahoma City (Figure 1-3). The distinct landscape, diversity of biological communities, and secluded location are inherent characteristics that contribute to the area's value as a natural preserve. The Refuge provides a variety of protected habitats for wildlife, open space, and wildlife-oriented recreation for the public.

As part of the central flyway, the Refuge offers food and sanctuary to migratory ducks and geese in the fall, winter, and spring. Each spring and fall see thousands of shorebirds along the lakeshore. Hundreds of wading birds flock to the Refuge to feed on food resources left by falling water levels in late summer. Other migratory birds are served throughout the year by the woodlands, prairies, and marshes of the Refuge.

The following provides a description of several specific habitats, vegetative communities, and general management areas located within the Refuge.

Administrative Lands

Administrative lands, including but not limited to roads, parking areas, public access, public use facilities, buildings, and grounds with limited or no vegetation present, account for 102 acres.

Grasslands and Prairie

Some 419 acres are grasslands with plant species, including but not limited to little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*.), switchgrass (*Panicum virgatum*), Indiangrass (*Sorghastrum nutans*), Maximilian sunflower (*Helianthus maximiliani*), broomsedge bluestem (*Andropogon virginicus*), sand dropseed (*Sporobolus cryptandrus*), and sideoats grama (*Bouteloua curtipendula*).

Croplands

Croplands comprise 1,000 acres. Typical crops include winter wheat (*Triticum aestivum*), grain sorghum (milo) (*Sorghum bicolor*), corn (*Zea mays*), common sunflower (*Helianthus annuus*), foxtail bristlegrass (millet) (*Setaria italica*), pearl millet (*Pennisetum glaucum*), and Austrian winter peas (*Pisum sativum*).

Upland Timber

Woodlands, with plant species that include, but are not limited to post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), black hickory (*Carya texana*), Mexican plum (*Prunus mexicana*), and winged elm (*Ulmus alata*), make up 1,566 acres.

Seasonally Flooded Flats

About 4,801 acres are in seasonally flooded flats with plant species that include (but are not limited to) swamp smartweed (*Polygonum hydropiperoides*), rushes (*Juncus* spp.), bulrushes (*Schoenoplectus* spp.) and (*Scirpus* spp.), and sedges (*Carex* spp.).

Wetlands

Ponds and plant species cover 156 acres; plant species include, but are not limited to eastern cottonwood (*Populus deltoides*), black willow (*Salix nigra*), common buttonbush (*Cephalanthus occidentalis*), cattails (*Typha* spp.), American lotus (*Nelumbo lutea*), pondweed (Family Potamogetonaceae), swamp smartweed, broadleaf arrowhead (*Sagittaria latifolia),* rushes, bulrushes, and sedges.

Floodplain, Riparian and Bottomland Forest

Rivers and streams with vegetation, including, but not limited to cottonwood, willow, rushes, bulrushes, and sedges, account for 7,105 acres.

Water or Lacustrine

Some 6,416 acres are comprised of the deep-water lake environment of the Cumberland Pool. Little or no rooted aquatic vegetation is present in the deep-water environment.

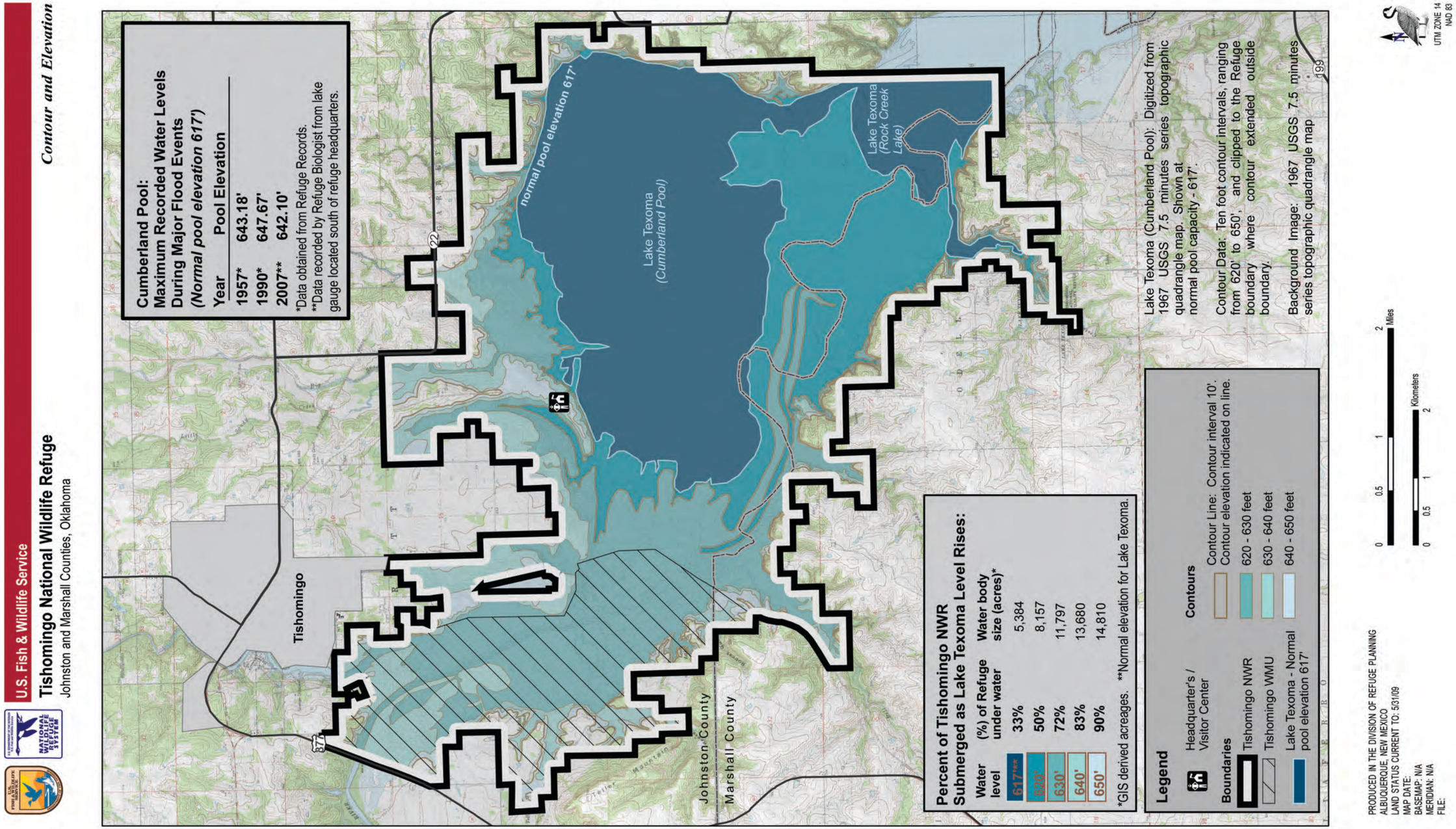

Figure 1-2. Tishomingo NWR Contour and Elevation Map

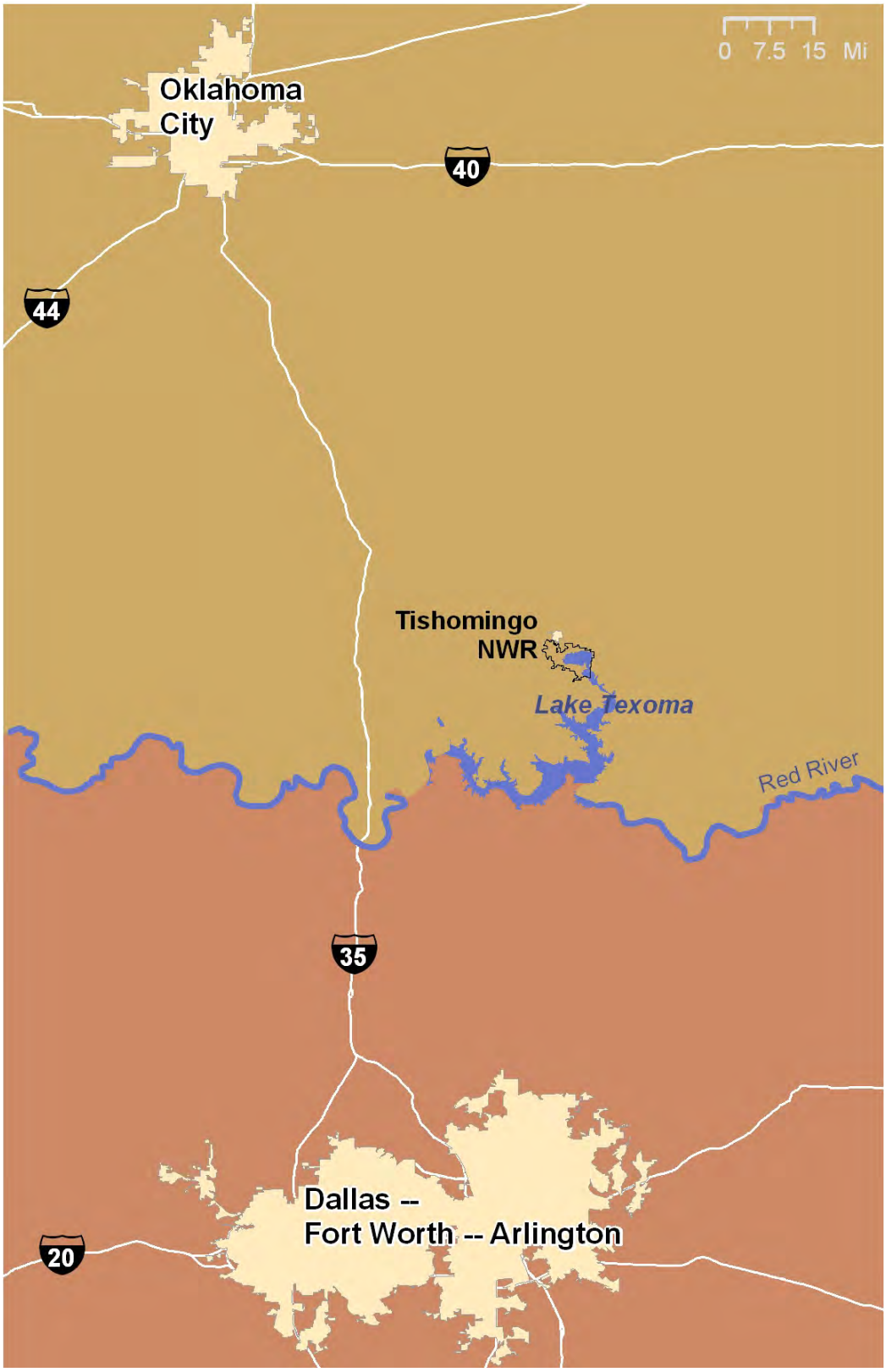

Figure 1-3. Proximity Map

1.3 Planning Context

Tishomingo NWR is part of a national system of more than 548 refuges. The Service places an emphasis on managing individual refuges in a manner that reflects the National Wildlife Refuge System (Refuge System, System) mission. As a result, the plan must also contribute to meeting the overall system mission and goals.

1.3.1 The U.S. Fish and Wildlife Service

The Service is the principal Federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The Service has a primary responsibility to manage and protect Federal trust species, which includes migratory birds, threatened species, endangered species, inter-jurisdictional fish, marine mammals, and other species of concern. In addition to the Refuge System, the Service also operates national fish hatcheries, fishery resource offices, and Ecological Services field stations. The Service enforces Federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, administers the Endangered Species Act, conserves and restores wildlife habitat such as wetlands, and helps Native American tribal governments and foreign governments with their conservation efforts. It also oversees the Federal Assistance Program, which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to State fish and wildlife agencies.

The mission of the U.S. Fish and Wildlife Service:

"…working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people…"

1.3.2 The National Wildlife Refuge System

The Refuge System is the only existing system of federally owned lands managed chiefly for the conservation of wildlife. Founded in 1903 by President Theodore Roosevelt with the designation of Pelican Island as refuge for brown pelicans, the Refuge System consists of over 97 million acres in over 548 refuges and 38 wetland management districts in all 50 states and U.S. territories. National wildlife refuges host a tremendous variety of plants and animals supported by a variety of habitats from arctic tundra and prairie grasslands to subtropical estuaries. Most national wildlife refuges are strategically located along major bird migration corridors, ensuring that ducks, geese, and songbirds have rest stops on their annual migrations. Many refuges are integral to the protection and survival of plant and animal species listed as endangered. The Refuge System is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and ecosystem protection.

The mission of the Refuge System 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" (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57).

The goals of the Refuge System are to:

- Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered.
- Develop and maintain a network of habitats for migratory birds, anadromous and interjurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges.
- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.
- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).
- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

1.3.2.1 Legal and Policy Guidance

Refuge management and administrative activities are dictated, in large part, by the legislation that created the unit and its purposes and goals. However, other laws, regulations, and policies also guide management. The Refuge is guided by the mission and goals of the Refuge System, Service Policy, Federal laws and executive orders, and international treaties. Key concepts and guidance of the Refuge System are covered in the Refuge Administration Act, as amended by the National Wildlife Refuge System Improvement Act; the Refuge Recreation Act of 1962; the Endangered Species Act, the Wilderness Act; Title 50 of the Codes of Federal Regulations; and the Fish and Wildlife Service Manual. A list of other laws and executive orders that may affect the Plan for Tishomingo NWR or the Service's implementation of the Plan is provided in Appendix B.

1.3.2.2 Principles of Refuge Management

The National Wildlife Refuge System Administration Act, as amended, states that each refuge shall be managed to fulfill both the mission of the Refuge System and the purposes for which the individual refuge was established. It also requires that any use of a refuge be a compatible use—a use that will not materially interfere with nor detract from, in the sound professional judgment of the refuge manager, fulfillment of the mission of the System or the purposes of the refuge.

The 1997 amendments to the National Wildlife Refuge System Administration Act of 1966 identified a number of principles to guide management of the Refuge System. They include the following:

- Conserve fish, wildlife, and plants, and their habitats within the System.
- Maintain the biological integrity, diversity, and environmental health of the System.
- Coordinate, interact, and cooperate with adjacent landowners and State fish and wildlife agencies.
- Maintain adequate water quantity and quality to meet refuge and System purposes and acquire necessary water rights.

- Maintain hunting, fishing, wildlife observation, wildlife photography, interpretation, and environmental education as the priority general public uses of the System.
- Provide opportunities for compatible priority wildlife-dependent public uses with the System.
- Provide enhanced consideration for priority wildlife-dependent public uses over the other general public uses in planning and management.
- Provide increased opportunities for families to experience priority general public uses, especially traditional outdoor activities such as fishing and hunting.
- Monitor the status and trends of fish, wildlife, and plants in each refuge.

To maintain the health of individual refuges, and the National Wildlife Refuge System as a whole, managers must anticipate future conditions. Managers must endeavor to avoid adverse impacts and take positive actions to conserve and protect refuge resources. Effective management also depends on acknowledging resource relationships and acknowledging that refuges are parts of larger ecosystems. Refuge managers work together with partners—including other refuges, Federal and State agencies, tribal and other governments, Native organizations and entities, and nongovernmental organizations and groups—to protect, conserve, enhance, or restore all native fish, wildlife (including invertebrates), plants, and their habitats.

1.3.2.3 Landscape Level Considerations in Planning

Climate Change

U.S. Department of the Interior Secretarial Order 3226 states that "there is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision making…This Order ensures that climate change impacts are taken into account in connection with Departmental planning decision making." Additionally, it calls for the incorporation of climate change into long-term planning documents such as the Plan.

The U.N. Intergovernmental Panel on Climate Change (IPCC, 2007) reports that direct temperature measurements at weather stations worldwide suggest that the surface of Earth has warmed, on average, 1.0 degree Celsius (1.8 degrees Fahrenheit) in the last 100 years. The data for the southwest show an increase in temperature from 1.1–1.7 degrees Celsius during the past century and project an increase of 4.5–6.1 degrees Celsius in the future. The last 10 years have been the warmest decade on record, during which global sea level has risen about 20 centimeters. The increase of carbon dioxide (CO_2) within the earth's atmosphere has been linked to the gradual rise in surface temperature, commonly referred to as global warming. The IPCC also concludes that substantial increases in global average temperatures will cause major changes in ecosystem structure and function, species' ecological interactions, and species' geographical ranges. These projected changes have enormous implications for management of fish, wildlife, and their habitats around the world.

The U.S. Department of Energy's *"Carbon Sequestration Research and Development"* defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere." Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in the Plan would conserve or restore land and habitat, and would thus retain existing carbon sequestration on

the Refuge. This, in turn, contributes positively to efforts to mitigate human-induced global climate change. Vegetated land is a tremendous factor in carbon sequestration. Terrestrial biomes of all sorts–grasslands, forests, wetlands, tundra, and desert–are effective both in preventing carbon emission and acting as a biological "scrubber" of atmospheric CO_2. The Department of Energy report's conclusions noted that ecosystem protection is important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere (U.S. Dept. of Energy 1999).

Our strategic approach to climate change will emphasize three strategies often used to describe responses to climate change: adaptation, mitigation, and education. Adaptation is an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. It refers to the management actions we take to reduce the impacts of climate change–reactive and anticipatory. Mitigation is human intervention to reduce the sources or enhance the sinks of greenhouse gases. It involves the Service's "carbon footprint" by using less energy, consuming fewer materials, and altering land management practices, such as controlled burning, water pumping, and feed production. Mitigation is also achieved through terrestrial carbon sequestration. Education is helping people learn and discover, thereby creating awareness and empathy, and ultimately leading to changes in human behavior. It is a fundamental conservation tool and a public service responsibility. In the context of climate change, education means helping Service employees, our national and international partners, and constituencies (e.g., the public, Congress) understand that climate change is real and happening now. It threatens fish and wildlife resources we have come to value, and each of us can do something meaningful to reduce the threats.

Climate change could have possible effects on the Refuge in addition to a general temperature increase, including desertification, reduced rainfall and surface water supplies, deterioration of water quality, decreased habitat availability for many species, changes in vegetation communities, modification of migratory bird patterns, loss of breeding grounds for ducks and other waterfowl, loss of some species along with the introduction of new species, and significantly increased energy costs. Possible effects were a substantive consideration in the development of the objectives and strategies in this Plan. Implementation of all the strategies for monitoring and surveys will emphasize identification and analysis of the effects of climate change on the various habitats and species. Also, implementation of all strategies will emphasize energy conservation and/or use of alternative energy source when feasible.

The managers and resource specialists on the Refuge need to be aware of the possibility of change due to global warming. When feasible, documenting long-term vegetation, species, and hydrologic changes should become a part of research and monitoring programs on the Refuge. Adjustments in Refuge management direction may be necessary over time to adapt to a changing climate.

Strategic Habitat Conservation

Strategic habitat conservation (SHC) is an adaptive management approach to habitat conservation (USFWS, 2006). Adaptive management refers to a management style in which the effectiveness of management actions is monitored and evaluated, and future management is modified as needed based on the results of this evaluation or other relevant information that becomes available. This approach will protect and enhance wildlife populations and ecological functions that sustain them. Additionally, it will direct our limited resources to achieve conservation for priority species. The Service believes that SHC is a

more effective strategic approach to conservation than the largely opportunity-driven approach taken in the past. It is a scientific method that is integral for our science-based organization and will help us and our partners meet common conservation objectives through more efficient uses of resources. Rarely will single organizational divisions of the Service have the capacity to perform all elements of SHC. Conservation success will be achieved through cooperation between divisions of the Service, interagency collaboration, and partnerships. SHC is a framework of four functional elements that must occur in an adaptive management loop. The four elements are: 1) biological planning; 2) conservation design; 3) program delivery; and 4) outcome-based monitoring.

Our partners in conservation will collaborate with us on the elements of SHC. Some programs within the Service already use the framework of SHC, notably Joint Venture and the National Fish Habitat Action Plan. Many of our conservation partners, such as The Nature Conservancy, World Wildlife Fund, and State wildlife departments in their State Action Plans, use a similar approach. This approach provides a framework for setting conservation objectives based on the best available information. Underlying assumptions will be monitored and tested to improve our knowledge, and any necessary changes will be made to our implementation strategies and techniques.

National and Regional Plans and Initiatives

Draft Climate Change Strategic Plan and Five-Year Action Plan (2008)

Secretarial Order No. 3226 directs the U.S. Department of the Interior to consider and analyze potential climate change impacts when undertaking long-range planning activities and decision making for public lands. Recognizing that climate change is one of the greatest environmental and conservation challenges, the Service began development on a Climate Change Strategic Plan and associated Five-Year Action Plan to consider and address the impacts of climate change on fish and wildlife resources. The Strategic Plan envisions efforts in adaptation, mitigation, and education, and provides flexibility for the Service to respond to evolving science, technology, and implementation experience.

North American Waterbird Conservation Plan for the Americas (2002)

This plan provides a continental-scale framework for the conservation and management of 210 species of waterbirds, including seabirds, coastal waterbirds, wading birds, and marshbirds utilizing aquatic habitats in 29 nations throughout North America , Central America, the islands and pelagic waters of the Caribbean Sea and western Atlantic, the U.S.-associated Pacific Islands, and pelagic waters of the Pacific.

North American Waterfowl Management Plan

This North American Waterfowl Management Plan (NAWMP) seeks to restore waterfowl populations in Canada, the United States, and Mexico to levels recorded in the 1970s. The international partnership has worked to identify priority habitats for waterfowl and has established goals and objectives for waterfowl populations and habitats (USFWS 1998). The purpose of the NAWMP is to achieve waterfowl conservation (through habitat protection, restoration, and enhancement) while maintaining or enhancing the associated ecological values in harmony with human needs (Esslinger and Wilson, 2002). Regional partnerships, called joint ventures, are the implementing mechanisms of the NAWMP.

Partners in Flight (PIF)

Partners in Flight 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. Partners in Flight was created in 1990 in response to growing concerns about declining populations of many land bird species and to emphasize the conservation of birds not covered by existing conservation initiatives. Bird conservation plans are developed in each region to identify species and habitats most in need of conservation, to establish objectives and strategies to provide needed conservation and conservation activities, and to implement and monitor progress on the plans.

U. S. Shorebird Conservation Plan (Brown et al. 2001)

This conservation plan seeks to stabilize populations of all shorebirds that are in decline because of factors affecting habitat in the United States. At a regional level, the plan's goal is to ensure that shorebird habitat is available in adequate quantity and quality to support shorebird populations in each region. Ultimately, the goal of the U. S. Shorebird Conservation Plan is to restore and maintain shorebird populations throughout the western hemisphere through an international partnership.

North American Bird Conservation Initiative (NABCI)

The NABCI, a coalition of U.S., Canadian, and Mexican governmental agencies and private organizations, is the most inclusive framework for bird conservation ever assembled. The primary role of the NABCI is to coordinate, not duplicate, the efforts of the four major land bird plans: NAWMP, PIF, U.S. Shorebird Conservation Plan, and North America Waterbird Conservation Plan. By leveraging the plans' limited resources, both human and financial, the NABCI will improve the outlook for bird conservation across all of North America.

Figure 1-4. Oaks and Prairies BCR

The NABCI vision is one of habitat partnerships based on the North American Waterfowl Management Plan's joint venture model and covering the continent coast-to-coast. It is hoped that each existing and new partnership will consider delivering conservation to all birds in all habitats and that these partnerships eventually move toward conservation of biological diversity using bird conservation regions (BCRs) as the ecological unit in which to achieve their goals. The Refuge is located in the Oaks and Prairies BCR (BLM, 2009). See Figure 1-4.

State and Local Plans and Initiatives

Oklahoma Wildlife Action Plan

Oklahoma's Wildlife Action Plan (2005) applies a habitat-based approach to address the state's 240 priority wildlife species. The document divides the state into six ecological regions and 22 habitat types. It covers important conservation issues, recommends conservation actions, and identifies potential conservation partners in each region. By focusing on the health of Oklahoma's natural areas, actions may benefit multiple wildlife species before populations decrease and they become increasingly difficult to protect.

1.3.2.4 Coordination with Other Entities, including the State of Oklahoma

The Service is required to consult and coordinate with affected State conservation agencies, as well as adjoining Federal, local, and private landowners. The Service is required to ensure effective coordination, interaction, and cooperation in a timely and effective manner with the State during the course of acquiring and managing refuges. Under the Refuge Administration Act of 1966 and 43 CFR 24, the Service director and the Secretary of the Interior's designee are required to ensure the Refuge System regulations and management plans are, to the extent practicable, consistent with State laws, regulations, and management plans. As such, the Service will ensure this Plan complements the State of Oklahoma's efforts to conserve fish and wildlife and their habitats, and to increase support for the Refuge System and participation from conservation partners and the public.

2. The Planning Process

2.1 Description of the Planning Process

The process used to develop a comprehensive conservation plan is consistent with the planning requirements specified in the National Wildlife Refuge System Administration Act, as amended; the Service's planning policy (602 FWS); National Environmental Policy Act (NEPA) direction (42 U.S.C. 4321-4347); and the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of NEPA (Figure 2-1).

Figure 2-1. The Planning Process

2.1.1 Preplanning

Preplanning is an important step in developing a quality Plan. Prior to formally initiating this Plan, the following tasks were completed to support planning activities:

- Established an interdisciplinary interagency planning team.
- Identified Refuge purpose, history, and establishing authority.
- Identified all relevant laws, regulations, and policies that would have to be considered during the development of the Plan.
- Identified purpose and need for the Plan to make sure all issues are adequately addressed.
- Identified planning area and resource data needs.

2.1.2 Initiate Public Involvement and Scoping

The purpose of this step was to let people know that the planning process was beginning and to solicit ideas on what issues should be addressed in the Plan. Formal scoping began with publication of a Notice of Intent (to prepare the Plan and EA), which was published in the *Federal Register* on November 17, 1999 [Vol.64, pages 62683-62684]. Major issues related to the management of the Refuge were actively solicited from the public, local public officials and governmental entities, State and Federal agencies, the Chickasaw Nation, Murray State College, private organizations, and Service staff specialists. The public scoping included briefings with public officials, a meeting with the USACE, a meeting with representatives of the ODWC, a briefing for the Chickasaw Nation, and a scoping meeting for the public. These public scoping activities were conducted during October 2007.

Personal briefings by the Service's planning team were provided for the following:

- Mike Thompson, Johnston County Commissioner.
- Janse Stewart, Executive Director of Johnston County Chamber of Commerce
- Jack Yates, Tishomingo City Manager.
- Kennedy Brown, Special Assistant to the Governor of the Chickasaw Nation.
- David Brown, Marshall County Commissioner.
- Noble Jobe, Provost of Murray State College.

In addition to a written briefing statement, these briefings consisted of a presentation explaining why a Plan was being prepared, the steps in the Plan planning process, how the NEPA compliance process works, and a conceptual discussion of what changes the Service may make to its current management practices. The briefed officials provided their concerns, comments, and suggestions for the specific issues they felt should be addressed in the Plan.

A meeting was held with the Corps in its Lake Texoma Project Office in Denison, Texas. The Service Planning Team met with management and specialists from the Corps to discuss the preparation of the upcoming Plan and its relationship to the Corps operation of Lake Texoma, especially the management of Cumberland Pool and adjacent water bodies. The Corps has primary jurisdiction on all lands within the Refuge, and the Service operates the Refuge under a cooperative agreement with the Corps.

The Service Planning Team also met at the Refuge office with the following ODWC representatives to discuss development of the Plan: Assistant Chief Wildlife Division Bill Dinkins, Area Manager Johnny Herd, Biologist Dennis Geary, and Southcentral Division Fishery Technician David Routledge. A full explanation of the Plan and NEPA planning processes was provided to the ODWC representatives; a number of subjects, including hunting, fishing, and farming programs, were discussed, along with other possible cooperative opportunities between ODWC and the Service. It was mutually agreed that the Service would provide a pre-publication draft of the Plan to ODWC for its review. Following a reasonable time for review, the Service would then meet with ODWC to discuss any ODWC concerns about, or additions or suggested changes to, the Plan before the draft document was distributed for public comments.

After these briefings, the Service held a public scoping meeting October 25, 2007, at 7:00 p.m. in the Chickasaw Community Center in Tishomingo, Oklahoma. The meeting was advertised in the local newspaper, and the Refuge mailed notices to local individuals and organizations.

The meeting had a small attendance, nine people, and the lead planner and Refuge Manager made a presentation explaining the Plan and NEPA processes with a short conceptual description of management goals, objectives, and strategies. Following the presentation, the planning team answered questions and received comments and suggestions from those in attendance. The Service received several written comments as a follow up to the announcement of the scoping meeting. In addition, the Refuge manager provided Plan briefings at local meetings he attended following the formal scoping meeting.

2.1.3 Determine Significant Issues

To determine the significant planning issues being addressed in the Plan, the planning team reviewed the concerns identified by the public; along with management concerns identified by Refuge staff and other interested parties. Significant planning issues are those issues for which multiple approaches to resolving the issue will be evaluated as part of the planning process.

2.1.4 Develop and Analyze Alternatives

The fourth step was to develop alternative approaches to the issues. These alternatives meet the Refuge's purposes and goals and comply with the Service and Refuge System missions. The planning team developed a range of alternatives that respond to the significant planning issues and eliminated alternatives that did not meet Refuge purposes or that were outside the Service's ability to implement. The environmental effects of the alternatives were analyzed, and the results are presented in Appendix C.

2.1.5 Prepare Draft Plan and EA

During the fifth step, a draft plan and required EA were prepared. This step includes an analysis of the potential impacts of implementing each alternative and describes how the Service determined its proposed action. The draft plan and EA are then submitted for internal review and followed by public review and comment.

2.1.6 Prepare and Adopt Final Plan

In the sixth step, comments received on the draft Plan and EA are reviewed and analyzed, and the Plan and EA modified as needed. The proposed action is determined, and a final Plan and appropriate NEPA documentation are prepared.

2.1.7 Implement Plan, Monitor, and Evaluate

A critical component of management is monitoring and measuring resources and social conditions to make sure that progress is being made toward meeting goals. Monitoring also detects new problems, issues, or opportunities that should be addressed. The Refuge is using an adaptive management approach, which means that information gained from monitoring is used to evaluate and, as needed, to modify Refuge objectives.

2.1.8 Review and Revise Plan

Service policy directs that the Plan be reviewed annually to assess the need for changes. The Plan will be revised when significant new information becomes available, ecological conditions change, or the need to do so is identified during the annual review. If major changes are proposed, public meetings may be held, or new environmental assessments and environmental impact statements may be necessary. Consultation with appropriate State agencies and Native corporations would occur at least every 15 years.

2.2 Issues

Refuge planning policy defines an issue as any unsettled matter that requires a management decision: an initiative, opportunity, resource management problem, threat to Refuge resources, conflict in uses, public concern, or presence of an undesirable resource condition (602 FW 1.6I). Public responses obtained through newsletters and public open house meetings, in addition to management concerns identified by Refuge staff and interested parties, were used to identify issues addressed in the Plan and EA.

The following issues and challenges associated with the management of the Refuge were identified during the public and internal scoping process. Following each issue is a list of questions, comments, concerns, and input from the scoping process relative to each issue. These issues and their accompanying questions, comments, concerns, and public input are addressed in the text of the Plan.

2.2.1 Issue 1. Habitat Management

Under the general heading of habitat management are three separate, but interrelated issues: 1) water resources and their management, 2) grasslands management, and 3) need for baseline biological inventories.

2.2.1.1 Water Resources

The Washita River, Pennington Creek, and Big Sandy Creek are the major potential water sources for the Refuge, and current Refuge water management is very limited. Cumberland Pool and Rock Creek Lake, the two large water bodies within the Refuge, are under the primary jurisdiction of the Corps as part of their Lake Texoma project. The primary purpose of the Corps' Lake Texoma (in addition to flood control, recreation, and electric generation) is to provide municipal, domestic, and industrial water for surrounding towns. The Refuge does not control the waters in the portions of Lake Texoma within its boundaries. Currently, there are 400 acre-feet allotted to the Refuge from Big Sandy Creek. The current water impoundments on the Refuge are primarily and significantly affected by water levels in Lake Texoma. Wetland areas could be enhanced through efficient water delivery, water level control, and expansion of moist soil management units.

The following issues were developed throughout the scoping process by the general public, government agencies, partners and the Refuge system.

- What are the minimum appropriate tools necessary to better inventory, monitor, and evaluate water resources?
- A permanent monitoring program should be established to evaluate riparian habitat.
- What strategies should the Refuge implement to maintain and protect sections of the natural stream and floodplain zones of the Washita River tributaries to benefit native plant and animal communities?
- What other strategies could be used to protect valuable riparian habitat?
- Can additional water rights for the Refuge be obtained to allow for better wetland management?
- Refuge water management activities must be coordinated with other area water users.

- Should the Refuge try to develop a cooperative agreement with the city of Tishomingo to provide a back up emergency water supply for the city and to provide additional water for the Refuge?
- Identify the holders of adjudicated water rights of the waterways on the Refuge (Washita Arm and Pennington Creek).

2.2.1.2 Grassland Management

The quality of Refuge rangelands is in rapid decline. Inadequate burning is affecting grassland quality for native wildlife and migratory birds. Funds are needed to conduct a five-year study to determine soil, vegetation, and wildlife response to prescribed fire. Prescribed fire serves to maintain and encourage native grasses and forbs and to cycle nutrients through the ecosystem. Fallow croplands on the Refuge require extensive and expensive management to be successfully restored to native grasslands. These same fallow croplands have also been degraded by invasive species, including eastern red cedar.

The following issues were developed throughout the scoping process by the general public, government agencies, partners and the Refuge system.

- A habitat management plan should be developed to address conservation needs for restoring native grassland.
- What strategies can the Refuge implement to restore, maintain, and protect native grasslands to benefit native plant and animal communities?
- What are the minimum appropriate tools necessary to better inventory, monitor, and evaluate resources?
- A permanent monitoring program needs to be established to evaluate the transition from a degraded grassland habitat to a restored grassland habitat.
- How can the invasive plants species be best removed and prevented from returning?

2.2.1.3 Baseline Biological Inventories

Complete biological information is needed to enhance fish and wildlife habitat for resident and migratory animal species. There is a need to inventory the Refuge habitats and identify those areas where natural biological diversity can be restored. A thorough database of biological information would enhance resource decision making. This information would be integral for the implementation of planned management programs that protect, maintain, and restore native habitats within the Refuge—in particular, wintering waterfowl habitats.

The following issues were developed throughout the scoping process by the general public, government agencies, partners, and the Refuge system.

- What strategies should be adopted by the Refuge that would benefit a variety of species?
- What baseline surveys are necessary to inventory existing biological resources, including vegetative species?
- What additional inventory, analysis, and monitoring is necessary to adequately understand what is occurring on the Refuge?
- What strategies can be adopted to improve the monitoring and evaluation of plant and wildlife resources on the Refuge?

- The Refuge needs to establish long-term monitoring programs to better understand the present and future status of species of concern.

2.2.2 Issue 2. Public Use and Recreational Opportunities

Fishing is the second largest public use program on the Refuge with 22,500 fishing visits each year. The majority of these fishing activities occur on and around Cumberland Pool, the largest water body on the Refuge. Since the completion of Lake Texoma in 1945, the Washita River has been depositing silt during flood events into the 5,100-acre Cumberland Pool within the Refuge. Cumberland Pool is part of the Lake's project design to slow heavy flows of water, thereby preventing large quantities of silt from being deposited in the lower portions of Lake Texoma. Under normal conditions, the river bypasses the pool; however, during flood periods, the river overflows its banks and spills into Cumberland Pool. Sedimentation deposition on the west side of Cumberland Pool has created a delta and shallow water area that is ideal for some migratory bird species. However, this continuing siltation will also further reduce fishing quality and opportunities in Cumberland Pool in the future. Cumberland Pool will eventually become completely filled in by sediment and silt, causing a change in functional use by wildlife and recreational use by the public. The primary jurisdiction over Cumberland Pool lies with the Corps as part of its Lake Texoma project.

The majority of hunting opportunities on the Refuge are found in the WMU jointly managed by the Service and ODWC.

Although, the Refuge is within 40 miles of Interstate 35 and U.S. Highway 75, there are no signs on either of these highways indicating the location of the Refuge. The Refuge would benefit by increasing the public's awareness of its existence and location.

The following issues were developed throughout the scoping process by the general public, government agencies, partners, and the Refuge system.

- Should the Refuge complete studies to determine the effect of public use on wildlife?
- Should the Refuge place restrictions on motorized boating (requirement to use electric or non-motorized boats in certain areas)?
- Should the boating season be shortened to April 1 through August 31?
- Should the Refuge eliminate picnicking?
- Should the Refuge eliminate overnight use outside the WMU?
- Should the Refuge eliminate the use of trotlines?
- Is dredging Cumberland Pool feasible? Would the Corps be the party responsible for dredging activities?
- Should there be an increase in public hunting access opportunities on WMU property in accordance with the cooperative agreement between the Service and ODWC?
- Should the farming program be increased to provide more supplementary food sources for migratory waterfowl?
- Is current funding adequate to meet the long-term recreational goals of the Refuge?
- What opportunities should the Refuge pursue to enhance and expand existing Refuge management and public use programs?
- Are current Refuge facilities adequate for public use?

- Will the public be assured future fishing opportunities with the transitional habitat change of Cumberland Pool?
- Can the Service establish an agreement with the Federal Highway Administration to consistently provide signs for national wildlife refuges on Federal interstate highways and other major U.S. highways?
- What accessibility arrangements are needed on the Refuge (universal access)?
- What environmental education and interpretation innovations should be implemented?

2.2.3 Issue 3. Cultural Resources Management

Tishomingo has a variety of historic cultural sites. There is a need to identify and monitor cultural resource sites and actively protect these sites from disturbance and degradation for the benefit of present and future generations.

The following issues were developed throughout the scoping process by the general public, government agencies, partners, and the Refuge system..

- What actions need to be taken to better understand and protect cultural and historical resources on the Refuge?
- What strategies should be adopted to improve protection of historical sites on the Refuge?
- How can the Refuge better interpret the Washita Farm history to gain support for the protection of buildings and sites associated with this historic enterprise?

2.2.4 Issue 4. Interagency Coordination and Relationships

Interagency coordination and cooperative partnerships with public agencies, local communities, and private stakeholders are essential components of the effort to preserve and improve natural resources for the benefit of the ecosystem. As anticipated increases in public use of the Refuge are realized, increased coordination with cooperating agencies will be required to protect Refuge resources and regulate public use. The Refuge currently enjoys many excellent interagency and community relationships. Strengthening current relationships while developing additional partnerships will be an ongoing process.

The Refuge has many opportunities to increase community involvement and assistance in natural resource programs, enhance wildlife compatible recreation opportunities, and expand wildlife education and community outreach. The Refuge has the greatest potential to grow if provided staff and funding to put forth a long-term consistent outreach effort in the community. Community outreach and environmental education would be instrumental in building a supportive constituency and furthering the understanding, appreciation, and stewardship of our natural resources.

The following issues were developed throughout the scoping process by the general public, government agencies, partners, and the Refuge system..

- What additional relationships need to be established to benefit wildlife and preserve natural resources?
- How can current relationships be improved and strengthened for the benefit of wildlife?

- Should the Refuge modify its cooperative agreements with the Corps and ODWC regarding the WMU to include and increase public use within the balance of the Refuge lands outside the WMU?
- What educational services and/or experiences should the Refuge offer to area schools and teachers?
- What emphasis should be given to off-site educational and informational programs?

3. Refuge Resources

3.1 Geographic/Ecosystem Setting

3.1.1 The Arkansas/Red River Ecosystem

Tishomingo NWR is located (Figure 3-1) within the south central portion of the Arkansas/Red River Ecosystem (Ark/Red). The Ark/Red covers approximately 245,000 square miles, extending from the Rocky Mountains of Colorado to the Bayous of Louisiana, and occupies all of Oklahoma and parts of seven other states. This ecosystem encompasses four major Oklahoma rivers and their associated drainage basins: the Canadian, Cimarron, Arkansas, and Red rivers. Elevations within the Ark/Red range from over 14,000 feet national geodetic vertical datum to less than 300 feet national geodetic vertical datum along the Red River in Louisiana.

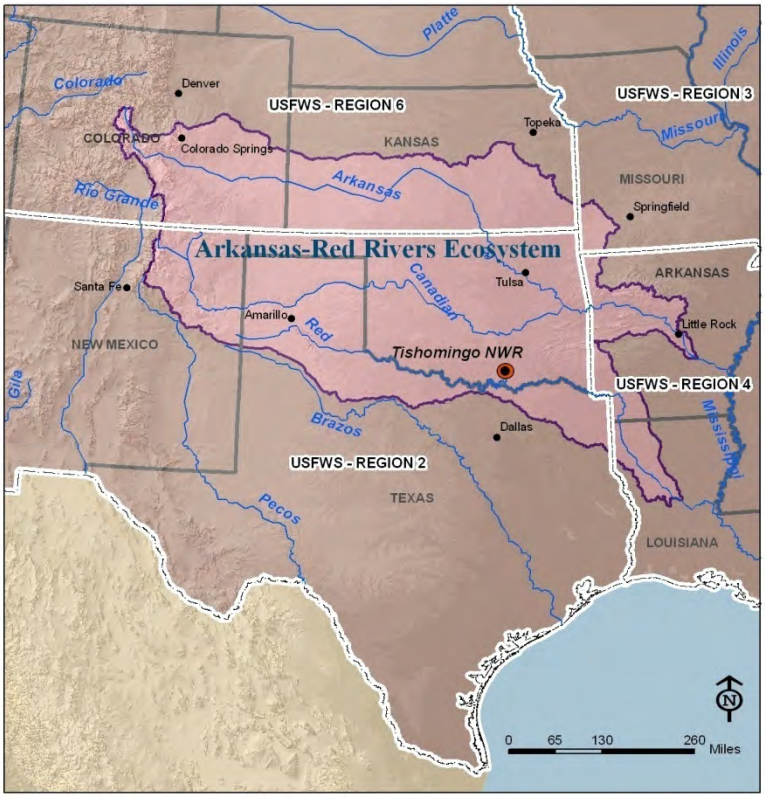

Figure 3-1. Arkansas/RedRiver Ecosystem Boundary

The dynamic variability of physiography, soil types, precipitation, and elevation gradients results in an ecosystem that is capable of supporting one of the most diverse collections of fish and wildlife resources in the nation. Meanwhile, the expanding human population within this ecosystem is increasing demands on land and water resources to accommodate agriculture, timber production, grazing, transportation, urban expansion, and outdoor recreational activities such as bird watching, fishing, hiking, boating, and hunting. Currently, these are the most critical resource issues in the Ark/Red center on water availability and quality.

Portions of four Service regions occur within the Ark/Red (Regions 2, 3, 4, and 6), and 26 Service field stations are located here, including 16 national wildlife refuges, four National Fish Hatcheries (NFH), three Law Enforcement offices, two Fishery Resources offices, and one Ecological Services (ES) field office. These, and numerous other Service installations, also have jurisdiction over portions of the Ark/Red and comprise the Arkansas/Red River Ecosystem Team. Overall, more than 40 Service installations administer programs within the ecosystem. Additionally, 16 ecoregions occur within the Ark/Red, ranging from the southern Rockies to the Mississippi Alluvial Plain in eastern Arkansas.

The goals of the Arkansas/Red River Ecosystem Team are to:

- Seek methods to facilitate the conservation of water resources for the management of important fish and wildlife species and habitats, with emphasis on areas downstream of Federal water management facilities.
- Assure that Federal and State water quality standards are established and applied in a manner that protects and enhances all aquatic resources. These strategies and actions will promote restoration of focus species and habitats while contributing to overall biodiversity conservation in the Ark/Red.
- Conserve, restore, or enhance focus species groups, including migratory birds; federally listed proposed, candidate, and species of concern; inter-jurisdictional fisheries; and non-indigenous species.
- Conserve, restore, or enhance focus species habitats and minimize impacts of development, urban and agricultural expansions, forestry practices, and cave exploration and development..
- Increase public outreach efforts relative to Service programs. Conservation of wildlife heritage can only be accomplished by increasing public knowledge of the related problems and opportunities through environmental education, exhibits, pamphlets, and other means.
- Provide recreational opportunities to increase public enjoyment and awareness of relationships between fish and wildlife resource conservation and quality of human life.

3.1.2 Location

The 16,464-acre Tishomingo NWR is located within Johnston and Marshall Counties in south central Oklahoma. It is approximately three miles southeast of the city of Tishomingo in Johnston County, Oklahoma. The Refuge is south-southwest of Oklahoma City and due north of the Dallas/Fort Worth metropolitan area. The Refuge is within 100 miles of nearly six million people, although it is still in a rural setting adjacent to a rural community.

3.1.3 Area of Ecological Concern

The Refuge lies within the Oak and Bluestem Parkland of the Prairie Parkland Province and consists of the Osage Savanna and Mixed Grass Plains Biota and Eastern Cross Timbers, which form a gently rolling sandy belt and rugged topography marked by steep ravines on the south and east sides of the Refuge (Figure 3-2). At an average elevation of approximately 655 feet above MSL, the Refuge is situated on the northcentral edge of the Red River Basin on Lake Texoma at the confluence of the Red and Washita rivers. Because the land use and land management practices conducted by the Refuge are affected by the hydrology and natural resources within the Red River watershed, the broader area of ecological concern is the Red River Basin.

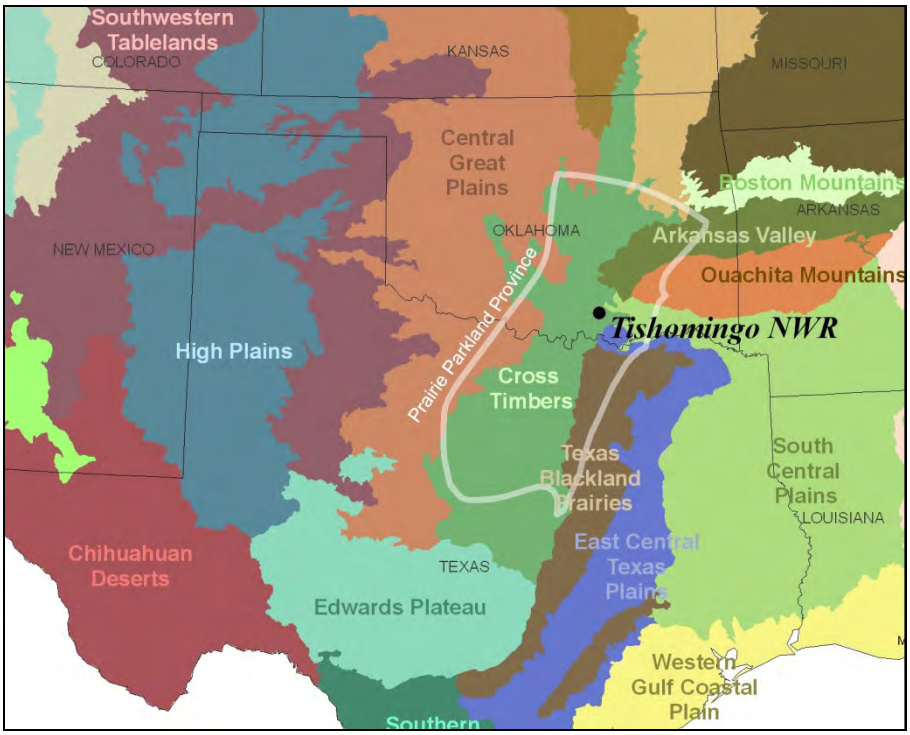

Figure 3-2. Area of Ecological Concern

3.2 Physical Environment

3.2.1 Climate

Situated at elevations ranging from 617–790 feet in elevation, the Refuge has hot summers and cool winters, with temperatures ranging from -9 to 110 degrees Fahrenheit. Average temperature in the summer is 81 degrees Fahrenheit. Winters are mild, with an occasional surge of cold air causing a drop in temperature. Snowfall is infrequent with an average four to six inches annually. In winter, the average temperature is 44 degrees Fahrenheit, and the average daily minimum temperature is 31 degrees Fahrenheit. Rainfall is fairly even throughout the year, with slight peaks in spring. Of the total annual precipitation, 23 inches or 59 percent usually falls between April and September. The total annual precipitation is usually adequate for production of small grains.

3.2.2 Geology

The Refuge lies on the northern edge of the Cretaceous rock formations that were deposited between 66 and 144 million years ago. Cretaceous formations are found in a band of lithology from southern Johnston County to southern Marshall County, and from western Love County all the way to the Arkansas state line (Anderson map 1999). The Tishomingo NWR features various geologic units within the landscape, such as: Caddo Formations, Woodford Shale, Terrace Deposits, Antlers Sandstone, Alluvium, Goodland Limestone and Walnut Clay, and Kiamichi Formations (USGS 2009).

3.2.3 Soils

With the exception of the south and east sides of the Refuge, which are almost completely limestone with a light cover of loam, the Refuge upland soils are a conglomeration of sand,

blackland, light clay, heavy clay, gravel, and sandy loam. Fertility is low, and soils are highly erodible.

Twenty soil types occur on the Refuge, as illustrated on the soil map (Figure 3-3) Ten major U.S. Department of Agriculture–Natural Resource Conservation Service (USDA-NRCS) range sites occur on the Refuge: sandy savannah, deep sand savannah, eroded sandy savannah, loamy savannah, loamy prairie, loamy bottomland, blackclay prairie, very shallow, subirrigated, and edge rock. A majority of the Refuge soils have moderate to slow permeability, and moderately deep and deep texture in the sandy to loamy categories. Upland soils are generally mapped as Konawa-Dougherty with loamy or sandy soils, or as Gasil-Stephenville loamy soils. Bottomlands are mapped as frequently flooded Verdigris-Gracemont-Oklared soils.

Konawa-Dougherty soils make up about 40 percent of the Refuge and are located primarily on the northwest side of the Refuge. Their potential is fair to good for cultivated crops and fair to good for pasture. Verdigris-Gracemont-Oklared is another prominent soil unit (30 percent), located along the Washita River. These soils can also be used for cultivated crops and for pasture with a poor to good potential for cultivated crops and a fair to good potential for pasture. Refuge croplands are made up of six major soil types: Oklared (33 percent), Dela (34 percent), Dougherty (17 percent), Konawa (10 percent), Counts (3 percent), and Verdigris (3 percent).

3.2.4 Topography

The topography of the Refuge is gently undulating to moderately rolling hills. The Eastern Cross Timbers forms a gently rolling sandy belt and more rugged topography marked by steep walled ravines along the south and east sides. The majority of the Refuge lies within the floodplain of Lake Texoma. The north and west sides of the Refuge consist of rolling hills divided by a wide and flat valley near the center.

3.2.5 Hydrology

The Refuge lies within the Edwards-Trinity aquifer system, which is in carbonate and clastic rocks of Cretaceous age in a 77,000-square-mile area that extends from southeastern Oklahoma to western Texas. The aquifer system consists of three complexly interrelated aquifers: the Edwards-Trinity, the Edwards, and the Trinity aquifers. The Edwards-Trinity and the Trinity aquifers are stratigraphically equivalent in part and are hydraulically connected in some places. The Edwards aquifer overlies the Trinity aquifer, and the two aquifers are hydraulically connected where no confining unit separates them.

3.3 Biological Environment

3.3.1 Vegetation

The general vegetation within the Refuge is classified as midgrass prairie and Eastern Cross Timbers (Hoagland, 2000). Stream banks and overflow floodplains support typical bottomland hardwood vegetation. This mixture encourages a diversity of plant species.

General plant communities found on the Refuge are forest, prairie, riparian/wetland, and agriculture, as depicted in (Figure 3-4).

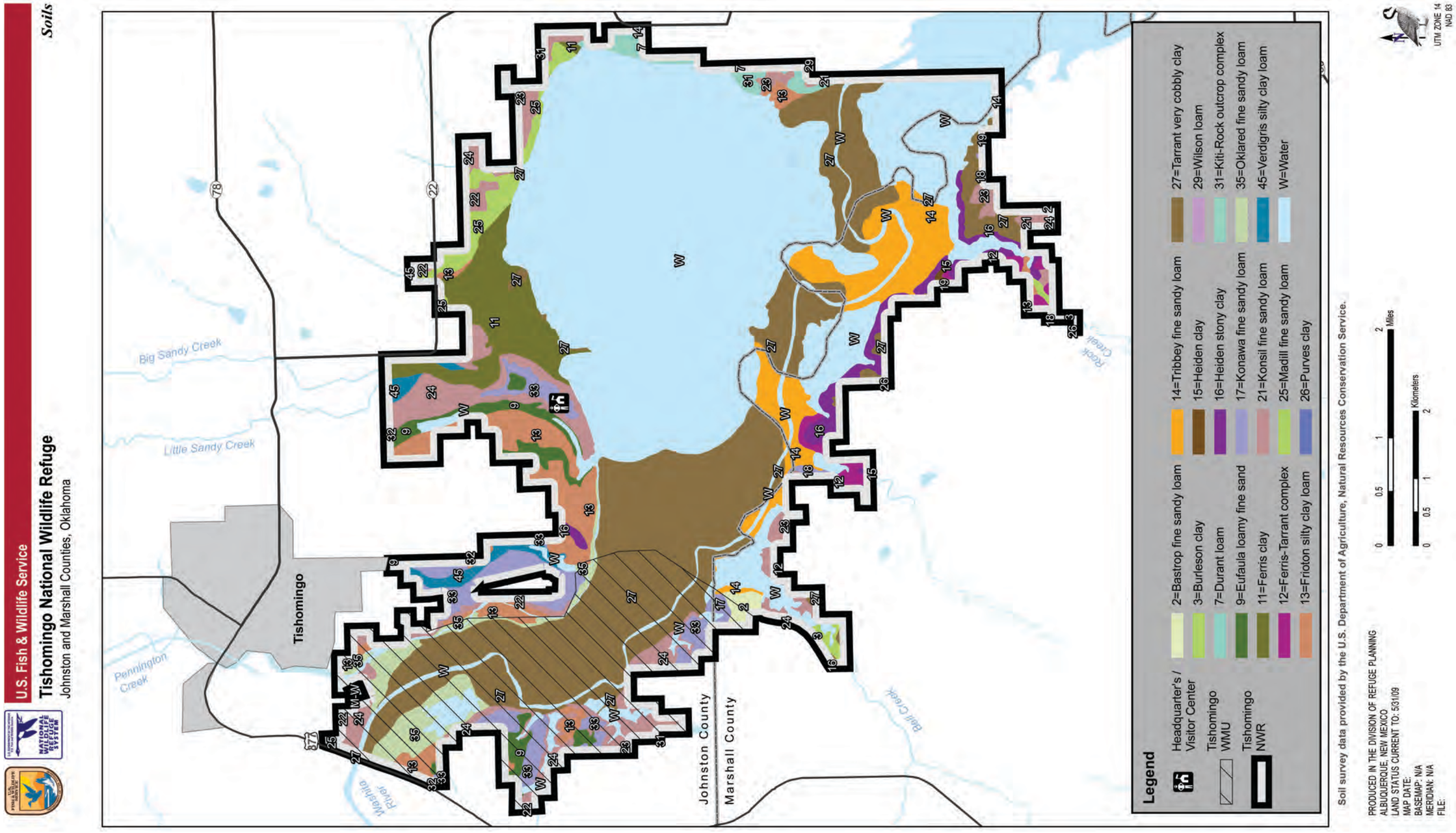

Figure 3-3. Soil Map

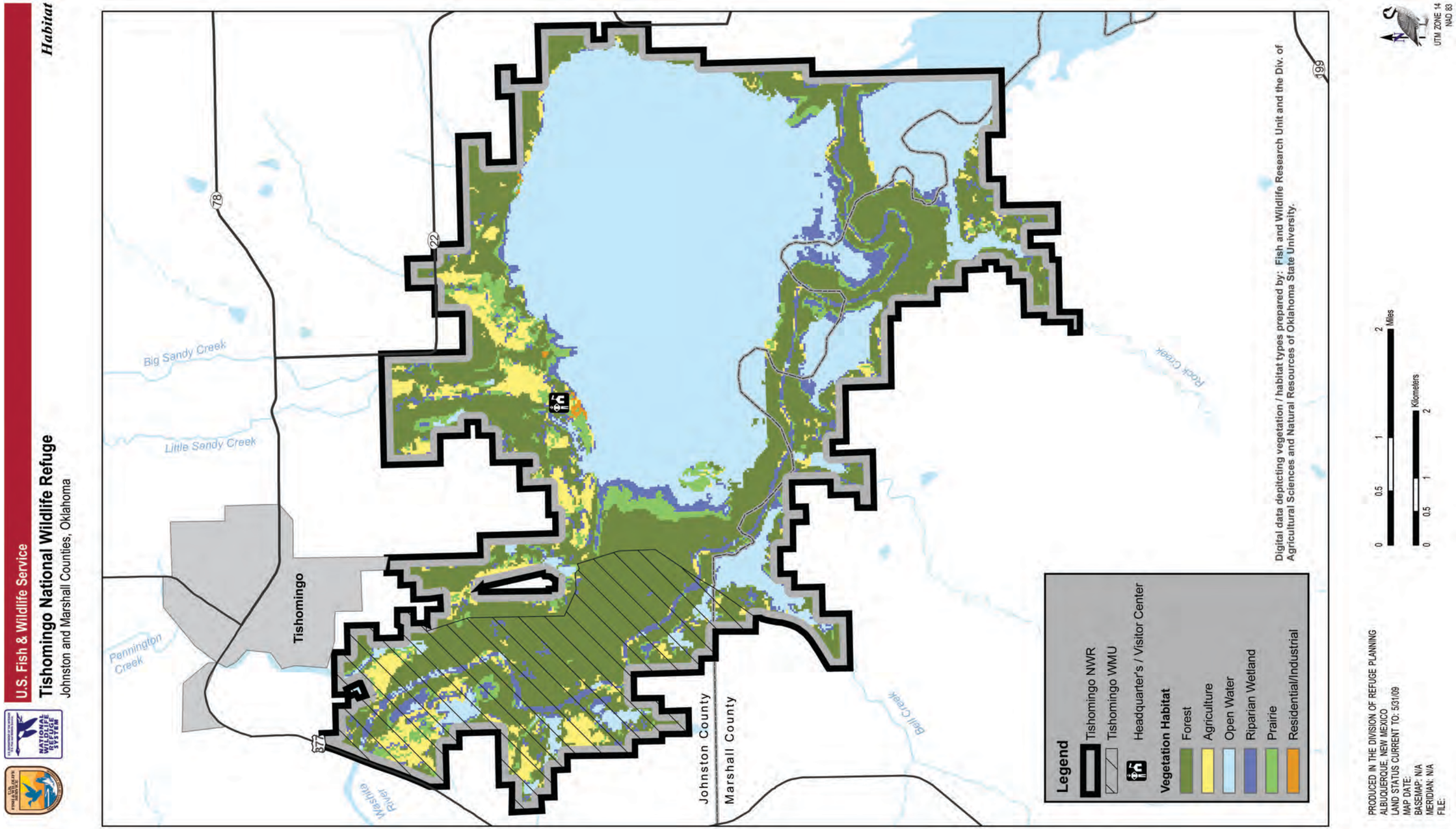

Figure 3-4. Vegetation Map

3.3.1.1 Forest

The topography of the uplands is characterized by gently rolling to sloping grasslands and forests with invading brushy growth. Hardwoods are found in the lowland valleys and in the steep bluffs of low relief found along Big Sandy Creek. Forest types range from bottomland hardwood timber to heavy brush in the floodplains and into savannah and scattered brush uplands. Interspersed in the grasslands are stands of winged elm and pecan (*Carya illinoinensis*), and brushy invaders such as Osage orange (*Maclura pomifera*). On the western portion of the Refuge, post oak and blackjack oak are found in the sandy soils of the Cross Timbers area. No timber stand improvement is practiced, but partial control of woody invaders is accomplished by controlled burning.

3.3.1.2 Prairie

A mixture of short, intermediate, and tallgrass species comprise the vegetation on approximately 419 acres of grasslands. Less than 10 percent of this is virgin native grassland. There is a predominance of little bluestems, Indiangrass, sand dropseed, and sideoats grama. Native forbs include American star thistle (basketflower) (*Centaurea americana*) firewheel (*Gaillardia pulchella*), and Leavenwoth's eryngo (*Eryngium leavenworthii*). An overall decrease in the diversity of native grasslands has occurred in southern Oklahoma because of agricultural conversion and overgrazing. Grasslands provide essential cover and food for many native species, including ground nesting birds.

3.3.1.3 Riparian/Wetland

The riparian-palustrine community occurs near and adjacent to the drainage of the Washita River, Pennington Creek, and Big Sandy Creek. The river and creek channels have riparian species such as boxelder (*Acer negundo*), black willow, and eastern cottonwood.

Vegetation such as longleaf pondweed (*Potamogeton nodosus*), swamp smartweed, broadleaf arrowhead, cattail, rushes, rufous bulrush (*Scirpus pendulus*), and sedges grow in seasonally flooded and permanent wetlands if moist soil conditions are conducive for seed germination. Wetlands provide essential habitat (Lower Mississippi Valley Joint Venture, 1989) for waterfowl, shorebirds, wading birds, and several mammal and reptile species.

3.3.1.4 Agriculture

The Refuge currently farms approximately 1,000 acres of cropland. Management objectives are primarily to provide browse for wintering and spring feeding needs but also include crop production to hold geese after hunting season to minimize depredation off the Refuge. Crops grown include milo (sorghum), corn, sunflower, cow peas, and winter wheat.

3.3.1.5 Exotic, Invasive, and Invading Plants

The Refuge has a number of introduced, invasive plants; but because of changes in fire frequency over the past centuries, several native species that normally would have been kept under check by periodic and frequent fires have become more abundant, modifying the landscape considerably. Invasive species reduce the carrying capacity of habitats by displacing desirable native species that provide better cover and food value for wildlife.

Table 3-1 lists both introduced, truly invasive plants; it also lists native plants which, due to lack of periodic fire over the past century or more, have invaded what once was historically

open grassland and modified it from grassland to shrub or woodland, or in the case of native forbs and vines, have manifested a competitive edge over other native species.

Table 3-1. Exotic, Invasive, and Invading Plants

COMMON NAME	SCIENTIFIC NAME	COMMENTS
Trees/shrubs		
silver maple	*Acer saccharinum*	Native to Oklahoma but not to counties within the Refuge
tree-of-heaven	*Ailanthus altissima*	
mimosa	*Albizia julibrissin*	
southern catalpa	*Catalpa bignonioides*	
flowering quince	*Chaenomeles speciosa*	
honey locust	*Gleditsia triacanthos*	native with invasive characteristics
eastern red-cedar	*Juniperus virginiana*	native with invasive characteristics
common Chinese privet	*Ligustrum sinense*	
chinaberry	*Melia azedarach*	
multiflora rose	*Rosa multiflora*	
saltcedar	*Tamarix* spp.*(chinensis?)*	
Forbs/Herbs		
shepherd's purse	*Capsella bursa-pastoris*	
henbit	*Lamium amplexicaule*	
sericea lespedeza	*Lespedeza cuneata*	
common mullein	*Verbascum thapsus*	
Canadian cocklebur	*Xanthium strumarium var. canadense*	native with invasive characteristics
Grasses/Sedges/Rushes		
giant reed	*Arundo donax*	
cheatgrass	*Bromus tectorum*	
Bermudagrass	*Cynodon dactylon*	
Johnsongrass	*Sorghum halepense*	
Japanese brome	*Bromus japonicus*	
Vines		
sweet autumn virginsbower , sweet autumn clematis	*Clematis terniflora*	*C. maximonicziana* =syn
Japanese honeysuckle	*Lonicera japonica*	
greenbriar	*Smilax* spp.	native with invasive characteristics

3.3.2 Wildlife

The Refuge was established primarily to provide habitat for migratory birds and other wildlife; therefore, ducks and geese were the major focus for many years. However, the

Refuge's variety of habitats can provide for a diversity of fish and wildlife species and nongame migratory birds that have received growing management interest in recent years. In general, a thorough documentation of the population status of most species of wildlife on the Refuge has not been performed. The Refuge has a comprehensive species list for birds compiled from biological inventories. Most accounts of mammals, reptiles, and amphibians are from range descriptions or spontaneous sightings, although some systematic studies have been done.

3.3.2.1 Mammals

Resident wildlife includes white-tailed deer (*Odocoileus virginianus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), swamp rabbit (*Sylvilagus aquaticus)*, raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), beaver (*Castor canadensis*), mink (*Mustela vison*), nine-banded armadillo (*Dasypus novemcinctus*), fox squirrel (*Sciurus niger*), and a variety of rodents typical of the Oklahoma/Texas Plains. Approximately 13 families of mammals comprising 30 species are listed as occurring or likely to occur on the Refuge.

White-tailed deer numbers are fairly stable at 500–700, which is likely within the carrying capacity of Refuge habitats. Habitat conditions are good to excellent, and the number of deer dispersing to surrounding areas is likely to increase because of habitat enhancement and population management.

In recent years, the increasing number of feral hogs has become a concern on the Refuge. Feral hogs damage crops and destroy wildlife habitat by rooting up vegetation. Since feral hogs are not considered native wildlife, no season or bag limit is set by the ODWC. Currently, feral hogs may be taken on the ODWC managed WMU year round; on the balance of the Refuge, hog trapping by special permit helps reduce the population.

3.3.2.2 Birds

Broad seasonal variation occurs in avian populations on the Refuge due to the arrival and departure of migratory species. Recent bird surveys have indicated that 284 bird species occur on the Refuge, of which over 90 species are known to nest locally. Approximately 134 species of Neotropical migratory songbirds use Refuge habitats, primarily during spring and fall migrations, although approximately 50 of these species nest in spring and summer.

The Refuge provides a sanctuary for wintering and staging waterfowl. At least 15 impoundments provide shallow, seasonally flooded wetlands and deepwater lakes, vegetated wetland margins for nesting and brood rearing, and aquatic plants and invertebrates for forage. In the past, approximately 12,000 Canada geese, 7,000 snow geese, 7,000 white-fronted geese, and 100 Ross' geese rested and fed on the Refuge during migration. Current goose numbers show a serious increase in snow geese and a commensurate decline in Canada geese, predominantly from the tallgrass prairie population. This can be attributed to conversion of croplands surrounding the Refuge and across the surrounding counties to mainly pastures and hay meadows "improved" with exotic grasses like Bermuda grass (*Cynodon dactylon*).

Continental duck populations have recently rebounded from low levels in the 1980s and early 1990s, primarily due to greatly improved habitat conditions in northern breeding areas and wetland conservation efforts in wintering areas.

The greatest number of ducks occurs in the fall and spring, with peak numbers averaging 39,000. Small numbers of mallards (*Anas platyrhynchos*) and wood ducks (*Aix sponsa*) are

known to nest on the Refuge. More than 30 species of shorebirds migrate through the Refuge, with peak numbers occurring in April and August. Killdeer (*Charadrius vociferus*); and western (*Calidris mauri*), least (*C. minutilla*), and spotted sandpipers (*Actitis macularius*) are the most abundant shorebird species. Lake Texoma consistently ranks in the top 20 locations for numbers of several species, including upland (*Bartramia longicauda*), buff-breasted (*Tryngites subruficollis*), and solitary sandpipers (*Tringa solitaria*), and for willets (*Tringa semipalmata*).

The area attracts 17 species of raptors during the fall and spring migration period, including ospreys (*Pandion haliaetus*), northern harrier (*Circus cyaneus*), Swainson's (*B. swainsoni*), and sharp-shinned (*Accipiter striatus*) hawks. Nesting raptor species on the Refuge include red-tailed (*B. jamaicensis*), Coopers' (*Accipiter cooperii*), broad-winged (*B. platypterus*), and red-shouldered hawks (*B. lineatus*); and American kestrel (*Falco sparverius*).

The bald eagle (*Haliaeetus leucocephalus*) was delisted from the Federal threatened and endangered list on June 28, 2007. Although no longer considered threatened or endangered, bald eagles are still protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Bald eagles will continue to be monitored by the Service, in cooperation with State wildlife agencies, for a term of no less than five years from the date of delisting. Bald eagles are still listed as threatened on Oklahoma's list of threatened and endangered species. Approximately 20 bald eagles use the Refuge during the winter.

3.3.2.3 Reptiles and Amphibians

Although perhaps not as endearing for much of the public as other species, reptiles and amphibians are a vital component of the ecosystem and are essential to the productivity and stability of habitats on the Refuge. Several species of reptiles and amphibians are found on the Refuge, including but not limited to the tiger salamander (*Ambystoma tigrinum*), small-mouthed salamander (*Ambystoma texanum*), Woodhouse's toad (*Bufo woodhousii*), great plains narrow-mouthed toad (*Gastrophryne olivacea*), gray treefrog (*Hyla versicolor*), bullfrog (*Rana catesbeiana*), eastern collared lizard (*Crotaphytus collaris*), eastern fence lizard (*Sceloporus undulatus*), Texas horned lizard (*Phrynosoma cornutum*), little brown (formerly ground) skink (*Scincella lateralis*), plainbelly water snake (*Nerodia erythrogaster*), Texas rat snake (*Elaphe obsoleta*), western ribbon snake (*Thamnophis proximus*), western cottonmouth (*Agkistrodon piscivorus*), pygmy rattlesnake (*Sistrurus miliarius*), timber rattlesnake (*Crotalus horridus*), alligator snapping turtle (*Macrochelys temminckii*), Mississippi mud turtle (*Kinosternon subrubrum*), red-eared slider (*Trachemys scripta*), and three-toed box turtle (*Terrapene carolina*). At least 65 reptiles and amphibians have been observed, and several are documented by specimens in university collections. Another nine species are expected to range in the area but have not been confirmed by specimen collection.

3.3.2.4 Fish and Invertebrates

Fish resources are abundant and varied within Lake Texoma (Cumberland Pool). Baseline fish data indicate that the dominant species in the Refuge lakes are shad (*Dorosoma* spp.), catfish (*Ictalurus* spp.), white bass (*Morone chrysops*), striped bass (*Morone saxatilis*), sunfish (*Lepomis* spp.), largemouth bass (*Micropterus salmoides*), and crappie (*Pomoxis* spp.). A variety of other fish species are also present, and many constitute a food source for the sport fishes, as well as terrestrial animals and fish-eating birds. Approximately 62 fish species could potentially be found in the area.

Aquatic invertebrates include but are not limited to damselfly and dragonfly nymphs (Odonata), diving beetles (Coleoptera), water fleas and crayfish (Crustacea), backswimmers (Hemiptera), snails (Mollusca), and a variety of species common to brackish and freshwater habitats. Chironomids (non-biting midges [*Diptera*]), are particularly important marsh species, as the larvae furnish an important waterfowl and fish food source.

3.3.2.5 Species of Special Interest

The Refuge provides potential habitat for a variety of rare or declining species, including several that are federally listed as threatened or endangered, and other species of concern. Nationwide declines may be related to loss and fragmentation of suitable habitat, increasingly large areas being cultivated, drought, lack of a natural fire regime, and the replacement of native grasses with exotic grasses. Some species inhabit the Refuge on a regular or seasonal basis, while others are migrants or accidental visitors that are infrequently sighted on the Refuge. No Federal or State listed plants have been found on the Refuge.

Management actions taken on the Refuge will adhere to compatibility standards, NEPA, Endangered Species Act (ESA) compliance, and Service regulations to ensure that protected species are not adversely affected. The Refuge will provide technical assistance on protected species management to neighbors and individuals from the private sector when it is requested.

Piping plovers, snowy plovers, and peregrine falcons use the Refuge on their migrations or as their wintering grounds. For a listing of threatened and endangered species, refer to Table 3-2.

3.3.2.6 Federal and State Endangered, Threatened, and Proposed Species

The purpose of the ESA is to conserve the ecosystems upon which endangered and threatened species depend and to conserve and recover listed species. Under the law, species may be listed as either "endangered" or "threatened" (see Table 3-2). An endangered species is in danger of extinction throughout all or a significant portion of its range. A threatened species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. A proposed species is any species of fish, wildlife, or plant that is proposed in the *Federal Register* to be listed under section 4 of the ESA.

Whooping Crane (*Grus americana*) - The whooping crane was listed as endangered on March 11, 1967 (USFWS 2009). Once widespread in North America, by 1941 the species had declined to about 16 individuals in a single wild flock that migrated between Canada and coastal Texas (Lewis, 1995). Several factors contributed to the historic decline of the species, including habitat loss and alteration, coastal and marine pollution, illegal hunting, disease, predation, collision with utility lines, loss of genetic diversity within the population, and vulnerability to natural and human caused disturbances (Lewis 1995). Whooping cranes are associated with marshes, shallow river bottoms, potholes, prairies and agricultural fields. Overall decline of the species is attributed to habitat loss and alteration; once reduced in numbers, killing and disturbance by humans, disease, and collision with manmade objects became important (Lewis 1995). The whooping crane has begun a slow but seemingly steady recovery, and as of March 12, 2003, the wild population of crane had increased to 292 (259 adults, 33 young). Of this number, the Aransas/Wood Buffalo population accounts for 185 birds (169 adults and 16 young). The historic wintering grounds included southwestern Louisiana, the Gulf Coast of Texas, interior west Texas, the highlands of northern Mexico, and Atlantic coastal areas of New Jersey, Delaware, South Carolina, and Georgia (DeHoyo et al. 2000). During migration, they feed and roost in a wide variety of habitats, including croplands, large and small

freshwater marshes, the margins of lakes and reservoirs, and submerged sandbars in rivers. Whooping cranes have not been observed on the Refuge, but are known to occur in Johnston County.

Interior Least Tern (*Sternula antillarum*) - The interior least tern was listed as endangered on May 28, 1985. All subspecies of the least tern apparently were abundant through the late 1880s but were nearly extirpated for their delicate plumage used for fashionable hats at that time. After the signing of the 1918 Migratory Bird Treaty Act, commercial harvesting became illegal and the species began to increase through the 1940s. However, human development and use of tern nesting beaches for housing and recreation subsequently led to another rapid population decline. In the interior United States, river channelization, irrigation diversions, and the construction of dams contributed to the destruction of much of the tern's sandbar nesting habitat. By the mid-1970s, least tern populations had decreased by more than 80 percent from the 1940s. This colonially nesting waterbird is a species that seldom swims, spending much of its time on the wing (Hubbard, 1985). The least tern is the smallest North American tern with gray above, black cap and nape, and white below. They nest on the ground, typically on sites that are sandy and relatively free of vegetation. The flight is light, swift, and graceful, and it is developed to the point that flight is the major means of foraging, allowing the birds to snatch fish, crustaceans, and insect food from the surface, almost without missing a beat. They nest on the ground, on sandbars in rivers or along lake or pond edges, typically on sites that are sandy and relatively free of vegetation. Interior least terns are migratory and breed along the Red, Mississippi, Arkansas, Missouri, Ohio, and Rio Grande River systems. Interior least terns are seen occasionally on the Refuge.

Peregrine Falcon (*Falco peregrinus*) - The peregrine falcon was originally listed as endangered on June 2, 1970. The shrinking population was the result of decreased nesting success attributed to accumulation of chlorinated pesticides such as Dichloro-Diphenyl-Trichloroethane (DDT) and its metabolite Dichloro-Diphenyl-Dichloroethylene (DDE). The population has shown a tremendous comeback from the bird's most critical low level of 30 pairs in the mid 1960s. By captive breeding and release programs, the population of these birds has rebounded remarkably and has exceeded the recovery goals for this species. Recovery efforts resulted in delisting of the peregrine falcon on August 25, 1999 (64 *Federal Register* 46543); however, this species is still listed as State threatened in Oklahoma. Peregrines take virtually all of their prey on the wing, typically after a stoop or dive from above. Prey consists almost entirely of other birds, such as shorebirds, waterfowl, pigeons, doves, robins, flickers, jays, swifts, swallows, and other passerine birds that opportunity presents (Craig, 1986). During the breeding season, a hunting range of 10 miles may be considered typical (Craig 1986); however, they may forage as far as 17 miles from the nest site (Porter and White, 1973). Peregrines use a wide variety of habitats for foraging, including riparian woodlands, coniferous and deciduous forests, shrublands, and prairies (Finch,1992). Regionally, continental peregrines breed in Colorado, New Mexico, far western Texas, and in the mountains of northern Mexico. Nests are primarily on high, vertical cliffs. In New Mexico, peregrine falcon breeding territories center on cliffs in wooded or forested habitats, with large "gulfs" of air nearby in which they can forage (Hubbard, 1985). Adequate nesting places are unavailable on the western Texas plains. The peregrine falcon is an infrequent visitor observed on an irregular basis.

Piping Plover (*Charadrius melodus*)- The Great Lakes population (found in Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario, and Great Lakes of Canada) of the piping plover was listed as endangered in 1985, while all other

populations are listed as threatened. Critical habitat has not been designated. Piping plovers migrate north in the spring to breed and nest, seeking habitat in open, sparsely vegetated areas near the water, such as sand bars, prairie sloughs and sandy beaches. Nesting begins in late April or early May and can last into September. The piping plover is rarely seen on the Refuge during migration.

Bald Eagle (*Haliaeetus leucocephalus*) - The bald eagle was listed as endangered on March 11, 1967, as a result of population declines due to pesticide-induced reproductive failure, loss of riparian habitat, and human disturbances, such as shooting, poisoning, and trapping. On August 11, 1995, the bald eagle was down-listed from endangered to threatened status in the majority of the contiguous U.S., including Oklahoma, due to nationwide recovery efforts. In 1999, the bald eagle was proposed for delisting. On June 28, 2007, the bald eagle was officially removed from the list of Threatened and Endangered Species. Bald eagles will continue to be protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Both federal laws prohibit "taking"—killing, selling or otherwise harming—eagles, their nests, or eggs (USFWS, 2007). As many as 100 bald eagles have wintered on the Refuge, arriving between October and November, but bald eagle numbers usually average around 20. Eagles traditionally winter in the cottonwoods on the shores of Cumberland Pool and the Washita River. Roost sites, open water, abundant waterfowl, and fish on or near the Refuge make it an attractive haven for wintering bald eagles. Historically, the population peaks in January.

Table 3-2. List of Threatened and Endangered Species

GENUS	SPECIES	COMMON	FEDERAL STATUS	STATE STATUS
Charadrius	*melodus*	Piping Plover	Threatened	Threatened
Grus	*americana*	Whooping Crane	Endangered	Endangered
Sternula	*antillarum*	Interior Least Tern	Endangered	Endangered
Nicrophorus	*americanus*	American Burying Beetle	Endangered	Endangered

3.3.2.7 Species of Concern

Species of concern are those species for which the Service may have enough information to warrant proposing them for listing as threatened or endangered, but these species have not yet been proposed for listing due to other higher priority listing activities. The Service works with states and private partners to carry out conservation actions for candidate species to prevent their further decline and possibly eliminate the need to list them as endangered or threatened. The following State species of concern (in Oklahoma) have either been documented in the area or whose historic range includes the Refuge.

Alligator Snapping Turtle (*Macrochelys temminckii*) - The alligator snapping turtle is currently State listed as a threatened species and is a State Species of Special Concern (category 2). Alligator snapping turtles are confined to river systems that drain into the Gulf of Mexico. They range as far north as Illinois and Indiana. The alligator snapping turtle is the largest freshwater turtle in North America. Adults are usually found in deeper water of large rivers and their major tributaries, and in lakes, oxbows, swamps, and ponds. Much of the natural habitat of this species in northeast Arkansas and southeast Missouri (lowlands and swamps) has been drained and replaced by soybeans and cotton fields in recent years. This is perhaps the most important factor contributing to the decline of the alligator snapping turtle. The alligator snapping turtle is a current resident of the Refuge.

Golden Eagle (*Aquila chrysaetos*) - The golden eagle nest is built out of sticks and twigs in a tree or on a cliff. The female often does most of the incubation. The males provide most of the food while the females feed and tend the young. The breeding success of this raptor is often very dependent on prey densities (especially jackrabbits in the western United States). They are found in a variety of habitats in the western United States including mountainous areas, canyons, shrubland, and grasslands. During the winter, they are found primarily in shrub-steppe vegetation in the west and wetlands, and river systems and estuaries in the east. Golden eagles prey primarily on mammals such as rabbits and hares, as well as larger rodents. Up to 20 percent of their diet is comprised of birds and reptiles. Golden eagles feed mostly on food they catch, although they will use carrion. Golden eagles are still subject to illegal shooting due to the erroneous belief that they are a serious threat to ranch animals (Ehrlich et al., 1988). Golden eagles are rarely seen on the Refuge.

Long-billed Curlew (*Numenius americanus*) - Breeding long-billed curlews disappeared from large portions of their range during the late 19th and early 20th centuries (Andrews and Righter 1992; Stewart, 1975) when populations of many shorebirds were decimated by uncontrolled hunting. With protection, the populations of most shorebirds breeding in the Arctic recovered. However, the long-billed curlew nests in grasslands of central and western North America, where habitat destruction and other factors have not allowed for a sustained population recovery of this species. Long-billed curlews prefer native shortgrass prairie for nesting, but also occupy grazed mixed grass communities and scrub prairie (Stewart 1975). In general, breeding long-billed curlews are most numerous on the western Great Plains from eastern New Mexico and the Texas Panhandle north to portions of Montana and Alberta, and from Utah into eastern Oregon. Breeding bird survey data indicate that long-billed curlew populations are declining in the High Plains and the western Great Plains. It is uncommon to observe the long billed curlew on the Refuge.

Ferruginous Hawk (*Buteo regalis*) - The ferruginous hawk is the largest *Buteo* in North America. Adult ferruginous hawks are brown above with rusty streaks and white below. The ferruginous hawk is primarily found on grassy prairies, dry mesas, irrigated agricultural lands, and habitats that support many rodents and rabbits. It prefers forest edge or mature, isolated, flat-topped junipers, with thick support branches for nesting. It is highly sensitive to human disturbance. The ferruginous hawk preys mainly on small to medium-size mammals (Stravers and Garber, 1998). Historically, ferruginous hawks experienced declines in the southwestern states, although recent trends appear to be stable (Hall et al., 1988). Conversion of grassland to intensive cultivation has reduced the amount of preferred habitat available to the ferruginous hawk and has been implicated in the population decline of the species in some areas (Schmutz, 1984; Olendorff, 1993). Agricultural development has restricted the species to areas of greater topographic relief or other areas unsuitable for agriculture (Stewart 1975). Nest disturbance, shooting while birds are perched along roadsides, and widespread control of prairie dogs, a vital source of food, are other factors that may have led to the current decline of this species. Ferruginous hawks range over much of the western half of the United States. During their fall migration, ferruginous hawks are attracted to prairie dog colony locations, as the hawks feed on prairie dogs and other rodents associated with the towns (Dechant et al., 1999). The greatest concentrations occur around the prairie dog colonies and at flooded playas with waterfowl disease outbreaks. The ferruginous hawk is an accidental visitor on the Refuge.

Snowy Plover (*Charadrius alexandrinus*) - The western population (found in California, Oregon, and Washington within 50 miles of the coast) of the western snowy plover was listed

as threatened on March 5, 1993. Snowy plovers are small relatives of killdeer and nest on western coastal beaches and in the interior on desert playas with nearby water. The interior western snowy plover is a breeding bird of the alkali and saline flats of the western states. Nest sites of the interior western snowy plover typically occur in flat, open areas with sandy or saline substrates; vegetation is usually sparse or absent (USFWS, 1993). A majority of snowy plovers are "site faithful"—returning to the same breeding site in subsequent breeding seasons. Birds often nest in exactly the same locations as the previous year (USFWS, 1993). Birds winter in habitats similar to those used during the nesting season. Snowy plovers forage on invertebrates in the wet salt pans, in spoil sites, and along the edges of salt marshes and salt ponds. Because of their reliance on interior wetland and playa lake habitats, monitoring of snowy plover breeding and wintering populations is a good indicator of the availability and condition of interior wetland habitats. The snowy plover is an accidental visitor to the Refuge during their migration.

Bell's Vireo (*Vireo bellii*) - The types of habitat used by Bell's Vireo for breeding include dense brush, willow thickets, mesquite, streamside thickets, and scrub oak in arid regions often near water, but also adjoining uplands (AOU 1998). This species nests in shrubs or low trees, usually averaging about one meter above ground. Declines may be related to loss of riparian habitat (USFWS 1998), particularly in western portions of their range. Urban development, water diversion, flood control projects, grazing, and the spread of agriculture have destroyed much western nesting habitat. The Central Valley of California, where the species was once a common breeding bird but is now extirpated, has lost 95 percent of its riparian vegetation in this century to agriculture and other anthropogenic factors (Smith, 1977). Overgrazing suppresses shrub growth and reduces available nest sites and vireo density (by 50 percent in Oklahoma, according to Overmire, 1963). This species has seriously declined in several portions of its range, particularly in the arid southwest where it is endangered. These birds are particularly vulnerable to loss and fragmentation of riparian and dense scrub habitats and to brood parasitism by brown-headed cowbirds *(Molothrus ater)*. These factors continue to threaten remaining breeding populations. Breeding habitat restoration and cowbird control has led to population recovery in limited areas. Bell's vireo is a common spring and summer nesting resident on the Refuge.

Barn Owl (*Tyto alba*) - This is a cavity-nesting bird that uses natural as well as human-created cavities. Tree cavities are the principal nest site used in most areas of the Northeast (Colvin et al., 1984); it also nests in buildings (church steeples, attics, platforms silos and barns, wooden water tanks, duckblinds); caves; and crevices on cliffs, burrows, and hollow trees; but rarely in trees with dense foliage (AOU 1983). Caves, cliff crevices, and cut bank burrows are commonly used in the western U.S., but rarely in the east. The barn owl uses nest boxes Marti and Wagner, 1985). Dense grass fields are the chief foraging habitat, including saltmarsh, wet meadows, lightly grazed pastures, grass hayfields, and recently abandoned agricultural fields (Colvin, 1980; Colvin 1984). Population declines have been attributed mainly to commercial development of farmland, reduction in the dairy and sheep industry, conversion to intensive row-crop farming, and decline in the number of farms and old farm structures, resulting in a loss of nest sites and important high-quality foraging habitat. Foraging habitat availability appears to limit numbers most significantly (Colvin et al. 1984; Colvin, 1985; Rosenburg, 1986). Loss of farmland to development and the intensification of agricultural practices on remaining farmlands have substantially reduced the quantity and quality of dense grass habitats in agricultural areas (Colvin, 1985; Rosenburg 1986). The loss of dense grass habitats for foraging appears to be the most significant limiting factor, but this could be

overcome by grassland management programs aimed at preserving large fields near nesting sites. Long-term monitoring of grassland availability and small mammal abundance, as well as nest sites, should be implemented regionally to track population trends. Nest boxes can be placed in areas of good foraging habitat to supplement natural nest sites. Grass habitats can also be managed by light grazing or mowing to maintain the grass sere without altering dense ground cover used by small mammals (Rosenburg, 1992). Barn owls are occasionally seen on the Refuge.

Swainson's hawk (*Buteo swainsoni*) - During the nesting season, Swainson's hawks typically prey on small mammals such as ground squirrels and voles, as well as the occasional small bird or lizard. The Swainson's hawk is associated with grasslands, sage-steppe, and agricultural habitats. In many areas, Swainson's hawks have adapted to farmed habitats, nesting in windbreaks and farmstead trees. Nesting is usually in isolated trees or riparian forest, although nests may be built in shrubs or on the ground in areas where trees are lacking. The hawks prefer semi-open and open habitats, which are best for aerial foraging (hunting while flying). Swainson's hawks are occasionally observed on the Refuge.

Prairie Mole Cricket (*Gryllotalpa major*) - The prairie mole cricket has broad spade-like front legs that allow it to burrow through the thick tangle of roots in prairie soil. Prairie mole crickets have exacting habitat requirements found only in high quality tallgrass prairie. With the loss of native tallgrass prairie in the United States, the range of the cricket has been severely reduced, and the cricket is currently listed as as State Sensitive Category 2 (SS2). The prairie mole cricket has not been observed on the Refuge, but its range includes Johnston County.

Texas Horned Lizard (*Phrynosoma cornutum*) - The Texas horned lizard was designated the Texas State Reptile in 1992, the same year its precipitous decline was documented. Currently, it is listed in Oklahoma as a Species of Special Concern Category 2. This species ranges from the southcentral U.S. to northern Mexico and is found in arid and semiarid habitats in open areas with sparse vegetative cover throughout much of Texas, Oklahoma, Kansas, and New Mexico. The Texas horned lizard is easily differentiated from the other two species by the double row of spines on each side of the abdomen. It inhabits flat, open, generally dry country with little plant cover except for bunchgrass and cactus. Strictly terrestrial, this lizard can bury itself in loose soil that is sandy, loamy, or rocky. It seeks shelter under rocks (Garrett et.al, 1987). It feeds heavily on ants, other insects, and arthropods as available. Pesticides, loss of habitat, the displacement of red ants by fire ants, and other causes are suspect in this species decline (Texas Parks & Wildlife Department, 2000). ODWC is tentatively planning a project that will target historical horned lizard sites. There is a closed season on the Texas horned lizard in effect now, as listed in the ODWC reptile and amphibian regulations. The Texas horned lizard has not been observed on the Refuge, but is known to exist in the area.

Loggerhead Shrike (*Lanius ludovicianus*) - The loggerhead shrike is a raptorial passerine that occurs in grasslands, shrublands, open woodlands, and chaparral from southcentral Canada throughout the United States to southern Mexico. The loggerhead shrike has shown a significant decrease over much of its breeding range, particularly in the southwestern and southeastern states and northern plains, as well as in Canada. Large breeding populations are still in Oklahoma and New Mexico. Habitat loss (loss of hedgerow, thorn tree, or shrubs for nesting sites), reduction in grassland feeding habitat, and consuming contaminated prey may be contributing factors to population declines. In winter, it is found from the central United States south, with large wintering numbers in Texas on the Edwards Plateau west into portions of the

Trans-Pecos (Root, 1988). It is most often associated with Conservation Reserve Program (CRP) grassland edges, prairies, prairie-mesquite, and sandhills. Loggerhead shrikes are known to occur on the Refuge.

3.3.2.8 Status of State Species of Concern

State species of concern are categorized according to their current vulnerability to extirpation and the level of technical evidence available to support those determinations. The State status of each of the aforementioned species conforms to one of the following descriptions and is provided in Table 3-3. State Species of Special Concern Category 1 (SS1) is defined as "a native species identified with a presently stable or decreasing population that current evidence indicates is especially vulnerable to extirpation because of limited range, low population, or other factors." State Species of Special Concern Category 2 (SS2) is defined as "a native species identified by technical experts as possibly threatened, or vulnerable to extirpation, but for which little, if any, evidence exists to document the population level, range, or other factors pertinent to its status." Closed Season (CS) status indicates that it is unlawful, statewide, to possess or kill individuals of these species or to remove any individuals of these species from their natural habitats.

Table 3-3. State Species of Special Concern

SPECIES	COMMON	STATE STATUS
Alligator Snapping Turtle	*Macrochelys temminckii*	CS, SS
Bell's Vireo	*Vireo bellii*	SS2
Barn Owl	*Tyto alba*	SS2
Ferruginous Hawk	*Buteo regalis*	SS1
Golden Eagle	*Aquila chrysaetos*	SS1
Long-billed Curlew	*Numenius americanus*	SS1
Loggerhead Shrike	*Lanius ludovicianus*	SS2
Prairie Mole Cricket	*Gryllotalpa major*	SS2
Snowy Plover	*Charadrius alexandrinus*	SS2
Swainson's Hawk	*Buteo swainsoni*	SS2
Texas Horned Lizard	*Phrynosoma cornutum*	CS, SS2

3.3.2.9 Other Species of Concern

Often species that are of concern locally have no official Federal or State status. These species may be candidate species in neighboring states or were candidates under the former Federal listing candidate system that had multiple tiers such as Category 1 and Category 2. These species need further biological research and field study to resolve their conservation status, or they are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional scientific societies. Other species may be recognized by nongovernmental organizations (such as PIF) as species that need monitoring as well as protection. The following species of concern are known to occur or have potential habitat on the Refuge.

Hammock Sedge (*Carex fissa*) - The hammock sedge thrives in a variety of habitats. It grows in shallow water along the edges of ponds, lakes, and periodically flooded mixed grass prairie and mesic post oak forests (Oklahoma Natural Heritage, 1999). The reason for the decline of

this species is unclear, and further study is needed to determine the needs of the species. The hammock sedge has not been observed on the Refuge, but it is known to occur in Johnston County.

Black Rail (*Laterallus jamaicensis*) - is the smallest of all rails. It is slate colored with a black bill, red eyes, and a white-speckled back. Although all rails prefer to run from danger rather than fly, the black rail is probably the least likely to take wing. It usually darts for cover in the thick grasses of the marsh. The black rail,a secretive bird, is rarely seen on the Refuge.

Several grassland bird species have been identified as Priority Bird Populations and Habitats by the PIF program for the Oaks and Prairies and Osage Plains physiographic regions. These species are indicators of the condition of the grassland and wetland systems within this region (BLM 2009). Their populations have been emphasized as a priority for monitoring. These include several species mentioned previously such as the Bell's vireo and loggerhead shrike, with the addition of the following PIF Priority species:

3.3.2.10 NABCI/PIF Priority Species

In addition to those species identified specifically for the Oaks and Prairies BCR, several nongame landbird species have been prioritized for the oaks and prairies physiographic prairie region. Through the PIF prioritization process, scores were determined for relative abundance, breeding and non-breeding distribution, threats to breeding and non-breeding areas, population trends, and area importance using various criteria established for these categories. Depending on the scores, each species was ranked and placed in tier groups from Tier I (having the highest priority for the region) to Tier II (the next group for prioritization). Species in subsequent tiers have already been protected as Species of Conservation Concern listed birds and those species protected as federally listed threatened and endangered species (Carter et al., 2000). The Tier I and Tier II bird species identified for the Oaks and Prairies BCR that are known to occur or could occur on the Refuge are listed in Table 3-4.

Priority species known to occur on the Refuge or species with potential habitat on the refuge include the following: Species highlighted in bold have previously been identified as species of special emphasis.

Table 3-4. NABCI/PIF Priority Species

Tier I	Tier II
Swainson's hawk [O]	killdeer*[A]
northern bobwhite*[O]	Inca dove [O]
scissor-tailed flycatcher*[C]	yellow-billed cuckoo*[C]
Bell's vireo*[U]	common nighthawk*[C]
Prothonotary warbler*[A]	chimney swift*[C]
worm-eating warbler [N]	great crested flycatcher*[C]
Swainson's warbler [O]	**loggerhead shrike***[U]
Kentucky warbler*[U]	northern rough-winged swallow*[U]
field sparrow*[C]	Carolina chickadee*[A]
painted bunting*[C]	marsh wren [O]
dickcissel*[A]	wood thrush [R]
	Louisiana waterthrush*[C]
	Cassin's sparrow [N]
	lark sparrow*[C]
	eastern meadowlark*[A]

* known to nest in the area

[A] Abundant - a common species which is numerous

[C] Common - certain to be seen in suitable habitat

[U] Uncommon - present, but not certain to be seen

[O] Occasional - seen only a few times during a season

[R] Rare - seen at interval of two to five years

[N] Not known to occur on the Refuge

3.3.2.11 Strategic Habitat Conservation "Focal Species"

Part of the Strategic Habitat Conservation process includes the determination of Focal Species for the Refuge. Focal species are a subset of priority species and represent larger guilds of species that use habitats in a similar fashion. Focal species are selected based on the knowledge that factors limiting their populations are sensitive to landscape scale characteristics and that by addressing the needs of these focal species, other priority species within a guild are expected to benefit. In addition, an appropriate set of focal species includes consideration for the specifics of the respective ecoregion, availability of data and information, and programmatic obligations, as defined in the Strategic Habitat Conservation Report (USGS & USFWS 2006). Therefore, focal species are those species and their associated habitats included in Plan objectives and strategies for which protection, management, research, and monitoring efforts will be focused and for which management and protection efforts are necessary to sustain them.

For this Plan, focal species are grouped into four categories, each meeting specific criteria. The first group includes listed species that 1) are Federal or State listed species known to (or may) reproduce or nest on the Refuge, 2) are representative of particular habitats at risk, and 3) are included in State or Federal landscape-level conservation plans. The second group includes priority bird species that 1) are known to nest on the Refuge, 2) are rare or uncommon on the Refuge during any season, and 3) are included in State or Federal landscape-level conservation plans. The third group includes priority waterfowl species that 1) occupy important wintering or staging habitat, 2) are representative of freshwater wetlands at

risk in the area, and 3) are included in State or Federal landscape-level conservation plans. The fourth group includes the priority mammal species that meet the following criteria: 1) a stable population exists on the Refuge, 2) the population provides excess numbers to disperse to surrounding areas, and 3) the species is included in State game management plans.

Focal Listed Species	Management practices focusing on this species
Alligator Snapping Turtle	Several hundred individuals of this species have been introduced into several bodies of water on (and around) the Refuge for at least eight years. Research is being conducted to track mortality, reproduction, and other population dynamics, as well as movement patterns and home ranges.
Focal Bird Species	**Management practices focusing on these species**
Northern Bobwhite Quail	Habitat management practices are being conducted, such as prescribed fire and native grass and forb plantings, as well as food plots and brush piles. The population will be monitored using quail-specific censuses during other bird surveys and by chance encounter sightings.
Bell's Vireo	Habitat management practices are being conducted, such as prescribed fire and native grass/forb plantings. Also, plum thickets and other motte type vegetative growth are encouraged. The population will be monitored by mist netting and banding, breeding bird surveys, monthly bird surveys, and chance encounter sightings.
Prothonotary Warbler	Habitat management practices are being conducted such as prescribed fire and protection of wetland, bottomland, and/or riparian habitats. Nesting sites are supplemented by adding man-made nest boxes. The population will be monitored by mist netting banding, breeding bird surveys, monthly bird surveys, and by visual observation. Southeastern Oklahoma State University is conducting ongoing research on the nesting success and other biological parameters of this bird.
Painted Bunting	Habitat management practices are being conducted, such as prescribed fire and native grass/forb plantings, as well as food plots. The population will be monitored by mist netting and banding, breeding bird surveys, monthly bird surveys, and chance encounter sightings.
Focal Waterfowl Species	**Management practices focusing on these species**
Canada Geese	Habitat management practices are being conducted, such as planting 700–900 acres of winter wheat and small grains. Several thousand acres of lake, river, and other wetlands are protected and enhanced for this species. The population will be monitored by aerial waterfowl counts, mid-winter waterfowl surveys, monthly bird surveys, and chance encounter sightings. Public hunting for this species is allowed on the WMU portion of the Refuge.

White-fronted Geese	Habitat management practices are being conducted, such as planting 700–900 acres of winter wheat and small grains. Several thousand acres of lake, river, and other wetlands are protected and enhanced for this species. The population will be monitored by aerial waterfowl counts, mid-winter waterfowl surveys, monthly bird surveys, and chance encounter sightings. Public hunting for this species is allowed on the WMU portion of the Refuge.
Mallard	Habitat management practices are being conducted, such as planting small grains (millet and milo) in moist soil units and around shorelines of permanent wetlands. Several thousand acres of lake, river, and other wetlands are protected and enhanced for this species. Also, when rain is plentiful, mast producing hardwood trees are flooded. The population will be monitored by aerial waterfowl counts, mid-winter waterfowl surveys, monthly bird surveys, and chance encounter sightings. Public hunting for this species is allowed on the WMU portion of the Refuge.
Wood Duck	Habitat management practices are being conducted, such as planting small grains (millet and milo) in moist soil units and around shorelines of permanent wetlands. Several thousand acres of lake, river, and other wetlands are protected and enhanced for this species. Also, when rain is plentiful, mast producing hardwood trees are flooded. Nesting boxes have also been built, installed, and monitored for this duck. The population will be monitored by aerial waterfowl counts, mid-winter waterfowl surveys, monthly bird surveys, nest box monitoring, and chance encounter sightings. Public hunting for this species is allowed on the WMU portion of the Refuge.
Focal Mammal Species	**Management practices focusing on this species**
White-tailed Deer	Habitat management practices are being conducted, such as prescribed fire and native grass/forb plantings, as well as planting 700–900 acres of winter wheat, legumes, and small grains. The population is monitored by doing a series of spotlight counts during the fall. Special hunts are conducted on the Refuge to manage the herd and to provide public recreation. Public hunting for this species is also allowed on the WMU portion of the Refuge.

3.4 Socioeconomic Environment

3.4.1 Archaeological, Cultural, and Historical Resources

The Refuge lies within the old Chickasaw and Choctaw Indian holdings, land obtained under a treaty at the time the tribes were dispossessed from their lands in the southeastern United States. Between 1830 and 1906, Oklahoma served the nation as the Indian Territory. In 1837, the Chickasaws settled among the Choctaws in the newly formed Choctaw Nation along the

Washita River. In 1855, the Choctaw and Chickasaw nations separated, and the Chickasaw settled in a large area known as the Chickasaw District, with the capitol located at Tishomingo. Three other tribes—the Seminoles, Creeks, and Cherokees—were also interested in this area, since they were also included in the treaty terms. Due to their advanced standard of living, these nations came to be known as the Five Civilized Tribes.

3.4.1.1 Chickasaw Manual Labor Academy 1851–1885

The Chickasaw Manual Labor Academy was located on 200 acres of present day Tishomingo NWR from 1851–1885. The academy was the first boarding school for tribal youth established in the Chickasaw Nation. After removal from east of the Mississippi River to Indian Territory in 1837–1838, the Chickasaw people settled in a large area of southcentral Oklahoma known as the Chickasaw District.

Educating young people has always been an important part of Chickasaw life. After settlement, there was a need to establish a school system to help Chickasaw students learn about the changing world before them. The Chickasaw Manual Labor Academy was formed to advance their knowledge and skills. The academy, a boarding school for boys of all ages, opened in 1851 under the direction of the Methodist Episcopal Church. It was funded almost entirely by the Chickasaw Legislature. Located 12 miles northwest of Fort Washita, the two-story building was situated on a 200-acre, self-sustaining farm. At first, only 60 pupils were registered, but the numbers grew to 140 by 1857. The basic courses included agriculture and mechanical arts, domestic arts, Latin, logic, music, and sacred studies.

A number of graduates of the academy went on to become tribal leaders and distinguished citizens of the State of Oklahoma and the Nation at large. In 1855, the academy was moved to a new location north of Tishomingo. Because they were primarily wooden buildings, none of the structures dating back to the time of the academy have survived on the Refuge.

3.4.1.2 Washita (Chapman) Farm 1920–1943

The Washita Farm was once known as the showcase of agriculture for southern Oklahoma and the central United States. It seemed like a "Garden of Eden" for people living in Johnston County, Oklahoma, from 1920 to 1943. The creation of Washita Farm actually began in 1913 when Fred Chapman, who was traveling through Johnston County, noticed railroad cars loaded with corn and other crops from the area. It made such an impression on him that he returned in 1916 to purchase land. The Chapman family acquired 30,000 acres of land in Johnston, Marshall, Carter, and Murray counties. The property included the Washita River bottomlands and vast stands of large bottomland hardwood trees. By 1925, all the land intended for farming was completely cleared of trees. The hardwood timber, which was a valuable asset, prompted the Chapman family to establish the Washita Lumber Company in Tishomingo. A considerable amount of this lumber was used to build the houses and barns of the Washita Farm.

The Chapman family was a great supporter of education and worked to establish three schools within easy access of the Washita Farm. These three schools were Truax, Cottonwood, and Murray 23, all of which went through the eighth grade level of education. The Washita Farm School, located on the present day site of the Refuge pavilion, opened in 1930 and provided a high school education opportunity for every child living on the Washita Farm.

The Washita Farm specialized in Duroc Jersey hogs and built a concrete hog barn on the farm with an internal waste cleaning system and electricity, which was state-of-the-art for the time.

The editor of the Capital-Democrat newspaper stated, "The establishment will revolutionize the hog industry in this section of the country." In 1928, there were 42 five-room concrete homes for managers and tenants, a concrete hatchery building with two large incubators capable of handing 22,000 eggs, a concrete hog barn housing 400 hogs, a concrete main office and store containing 10,000 square feet, 14 concrete grain silos, and a chicken rearing barn 5,000 square feet in size. The farm also included 40 barns, 6 frame houses, 22 box houses, 9 sheds, and 33 garages.

In 1938, Congress authorized the USACE to build a dam near Denison, Texas, thereby creating Lake Texoma along the Oklahoma and Texas border. The Chapman family fought to save their farming showplace but ultimately lost, and their land was condemned by the Federal government. Dismantling of Washita Farm began in 1941 and was finished by 1943 as the impounded waters began to flood the fertile fields.

Today, Tishomingo NWR uses seven of the sturdy concrete buildings for operations and maintenance. The former Washita Farm headquarters building is now the headquarters for the Refuge, and one concrete residence is used to house Refuge staff. The submerged concrete buildings found in Cumberland pool provide popular spots for crappie fishing and are known locally as the "house tops."

3.4.1.3 Other historical sites

The Harley family burial ground is located on present day Refuge lands, and the old homestead of former governor William O. "Alfalfa Bill" Murray is also located within the Refuge boundary but is now covered by lake waters. According to the Service Archeological Literature Survey Report of 1997, the Refuge has 16 known sites within its boundaries; 14 have register numbers and 2 had applications in process at that time. A majority of these sites were indicated as having surface debris, which included stone tools, points, and flakes. Some showed burial sites and foundations.

3.4.2 Population and Economic Profiles

3.4.2.1 Population

According to the U.S. Census Bureau, the State of Oklahoma had a population estimate of 3,642,361 in the year 2008. Among the 50 states, it ranked as the 28th most populous. By 2025, it is projected to have a population above four million people. Approximately 10,286 residents resided in Johnston County in 2008. From 2000 to 2008, among the 77 counties, Johnston County population was ranked 59th within the State of Oklahoma.

Citydata.com (2007) indicated that 75.4 percent of the population of Johnston County is non-Hispanic whites. Native Americans contribute approximately 20.1 percent to the total population. African-Americans and Hispanics each contribute approximately two percent to the county's population.

The Refuge is located in Johnston and Marshall counties with populations of 10,286 and 14,919, respectively. The Refuge is located approximately three miles southeast from the city of Tishomingo. Tishomingo is the only city in the Johnston County with a population greater than 1,000. Several small towns are within 25 miles of the Refuge, including Madill, Milburn, and Nida. Dallas (with a population of 1,279,910) and Oklahoma City (with a population of 551,789) are within 120 miles of the Refuge. Including Fort Worth, the Mid-Cities, and metro

Oklahoma City, more than six million people live within 120 miles of the Refuge, providing a tremendous potential for delivering a conservation message to the public.

3.4.2.2 Regional Economic Profile

The primary economic sectors (categories of economic activities) in the region include manufacturing, public administration, healthcare services, retail, and agriculture. However, there has been a steady decline in agricultural occupations over the years, with those jobs being replaced by manufacturing, retail, and healthcare services (City-data.com 2009).

The estimated median household income for the region in 2007 was $30,605, with an estimated median home value of 70,760. The median real estate property taxes paid for housing units in the area during 2000 were $245 (0.05 percent). The average unemployment rate for the region was 5.7 percent.

3.4.2.3 Economic Profile

The economic impact of Refuge operations is mainly in the neighboring communities of Tishomingo, Madill, Ardmore, and Durant. Operations and maintenance funds channel an estimated $90,000 directly into community businesses. All seven Refuge employees live and shop within this area. Youth and other cooperative programs provide occasional employment to members of the community.

The Refuge provides various wildlife-dependent recreational opportunities—with fishing, hunting, and wildlife observation being the most popular. According to traffic counts, the Refuge receives approximately 210,000 visitors a year. Approximately 22,500 anglers and 1,357 hunters use the Refuge each year. While the Refuge has many out-of-state visitors, the majority of visitors are from nearby communities. Local community businesses, including restaurants, grocery stores, motels, service stations, and sporting goods stores, profit significantly from these public use programs.

The Refuge's annual budget is approximately $750,000, and the majority of this money is recycled in the local economy through Refuge staff salaries, purchases from local suppliers, and service contracts.

Johnston and Marshall counties do not receive payments from the Service under the Refuge Revenue Sharing Act of 1978, Public Law 95-469, because all Refuge lands in Johnston and Marshall counties are considered the property of the Corps, and that agency makes a payment to the county in lieu of taxes. However, Johnston County does receive payment in lieu of taxes from the Service for the 235 acres occupied by the Tishomingo National Fish Hatchery, which was established in 1929.

3.4.3 Wildlife-Dependent Recreational Opportunities

The National Wildlife Refuge System Improvement Act of 1997 recognizes six wildlife-dependent public uses—hunting, fishing, wildlife observation, photography, environmental education, and interpretation—that are determined to be appropriate uses . The refuge manager must determine if an activity is a compatible use before allowing it on the refuge. The refuge manager must find that the compatible use will not interfere with or detract from the fulfillment of the refuge before undertaking a compatibility review to provide the greatest benefit to refuge resources and the public. Determinations on whether or not to allow otherwise compatible uses are based on compliance with other laws, the System mission, policy, refuge purposes, availability of resources to manage the use, possible

conflicts with other uses, public safety, and other administrative factors. (USFWS, Service Manual 603 FW 1&2)

The Refuge has many recreation facilities, buildings, roads, trails, boat launches, and other features that support visitor use, with approximately 210,000 visitors per year (Figure 3-5). Visitors can access the Refuge easily from Interstate Highway 35 or U.S. Highway 75, major north-south highways in Oklahoma and Texas. The Refuge headquarters is located southeast of Tishomingo, Oklahoma. There are multiple signs directing visitors to the many public use areas.

All refuges are closed to the public, until specifically opened for selected activities. It has been determined that the following public uses are compatible with the purpose for which the Refuge was established: limited waterfowl, deer, turkey, dove, quail, squirrel, and rabbit hunting; fishing; camping; wildlife observation; photography; boating; hiking; and picnicking.

These uses are accommodated by such facilities as the Craven Nature Trail, including a small wildlife observation pier on Dick's Pond, the Refuge visitor center, and the Tishomingo WMU opened for hunting and fishing.

Four roadways provide visitors excellent opportunities to view wildlife, natural habitats, and Refuge management practices on more than 4,000 acres. The main entrance road through the heart of the Refuge is open seven days a week, 365 days a year.

3.4.3.1 Hunting

Within the Tishomingo WMU, limited waterfowl, deer, turkey, dove, quail, squirrel, and rabbit hunting is an acceptable form of wildlife-oriented public recreation compatible with the purpose for which the Refuge was established, and offers hunters high quality hunting opportunities. The Service and the ODWC manage the 3,170-acre WMU cooperatively under secondary jurisdiction from the Corps. The Service manages for habitat conservation, while the ODWC manages hunting activities. ODWC allows hunting on the WMU from October 1 to March 1 following the Oklahoma State hunting seasons. Hunting is allowed as "walk-in" only. No motor vehicle use is permitted while hunting in the WMU. The WMU consists of three separate areas: the Check Station Unit, the Airport Unit, and the Pennington Bottom Unit. All hunters using shotguns must use steel shot only and must self register because the check station is no longer manned. Dove hunting is permitted from September 1 to September 30. Squirrels and rabbits may be hunted after the close of the dark goose season. Quail hunting is permitted from February 1 to the end of the State season.

White-tailed deer hunting occurs on the rest of the Refuge through controlled hunt drawings conducted by the ODWC.

Numerous public land hunting opportunities, including waterfowl hunting, are located in the areas surrounding the Refuge on both Corps and State managed lands: (Figure 3-5).

3.4.3.2 Fishing

Daytime fishing from shore is allowed Refuge-wide, year-round in accordance with State regulations. Fishing from boats is allowed 24 hours a day during the boating season. Night fishing from the bank is permitted at the Headquarters Area, Sandy Creek Bridge, Murray 23, Nida Point, Pennington Creek, and in the WMU.

Cumberland Pool is approximately 5,100 acres and is managed primarily for public water, wildlife, and recreational (i.e., fishing, boating) use. Other fishing areas include Sandy Creek

Bridge, Murray 23, Rock Creek Lake, and Bell Creek, and the WMU's McAdams Pond (8 acres), Muel Lake (12 acres), Reeves Ravine (48 acres), Lost Lake (10 acres), Teal Pond (2 acres), Whiskey Creek (5 acres), and Bobcat Gulch (10 acres). Also, anglers can bow fish in the WMU. Approximately 22,000 of the 210,000 annual visitors come to the Refuge to fish.

3.4.3.3 Wildlife Observation and Photography

Several activities and facilities currently in place provide the public with opportunities to observe and enjoy the Refuge's wildlife resources. With approximately 62,000 visitors participating annually, wildlife observation and photography is by far the most popular recreational activity. An observation tower with a spotting scope east of Big Sandy Creek is available to engage visitors, as is the Craven Nature Trail. The observation deck is roofed with railings and benches. It is most popular during the winter when large numbers of geese, ducks, and other birds are readily viewable through the 20-power spotting scopes mounted there. Recently, the overlook at Nida Point was equipped with two spotting scopes and benches. The Craven Nature Trail is a ¾-mile loop trail that offers a close look at forest and marsh habitats along the wooden boardwalk.

The WMU is closed to vehicle access for a short time during the fall and late winter to accommodate the hunting programs. The Refuge entrance drive is always open for visitors to observe the fall flights of migratory birds resting and feeding on Refuge farm fields and on the Cumberland Pool lakeshore.

3.4.3.4 Environmental Education and Interpretation

The Refuge currently accommodates a few requests for classroom and group presentations on- and off-site, as well as hosts several types of presentations on-site annually for civic and other adult groups. Local grade school and high school classes complement their environmental education curriculum with a visit to the Refuge. The Refuge presented brief programs, including 13 education programs on the Refuge in 2007. The total number of participants involved in Refuge programs in 2007 was 3,945.

Refuge staff provides limited environmental education programs and outreach efforts due to a small staff and limited funding. The Refuge staff encourages and solicits environmental education and offers outdoor classroom opportunities for area schools and universities. Local grade school classes conduct field trips to the Refuge. Teacher workshops, such as Project WILD, have been held on the Refuge to encourage teachers to use the Refuge for curriculum enrichment. Wildlife classes from local colleges and high schools regularly use the Refuge for field studies during the fall and spring semesters, and presentations to civic groups are provided upon request.

School presentations are rare due to limited personnel and time resources. This is the area where the Refuge has the greatest potential to grow if provided the staff and funding to put forth a long-term consistent outreach effort in the community. Community outreach will be instrumental in building a supportive constituency and will further the understanding, appreciation, and stewardship of our natural resources.

A number of interpretive signs with photographs addressing Refuge bird species are located on Craven Nature Trail. Interpretive signs and brochures describe cultural resources along the Oklahoma Legacy Trail on the Refuge. There is a sign interpreting Washita Farm, with an accompanying brochure located at the observation tower. Three panels in the entrance kiosk interpret wildlife resources and viewing opportunities on the Refuge.

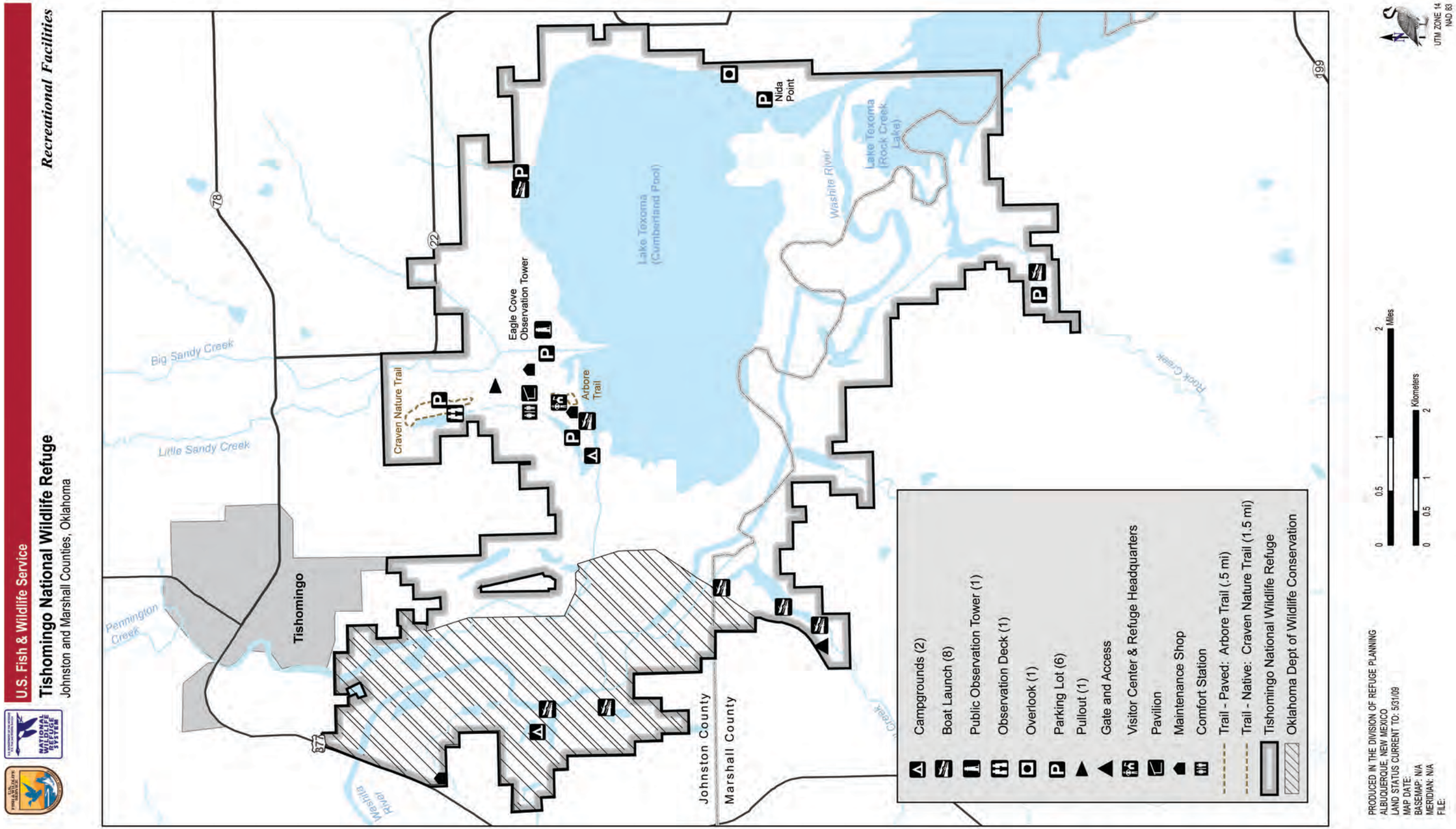

Figure 3-5. Recreation and Facilities and Buildings Map

3.4.4 Public Access and Transportation Management

Access on refuges is provided primarily to facilitate the six priority public uses of the Refuge System (hunting, fishing, wildlife observation, photography and environmental education and interpretation), when compatible with refuge purposes and the Refuge System mission. Public access is normally only allowed in designated areas and along designated routes of travel (e.g., roads, trails, waterways, and other routes). Designated routes of travel can be public roadways (e.g., State or county roads) and waterways or refuge roads, trails, and waterways. Refuge routes of travel and access are maintained, improved, or added through various funding sources, with one of the main sources being the Refuge Roads Program (RRP).

The RRP was established in June 1998 as part of the Transportation Equity Act for the 21st Century (TEA-21) and reauthorized in August 2005 under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). This makes Federal highway funds available for Refuge roads; it pays the cost of maintenance and improvement of these roads, as well as parking areas, rest areas, pedestrian and bicycle trails, and related facilities. This also includes administrative costs associated with such maintenance and improvements. Refuge roads are generally any road open to public travel that provides access to or within a unit of the Refuge System and for which title and maintenance responsibility are vested in the United States Government.

All projects funded under the RRP must be consistent with the goals and objectives outlined in comprehensive conservation plans and step-down management plans. The Service's refuge planning policy requires that one of the elements to be considered in the development of a comprehensive conservation plan are transportation issues, including public use roads and trails; and passenger vehicle, pedestrian, and bicycle needs as appropriate for the refuge. Refuge transportation infrastructure and related issues will be coordinated with the respective State or county transportation agencies and metropolitan and rural road planning organizations to assure that, among other considerations, there are no negative impacts to traffic congestion or air quality on the Refuge.

Tishomingo NWR has 2.93 miles of paved roads within the Refuge, with 1.6 miles of that being the north entrance road leading to the Headquarters site. The remaining paved roads are Sandy Creek Road, Goose Pen Pond Road, and the Headquarters Boat Access Road. In addition, there are 9.17 miles of unpaved roads on the Refuge, most of which are directly associated with recreational facilities and/or sites. In connection with the roads system, there are 11 paved parking areas and 23 unpaved parking areas.

3.4.5 Law Enforcement

There is currently a law enforcement officer stationed at the Refuge that is responsible for enforcement of Refuge regulations and State laws on the Refuge. Most law enforcement actions involve violations of Refuge regulations, such as speeding, disturbing wildlife, removing plants, littering, and vandalism.

3.4.6 Land Use/Current Management

Refuge grasslands evolved with grazing by native ungulates like bison and elk (*Cervus canadensis*) as an inherent part of the environment; until recently, Refuge grasslands were grazed by domestic livestock. Over the years and prior to becoming a Refuge, rangelands were plowed and converted to croplands. Much of the soil placed under cultivation was not very suitable for crop production and considerable erosion occurred. Present plant associations

reflect changes caused by overgrazing, plowing native rangeland, and in a few instances, prairie restoration efforts. Current management of grasslands is aimed at restoring warm season perennial bunch grasses, as they offer the greatest cover potential for ground nesting birds while providing abundant forbs, which produce the seed for wildlife food. The landscape objective is to have prairie grasslands at or approaching climax with a patchwork pattern of use providing the greatest diversity of microhabitats achievable.

3.4.6.1 Croplands

The Refuge was established to aid in the restoration of this section of Oklahoma as an important Canada goose and duck migration area. The value of the Tishomingo area to waterfowl had become minimal prior to construction of Lake Texoma and development of the Refuge because of changes in agricultural practices in the local area, mainly away from row crops to dairy and cattle pasturage with limited grain production.

However, by 1943, much of the area had been purchased and evacuated for the construction of Denison Dam, which was completed in 1944. Although Lake Texoma flooded most of the agriculturally rich bottomlands, farming operations resumed on uplands adjacent to the lake. The combination of abundant supplemental food sources and year-round aquatic habitat provided an optimum location for migrating waterfowl. Ultimately, the economic realities of agriculture have led to a reduction in regional farming operations, resulting in an overall loss of supplemental waterfowl food supplies and thereby contributing to less waterfowl retention in the area.

Refuge cropland use is planned and implemented to produce grain (or alternative crops) and browse to meet the forage requirements of geese, ducks, and other wildlife for the critical period of December and January (up to half a million use days). Approximately 1,000 acres of the Refuge are planted with winter wheat, corn, milo, sunflower, millet, and cowpeas. Green browse and/or cereal grains are grown to be available to wintering waterfowl and other wildlife from October through February. White-tailed deer (*Odocoileus virginianus*) also use these areas for food and cover.

The Refuge practices low input sustainable agriculture, which incorporates crop rotation for soil enrichment. Fallow fields are planted in legumes to provide erosion protection, organic material, and increased soil fertility. The Refuge uses herbicides as a component of Integrated Pest Management (IPM) practices, but more often employs mechanical methods of weed control. The Refuge plans to obtain a sweep (stubble mulch) plow that cuts weeds two to four inches below the surface without disturbing the soil-holding thatch on the surface. The Refuge periodically uses fertilizer as a way to improve the fertility of the soils. Where possible, crops are drilled through the remnants of the previous year's planting, reducing the need to disturb the soil and reducing fuel consumption. Refuge personnel conduct the farming practices at the Refuge.

3.4.6.2 Forest Lands

Approximately 1,566 acres of the Refuge are classified as non-commercial forest lands. This acreage is a combination of planted windbreaks or shelterbelts and native bottomland hardwoods found along the Washita River. Some of the dominant tree species are eastern cottonwood (*Populus deltoides),* hickory (*Carya* spp.), elms (*Ulmus* spp.), and oaks (*Quercus* spp.). Currently, management of these forested areas is limited to protecting this resource.

3.4.6.3 Grasslands

The Refuge contains approximately 419 acres of native grasslands. Dominant grass species include little bluestem, Indiangrass, switchgrass, sand dropseed, and sideoats grama. Native forbs include basketflower and firewheel, and much of this grassland is vulnerable to erosion. Management of these areas is aimed toward maintaining a healthy grassland ecosystem with a diversity of plant and animal species.

3.4.6.4 Water Management and Quality

The Refuge is located north of the Red River, on the Washita River arm of Lake Texoma, largely within the floodpool of Lake Texoma, which was completed by the Corps in 1944. The Corps still has primary jurisdiction of the impoundment and can manage the waters for project purposes without notice to the Refuge. Project purposes include flood control, navigation, municipal and industrial water, hydroelectric power generation, and recreation. Water resources in the lake are subject to the Red River Compact, and are heavily allocated. The Texas Natural Resources Conservation Commission (TNRCC) also exercises jurisdiction over Lake Texoma water. Siltation and delta formation over the years has isolated the Cumberland Pool from the main lake, and water levels are influenced greatly by Lake Texoma water manipulation.

Water is a prime component in any wildlife management regime. The Refuge has more than 15 small impoundments constructed in draws and small wet weather streams varying from cloudy to clear. Since these areas are below the lake's flood levels, they are subject to occasional siltation. Most of the small water impoundments have water control structures in place; however, many of these have become non-functional due to siltation. Previous controls were primarily for the purpose of drainage for management of aquatic growth and rough fish (i.e., carp and buffalo) control. Once silted, these ponds are difficult to clear, particularly since the floods stock them with rough fish that continually roil the water. Water management of lakeshore impoundments is seriously affected by lake levels; when lake levels are too low, there is no water to flood the impoundments, and when lake levels are too high, dewatering is impossible. However, the Refuge does not have control over the lake's water level.

The Refuge is located in the Lower Washita watershed. This watershed encompasses approximately 641 square miles in Oklahoma and extends across seven counties. The watershed includes 587.2 total river miles, including 318.8 perennial river miles and 178 lakes with 41,842.5 total watershed acres. The overall water quality of the Lower Washita watershed is ranked by the U. S. Environmental Protection Agency as 3 on a scale of 6, with 1 being pristine water quality. This ranking indicates a watershed having less serious problems with low vulnerability to future impact changes (EPA 2000). Water quality of the Refuge could be affected by the discharge of treated water, potentially high in nutrients and other pollutants. Upstream agriculture, upstream refinery practices, and upstream effluent actions may also affect the waters on the Refuge.

Pennington Creek is the one substantial drainage actually entering the Refuge and draining into Cumberland Pool. This creek is the main source of water for the City of Tishomingo, and the city's municipal sewage treatment plant is constructed along this same creek. Municipal sewage plant effluent is released into the creek above the Refuge. In July 2005, the Service submitted an application to the OWRB to appropriate water from Pennington Creek (Application # 2005-017). The Service wanted to ensure water levels and storage volumes within Cumberland Pool. After a number of discussions, the OWRB and the Service ultimately agreed that a designation for a minimum flow restriction for Pennington Creek

would be sufficient to meet the needs of the Refuge. Furthermore, it was determined that a designation for flow rates and volumes through Pennington Creek would be determined after a hydrologic study of the area was completed by the United States Geological Survey (USGS). The study focuses on the Arbuckle-Simpson Groundwater Basin and should provide guidance on establishing minimum flows for spring fed creeks (like Pennington Creek) in the basin. The study is scheduled to be completed by the end of 2009. Communications between the State of Oklahoma and the Service are ongoing, and as of the present time, no decision has been made by the State of Oklahoma.

3.4.6.5 Fire Management

The Refuge has one or two wildfires every few years, primarily during times of drought. Fires are generally caused by lightning; however, occasionally, arson fires have occurred. Luckily, Refuge wildfires are not common now nor have they been in the past. Adjacent landowners graze native grasslands that maintain short vegetation, so the chances of a wildfire on private lands are relatively low. Cooperative agreements for fire suppression are essential since the Refuge has limited resources to fight wildfires on the Refuge. Volunteer fire departments have initial control responsibilities on private and Federal lands, but are generally poorly trained and funded to handle grass and brush fires. Statewide fire suppression activities are coordinated by the Oklahoma Forestry Service, with support and assistance from various Federal agencies.

3.4.6.6 Research

The research priorities of the Refuge are the continued monitoring and study of the alligator snapping turtle and selected birds, such as the prothonotary warbler, along with the nesting status of the interior least tern. In addition, ongoing research will include monitoring and evaluating the effectiveness of prescribed burning and other methods of habitat management for non-native invasive and native invader species control.

3.4.6.7 Sanctuary Areas

The Refuge has designated sanctuary areas within Cumberland Pool and along the south banks of Big Sandy Creek that provide undisturbed habitat for many wildlife species. Restrictions imposed by the Refuge on these sanctuary areas are intended to limit outside impacts and indirect stress on all wildlife species, thereby promoting the unaltered continuation of normal wildlife behavior.

3.4.6.8 Wilderness Potential

Wilderness areas are Service lands designated by Congress to be managed as a unit of the National Wilderness Preservation System in accordance with the terms of the Wilderness Act of 1964 (Wilderness Act). An area of wilderness as defined in the Wilderness Act (U.S.C. 1121 (note) as "an area of underdeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprints of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or primitive and unconfined type of recreation; (3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value."

The Service has considered the potential for designating wilderness areas on the Refuge. The Refuge was evaluated for the presence of 1) existing physical structures (roads, houses building, water facilities, and other structures); 2) legal requirements and/or constraints (including but not limited to endangered species and law enforcement); and 3) management priorities (including but not limited to prescribed fires, wildlife habitat and/or wetland development, and public use) that would preclude such designation.

It has been determined that the Refuge does not conform to the definition of a wilderness, as described in the Wilderness Act. The area has been noticeably affected by humans (historic homesteads, farming, and logging). In addition, due to existing inholdings and associated rights-of-way, there are no extensive undisturbed areas that provide for outstanding solitude and primitive recreational opportunities. Designation of a wilderness area that meets the standards of the Wilderness Act (approximately 5,000 acres) would potentially conflict with other Refuge management goals and the operation and maintenance of the underlying Corps projects, specifically Lake Texoma. On September 8, 2000, the Refuge conducted a wilderness review in accordance with Director's Order No. 125 and reported a negative finding. Circumstances on the Refuge remain unchanged from the time of the 2000 wilderness review.

3.4.6.9 Other State and Federal Managed Lands

Within approximately 80 miles of the Refuge, there are a number of State and Federal managed parks, reservoirs, grasslands, natural areas, wildlife management areas, and recreational areas (Figure 3-6. Other State and Federal Managed Land Maps). The relatively close proximity of these lands to the Refuge could provide additional opportunities to research and compare the effects of disturbed and undisturbed habitat use on biota within the same ecosystem.

(This page intentionally left blank.)

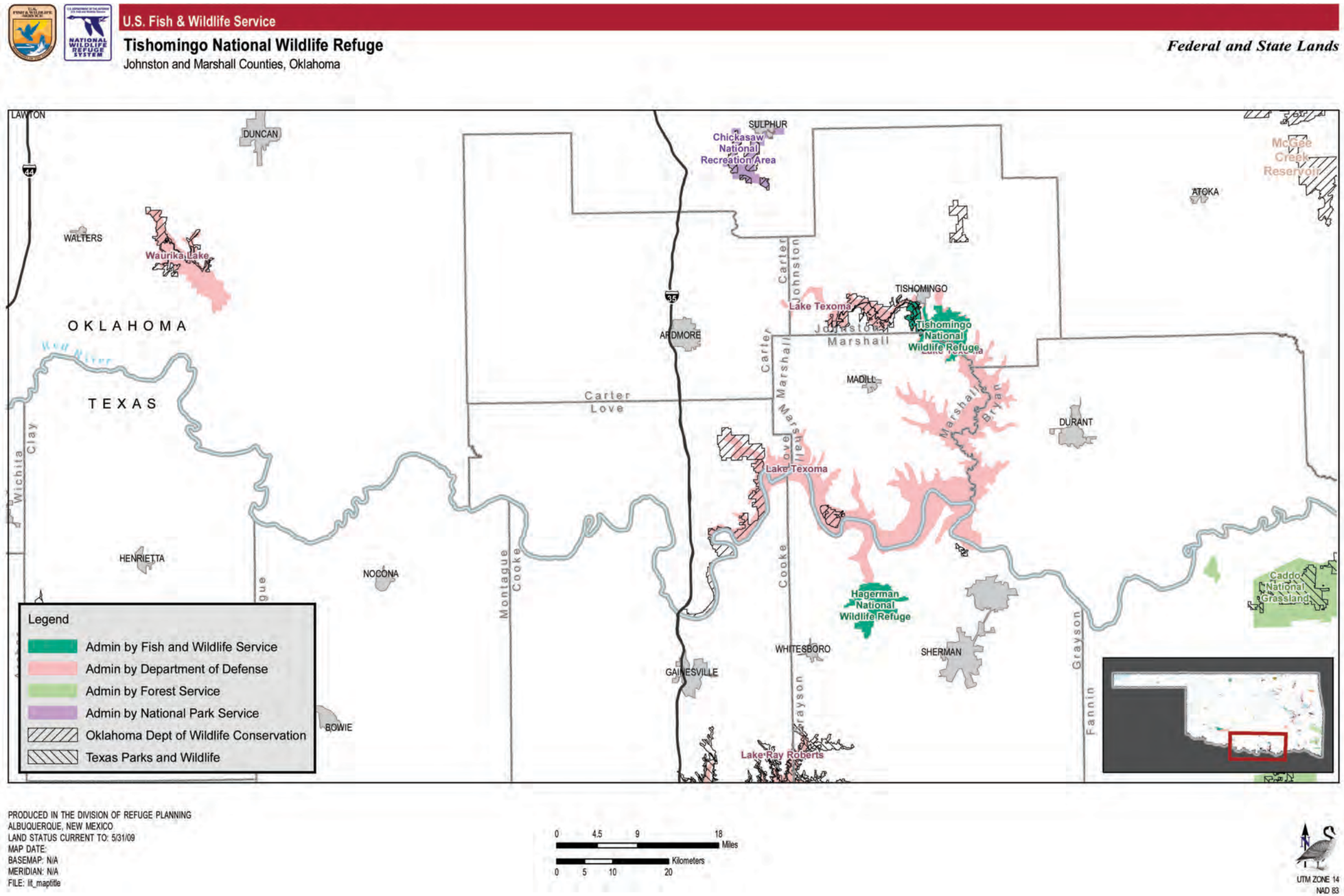

Figure 3-6. Other State and Federal Managed Land Maps

4. Refuge Management Direction: Goals, Objectives, and Strategies

The following goals, objectives, and strategies are the Service's response to the issues and concerns expressed by the planning team and the public; unless otherwise noted in the text, they are expected to be implemented throughout the 15-year term of this Plan. Because the Refuge Plan is a working document, modifications to the following objectives and strategies are anticipated. Ultimately, these proposed actions are designed to assist in the achievement of both the purposes of the Refuge and the mission of the Refuge System.

Planning Horizon: 15 Years

Short-Term Objectives: 1 to 7 years

Long-Term Objectives: by end of 15-year period

4.1 Habitat Conservation (Protection and Restoration)

Goal 1: **Habitat Conservation (Protection and Restoration)**: Preserve and restore habitat for migrating waterfowl, Neotropical migrants, other migrating birds, threatened and endangered species, and other species of concern. Promote ecological integrity and achieve natural diversity.

Rationale:

The present day environment has been altered markedly from the historic record by changes in land use patterns and interruptions in natural fire processes. The effects of these changes have resulted in the loss of native habitat diversity. Resulting conservation challenges have arisen from changing land use patterns, including altered fire cycle, livestock overgrazing, red cedar encroachment, conversion of native habitats to non-native forages and crops, residential and industrial development, alteration of riparian habitat, changing patterns of land ownership, invasive species, and increased water usage.

Objective 1: **Convert existing fallow farm fields to native prairie, and implement monitoring with follow-up treatment** (Short-term 50 acres; long-term 125 acres).

Rationale:

A major Tishomingo NWR habitat challenge is to bring back the natural plant biodiversity of a grassland habitat that was converted to crop production (now fallow farm fields) in the 1920s. The historic biodiversity of these areas were substantially altered by the planting of row crops, which removed native grasses and forbs. Once the farm fields were removed from ongoing agricultural practice, they were readily invaded by non-native species. The myth that fallow farm fields naturally regenerate to native prairie is far from fact. A comprehensive IPM approach to controlling eastern red cedar and non-native invasive species such as Johnson grass and Bermuda grass in fallow farm fields must be designed and implemented before the 80 percent goal of native grasses and forbs will be achievable. Such a plan should include herbicide applications, prescribed fire, mechanical removal, and other species-specific control methods as appropriate.

Native warm season grasses (also called "bunch grasses") grow with spaces between the "bunch" that are readily utilized by ground nesting birds and make ideal wildlife habitat. The return of prairie forbs in the form of native wildflowers is also fundamental to sound restoration work. Wildflowers benefit pollinators such as butterflies, bees, and moths. Pollinators are considered guardians of the biological integrity of ecosystems, because they are crucial to the reproduction of many plants. There is increasing evidence that many pollinator species are in decline, and the restoration of native prairie can only benefit their plight.

Native grass usually takes at least two years to become established, and periodic monitoring and follow-up treatment will be needed to prevent re-invasion by red cedar and non-native plants. Young native grass is susceptible to harsh environmental conditions, and replanting of some areas may be required to obtain the 80 percent goal. The cost for a native grass and wildflower seed mixture averages $400 per acre, with some native wildflower seed costing $300 per pound.

Strategy 1: Complete a floristic inventory on Tishomingo NWR to develop baseline data for vascular plants (RONS #05NNN).

Strategy 2: Increase controlled burning as a grassland management tool to increase plant vigor and structural variation.

Strategy 3: Delineate and prioritize manageable areas for restoration, and develop parameters to determine restoration progress of targeted grassland areas.

Objective 2: Control eastern red cedar, invasive species such as salt cedar, and feral hogs to reduce their impact; increase native shrub habitats, hardwood bottomlands, and grasslands (long-term and beyond)**.**

Rationale addressing invasive plant species:

The Cross Timbers is an abrupt transition from prairie to forested landscape where fire played a central role (Ladd, 1991) in maintaining both the structure of woodlands and the existence of prairie islands. This lack of fire has caused the reduction of native shrub habitat and allowed the invasion of eastern red cedar into both hardwood bottomlands and grasslands. The resulting red cedar invasion into these habitat types raises concerns for all Oklahomans based on environmental changes, safety, economic impacts, and health.

The Oklahoma Conservation Commission reported in 2002 that Oklahoma is losing over 300,000 acres of rangeland habitat each year to this invader. Once eastern red cedar dominates the habitat grasses, forbs and shrubs are lost from the plant community, causing the reduction of associated wildlife species. Eastern red cedar is costing the State of Oklahoma $218 million a year in loss of cattle forage, wildlife habitat, recreation, and water yield. This annual economic loss will increase to $447 million in 2013 if steps are not taken to control the growing population of cedar, according to the Oklahoma Conservation Commission (2003). Cedar also creates a significant fire hazard, as their densities continue to spread at the rate of 762 acres a day. Pollen grain concentrations from red cedar have tripled in 10 years and are a growing health concern for many Oklahomans.

The use of prescribed burning is the most cost effective cedar control strategy, but it is not practiced widely because of legal concerns under Oklahoma's liability law. Cedars reaching a height of 10 feet or more are also difficult to control with prescribed fire, as it is nearly impossible to kill all of the green branches near the top of the tree.

Mechanical removal of cedar trees is a very expensive option. For example, the Chickasaw National Recreation Area, a local unit of the National Park Service, contracted cedar tree removal with the following costs: $450 per acre to cut cedars on site and leave them for burning, and $1,200 per acre to completely remove the trees as mulch. Under this option, Tishomingo NWR would have an estimated $250,000 to $2,500,000 in cedar removal needs. The Refuge does not have the necessary funding to contract for the removal of cedar trees; therefore, the refuge relies upon issuing cedar removal permits to private individuals.

Eastern red cedar tree removal permits are issued by public drawing with permittees awarded the right to remove all sizes of cedars for saw timber, lumber, furniture, post, mulch, etc. The economic value to the permittee is far outweighed by the benefit to the natural resources without the high cost of contracting for removal. The permits require that the eastern red cedars be cut down within four inches of the ground because the cedar tree will not regenerate from the root system if the tree is cut below the last green limb. Therefore, the tree, along with its root system, is permanently eliminated after being cut off close to the ground.

Development and implementation of a weed inventory and mapping protocol will identify areas for treatment and/or removal of eastern red cedar and invasive plants. Mapping of red cedar and non-native invasive plants will provide up-to-date data on species occurrence, spread, and density to assist with determining the most efficient and effective site-specific means of control. In addition to red cedar, the refuge needs to address the emerging threat of salt cedar invasion along the Washita River. Salt cedar is highly competitive, increases fire frequency in riparian areas and subsequent destruction of native trees, and can increase soil salinities, resulting in modification or elimination of native forbs and grasses. Early control of salt cedar will prevent spread and minimize control costs.

Rationale addressing feral hogs:

Feral hogs are domestic hogs that have escaped into the wild or have been released for hunting purposes, ultimately becoming a free-ranging population. Hogs were first introduced into the Americas in 1498 by Christopher Columbus and have been present in Texas since 1689. In neighboring Texas, the Texas Department of Agriculture estimated in March 2007 that feral hog damage to state agriculture alone was $52 million each year. Feral hogs in Oklahoma are experiencing a dramatic population explosion and can now be found in all 77 counties, with the southern part of the state reaching the highest densities. Sows are capable of breeding at six months of age and can have two litters per year. Average litter size is approximately 6, with larger litters reaching up to 13.

Refuge staff requested in November 2000 that the U.S. Department of Agriculture (USDA) Wildlife Services develop a program for reduction of feral hog numbers on the Refuge. The intent of the program was to reduce hog numbers to a level that would not conflict with Refuge objectives and would not compromise a safe, quality wildlife recreational experience for the public. The program developed by the USDA proposed reducing hog numbers by a combination of shooting hogs on sight by Refuge staff, live trapping, and aerial shooting from helicopters. The cost for the program was estimated at $70,000 for the first year and $50,000 for each subsequent year.

Tishomingo NWR lacks the funding to pay for the recommended control program, and the refuge staff is too few to successfully reduce the feral hog population. Therefore, the Refuge uses the most effective option available, which is the issuance of no-cost live trapping permits to private individuals. Feral hog live trapping permits are issued by public drawing, with

permittees allowed the right to remove feral pigs from the Refuge. The economic value to the permittee is outweighed by the benefit to the natural resources without the cost of contracting for services. Permittees must comply with the Oklahoma Feral Swine Control Act enacted in 2007 by the State of Oklahoma, which requires all transporters of feral swine to be licensed with the Oklahoma Department of Agriculture (Food and Forestry, 2008); it also sets reporting requirements and establishes criminal penalties for release of feral swine into the wild. The program is successful: two live trapping permittees removed 476 feral hogs Refuge-wide in 2006, whereas public hunting by 594 hunters on the WMU removed only 52 hogs.

The development and implementation of an IPM program will assist with reducing risk to natural resources, the public, and the environment from pests and pest management related strategies. IPM will incorporate monitoring infestation levels and treatment strategies into an overall decision making process.

Strategy 1: Utilize habitat management techniques (such as native species planting, prescribed fire, and protection of Cross Timbers habitat from disturbance) to enhance desirable species. Reduce or eliminate invasive species by chemical and mechanical removal (RONS #04NNN).

Strategy 2: Control the feral hog population that is severely degrading Refuge habitat and wildlife resources. A term appointment biotech will be responsible for assessing the Special Use Permit live trapping removal program currently underway at the Refuge (RONS # 00002).

Strategy 3: Control invasive eastern red cedar trees that are severely degrading Refuge habitat and wildlife resources (RONS #04NNN). The current Special Use Permit process has produced limited results, and other management techniques (such as chemical and mechanical removal) will be initiated.

Strategy 4: Develop and implement an IPM program for the control or removal of invasive exotic weeds, woody plants, feral hogs, and fire ants that negatively affect habitats and crop production, and pose risk to Refuge visitors.

Strategy 5: Develop and implement a volunteer based weed inventory and mapping program to determine species, location, extent, and relative abundance of non-native invasive plants on the Refuge.

Strategy 6: Work with the invasive species biologist for Texas and Oklahoma to secure funding, and implement a salt cedar management project focusing on early detection and rapid response.

Objective 3: **Continue to protect endangered, threatened, and other species of concern, and maintain or improve their habitats on Refuge and adjacent lands** (long-term and beyond).

Rationale:

The Johnston County list of endangered and/or threatened species, maintained by the Ecological Services office of the U.S. Fish and Wildlife Service, currently contains five species: American peregrine falcon, bald eagle, interior least tern, piping plover, and whooping crane. The bald eagle and American peregrine falcon were recently removed from the listing status but are still within the five-year monitoring protocol for delisting species. The refuge has a

winter migrating population of bald eagles, an occasional peregrine falcon, and a non-nesting population of interior least terns that utilize Refuge lakeshore and sandbar habitats.

Oklahoma Species of Special Concern – Category I Species recorded on the Refuge include the golden eagle and the ferruginous hawk. Category II Species include the river otter, Swainson's hawk, barn owl, loggerhead shrike, Bell's vireo, alligator snapping turtle, Texas horned lizard, and the alligator gar. The Refuge also has several other "accidental" species (those that have been seen only once or twice) that are listed on the Oklahoma Species of Special Concern list.

The development and implementation of a Refuge Habitat Management Plan will establish biological goals, objectives, and strategies for habitat management of Tishomingo NWR. Endangered, threatened, and Oklahoma Species of Special Concern will be included within focal species of each habitat type on the Refuge. The Habitat Management Plan will assist with defining how the Refuge can best contribute to maintaining biological diversity and determining biodiversity objectives within the southern Great Plains and Cross Timbers Ecosystem.

Strategy 1: Determine the population status of the State listed Texas horned lizard on the Refuge by analyzing habitat, food availability, disturbance, and other factors that may be influencing the population decline (RONS #00007).

Strategy 2: Develop population monitoring surveys for species of concern to determine if Refuge objectives are being met and to determine population fluctuations and trends in habitat use. (RONS #00004).

Strategy 3: Develop a population monitoring survey for the alligator snapping turtle, which is an Oklahoma listed species of concern. The program will be developed in conjunction with the Tishomingo National Fish Hatchery and Oklahoma State University.

Strategy 4: Conduct a comprehensive survey of all habitats on the Refuge to determine species types of resident bats and their roost sites (RONS #00005).

Objective 4: Monitor population status of priority species of Neotropical and other migratory birds by completing one comprehensive migratory bird survey (long-term)**.**

Rationale:

Tishomingo NWR falls within the Oaks and Prairie Joint Venture, which is a self-directed partnership of government and nongovernmental organizations that work across administrative boundaries to deliver science-based avian conservation. Tishomingo NWR harbors a rich assemblage of resident and migratory bird species. However, breeding bird surveys conducted within this joint venture suggest that 60 percent of bird species breeding in grassland habitat and 40 percent of species breeding in shrub habitat are experiencing long-term declines.

The Oaks and Prairies BCR is home to 450 species of birds, and Tishomingo NWR provides sanctuary to over 275 of those species. The Oaks and Prairies BCR lists 30 bird species of major concern; 24 of those use Tishomingo NWR habitats. The Partners in Flight North American Landbird Conservation Plan states that over 25 percent of the global breeding population of painted buntings and scissor-tailed flycatchers (both of which nest on the

Refuge) are within the Oaks and Prairie Joint Venture. The Oklahoma and Texas state bird conservation plans list 88 of the 275 bird species found on the Refuge.

Strategy 1: Determine habitat use and abundance of migratory birds with emphasis on Neotropical birds (RONS #00006).

Strategy 2: Study habitat utilization, ecology, and population status of the painted bunting on the refuge (RONS #00008).

Strategy 3: Compile and review available species-specific literature, population data, historical refuge survey information, and other appropriate criteria to develop bird species management priorities and population objectives.

Strategy 4: Determine the prothonotary warbler population status on the Refuge by conducting a five-year nest box study.

Objective 5: **Restore a prescribed fire interval to Cross Timbers and grasslands communities** (average 500 acres a year in a three-year to five-year rotational burning program – short-term)**.**

Rationale:

The Cross Timbers is an abrupt transition from prairie to forested landscape where fire played a central role in maintaining both the structure of woodlands and the existence of prairie islands. Altered fire cycles dramatically reduce the quality of grassland habitat and results in encroachment of red cedar, other woody plants, and invasive species, and results in conversion of deciduous forest to red cedar dominance. Fire is a major component of rejuvenating and revitalizing the prairie habitat. Refuge monitoring of fire and fire frequency will provide an in-depth look into the proper fire regime for numerous habitat types found on the Refuge.

The Refuge fire program is administered out of Wichita Mountains NWR where the regional fire team is stationed. The regional fire team is stretched quite thin—all of Oklahoma and part of North Texas are within its district boundaries. Therefore, it is important and necessary that the Refuge maintain agreements with local rural fire departments to provide immediate response to wildfire situations on the Refuge.

Fire monitoring is an essential part of adaptive management, which is a systematic approach for improving resource management outcomes. Adaptive management focuses on learning and adapting through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable resource systems. Results from monitoring data are used to determine management impacts, assess goal accomplishments, and assist with future decision making processes.

Strategy 1: Develop and maintain partnerships with Tishomingo Fire Department, local rural fire departments, the Noble Foundation, and area universities.

Strategy 2: Continue to coordinate with the regional fire ecologist to develop and implement fire monitoring standards for measuring success of fire restoration.

Strategy 3: Conduct a five-year study to determine soil, vegetation, and wildlife response to fire. Monitoring will determine fire effects under differing burn frequencies and intensities, burn timing, and among habitat types (RONS #00009).

Objective 6: **Protect and restore high quality bottomland hardwood forest along the Washita River and Pennington Creek** (long-term)**.**

Rationale:

The Cross Timbers is a diverse mix of post oak and blackjack oak woodlands intermixed with prairie and shrubland habitats. Post oak is the predominant hardwood tree species found in the Cross Timbers habitat, and the majority of the oak mast crop (acorns) is produced by post oak trees. One of the unique attributes of the Cross Timbers is the existence of post oak stands that are more than 300 years old and represent some of the oldest unharvested trees in the United States.

Riparian habitat, because of its close proximity to water, can vary considerably from adjacent habitats. These riparian buffers represent an extremely important part of the overall ecosystem based on the increased benefits to fish and wildlife, erosion control, forage availability, and water quality protection. A major goal is the protection, restoration, and maintenance of the Washita River, Pennington Creek, Big Sandy Creek, and Rock Creek and their associated riparian forests. An important strategy is the development of vegetated buffers at least 150 feet wide along these three waterways. These buffers provide conditions necessary to maximize breeding populations of Neotropical migratory birds, Nearctic migratory birds, and other resident animals.

Strategy 1: Establish and maintain riparian buffer zones along Refuge streams and rivers by ceasing mowing operations, by cultivation, and by controlling invasive species to permit restoration of native vegetation.

Strategy 2: Protect and restore historical post oak Cross Timbers habitat by establishing monitoring sites to determine whether post oak (*Quercus stellata*) is regenerating and whether the species is represented by different age classes; this will help maintain a healthy population of this important wildlife tree.

4.2 Habitat Management

Goal 2: **Habitat Management:** Protect the area's resource values through land protection strategies and a comprehensive biological program that will manage habitats to maximize benefit to waterfowl, migrants, and native species.

Objective 1: **Complete a step-down Habitat Management Plan for the Refuge** (short-term)**.**

Rationale:

Tishomingo NWR plays an important role in contributing to the conservation of wildlife at the local, regional, and ecosystem levels; it also contributes to the overall biological diversity of the Refuge System. To clarify its role, the Refuge will develop a step-down Habitat Management Plan that develops priorities among species and species groups; it will be used to guide the development of appropriate strategies to achieve habitat objectives. The plan will provide a process whereby Refuge staff use key historical Refuge data, scientific literature, expert opinion, and staff expertise to make habitat management decisions. The Habitat Management

Plan will be a dynamic document, providing a decision making process and guidance for the management of Refuge habitat.

The Habitat Management Plan further helps define how the Refuge can best contribute to maintaining biological diversity and determine biodiversity objectives within the context of the southern Great Plains and Cross Timbers Ecosystem. This ecosystem includes cross timbers prairie, shrublands, upland hardwood forest, floodplains and riparian bottomland hardwood forest, Ardmore geologic basin, Washita River drainage, and the Red River Valley Ecosystem.

Strategy 1: Develop habitat monitoring programs in bottomland and riparian areas to document results of management actions; evaluate these in terms of habitats objectives, focusing on bottomland hardwood species composition changes over time (RONS #00004).

Strategy 2: Review Refuge resources to determine priority habitats and management areas that will be addressed in the Habitat Management Plan.

Strategy 3: Develop habitat monitoring techniques for all areas undergoing active management. Document results of management actions, and evaluate these in terms of habitat objectives. Identify factors that limit the Refuge's ability to meet objectives and to amend habitat management plans when monitoring and evaluation data support adjustments (RONS #00004).

Strategy 4: Develop a monitoring program and database to evaluate wetlands in terms of key habitat components, such as numbers and types of invertebrates, wildlife use, water quality, and vegetation response to water management.

Strategy 5: Complete a detailed vegetation map for the entire Refuge to be used as an overall baseline and to monitor future changes.

Objective 2: **Implement adaptive management practices by monitoring key habitats and species** (long-term)**.**

Rationale:

Adaptive management is a systematic approach for improving resource management by learning from management outcomes. The goal of adaptive management is a structured but flexible decision making process that can be adjusted based on uncertainty of outcomes from management actions or external events. Adaptive management involves continuous real-time learning and awareness following stakeholder involvement, management objectives, management alternatives, predicative models, monitoring plans, monitoring responses to management actions, and adjustment to management actions. Stakeholders are actively engaged in all phases of a project, facilitating mutual learning and reinforcing commitments to learning based management. Adaptive management requires measurable objectives so that progress towards their achievement can be assessed. Adaptive management will be implemented after the completion of the Habitat Management Plan and will focus on priority management areas and monitoring within those areas.

Strategy 1: Conduct essential wildlife habitat surveys and monitoring projects. Scientific information is needed to define relationships between management practices, including water management, prescribed burning, and habitat and wildlife management (RONS #00004).

Strategy 2: Conduct a five-year study to determine soil, vegetation, and wildlife response to fire on the Tishomingo NWR. Monitoring will determine fire effects under differing burn frequencies and intensities, burn timing, and among habitat types (RONS #00009).

Strategy 3: Develop and implement long-term breeding surveys to document bird species diversity, population levels of indicator species, and trends by habitat type.

Strategy 4: Implement long-term habitat monitoring programs (grassland and photo transects) to determine grassland condition and restoration progress in targeted areas to desired species diversity.

Objective 3: **Maintain the existing 125 acres and develop 75 new acres of moist soil management units to provide shallow water marshes and wetlands** (long-term)**.**

Rationale:

The state of Oklahoma has lost nearly two-thirds of its original wetlands because of agricultural conversion, channelization, impoundment, increased water consumption, and stream flow regulation. According to the USGS, national wetland loss averaged 550,000 acres each year during the 1950s through the 1970s, with 80 percent of the loss attributed to agricultural conversion. The wetland losses have significantly reduced available waterfowl habitats and food sources. The Refuge tries to offset some of this wetland loss by development of moist soil management units.

A moist soil management unit is an artificial impoundment that contains a water control structure and exterior levee, allowing for dewatering or re-flooding of the impoundment. Water is manipulated at critical times to provide optimum growth of native and/or planted forage.

Moist soil impoundments provide plant and animal foods that are a critical part of the diet of wintering and migrating waterfowl. Moist soil units are a significant part of management efforts on the Refuge to provide optimum habitat for migrating birds. Moist soil impoundments also support diverse populations of invertebrates, an important protein source for waterfowl and shorebirds. The plants and invertebrates available in moist soil units provide food resources necessary for wintering and migrating waterfowl to complete critical aspects of the annual cycle, such as molt and reproduction. Draining moist soil units at established dates based on soil temperature, rainfall, evaporation, and expected plant response is essential to providing readily available plant seeds for migrating birds.

Strategy 1: Repair water control structures, improve water management, and implement moist soil wetland management to provide shallow water impoundments for shorebird habitat.

Strategy 2: Utilize mowing and disking in moist soil units to control undesirable emergent vegetation.

Strategy 3: Develop new moist soil units in the East Field and Big Bottom Field. Rehabilitate moist soil units at Goose Pen Pond, Teller Pond, Muel Lake, and Whiskey Creek Pond.

Objective 4: **Continue farming operations with 500 acres on WMU and 480 acres on the Refuge to produce forage crops in support of waterfowl population objectives** (short-term)**.**

Rationale:

The USDA currently lists the raising of beef cattle as the major enterprise in Johnston County. A 1997 survey of Johnston County showed that 92,142 acres were used for crops, while stating that acreage in crops was gradually decreasing as more land was being used for pasture and urban development. A 1997 Agricultural census conducted by the USDA reported 92,142 acres of cropland in 1997 compared to 78,873 in 1992. A 2002 census of agriculture by the USDA showed 33,603 acres of harvested cropland in Johnston County. In the last 25 years, cropland in Johnston County has decreased by approximately seventy percent (USDA 2009).

Also, much marginal cropland has been retired and placed in the USDA's CRP Program. The CRP was authorized by the Food Security Act of 1985 and is a voluntary program for agricultural landowners which may receive financial assistance and support long-term land conservation. The program was reauthorized in the 1996 Farm Bill and the 2002 Farm Bill. In 2005 the CRP program reported 1,030,514 acres of land enrolled with 6,107 farms contributing in Oklahoma. (USDA-FSA 2009)

The substantial reduction of farming operations in Johnston County and southeastern Oklahoma has caused a major loss of supplemental food sources for migrating waterfowl. During the 1960s and 1970s, this supplemental food source on area farms supported waterfowl populations exceeding 100,000 birds on the Refuge. The Refuge replaces a small portion of this loss of supplemental food sources with its current farming program on nearly 1,000 acres.

The farming program consists of 80 percent winter wheat and 20 percent milo and/or millet. The wheat provides winter browse for migrating geese, and the milo and millet provide an additional "hot" food source that can be quickly mowed, dispersing food during extreme weather conditions. The Refuge also coordinates with the ODWC to aerially broadcast millet on exposed Refuge mudflats during August. The millet quickly germinates and produces a crop within 60 days, providing a food source for waterfowl adjacent to Lake Texoma.

A crop rotation program is utilized each year on the Refuge for row crops such as milo; it allows farm fields time to recover from the demands of such plantings. The area is also normally planted in the late spring with a nitrogen producing crop such as cowpeas or vetch that returns nitrogen to the soil when it is disked under.

Strategy 1: Hire two seasonal maintenance workers to implement the Refuge farming operations (RONS #94001).

Strategy 2: Continue Refuge farming to sustain migratory geese waterfowl through implementation of low input sustained agricultural practices (RONS #00003).

Strategy 3: Expand and improve farming capabilities through the purchase of farming equipment and irrigation pumps, and level farm fields for more efficient irrigation (RONS #00003).

Strategy 4: Purchase equipment to improve efficiency of Refuge operations (RONS #98011).

Strategy 5: Secure annual funding to purchase and clean seed wheat and to fertilize the fall wheat crop for the benefit of migratory birds.

4.3 Visitor Services:

Goal 3: **Visitor Services:** Further the public's interest and involvement with Tishomingo NWR through wildlife interpretation and quality wildlife-dependent recreational opportunities. New partnerships with local communities will be forged to highlight, promote, and conserve the unique assets of Tishomingo NWR.

Objective 1: **Improve and expand the fishing program by adding one new fishing pier (dock) and continue the catfish stocking program** (short-term).

Rationale:

Tishomingo NWR has approximately 22,500 fishing visits each year, making it the second largest public use program on the Refuge behind wildlife observation and photography. The Refuge has three boat ramps for fishing access to Cumberland Pool (part of Lake Texoma) and four primitive boat ramps for fishing access to four Refuge ponds. Fishing from boats is allowed March 1 until the end of September each year. Boats are not allowed during the rest of the year to prevent disturbance to migrating waterfowl that depend heavily on Cumberland Pool and Refuge waters for sanctuary.

Bank and wade fishing with rod and reel is permitted year around in areas open for public access. Night fishing from the bank is also allowed at the Headquarters Area, Sandy Creek Bridge, Murray 23, Wildlife Management Unit, and other authorized fishing areas. A large portion of fishing visits occur during the spring season when crappie and sand bass make their yearly spawning runs. The Refuge is well known for its fishery resources and currently holds the state record for blue catfish on rod and reel. Tishomingo National Fish Hatchery has assisted the Refuge with stocking channel catfish into stock ponds on the Refuge and WMU over the past several years. This stocking of catfish allows for additional recreational opportunities beyond the use of Cumberland Pool by Refuge anglers.

The Refuge completed a Public Use Management Plan in 1997 with accompanying public input and support. The plan proposed development of new infrastructure to support the public use program. For the fishing program, the plan proposed establishing a universally accessible floating fishing dock at Headquarters Boat Ramp, but shallow water depth at that site caused by siltation required that the project be relocated to the Murray 23 Boat Ramp where adequate water depth is normally available.

Strategy 1: Develop fishing pier (dock) consistent with the Public Use Management Plan on various areas of the Refuge, including Headquarters Area and Murray 23 Boat Ramp.

Strategy 2: Develop a fishing brochure (RONS #97022).

Strategy 3: Continue to stock channel catfish, when available, in cooperation with the Tishomingo National Fish Hatchery on WMU and Refuge ponds.

Objective 2: Continue and improve Hunting Program (long-term).

Rationale:

Pursuant to the Cooperative Agreement with the ODWC, the State manages the hunting program on the WMU portion of the Refuge. The area is open to hunting of all species under Oklahoma game laws with the exception of the dark geese priority. Refuge staff assist ODWC with planting food plots and wheat fields on the WMU to support its hunting program. The refuge also assists ODWC with a cooperative prescribed fire program to enhance habitat on the WMU.

The hunt program for the balance of Tishomingo NWR consists of controlled white-tailed deer hunts conducted with the cooperation and assistance of the ODWC. These hunts are held to control population numbers of deer on the Refuge and prevent habitat damage and disease spread. The Refuge carefully monitors the deer population each fall by conducting spotlight surveys to determine the density and diversity of the herd. The results of the white-tailed deer spotlight survey provide harvest quotes, developed with the ODWC, for the three Refuge controlled hunts. The Refuge currently provides youth hunts, hunts for persons with disabilities, and general white-tailed deer hunts in the fall of each year. The hunters are selected through an application and lottery-type drawing process conducted by ODWC in April of each year. Applications are normally received from across the state of Oklahoma and sometimes from out of state. The Refuge controlled hunts are focused on reducing deer populations numbers and require hunters to "earn a buck" by first harvesting a doe. Also, the Refuge requires all deer hunters to attend Refuge hunter orientation sessions that focus on educating the attendees about wildlife habitat and the role that the deer hunters play in the management of that habitat.

Unlike the WMU, the rest of the Refuge is not open to migratory bird hunting because of the need and the importance of sanctuary zones in an area surrounded by numerous public hunting opportunities. Public waterfowl hunting opportunities in Johnston and Marshall counties (in Oklahoma) include Blue River Public Fishing and Hunting Area, Fobb Bottom Wildlife Management Unit (WMU), Texoma-Washita Arm WMA, Tishomingo WMU, and USACE (Texoma). Also, the rest of the Refuge does not allow hunting of small game and other species because of the inability to manage unlimited hunting, disturbance to nesting Neotropical migrants, habitat damage by hunters, and protection of the sanctuary zone.

Wildlife Management Unit Strategy:

Strategy: Continue to help the ODWC improve their hunting plan by providing Refuge staff expertise.

Refuge Strategy:

Strategy: Review, evaluate, and adjust the existing white-tailed deer hunt plan to improve hunting opportunities on the Refuge based upon known wildlife population levels and habitat relationships.

Objective 3: Increase opportunities for wildlife observation and photography, and improve facilities, by completing implementation of Public Use Management Plan (long-term)**.**

Rationale:

The combination of wildlife observation and photography is the number one visitor use program on the Refuge. The 2004 Banking on Nature Report conducted by the USFWS, Division of Economics showed that Tishomingo NWR had 198,035 visitors that consisted of 118,810 local residents and 79,225 non-residents. That survey counted 139,700 visits for nature trails, observation platforms, automobile tours, photography, and other related wildlife observation. The updated 2006 report -confirmed the 2004 survey with very similar numbers showing the continuing importance of wildlife observation at Tishomingo NWR. (USFWS, Banking on Nature 2004 & 2006 Reports)

Refuge visitation is currently at approximately 210,000 visitors per year and is expected to continue rising. The Refuge worked with hundreds of community members and various interested groups in public meetings and workshops during the development of the Public Use Management Plan to ensure that compatible, wildlife-dependent recreation opportunities are available on the Refuge. The plan outlines a vision for the management of recreational uses and development of related facilities at Tishomingo NWR. Hundreds of community members and various interested groups participated in public meetings and workshops during the planning process.

The Public Use Management Plan developed a large number of projects and improvements, some based on the Service's Public Use Minimum requirements, to support and improve the quality of visitor opportunities on the Refuge. Some of these improvements have not been completed, including 1) making the entrance to the Refuge more noticeable, 2) orienting visitors from adjoining highways to refuge facilities, 3) constructing a fishing platform accessible to all visitors, 4) improving fishing access to twin lakes near the airport, 5) placing interpretive panels at key observation sites, 6) revising the three orientation kiosks near the pavilion, and 7) interpreting how visitors can landscape for wildlife at home. Also, projects proposed in the Plan that have not been completed include 1) connecting Dick's Pond to the Craven Nature Trail, 2) constructing an accessible fishing platform at Goose Pen Pond, 3) developing an interpretive plan for the Washita Farm with a combination driving and walking loop of farm sites near the Refuge headquarters, 4) developing a brochure for the historic Washita Farm, 5) planting wildflowers near the silo area, 6) rehabilitating the observation point at Nida Point, 7) constructing an observation deck at Nida Point to provide a view of the whole Cumberland Pool area, and 8) developing a five-mile (or longer) Skyline Hiking Trail at Nida Point.

The Public Use Management Plan also proposed several additional outreach programs, some of which have not been completed, including: 1) working with the community to explore the possibility of developing a partnership to sponsor an annual festival or celebration aimed at increasing awareness of wildlife and our natural resources, 2) working with the community to establish a Friends of Tishomingo NWR group to provide an opportunity for the public to become more active in development of Refuge public use facilities and interpretation on the Refuge, 3) working with local universities to establish an internship program, and 4) hiring an outdoor recreation planner with strong outreach skills.

Strategy 1: Hire a visitor services manager to enhance compatible recreational and educational opportunities on the Refuge (RONS #91004).

Strategy 2: Develop conceptual and construction plans for uniform design of recreational facilities, including associated cost estimates (RONS #97005).

Strategy 3: Develop and design Refuge-specific educational, interpretive, and outreach materials.

Strategy 4: Continue to seek funding to complete the implementation of the Public Use Management Plan (RONS #97022).

Strategy 5: Purchase and install interpretive signs for the headquarters exhibit area (RONS #98006).

Objective 4: Work with Tishomingo Refuge Ecology and Education Society to develop and improve educational opportunities on the Refuge (short-term)**.**

Rationale:

Tishomingo Refuge Ecology and Education Society (TREES) is an independent, nonprofit organization dedicated to promoting the conservation of the natural resources of the Refuge, fostering public understanding and appreciation of the Refuge, and engaging in activities that will assist and challenge the Service in meeting its mandates.

The TREES group has several objectives, including: 1) sponsoring activities on and off the Refuge that will encourage the public to become more knowledgeable stewards of the environment; 2) raising funds through the sale of educational books and environmental materials; 3) initiating fundraising programs and otherwise seek public and private financial support for new and ongoing programs at the Refuge; 4) contributing funds, goods, and services for Service restoration, recreational, and educational programs at the Refuge; 5) contributing funds, goods, and labor to maintain Refuge recreational and educational facilities and accomplish biological projects; 6) helping establish and maintain highly positive public recognition of the Refuge and the TREES; and 7) providing a diverse base for TREES membership and activities.

TREES was officially established in July 2005. Since then, the group has completed the Rain Crow photo blind, assisted with the Eagle Cove Tower Project, held an annual youth art contest and numerous educational workshops and teaching events, been part of the Chickasaw Nation partnership agreement and a Tishomingo National Fish Hatchery partnership agreement, assisted with the Wage Grade Professional Workshop,co-sponsored the Arbuckle Simpson Nature Festival with Murray State College, and assisted with several projects aimed at the development of community support and outreach through education.

TREES was officially established in July 2005 and has completed the following projects on the Refuge since then: Rain Crow Photo Blind, assistance with Eagle Cove Tower Project, annual youth art contest, numerous educational workshops and teaching events, Chickasaw Nation partnership agreement, a partnership agreement with Tishomingo National Fish Hatchery, assisted with the Wage Grade Professional Workshop, co-sponsored the Arbuckle Simpson Nature Festival with Murray State College, and several projects aimed at the development of community support and outreach through education.

TREES is currently working on the restoration of an abandoned Washita Farm residence to be developed into a historical museum for the farm and a weekend Refuge welcome center and book store for visitors. The group is also developing partnerships to co-sponsor the second

annual Arbuckle Simpson Nature Festival and providing educational outreach through Redbud Environmental Education Center.

Strategy 1: Continue to develop the Arbuckle Simpson Nature Festival with TREES to support public outreach and education on and off the Refuge.

Strategy 2: Develop public workshops and educational events in partnership with TREES to foster public understanding and support for the Refuge.

Strategy 3: Continue to work with TREES to become an integral part of the local communities and assist with the implementation of Refuge outreach objectives.

Strategy 4: Work with TREES to develop partnerships with local education institutions, youth groups, and civic groups.

Strategy 5: Assist TREES with the restoration of an abandoned Washita Farm residence to develop a historical museum and Refuge welcome center that will serve weekend visitors.

Objective 5: Improve other recreational uses (camping, etc.) – (long-term)**.**

Rationale:

Camping is currently allowed anywhere within the WMU. However, in recent meetings between Refuge staff and the ODWC, it was determined that five specific camping sites would better serve anglers and hunters within the WMU. Limiting the area to five campsites would also remove associated camping disturbance to the larger area and make it possible to better manage camping. The five designated sites would be improved with the addition of picnic tables, fire rings, and trash receptacles. The five specific camping sites would reduce the need to remove trash from campsites scattered over the entire unit and improve overall public use.

Camping on the balance of the Refuge is limited to the Headquarters Campground. This site is not readily usable by campers with disabilities because of unlevel ground conditions. The dirt campground roads are also subject to severe washing during heavy rains, making parking and leveling of recreational vehicles difficult at best. The Refuge needs to seek funding to significantly improve the roads and upgrade the campsites at the Headquarters Campground.

Within the Refuge public use areas, including the campgrounds, red imported fire ants interfere with the recreationist's enjoyment of natural resources, cause injury to the public, and damage native wildlife. The Refuge needs to include the suppression of fire ants within public use areas on the Refuge in an IPM Plan.

Strategy 1: Include control of fire ants and other non-native insects that may pose a risk to Refuge visitors in the development and implementation of an IPM Plan.

Strategy 2: Develop a primitive camping area at Murray 23 boat launching area to support use of that facility.

Strategy 3: In cooperation with the ODWC, develop and manage five campsites on the WMU.

Strategy 4: Obtain funding to improve campsites and roadways at Headquarters Campground.

4.4 Address ecosystem threats to the Washita River Basin:

Goal 4: **Address ecosystem threats to the Washita River Basin:** Work to ensure the long-term health of streams, riparian corridors, and wetlands threatened by pollution, invasive species, erosion, siltation, subsidence, and altered hydrological regimes.

Objective 1: **Monitor ecosystem threats to the Washita River Basin** (long-term)**.**

Rationale:

Local waterways, particularly the Washita River and Pennington Creek, are threatened with increasing pollution, diversion for municipal or industrial use, decreasing water flows, and the spread of non-native invasive species. Pennington Creek is the primary inflow source of water for the 4,500-acre Cumberland Pool and is the only all season flow of water to Cumberland Pool—absent flood events from the Washita River. These riparian waterways also provide miles of habitat that serve as migration corridors for numerous Neotropical migrants. Continual monitoring for waterway pollutants through the State of Oklahoma's volunteer based Blue Thumb Program is needed to provide the Refuge insight into the challenges that lay ahead to maintain high quality waterways.

Strategy 1: Participate with State of Oklahoma Blue Thumb Program to monitor pollution levels in Pennington Creek and the Washita River.

Strategy 2: Develop ecological impact studies for the purpose of identifying emerging ecosystem threats, including climate change, decreased groundwater and surface water flows, and the spread of non-native invasive species.

Objective 2: **Develop water availability and protection strategies** (long-term)**.**

Rationale:

An inflow of water onto the refuge is critical to maintaining healthy riparian and aquatic habitats. The Refuge is currently working to establish a minimum flow for Pennington Creek with the OWRB. This flow is critical to riparian habitat on the Refuge, important to Cumberland Pool, and serves the interest of the local community. The Refuge will be better able to determine the minimum needed flow in the Washita River Basin by establishing monitoring points to measure stream flow in the Washita River and in Pennington Creek, which is an essential component of the lower Washita River Basin. The fundamental need for water increases competition for limited water resources each year. Residential growth in Tishomingo and area communities will increase demand for water usage from Pennington Creek, which is the City of Tishomingo's sole source for water.

The Refuge needs to develop and maintain partnerships with local municipalities and grassroots organizations to protect critical water supplies through legislative action. The vast majority of land within Oklahoma is privately owned, which underscores the need for a coordinated outreach effort to inform and educate landowners. A grassroots organization called the Citizens for the Protection of the Arbuckle Simpson Aquifer (CPASA) already exists in southern Oklahoma and is working with local communities to protect water. The Refuge

needs to cooperate with this group and other organizations to help educate the public about water protection needs and strategies.

Strategy 1: Continue to coordinate with the regional office hydrologist to establish water quality monitoring sites with automatic data recorders on the Washita River, on Pennington Creek, and at Cumberland Pool.

Strategy 2: Develop a system to collect flow readings in the intermittent and spring fed streams that bring water to the Refuge. Install measurement devices on all diversions.

Strategy 3: Work with city and State officials to secure a guaranteed minimum flow on Pennington Creek to maintain Cumberland Pool for fish and wildlife use.

Strategy 4: Cooperate with and support grassroots organizations such as the CPASA to work to secure legislation protecting ground and surface water in the Washita River watershed from over development and exploitation.

Strategy 5: Advocate sustainable water use. Encourage use of water conservation measures.

Objective 3: Monitor water quality and point source contaminants through the establishment of long-term permanent water quality monitoring sites on the Washita River, on Pennington Creek, and at Cumberland Pool (long term)**.**

Rationale:

There is a continuing threat of contamination from upstream petroleum refineries, agricultural runoff, pesticides, and industrial chemicals. This threat is ever growing and requires the Refuge and its partners to be even more active with monitoring efforts on and off the Refuge. The Refuge needs to work with its partners to strengthen requirements on the release of all kinds of pollutants into State waters. The State of Oklahoma's Blue Thumb Program is an excellent example of how local volunteers can make a difference in water protection.

The Refuge must also play an integral part in the education of citizens about proper land stewardship. Education is the key to ultimately protecting the watershed and its riparian habitat. Water flowing into Refuge boundaries must be protected long before it reaches those boundaries. Therefore, the Refuge must become involved and partner with other groups to provide awareness to private property landowners about riparian buffers, proper use of common agricultural products, and fundamental watershed protection strategies.

Strategy 1: Work with partners to encourage the State to regulate higher standards for water quality and to strengthen regulation of releases into the State's rivers and streams.

Strategy 2: Seek funding and new partners to educate the public and private landowners upstream about the importance of watershed protection, the need for riparian buffers, and the proper use of common agricultural products that can become contaminants if used or disposed of improperly.

Strategy 3: Participate with State of Oklahoma Blue Thumb Program to monitor pollution levels in Pennington Creek and the Washita River.

Objective 4: **Begin development of a transition management plan for Cumberland Pool's future transformation** (long-term)**.**

Rationale:

Cumberland Pool continues to be silted in and currently has an average water depth of approximately eight feet. The Refuge must begin to consider how to manage the diminishing open water area. The transition from lake to periodic wetlands will occur during a range of time determined by siltation rates and the movement of riparian corridors within the changing system. The continuing loss of water depth will have a negative impact on fishery resources, but conversely, provide optimum habitat for other species.

The rate at which silt is infilling Cumberland Pool has recently increased with the natural development of a "cut" into the Cumberland Pool from the Washita River. The development of a habitat modeling program for the area could help predict a timeline for vegetation and species changes, which would allow the Refuge to focus management objectives for this inevitable transition.

Strategy 1: Develop a monitoring program in the Cumberland Pool to determine siltation rate and levels.

Strategy 2: Identify research needs and begin ecological impact studies.

Strategy 3: Develop a habitat modeling program to determine future changes to Cumberland Pool.

Objective 5: **Inform the public about the impacts of salt cedar to the Washita River watershed** (long-term).

Rationale:

Although the invasion of salt cedar into the Washita River watershed and the Refuge is currently small, it is extremely important to remove this invasive species before it spreads. The development of a monitoring program would allow for the removal of salt cedar as it first enters the watershed or Refuge. This problem was not addressed early enough in the southwestern United States river systems and is now so deeply entrenched that it may be beyond control. Since salt cedar has already been identified at the initial stages of invasion along the Washita River, educating the public about the threat is essential to successfully combating this formidable invasive species.

The Refuge should partner with the Oklahoma Clean Lakes and Watersheds Association to develop an educational program informing the public about this threat, as well as how to recognize this species and better understand the consequences associated with its spread.

Strategy 1: Coordinate a salt cedar detection and prevention program that includes public education.

Strategy 2: Develop a public educational program suitable for high schools and the public about the threat of salt cedar to the ecosystem.

Strategy 3: Work with upstream refuge (Washita NWR) and the ODWC to expand this program along the entire Washita River drainage in Oklahoma.

Strategy 4: Attend meetings and participate in State-level organizations and associations to promote public awareness.

Strategy 5: Address salt cedar in the development of a Refuge IPM Plan.

4.5 Partnerships and Interagency Cooperation:

Goal 5: **Partnerships and Interagency Cooperation**: Maintain and strengthen existing interagency and jurisdictional relationships and establish new partnerships within the community to cooperate on mutually beneficial programs for improving wildlife and habitat resources on the Refuge.

Objective 1: **Continue tostrengthen the partnership with ODWC in management direction of the WMU** (long-term)**.**

Rationale:

The cooperative agreement with the State of Oklahoma gives the State full authority to develop and implement a hunting management plan for the WMU. ODWC has indicated its intention to modify the existing hunt plan for the WMU, and the Refuge will assist with the development of the modified plan as requested by ODWC.

Tishomingo NWR currently participates in numerous joint programs with the ODWC on the Refuge and wildlife WMU. The farming program is a key example of the fundamental need for cooperation between the two agencies and the resulting successes. The Refuge provides tractors, equipment, and part of the manpower, while the ODWC provides seed, equipment, and part of the manpower. This partnership allows for both agencies to meet mission-critical goals and objectives in less time and with direct cost savings. Partnerships also exist in habitat management activities, law enforcement, prescribed fire program, and boundary fence projects. The ODWC also assists with the management of the Refuge's controlled white-tailed deer hunts by providing guidance to Refuge staff on needed harvest ratios and by completing the public application and drawing process for all of the controlled deer hunts.

The Refuge maintains a partnership with the Blue River Public Hunting and Fishing Area, Southeast Regional Fishery Division, and other area WMUs to provide support in managing wildlife resources on and off the Refuge. A yearly meeting is held between the Refuge and the ODWC to discuss needs and cooperative efforts, and to maintain outreach efforts among the partners. The director of the ODWC normally participates in this meeting.

Wildlife Management Unit Strategies:

Strategy 1: Provide support to the ODWC in modifying the hunting plan for the WMU.

Strategy 2: Cooperate with the ODWC in wildlife management activities on other area WMUs.

Refuge Strategy:

Strategy: Gain assistance and expertise from the ODWC in wildlife management activities on the Refuge.

Objective 2: **Pursue and strengthen partnerships with other government and local agencies, nongovernmental organizations, local citizen organizations, and private landowners** (long-term)**.**

Rationale:

The Refuge recognizes that it is an integral part of the community and should utilize its resources to assist and educate the public about the value and need for conservation of natural resources. The Refuge works towards this by trying to develop partnerships with local groups and municipalities. The Refuge has developed a partnership with the City of Tishomingo to provide for cooperative efforts between the Refuge, city firefighters, and city police. The Refuge has also partnered with the City of Tishomingo's city manager to serve as a Refuge grant writer in pursuing grants for Refuge improvements. It is hoped that this partnership will result in the development of a Refuge welcome center and historical museum that will involve the Chickasaw Nation, the TREES group, and the Johnston County Historical Society.

The Refuge developed a partnership with the Chickasaw Nation that has already resulted in funding for Refuge projects, assistance with Refuge cleanup efforts following a major flood event, summer maintenance assistance, partnerships with the Refuge friends group, training and education opportunities, and the development of the Arbuckle Simpson Nature Festival. It is hoped that in the future this partnership will result in many more joint successes.

Strategy 1: The Refuge will continue to develop its current partnership with the Chickasaw Nation to improve Refuge facilities, improve access, and assist with outreach and education on and off the Refuge.

Strategy 2: Continue close relationships with the City of Tishomingo and the Johnston County Chamber of Commerce for the benefit of both the city and Refuge.

Strategy 3: Pursue opportunities with local businesses, schools, scouting organizations, and others to adopt the Refuge for projects or special community programs such as Earth Day, etc.

Strategy 4: Coordinate and cooperate with nongovernmental organizations in the area such as the CPASA, the Noble Foundation, Oklahoma Ornithological Society, and the Nature Conservancy on projects that benefit wildlife and wildlands.

Strategy 5: Provide technical assistance to private landowners in managing, developing, and enhancing wildlife habitat and environmental protection measures on their lands.

Strategy 6: Continue to develop educational outreach projects on the Refuge with Southeastern Oklahoma State University, Murray State College, and East Central University.

Strategy 7: Continue to partner with TREES, Johnston County Historical Society, Chickasaw Nation, and the City of Tishomingo in developing and completing the Refuge welcome center and historic museum.

Strategy 8: Continue to partner with the National Park Service, ODWC, Nature Conservancy, Chickasaw Nation, Johnston County Chamber of Commerce, Tishomingo National Fish Hatchery, Murray State College, Southeastern Oklahoma State University, TREES, Johnston County Historical Society, area

businesses, and private individuals to increase public appreciation and enjoyment of this region's treasures through the Arbuckle Simpson Nature Festival.

Strategy 9: Partner with the Marshall County commissioners to improve fishing access at the Rock Creek area of the Refuge.

Strategy 10: Partner with the Johnston County commissioners to improve roadway access, Murray 23 Boat Ramp parking, and headquarters camping opportunities on the Refuge.

Objective 3: Develop outreach strategies to involve local communities in Refuge events (long-term)**.**

Rationale:

The Refuge works with local schools and universities to foster greater awareness about the Refuge, Refuge System, and the mission of the Service. During an age where schoolchildren are increasingly staying indoors with television and video games, the Refuge System must work to strengthen the tie between children and the outdoors. Filling an outdoor recreation planner position at the Refuge would enhance communication, and that person would serve as the liaison between the Refuge and community. An outdoor recreation planner would focus programs and events to maintain and increase community involvement with Refuge events.

TREES currently provides events and workshops to help focus public awareness on the Refuge and Refuge System. Continuing a partnership which this group will help foster greater appreciation of the Refuge within local communities and organizations. The Refuge will also strive to develop partnerships with other groups to raise awareness of utilizing native plants in backyard habitats.

Strategy 1: Expand Refuge relations with schools and universities through outreach programs, volunteer programs, and workshops using the services of the new outdoor recreation planner (RONS #91004).

Strategy 2: Use the outdoor recreation planner position to create and develop outreach products that interpret the resources of the area to generate interest in the Refuge (RONS #91004).

Strategy 3: Work with TREES to host workshops and events on and off the Refuge to promote awareness of the Refuge.

Strategy 4: Develop a partnership with the Tishomingo Home and Community Education Club to maintain native plants in Refuge butterfly and hummingbird gardens. This program will provide awareness to Refuge visitors on the importance of native plants and ways to incorporate native plants into their own backyards.

(This page intentionally left blank.)

5. Plan Implementation

Refuge objectives are intended to be accomplished during the next 15 years. New management activities will be phased in over time. Implementation of these will be contingent upon results of biological inventories, monitoring and evaluation, funding, staffing, and regional and national Service directives. This section identifies resource projects, staffing, partnership opportunities, step-down management plans, and the monitoring and evaluation plan.

5.1 Funding and Personnel Needs

5.1.1 Current Staff and Funding

The Refuge currently has seven permanent full-time employees (FTEs):

Position	Grade
Refuge manager	GS-13
Law enforcement officer	GS-9
Office assistant/Administrative technician	GS-7
Maintenance worker	WG-8
Maintenance worker	WG-8
Wildlife biologist	GS-11
Wildlife Refuge specialist	GS-11

Approximate current annual staff costs $560,843

5.1.1.1 Current Funding

The total annual budget for the Refuge varies depending on the Service priorities for the resource projects each year, and the national and regional allocation of Refuge Operation Needs (RONS) and Service Asset Maintenance Management System (SAMMS) funds. Funds for water rights and water measuring devices were provided by the Service Division of Water Resources (1993–1995). With the inclusion of these miscellaneous funds, the Refuge funding totaled between $656,375 and $957,838 from 2005 to 2008.

5.1.2 Proposed Staff

To accomplish the goals and objectives of this plan, the following increase in staff is proposed:

Position	Grade
Outdoor recreation planner	GS-9
Maintenance worker	WG-6
Laborer	WG-4

Approximate annual cost of proposed staff.....239,330

5.2 Existing Partnerships

5.2.1 Governmental Entities

- **United States Department of Agriculture – Natural Resource Conservation Service** – This partnership provides for a yearly Earth Day event held at Tishomingo NWR for fourth grade students across Johnston County. The event focuses on educating students about several land management agencies and their mission. Partners include the National Park Service – Chickasaw National Recreation Area, Oklahoma Department of Forestry, Chickasaw Nation, USDA- Animal Damage Control, ODWC, Oklahoma Highway Patrol, Oklahoma State University – Extension Service, and the Johnston County School System. NRCS also provides partnership support in the development of moist soil unit on Tishomingo NWR.
- **Oklahoma Department of Wildlife Conservation** – Tishomingo NWR and the ODWC jointly manage the approximately 3,000-acre WMU. ODWC provides partnership support by aerial seeding refuge mudflats with millet, providing wheat seed for a 1,000-acre farming program, and providing equipment and labor to assist with farming operations. ODWC also provides law enforcement patrol on the Refuge and WMU, and assists with controlled white-tailed deer hunts on the Refuge.
- **ODWC – Blue River Public Hunting and Fishing Area (Southeast Regional Fishery Division)** – This partnership provides for a yearly meeting, allowing the Refuge to discuss needs, cooperative efforts, and fishery resources, and maintain outreach efforts among the partners. The director of the ODWC normally participates in this meeting.
- **Tishomingo National Fish Hatchery** – Tishomingo NFH partners with Tishomingo NWR to provide for restocking efforts of alligator snapping turtles on the Refuge. Tishomingo NFH has also provided funds to support monitoring of these turtles. The Refuge also benefits from the restocking of channel catfish by the NFH on both the WMU and the rest of the Refuge.
- **Johnston County Commissioners** – This is a partnership agreement to improve Refuge roadways at Murray 23, Nida Point Parking, and Headquarters Campground. This agreement will upgrade roadways and parking areas from gravel to asphalt to improve access for the visiting public.
- **City of Tishomingo** – These partnership agreements provide improved fire and police response to Tishomingo NWR. The Tishomingo city manager also assists the Refuge by writing grant projects.
- **Marshall County Commissioners** – This partnership has improved safety issues and access to the Fishing Bridge at the Rock Creek Unit of Tishomingo NWR. Marshall County completely funded the refurbishing of the old bridge and developed a gravel parking area for angler access.
- **Johnston County Chamber of Commerce** – This partnership promotes Tishomingo NWR as one of the most important tourism assets in Johnston County. The Chamber assists the Refuge with education and outreach efforts for both congressional staff and the public.
- **Chickasaw Nation** – This partnership provides for education opportunities such as the yearly Youthful Celebration held at the Refuge, which targets seventh and eighth

grade students from across the State of Oklahoma. The program allows students to learn more about the history of Tishomingo NWR and the cultural aspects of the Chickasaw Nation. The Chickasaw Nation has also provided funding for the improvement of Refuge directional signage, Sandy Creek Trail, and flood cleanup efforts. The Chickasaw Nation is also a major partner in the Arbuckle Simpson Nature Festival.

- **Oaks and Prairies Joint Venture** – This partnership brings an array of groups and organizations to the table to develop goals and strategies to protect bird populations on and off the Refuge. The overlying goal of this partnership is to develop broad land management strategies to protect birds and their critical nesting habitat within their ecosystem.
- **Oklahoma Blue Thumb Program** – This partnership provides for the monitoring of pollution levels in Pennington Creek and the Washita River. Monitoring is normally completed on a monthly basis by trained public volunteers. This program provides early warning of erupting problems within a stream basin.

5.2.2 Educational Institutions

- **Murray State College –** This partnership provides the base for the Arbuckle Simpson Nature Festival, which includes the following partners: Chickasaw Nation, ODWC, TREES, Johnston County Historical Society, City of Tishomingo, Southeastern Oklahoma State University, Nature Conservancy, East Central University, Oklahoma Ornithological Society, Tishomingo NFH, Oklahoma University, Johnston County Chamber of Commerce, and several area businesses. Murray State College also partners with the Refuge to provide educational programs on the Refuge such as "A Brush with Nature."
- **Southeastern Oklahoma State University –** This is a partnership to study Neotropical migrants on the Refuge, especially prothonotary warblers and their nesting success. The partnership conducts bird banding on the Refuge during spring migration season to determine species richness and abundance.
- **East Central University –** The university is a partner in the Arbuckle Simpson Nature Festival.
- **Oklahoma University –** The university provides educational classes on the Refuge to identify aquatic plants and insect species.

5.2.3 Private Organizations

- **National Wild Turkey Federation –** This is a partnership to develop a fire break along the west side of the WMU to improve habitat for upland game birds, especially the wild turkey, by allowing the area to be burned on a recurring basis.
- **Tishomingo Refuge Ecology and Education Society –** TREES is the Refuge friends group and serves in numerous capacities to support the Refuge in its mission of promoting the conservation of natural resources, fostering public understanding and appreciation of the Refuge, and providing responsible wildlife-oriented activities for individuals of all ages.
- **Johnston County Historical Society –** This partnership is currently developing a welcome center and historical museum interpreting the Washita Farm history on the Refuge. The Society has worked diligently to raise funds and provided volunteer

labor to accomplish the opening of this building for the betterment of the Refuge. The Historical Society also provides guided tours of the Refuge's historic Washita Farm buildings.

- **Noble Foundation –** This partnership provides an independent, diversified management team perspective on Refuge farming, wildlife, and habitat needs, and assists with developing strategies to accomplish Refuge goals.
- **Citizens for the Protection of Arbuckle Simpson Aquifer –** This grassroots organization in southern Oklahoma works with local communities and Tishomingo NWR to educate the public about water protection needs and strategies. CPASA is currently assisting the Refuge in developing strategies to protect the refuges main water source—Pennington Creek.
- **The Nature Conservancy –** This group is a partner in the Arbuckle Simpson Nature Festival.
- **Tishomingo Home and Community Education Club –** This group assists the Refuge with native plantings in the Oklahoma Legacy Arboretum.

5.3 Step-Down Management Planning

The following is an annotated list of step-down management plans that are required for the programs implemented on the Refuge. Some of these plans have been completed and include, where required, compatibility determinations and environmental assessments. The preparation and execution of these plans is dependent on funding and the availability of staff or technical support.

5.3.1 Completed Step-Down Management Plans:

The following plans and documents have been completed and are subject to review and periodic updates.

5.3.1.1 Visitor Service Management Plan

The current Public Use Management Plan addresses specific interpretive, educational, and wildlife related public recreation issues and needs. The Public Use Management Plan completed in 1997 includes an EA.

The Refuge worked with hundreds of community members and various interested groups in public meetings and workshops during the development of the Public Use Management Plan to ensure that compatible, wildlife-dependent recreational opportunities are available on the Refuge. Some of the improvements from the Public use Management Plan have not been completed, including 1) making the entrance to the refuge more noticeable, 2) orienting visitors from adjoining highways to Refuge facilities, 3) constructing a fishing platform accessible to all visitors at Murray 23 Boat Ramp, 4) improving fishing access to twin lakes near the airport, 5) placing interpretive panels at key observation sites, 6) revising the three orientation kiosks near the pavilion, and 7) interpreting how visitors can landscape for wildlife at home. Also, there are projects proposed in the Public Use Management Plan that have not been completed, including: 1) connecting Dick's Pond to the Craven Nature Trail, 2) constructing an accessible fishing platform at Goose Pen Pond, 3) developing an interpretive plan for the Washita Farm with a combination driving and walking loop of farm sites near the Refuge headquarters, 4) developing a brochure for the historic Washita Farm, 5) planting wildflowers near the silo area, 6) rehabilitating the observation point at Nida Point, 7)

constructing an observation deck at Nida Point to provide a view of the entire Cumberland Pool area, and 8) developing a 5-mile (or longer) Skyline Hiking Trail at Nida Point.

The Public Use Management Plan also proposed several additional outreach programs, some of which have not been completed, including: 1) working with the community to explore the possibility of developing a partnership to sponsor an annual festival or celebration aimed at increasing awareness of wildlife and our natural resources, 2) working with the community to establish a Friends of Tishomingo NWR group to provide an opportunity for the public to become more active in development of Refuge public use facilities and interpretation on the Refuge, 3) working with the local universities to establish an internship program, and 4) hiring a visitor services manager with strong outreach skills.

5.3.1.2 Fire Management Plan

The Fire Management Plan details suppression strategies and determines the best use of fire in managing and enhancing Refuge habitats. This plan provides specific strategies, conditions, and parameters for the use of fire to accomplish habitat objectives for targeted grassland and wetland areas. This plan was approved in 2001.

The Refuge fire program is administered out of Wichita Mountains NWR where the regional fire team is stationed. The regional fire team is stretched quite thin; it covers all of Oklahoma and part of North Texas within it district boundaries. Therefore, it is important and necessary that the Refuge maintain agreements with local rural fire departments to provide immediate response to wildfire situations on the Refuge.

Fire monitoring is an essential part of adaptive management, which is a systematic approach for improving resource management outcomes. Adaptive management focuses on learning and adapting through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable resource systems. Results from monitoring data are used to determine management impacts, assess goal accomplishments, and assist with future decision making processes. The Refuge plans to burn an average of 500 acres per year in a 3-year to 5-year rotational burning cycle.

5.3.1.3 Hunt Plan

This plan addresses specific aspects of the Refuge hunt program, defining species to be hunted, season structure, hunting methods, and applicable Refuge specific hunting regulations.

Pursuant to the Cooperative Agreement with the ODWC, the State manages the hunting program on the WMU portion of the Refuge. The area is open to hunting of all species under Oklahoma game laws with the exception of the dark geese priority. ODWC is currently in the process of modifying its hunt plan for the WMU.

The hunt program for the balance of Tishomingo NWR consists of controlled white-tailed deer hunts conducted with the cooperation and assistance of the ODWC. These hunts are held to control population numbers of deer on the Refuge and prevent habitat damage and disease spread. The Refuge carefully monitors the deer population each fall by conducting spotlight surveys to determine the density and diversity of the herd. The results of the white-tailed deer spotlight survey provide harvest quotes, developed with the ODWC, for the three Refuge controlled hunts. The Refuge currently provides youth hunts, hunts for persons with disabilities, and general white-tailed deer hunts in the fall of each year. The hunters are selected through an application and lottery-type drawing process conducted by ODWC in April of each year. Applications are normally received from across the State of Oklahoma and

sometimes from out of state. The Refuge controlled hunts are focused on reducing deer populations numbers and require hunters to "earn a buck" by first harvesting a doe. Also, the Refuge requires all deer hunters to attend Refuge hunter orientation sessions that focus on educating the attendees about wildlife habitat and the role that the deer hunters play in the management of that habitat.

Unlike the WMU, the rest of the refuge is not open to migratory bird hunting because of the need and the importance of sanctuary zones in an area surrounded by numerous public hunting opportunities. Public waterfowl hunting opportunities in Johnston and Marshall Counties Oklahoma include Blue River Public Fishing and Hunting Area, Fobb Bottom WMA, Texoma-Washita Arm WMA, Tishomingo WMU, and USACE (Texoma). Also, the rest of the Refuge does not allow hunting of small game and other species because of the inability to manage unlimited hunting, disturbance to nesting Neotropical migrants, habitat damage by hunters, and protection of the sanctuary zone.

5.3.2 Future Step-Down Management Plans

5.3.2.1 Habitat Management Plan

Tishomingo NWR plays an important role in contributing to the conservation of wildlife at the local, regional, and ecosystem levels; it also contributes to the overall biological diversity of the Refuge System. In order to clarify its role, the Refuge will develop a step-down Habitat Management Plan. The plan will develop priorities among species and species groups that will be used to guide the development of appropriate strategies to achieve habitat objectives. The plan will provide for a process whereby Refuge staff use key historical refuge data, scientific literature, expert opinion, and staff expertise to make habitat management decisions. The Habitat Management Plan will be a dynamic document, providing a decision making process and guidance for the management of Refuge habitat.

The Habitat Management Plan further helps define how the Refuge can best contribute to maintaining biological diversity and determine biodiversity objectives within the context of the southern Great Plains and Cross Timbers Ecosystem. This ecosystem includes cross timbers prairie, shrublands, upland hardwood forest, floodplains and riparian bottomland hardwood forest, Ardmore geologic basin, Washita River drainage, and the Red River Valley ecosystem.

A major Refuge habitat challenge is to bring back the natural plant biodiversity of the grassland habitat that was converted to crop production (now fallow farm fields) in the 1920s. The myth that fallow farm fields naturally regenerate to native prairie is far from fact. The eruption of invasive species such as Johnson grass, Bermuda grass, and native eastern red cedar into these fallow farm fields must first be addressed with herbicide treatment before undertaking any restoration work.

Native warm season grasses (also called "bunch grasses") grow with spaces between the "bunch" that are readily used by ground nesting birds and make ideal wildlife habitat. The return of prairie forbs in the form of native wildflowers is also fundamental to sound restoration work. Wildflowers benefit pollinators such as butterflies, bees, and moths. Pollinators are considered guardians of the biological integrity of ecosystems because they are crucial to the reproduction of many plants. There is increasing evidence that many pollinator species are in decline, and the restoration of native prairie can only benefit their plight.

Native grass usually takes at least two years to establish, and persistent monitoring is required to continually combat invasive species that have survived treatment and herbicide applications. Young native grass is susceptible to harsh environmental conditions, and replanting of some areas may be required to obtain the 80 percent goal. The Refuge plans to restore 50 acres of fallow field to grassland for their seven-year short-term goal and 125 acres by the 15-year long term goal.

The State of Oklahoma has lost nearly two-thirds of its original wetlands because of agricultural conversion, channelization, impoundment, increased water consumption, and stream flow regulation. The Refuge tries to offset some of this wetland loss by development of moist soil management units. Water is manipulated at critical times to provide optimum growth of native and/or planted forage. The Refuge plans to maintain the existing 125 acres and develop 75 new acres of moist soil management units to provide shallow water marshes and wetlands.

Moist soil impoundments provide plant and animal foods that are a critical part of the diet of wintering and migrating waterfowl. Moist soil units are a significant part of management efforts on the Refuge to provide optimum habitat for migrating birds. Moist soil impoundments also support diverse populations of invertebrates, an important protein source for waterfowl and shorebirds. The plants and invertebrates available in moist soil units provide food resources necessary for wintering and migrating waterfowl to complete critical aspects of the annual cycle such as molt and reproduction. Draining moist soil units at established dates based on soil temperature, rainfall, evaporation, and expected plant response is essential to providing readily available plant seeds for migrating birds.

A major goal is the protection, restoration, and maintenance of the Washita River, Pennington Creek, Big Sandy Creek, and Rock Creek and their associated riparian forests. An important strategy is the development of vegetated buffers at least 150 feet wide along these three waterways. These buffers provide conditions necessary to maximize breeding populations of Neotropical migratory birds, Nearctic migratory birds, and other resident animals. An inflow of water onto the Refuge is critical to maintaining healthy riparian and aquatic habitats. The Refuge is currently working to establish a minimum flow for Pennington Creek with the OWRB. This flow is critical to riparian habitat on the Refuge, important to Cumberland Pool, and serves the interest of the local community.

5.3.2.2 Integrated Pest Management Plan

Development and implementation of a red cedar and invasive plant inventory and mapping protocol is essential for targeting areas of the Refuge where control programs need to be implemented for setting control priorities and for providing ongoing monitoring to evaluate control success. Since native grasses usually take at least two years to become established, periodic monitoring and follow-up control will be needed to prevent re-invasion by red cedar and non-native invasive plants

Mapping of invasive species will also provide updated data on plant species occurrence and assist with determining the most efficient means of control. The Refuge also needs to address the emerging threat of salt cedar along the Washita River. Salt cedar negatively affects the floor canopy, causing habitat changes; control method time frame is extremely limited; and herbicide treatment is very costly.

The lack of natural fire has caused the reduction of native shrub habitat and allowed the invasion of eastern red cedar into both hardwood bottomlands and grasslands. The resulting

red cedar invasion into these habitat types raises concerns for all Oklahomans based on environmental changes, safety, economic impacts, and health. The use of prescribed burning is the most cost effective cedar control strategy, but it is not practiced widely because of legal concerns under Oklahoma's liability law. Cedars reaching the height of 10 feet or more are also difficult to control with prescribed fire, as it is nearly impossible to kill all of the green branches near the top of the tree.

Mechanical removal of cedar trees is a very expensive option. For example, the Chickasaw National Recreation Area, a local unit of the National Park Service, contracts cedar tree removal with the following costs: $450 per acre to cut cedars on site and leave them for burning, and $1,200 per acre to completely remove the trees as mulch. Under this option, Tishomingo NWR would have an estimated $250,000 to $2,500,000 in cedar removal needs.

The development and implementation of an IPM program will assist with reducing risk to natural resources, the public, and the environment from pests and pest management related strategies. IPM will incorporate monitoring infestation levels and treatment strategies into an overall decision making process.

5.3.2.3 Inventory and Monitoring Plan

An Inventory and Monitoring Plan describes specific wildlife inventory activities and techniques for monitoring wildlife populations, including census and survey methods, data analysis, and reporting requirements. Develop a wildlife inventory plan with wildlife population objectives determined from baseline biological data. Implement census/surveys to monitor natural population fluctuations in response to habitat management activities. The inventory plan and baseline biological data are essential for making informed management decisions affecting the Refuge resources. The inventory plan will assist in the management of the hunting and fishing plans.

5.4 Compatibility Determinations

5.4.1 Recently Completed Compatibility Determinations

5.4.1.1 Wildlife Observation, Photography, and Access (Walking, Jogging, and Bicycling)

This 2006 Compatibility Determination determined that wildlife observation, photography, and access, including walking, jogging and bicycling, were compatible with the purposes for which the Refuge was established.

5.4.1.2 Rock Creek Lake Trotlines

This 2006 Compatibility Determination determined that the use of trotlines at Rock Creek Lake was compatible with the purposes for which the Refuge was established.

5.4.2 Draft Compatibility Determinations

Appendix D contains seven additional Compatibility Determinations that have been drafted as part of this comprehensive conservation planning, effort including:

- Auto-Touring

- Boating and Sport Fishing
- Camping, Picnicking, and Group Shelter
- Eastern Red Cedar Tree Removal
- Feral Pig Live Trapping by Special Use Permit.
- Hiking Trails
- Refuge-controlled Deer Hunt

5.5 Resource Projects

What follows is a summary of major resource project needs addressing the goals and objectives of this Plan. Each project summary includes planning links to this Plan. This list only reflects the basic needs identified by the planning team based on available information and is subject to modification depending on future conditions, needs, and cost adjustments.

5.5.1 Project 1. Habitat Management

Develop complete vegetation maps delineating major habitat types on the Refuge. Inventory plant species associated with each habitat. Implement improvements to the water delivery system to enhance moist soil and wetland management opportunities and provide for a diversity of wetland habitat components. Implement habitat monitoring programs for key habitats, areas targeted for restoration, and red cedar and invasive plant removal.

Planning Links: Goal 1 Objectives 1, 2, 3, and 4, Goal 2 Objectives 1, 2, 3, and 4, Goal 4 Objectives 1, 2, 3, 4, and 5, Goal 5 Objective 1.

5.5.2 Project 2. Biological Program

Develop a wildlife inventory plan with wildlife population objectives determined from baseline biological data. Implement censuses and surveys to monitor natural population fluctuations in response to habitat management activities. The inventory plan and baseline biological data are essential for making informed management decisions affecting Refuge resources. The inventory plan will assist in the management of the hunting and fishing plans.

Planning Links: Goal 1 Objectives 1, 2, 3, and 4; Goal 3 Objectives 1 and 2.

5.5.3 Project 3. Complete Implementation of Public Use Management Plan

Complete the tasks outlined in the Public Use Management Plan, which include directional signs, entrance signs, visitor interpretive displays, exhibits at the visitor contact station, environmental education and outreach materials, an outdoor interpretive kiosk, an outdoor classroom curriculum guide and field equipment, boundary postings, parking pull outs, an expanded hiking trail, a hiking trail brochure, etc.

Planning Links: Goal 3 Objectives 1, 2, 3, 4, 5, and 6, Goal 4 Objective 5, Goal 5 Objectives 1 and 2.

5.6 Partnership Opportunities

Many opportunities exist to partner with State and Federal government agencies, nongovernmental agencies, private landowners, and local conservation groups to combine

efforts on resource issues or projects that would be mutually beneficial to all—with the greatest benefits to the area's natural resources.

- Developing partnerships through cooperative agreements with universities would provide seasonal student interns to assist with Refuge biological programs, habitat and maintenance projects, and education and outreach efforts. In the past, the Refuge has partnered with Tishomingo High School, Murray State College, and Southeastern Oklahoma State University. Opportunities exist to partner with other educational institutions to further the public outreach effort.
- Strengthening existing partnerships with ODWC would provide mutual benefits: enhanced biological programs and management strategies of habitats and wildlife populations, shared research opportunities and information that would mutually benefit management of nearby resource areas, joint efforts to provide wildlife-oriented recreation opportunities, and coordinated efforts for more efficient law enforcement coverage.
- Continuing partnerships with the NRCS in Tishomingo, Oklahoma, will enhance efforts to implement riparian restoration projects on private lands along the Washita River and Pennington Creek and Big Sandy Creek drainages, and other habitat restoration efforts on private lands.
- Establishing relationships with private landowners and conservation organizations will promote dialogue on options for land protection; combine efforts and management strategies to protect, enhance, and restore native habitats; and generate volunteers to share duties associated with various projects on the Refuge. Past partners include Ducks Unlimited, Quail Unlimited, National Wild Turkey Federation, and National Audubon Society. The future holds the possibility for increased involvement with Partners for Wildlife programs in the local area.
- Strengthening relationships with area water users and the Corps would provide better communication on water issues, a coordinated effort for the protection of water rights, and more efficient use of this limited resource for the benefit of users.

Maintaining and developing partnerships will enable the Refuge to achieve its goals and objectives, minimize costs, share funding, and bridge relationships with others. To maintain and enhance wildlife outside of the Refuge, the Service will focus its efforts on continuing to develop partnerships with landowners, State resource agencies, and interested conservation and sportsmen groups. Although the Service does not have management responsibilities for lands outside the Refuge, it is important to articulate the wildlife resource needs area wide. Collaboration with colleges, universities, and conservation organizations will enable the Refuge to carry on its plan for research, monitoring, and education. To create awareness and expand environmental education efforts in the community, partnerships will be established or expanded with organizations and school systems.

5.7 Monitoring and Evaluation

The National Wildlife Refuge System Improvement Act requires that the Service monitor fish, wildlife, and plants on refuges to establish status and trends of both resident and migratory wildlife. Monitoring is an essential component of this Plan, and specific strategies have been integrated into the previously described goals and objectives. Habitat management activities

will be monitored to assess whether the desired effect on wildlife and habitat has been achieved. Baseline surveys will be established for species of wildlife for which existing or historical numbers are not well known.

If the Plan is to be a useful measure of the achievements of the Refuge programs and useful to future Refuge managers, documentation needs to be a priority to determine if the objectives are achieved within the time frame of this plan. The existing Refuge programs, current databases, and guidelines for monitoring and evaluation of each step-down program plan needs to be considered in the review, evaluation, and amendments of the Plan. Implementation of the Plan will require periodic review and adjustments to amend the plan so it will continue to be effective as the programs progress.

Where possible, the Plan identified and incorporated monitoring and evaluation activities as objectives or strategies under the general goals for the Refuge. Specific guidelines for monitoring and evaluation will vary by program and need to be developed and referred to in the appropriate step-down plan.

5.8 Plan Amendment and Revision

The Refuge Plan is a dynamic plan. While it will serve as a guide for overall Refuge direction, it will be adjusted to consider new and better information, ensuring that refuge activities best serve the established purpose of the Refuge and the mission of the Refuge System. The Plan will be reviewed every five years and monitored continuously to ensure the developed management actions support the goals and objectives of the Refuge.

This Plan will be informally reviewed by Refuge staff while preparing annual work plans and updating the Refuge Information Management System database. It may also be reviewed during routine inspections or programmatic evaluations. Results of the reviews may indicate a need to modify the Plan. The monitoring of objectives is an integral part of the Plan, and management activities may be modified if desired results are not achieved. If minor changes are required, the project leader will determine the level of public involvement and associated NEPA documentation. This Plan will be formally revised at least every 15 years.

(This page intentionally left blank.)

Glossary of Terms

Adaptive Management: A process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in a management plan. Analysis of results helps managers determine whether current management should continue or whether it should be modified to achieve the desired results.

Biological Diversity: The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and communities and ecosystems in which they occur.

Biological Integrity: The biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities.

Cultural Resources: The remains of sites, structures, or objects used by people in the past, including archeological sites, historic sites, historic buildings, historic districts, cultural landscapes, and traditional cultural properties.

Ecological Integrity: The relative intactness of biotic and abiotic components and their interrelated structure and function within a given ecosystem.

Ecosystem: A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

Environmental Health: Composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment.

Exotic and Invasive Species: Any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem, and whose introduction causes or is likely to cause environmental or economic harm or harm to human health.

Forb: A broad-leaf, herbaceous flowering plant that is not a grass (i.e., an annual sunflower).

GIS: Geographic Information System. A computer based system for the collection, processing, and managing of spatially referenced data. GIS allows for the overlay of many data layers and provides a valuable tool for resource management.

Habitat: Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.

Invertebrate: Any animal without a spinal column. The group includes 97 percent of all animal species.

Neotropical Migratory Bird: A bird that breeds in Canada and the United States during summer and spends the winter in Mexico, Central America, South America, or the Caribbean islands.

Prescribed Burning: Burning conducted under controlled conditions to enhance natural habitats and/or to reduce vegetative fuels to reduce the risk from uncontrolled natural fires.

RONS: Refuge Operating Needs System. A national database which contains the unfunded operational needs of each refuge.

Scoping Process: An early and open public participation process for determining the scope of issues to be addressed in an Environmental Assessment, and for identifying significant issues related to a proposed action.

Succession: The natural replacement of one biotic community by another.

Wetland: Wetlands are lands transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface or the land is covered by shallow water; wetlands support, under natural conditions, plants and animals that require saturated or seasonally saturated soils.

Abbreviations and Acronyms

MSL	mean sea level
Ark/Red	Arkansas/Red Rivers Ecosystem
BCR	bird conservation region
CS	Closed Season
CRP	Conservation Reserve Program
EA	environmental assessment
EO	Executive order
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FTE	full-time employee
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
NABCI	North American Bird Conservation Initiative
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act
NFH	National Fish Hatchery
NWR	National Wildlife Refuge
ODWC	Oklahoma Department of Wildlife Conservation
ORP	outdoor recreation planner
OWRB	Oklahoma Water Resources Board
PIF	Partners in Flight
Refuge System	National Wildlife Refuge System
RO	regional office
RONS	Refuge Operation Needs
RRP	Refuge Roads Program
SAMMS	Service Asset Maintenance Management System
System	National Wildlife Refuge System
Service	U.S. Fish and Wildlife Service
SHC	Strategic habitat conservation
SS1	State Species of Special Concern Category 1
SS2	State Species of Special Concern Category 2
TREES	Tishomingo Refuge Ecology and Education Society

USDA	U.S. Department of Agriculture
USDA-NRCS	U.S. Department of Agriculture–Natural Resource Conservation Service
USGS	United States Geological Survey
USACE	U.S. Army Corps of Engineers
WMU	Wildlife Management Unit

List of Preparers

U. S. Fish and Wildlife Service Employees

Project Leaders:

Kris Patton (BS, Environmental Management; BS, Wildlife Conservation; MT, Wildlife Conservation)

Refuge Manager

Tishomingo NWR

Melissa Holder

Assistant Refuge Manager

Tishomingo NWR

Joseph Lujan

Planning Team Leader

Biologist/Natural Resource Planner

Southwest Regional Office, Albuquerque, NM

Doug St. Pierre (BBA, Finance; JD, Law)

Planning Team Leader

Natural Resource Planner

Regional Refuges Office, Albuquerque, NM

Contributors:

Kari McGuire (BS, Agronomy; MLA, Landscape Architecture)

Natural Resource Planner and GIS Specialist

Regional Refuges Office, Albuquerque, NM

Justin Roach (BS, Forestry; MS, Biology)

Refuge Biologist

Tishomingo NWR

Contract Consultants:

Kleinfelder, Inc.:

Louis J. Bridges (BS, Biology; MA, Science Education; PhD, Administration/Complex Systems)

Biologist/Senior Project Manager

Hotchkiss, CO

Jeremy Henson (BS, Biology; MS Candidate, Plant Ecology)

Biologist/Project Manager

Austin, TX

A. References

American Ornithologists' Union (AOU). 1998. http://www.aou.org/checklist/index.php3#tyto Accessed on January, 2008.

Anderson, Jim. 1999. Generalized Surface Geological Map of Oklahoma. http://www.okgeosurvey1.gov/level2/geology/ok.geologymap.html

Andrews, R., and Righter, R., 1992. *Colorado Birds.* Denver Museum of Natural History. Denver, CO. p. 442

Brown, Stephen, C. Hickey, B. Harrington, and R. Gill, eds. 2001 United States Shorebird Conservation Plan. Second Edition. May

Bureau of Land Management, 2009. Oaks and Prairies, Physiographic Area 08 – Executive Summary and Osage Plains, Physiographic Area 33. http://www.blm.gov/

Carter, M. F., Hunter, W. C., Pashley, D. N., and Rosenberg, K. V., 2000. Setting Conservation Priorities for Landbirds in the United States: The Partners in Flight Approach, *Auk* 117:541-548.

Citydata.com

Colvin, B.A., 1980. Feeding Strategy and Habitat Requirements of the Barn Owl in Ohio. John Carroll University, Cleveland, Ohio. M.S. Thesis. 97pp.

Colvin, B. A., Hegdal, P. L., and Jackson, W. J., 1984. A Comprehensive Approach to Research and Management of Common Barn Owl Populations, *Proceedings of the Workshop on Management of Non-game Species and Ecological Communities*, University of Kentucky, Lexington, pp. 270-282.

Colvin, B.A., 1985. Common Barn Owl Population Decline in Ohio and the Relationship to Agricultural Trends. Journal of Field Ornithology 56: 224-235.

Craig, G. 1986. Peregrine Falcon, *Audubon Wildlife Report,* National Audubon Society, New York, pp. 807-824.

Craven, Earl, (1946). Tishomingo National Wildlife Refuge, First Refuge Manager, 1946-1966.

Dechant, J. A., Sondreal, M. L., Johnson, D. H., Igl, L. D., Goldade, C. M., Rabie, P. A. and Euliss, B. R., 1999 (revised 2000). *Effects of Management Practices on Grassland Birds: Burrowing Owl*, Northern Prairie Wildlife Research Center, Jamestown, ND. http://www.npwrc.usgs.gov/resource/literatr/grasbird/buow/buow.htm

Del Hoyo, J., Elliott, A., and Sargatal, J., 2000. Anseriformes, *Handbook of the Birds of the World,* Vol. 1 p. 555.

Ehrlich, P., Dobkin, D., and Wheye, D., 1988. *The Birder's Handbook - A Field Guide to the Natural History of North American Birds*, Simon and Shuster, New York.

Environmental Protection Agency (EPA). 2000. Accessed in January, 2008. http://www.epa.gov/OWOW/watershed.htm

Esslinger, C.G., and B.C. Wilson. 2002. *North American Waterfowl Management Plan, Gulf Coast Joint Venture: Laguna Madre Initiative.* North American Waterfowl Management Plan, U.S. Fish and Wildlife Service, Albuquerque, NM. 28pp.

Finch, D. 1992. *Threatened, Endangered, and Vulnerable Species of Terrestrial Vertebrates in the Rocky Mountain Region*. United States Department of Agriculture Forest Service General Technical Report RM-215.

Garrett, J. and Barker, D., 1987. *A Field Guide to Reptiles and Amphibians of Texas* University of Texas Press, Austin, Texas.

Hall, R.S., Glinski, R.L., Ellis, D.H., Ramakka, J.M., and Base, D.L., 1988. Ferruginous Hawk. *Proceedings of the Southwest Raptor Management Symposium and Workshop*, National Wildlife Federation, 11:111-118

Hoagland, B.W. 2000. The Vegetation of Oklahoma: A Classification of Landscape Mapping and Conservation Planning, Southwestern Naturalist 5:385-420.

Hubbard, J.P., 1985. *Interior Least Tern,* Handbook of Endangered Species in New Mexico, New Mexico Department of Game and Fish

Ladd, D. 1991. Reexamination of the Roles of Fire in Missouri Oak Woodlands. In: (G.V. Burger, J.E. Ebinger, G.S. Wilhelm eds.) Proceedings of the Oak Woods Management Workshop; 1988; Peoria, IL. Charleston, IL. Eastern Illinois University: 67-80.

Lewis, J. C. 1995. *Whooping Crane* (*Grus americana*), The Birds of North America, The Academy of Natural Sciences, Philadelphia, Pennsylvania, 153:28

Lower Mississippi Valley Joint Venture, 1989. Eastern Oklahoma Wetlands Plan and North American Waterfowl Management Plan. Accessed January, 2008. http://www.lmvjv.org

Marti, D., and Wagner, P. W., 1985. Winter Mortality in Common Barn Owls and its Effect on Population Density and Reproduction, *Condor 87*

North American Waterbird Conservation Plan for the Americas, 2002. Accessed January, 2008 http://www.waterbirdconservation.org/pubs/complete.pdf.

Oklahoma Conservation Commission, 2003. *Eastern Red Cedar: A Growing Threat to Oklahoma*, Oklahoma City, Oklahoma

Oklahoma Department of Agriculture, Food, and Forestry, 2008. *Feral Swine*, Animal Industry, Chapter 15, Subchapter 34

Oklahoma Natural Heritage Database, 1999. Accessed January, 2008 http://www.oknaturalheritage.ou.edu/

Oklahoma Wildlife Action Plan 2005. Oklahoma Comprehensive Wildlife Conservation Strategy

Olendorff, R. R., 1993. *Biology and Management of Ferruginous Hawk* (*Buteo regalis*): *A Review*, U.S. Bureau of Land Management, Raptor Research and Technical Assistance Center, Boise, Idaho

Overmire, T. G., 1963. *The Effects of Grazing Upon Habitat Utilization of the Dickcissel (Spiza americana) and Bell's Vireo(Vireo bellii) in North Central Oklahoma*, Oklahoma State University Press, Stillwater, Oklahoma

Partners in Flight. Accessed January, 2008. http://www.partnersinflight.org

Porter, R.D. and White, C.M., 1973. The Peregrine Falcon in Utah. *Brigham Young University Science Bulletin,* 18:1-74

Root, T., 1988. *Atlas of Winter North American Birds: An Analysis of Christmas Bird Count Data*, University of Chicago Press, Chicago

Rosenburg, C. P., 1986. *Barn Owl Habitat and Prey Use in Agricultural Eastern Virginia*, College of William and Mary, Williamsburg, Virginia, M.S. Thesis

Rosenburg, C., 1992. Barn Owl, (*Tyto alba*), *Migratory Non-game Birds of Management Concern in the Northeast*, United States Fish and Wildlife Service, Newton Corner, Massachusetts, pp. 253-279

Schmutz, J.K., 1984. Ferruginous and Swainson's Hawk Abundance and Distribution in Relation to Land Use in Southeastern Alberta, *Journal of Wildlife Management*, 48:1180-1187

Smith, F., 1977. A Short Review of the Status of Riparian Forests in California, Riparian Forests in California: Their Ecology and Conservation, *Institute of Ecology Publication*, 15:1-2

Stewart, R.E., 1975. *Breeding Birds of North Dakota*, Harrison Smith, Lund Press, Minneapolis, Minnesota, p. 295

Stravers, J.A. and Garber, G.L., 1998. *Nest Site Selection, Reproductive Success and Territory Reoccupation of Ferruginous Hawks in Three Regions in New Mexico*, Bureau of Land Management, Socorro and Farmington Field Offices (unpublished report)

Texas Parks and Wildlife Department, 2000. Accessed January, 2008 http://www.tpwd.state.tx.us/publications/pwdpubs/pwd_rp_w7000_1442/sightings

Texas Parks and Wildlife Department, 2007. *Oaks and Prairies Joint Venture: A Vision for Regional Bird Management*, Austin, Texas

United Nations Intergovernmental Panel on Climate Change, *Fourth Assessment Report – Climate Change (2007)* available at, http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

United States Army Corp of Engineers 2009. "Striper Capital of the World," Lake Texoma Project webpage: www.swt.usace.army.mil. Accessed November 2009.

United States Census Bureau (2008) http://www.census.gov. Accessed on November 2009

United States Department of Agriculture (2009). http://www.usda.gov. Accessed November 2009

United States Department of Agriculture, Farm Service Agency (2009). http://www.fsa.usda.gov. Accessed November 2009

United States Department of Energy, 1999. Carbon Sequestration Research and Development. Office of Science; Office of Fossil Energy. http://www.fossil.energy.gov/ Accessed November 2009

United States Fish and Wildlife Service. 1993. Species Profile, Snowy Plover. http://www.fws.gov/arcata/es/birds/WSP/plover.html

United States Fish and Wildlife Service. 1998. Draft Recovery Plan for the Least Bell's Vireo. U.S. Fish and Wildlife Service, Portland, Oregon. 139pp.

United States Fish and Wildlife Service. 1998. North American Waterfowl Management Plan: 1998 United States Progress Report

United States Fish and Wildlife Service. 1999. *Endangered and Threatened Wildlife and Plants; Proposed Rule To Remove the Bald Eagle in the Lower 48 States From the List of Endangered and Threatened Wildlife*, Federal Register, Vol. 64, No. 128

United States Fish and Wildlife Service. 2004. Banking on Nature 2004: The Economic Benefits to Local Communities for the National Wildlife Refuge Visitation. J. Caudill and E. Henderson, Division of Economics, Washington, D.C. 2005. http://www.fws.gov/refuges/

United States Fish and Wildlife Service. 2006. Banking on Nature 2006: The Economic Benefits to Local Communities for the National Wildlife Refuge Visitation. J. Caudill and E. Carver, Division of Economics, Washington, D.C. 2007. http://www.fws.gov/refuges/

United States Fish and Wildlife Service. 2006. *Strategic Habitat Conservation: Final Report of the National Ecological Assessment Team,* United States Fish and Wildlife Service and United States Geological Survey

United States Fish and Wildlife Service. 2007. "Fact Sheet: Natural History, Ecology and History of Recovery." http://www.fws.gov/midwest/eagle/recovery/ Accessed November 2009.

United States Fish and Wildlife Service. 2009. Tom Stehn, Species Status and Fact Sheet, USFWS, North Florida Ecological Services Office. http://www.gov/north florida/WhoopingCrane. Accessed November 2009

United States Fish and Wildlife Service Manual 603 FW 1 (2006). Refuge Management, National Wildlife Refuge System Uses. Appropriate Refuge Uses. http://www.fws.gov/policy/manuals. Accessed November 2009

United States Fish and Wildlife Service Manual 603 FW 2 (2000). Refuge Management, National Wildlife Refuge System Uses, Compatibility. http://www.fws.gov/policy/manuals. Accessed November 2009

United States Geological Survey. 2009. http://tin.er.usgs.gov/geology/state. Accessed November 2009

United States Geological Survey, U.S. Fish and Wildlife Service. 2006. *Strategic Habitat Conservation*: Final Report of the National Ecological Assessment Team

United States Shorebird Conservation Plan. Accessed January, 2008 http://www.fws.gov/shorebirdplan/USShorebird/overview.htm

B. Applicable Laws and Executive Orders

Administrative Procedure Act (1966; 5 U.S.C. 551-559, 701-706 and 801-808, as amended): Contains procedures that Federal agencies must follow, including public information, open meetings, and privacy of information requirements, and provisions for hearings, adjudications, rule making, and judicial and congressional review of Federal agency actions.

Agricultural Credit Act of 1987 (7 U.S.C. 5104; P.L. 100-233): Authorizes the Farmer's Home Administration (FmHA) to transfer land to any Federal or State agency for conservation purposes (e.g., the FmHA can transfer fee-title or assign interests in real estate to the U.S. Fish and Wildlife Service for the protection of floodplains, wetlands, and surrounding uplands).

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.

Americans with Disabilities Act (1992): The Americans with Disabilities Act is the most comprehensive Federal civil-rights statute that prohibits discrimination on the basis of disability in employment, state and local government, public accommodations, commercial facilities, transportation, and telecommunications.

Antiquities Act of 1906 (16 U.S.C. 431-433): First United States law to provide general protection of cultural or natural resources. This act authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Archaeological and Historic Preservation Act (1974): Requires that Federal agencies provide for *"...the preservation of historical and archeological data (including relics and specimens) which might otherwise be irreparably lost or destroyed as the result of...any alteration of the terrain caused as a result of any Federal construction project of federally licensed activity or program."*

Archaeological Resources Protection Act of 1979, as amended (16 U.S.C. 470aa-470mm): The Archaeological Resources Protection Act (ARPA) was enacted *"...to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals."* The main focus of ARPA is on regulation of legitimate archaeological investigations on public lands and the enforcement of penalties against looting or vandalism of these resources. Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

Appropriate Uses Policy (2006) 603 FW1: Describes procedures for Refuge managers to follow when deciding if uses are appropriate on a refuge. Appropriate uses are either proposed or existing uses on a refuge that meet at least one of the following four conditions: 1) the use is a wildlife-dependent recreational use as identified in the 1997 Improvement Act; 2) the use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law; 3) the use involves the taking of fish and wildlife under State regulations; or 4) the use has been found to be appropriate as described further in the Appropriate Refuge Uses policy. This policy applies to all proposed and existing uses in the Refuge System only where the Service has jurisdiction over the use. The policy does not apply:

1) In situations where reserved rights or legal mandates provide that the Service must allow the use, or
2) To refuge management activities (e.g., fish and wildlife population or habitat management actions, including but not limited to prescribed burns, water level management, invasive species control, routine scientific monitoring, law enforcement activities, and maintenance of existing refuge facilities).

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

Bald and Golden Eagles Protection of 1940 (16 U.S.C. 668-668d; 54 Statute 250), as amended: Provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds.

Biological Integrity, Diversity, and Environmental Health (2001) 601 FW 3: As part of the comprehensive conservation planning process, this policy provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and associated ecosystems. It provides refuge managers with an evaluation process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate and in concert with refuge purposes and Refuge System mission, restore lost or severely degraded components.

Clean Air Act (1970; 42 U.S.C. 7401 et seq.), as amended: A comprehensive Federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes the U.S. Environmental Protection Agency to establish National Ambient Air Quality Standards to protect public health and the environment.

Clean Water Act (1977); Federal Water Pollution Control Act: This is the principal law that governs pollution of the Nation's surface waters. The Clean Water Act employs several regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. Section 404 of the Clean Water Act requires permits (issued by the U.S. Army Corps of Engineers) for the discharge of dredged or fill material into waters of the United States, including wetlands.

Coastal Barrier Resources Act (1982; 16 U.S.C. 3501 et seq.), as amended: This act (CBRA) designated various undeveloped coastal barrier islands, depicted by specific maps, for inclusion in the Coastal Barrier Resources System. Areas so designated were made ineligible for direct or indirect Federal financial assistance that might support development, including flood insurance, except for emergency lifesaving activities. Exceptions for certain activities, such as fish and wildlife research, are provided and national wildlife refuges and other otherwise protected areas are excluded from the system.

Compatibility Policy (2000) 603 FW 2: Incorporates the compatibility provisions of the National Wildlife Refuge System Improvement Act of 1997 that amends the National Wildlife Refuge System Administration Act of 1966. The Compatibility Policy is for determining whether proposed and existing uses, which the Service has jurisdiction over and that are occurring on national wildlife refuges, are compatible (i.e., will not detract from nor materially interfere) with the purpose(s) of the refuge or with the Refuge System's mission. The policy is to ensure that the Service administers proposed and existing national wildlife refuge uses according to laws, regulations, and policies concerning compatibility, and provides procedures for documentation and periodic review of existing refuge uses.

Comprehensive Conservation Plans (2000) 602 FW 3: As required by the National Wildlife Refuge System Improvement Act of 1997, comprehensive conservation plans describe the desired future conditions of a refuge; provide long-range guidance and management direction to achieve refuge purposes; help fulfill the Refuge System mission; maintain and, where appropriate, restore the ecological integrity; and meet other mandates. The purpose of developing the plan is to provide the refuge manager with a 15-year management plan for the conservation of fish, wildlife, and plant resources and their related habitats, while providing opportunities for compatible wildlife-dependent recreational uses.

Convention Between the United States of America and the Mexican States for the Protection of Migratory Birds and Game Mammals, 1936 (50 Statute 1311).

Convention of Nature Protection and Wildlife Preservation in the Western Hemisphere, 1940 (56 Statute 1354).

Convention Between the United States and Great Britain (for Canada for the Protection of Migratory Birds). (39 Statute 1702; TS 628), as amended.

Convention on Wetlands of International Importance, Especially as Waterfowl Habitats (I.L.M. 11:963-976, September 1972, Ramsar Convention).

Cooperative Research and Training Units Act (1960; 16 U.S.C. 753a-753b), as amended: Authorizes the Secretary of the Interior to enter into cooperative agreements with colleges and universities, State fish and game agencies, and nonprofit organizations for the purpose of developing adequate, coordinated, cooperative research and training programs for fish and wildlife resources.

Criminal Code Provisions of 1940 (18 U.S.C. 41), as amended: Provides for fines and penalties for the unlawful taking, disturbing, hunting, trapping, and/or capturing of "*...any bird, fish, or wild animal of any kind whatever, or takes or destroys the eggs or nest of any such bird or fish, on any lands or waters which are set apart or reserved as sanctuaries, refuges or breeding grounds for such birds, fish, or animals under any law of the United States or willfully injures, molests, or destroys any property of the United States on any such lands or waters...*"

Disaster Relief Act of 1974 (42 U.S.C. 5121 et seq.), as amended: Provides authority for Federal agencies to assist State and local governments during Presidentially-declared emergencies.

Economy Act (1932; 31 U.S.C. 1535): Provides authority for Federal agencies to order goods and services from other Federal agencies and to pay the actual costs of those goods and services. The act was passed to obtain economies of scale and eliminate overlapping activities of the Federal government.

Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901-3932, as amended): The purpose of this act is to promote wetlands conservation for the public benefit and to help fulfill international obligations in various migratory bird treaties and conventions. The act authorizes the purchase of wetlands from Land and Water Conservation Fund monies. The act also requires the Secretary of the Interior to establish a National Wetlands Priority Conservation Plan, requires the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers funds from import duties on arms and ammunition to the Migratory Bird Conservation Fund.

Endangered Species Act of 1973, as amended: The main purposes of the Endangered Species Act are to: 1) provide a means whereby ecosystems of threatened and endangered species may be conserved; and 2) provide a program for the conservation of threatened and endangered species. The provisions of the Endangered Species Act include but are not limited to land acquisition, cooperative programs with the states, and interagency cooperation (Section 7). Section 7(a)(1) directs Federal agencies to carry out programs for the conservation of threatened and endangered species.

Environmental Education Act of 1990 (20 U.S.C. 5501-5510): Established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a Federal environmental education program. The office is required to develop and support environmental programs in consultation with other Federal natural resource management agencies, including the U.S. Fish and Wildlife Service.

Executive Order 11514, Protection and Enhancement of Environmental Quality (1970): This directs that the "*...Federal government shall provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans, and programs so as to meet national environmental goals...*"

Executive Order 11644, Use of off-road vehicles on the public lands (1972): Requires that the Service designate areas as open or closed to off-highway vehicles in order to protect refuge resources, promote safety, and minimize conflict among the various refuge users; monitor the effects of these uses once they are allowed; and amend or rescind any area designation as necessary based on the information gathered.

Executive Order 11987, Exotic organisms (1977): Executive agencies shall, to the extent permitted by law, restrict the introduction of exotic species into the natural ecosystems on lands and waters which they own, lease, or hold for purposes of administration; and, shall encourage the States, local governments, and private citizens to prevent the introduction of exotic species into natural ecosystems of the United States.

Executive Order 11988, Floodplain Management (1977): This directs that each Federal agency *"...shall provide leadership and take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains..."* in carrying out its responsibilities.

Executive Order 11989, Off-Road Vehicles on Public Lands (1977): Requires the Service to close areas to off-highway vehicles when we determine that the use will cause considerable adverse effects on the soil, vegetation, wildlife, habitat, or cultural or historic resources.

Executive Order 11990, Protection of Wetlands (1977): This directs that each Federal agency *"...shall provide leadership and shall take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities..."*

Executive Order 12962, Recreational Fisheries (1995): Federal agencies shall, to the extent permitted by law and where practicable, and in cooperation with states and tribes, improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities.

Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System (1996): This spells out the mission of the National Wildlife Refuge System, along with establishing guiding principles to help ensure the long-term enjoyment of the Refuge System for present and future generations. The order directs the Secretary of the Interior to recognize compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation as priority general public uses on the Refuge System (i.e., the "big six").

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.

Executive Order 13112, Invasive Species (1999): This order was established to address the growing ecological and economic damage caused by invasive species. Executive Order 13112

requires Federal agencies to: 1) identify actions that might affect the status of invasive species and prevent introductions of invasive species; 2) not authorize, fund, or carry out actions likely to cause the introduction or spread of invasive species; 3) detect and respond rapidly to control invasive species populations; 4) monitor and conduct research on invasive species; 5) restore native species and habitat conditions in ecosystems that have been invaded; and 6) promote public education on invasive species.

Executive Order 13158, Marine Protected Areas (2000): Directs protection of the significant natural and cultural resources within the marine environment for the benefit of present and future generations by strengthening and expanding the Nation's system of marine protected areas (MPAs). An MPA is any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein. The EO directs Federal agencies to work together with states, territories, tribes, and nongovernmental partners to develop and maintain an effective national system of MPAs in the United States and to accomplish a variety of related tasks working with public and private partners. The "marine environment" is defined as those areas of ocean and coastal waters, the Great Lakes and their connecting waters, and submerged lands thereunder, over which the United States exercises jurisdiction, consistent with international law.

Executive Order 13186, Responsibilities of Federal agencies to protect migratory birds (2001): Provides guidance for Service programs relative to the management and conservation of migratory birds. Its purpose is to minimize the potential adverse effects of migratory bird take, with the goal of striving to eliminate take, while implementing our mission. This guidance includes, but is not limited to: 1) integrating migratory bird conservation measures into our activities; 2) restoring and enhancing the habitat of migratory birds; 3) ensuring our actions and plans promote migratory bird conservation; 4) promoting inventory, monitoring, research, management studies, and information exchange related to migratory birds; 5) promoting education and outreach related to migratory birds; 6) identifying special migratory bird habitats; and 7) strengthening non-Federal partnerships to further bird conservation.

Executive Order 13443, Facilitation of Hunting Heritage and Wildlife Conservation (2007): Directs Federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management, including the Department of the Interior and the Department of Agriculture, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

Farmland Protection Policy Act (7 U.S.C. 4201 et seq.): Requires Federal agencies to identify and take into account the adverse effects of their programs on the preservation of farmlands.

Federal Aid in Sport Fish Restoration Act (1950; 16 U.S.C. 777-777k), as amended: Commonly called the Dingell-Johnson Act or Wallop-Breaux Act, this provides Federal aid to the States for management and restoration of fish, having "*...material value in connection with sport or recreation in the marine and/or fresh waters of the United States.*" In addition, amendments to the act provide funds to the states for aquatic education, wetlands restoration, boat safety, clean vessel sanitation devices (pumpouts), and a non-trailerable boat program.

Funds are derived from a 10 percent excise tax on certain items of sport fishing tackle; a three percent excise tax on fish finders and electric trolling motors; import duties on fishing tackle, yachts, and pleasure craft; interest on the account; and a portion of motorboat fuel tax revenues and small engine fuel taxes. To participate in the Federal Aid in Sport Fish Restoration program, states are required to agree to this law and pass laws for the conservation of fish, which include a prohibition against the diversion of license fees for any other purpose than the administration of the state fish department.

Federal Aid in Wildlife Restoration Act (1937; 16 U.S.C. 669-669i), as amended: Commonly called the "Pittman-Robertson Act," this provides Federal aid to states for management and restoration of wildlife. Funds from an 11 percent excise tax on sporting arms and ammunition are appropriated to the Secretary of the Interior and apportioned to states on a formula basis for paying up to 75 percent of the cost-approved projects. Project activities include acquisition and improvement of wildlife habitat, introduction of wildlife into suitable habitat, research into wildlife problems, surveys and inventories of wildlife problems, acquisition and development of access facilities for public use, and hunter education programs, including construction and operation of public target ranges.

Federal Environmental Pesticide Control Act of 1972 (7 USC 136-136y), as amended: This established, under the Administrator of the EPA, a program for controlling the sale, distribution, and application of pesticides through an administrative registration process. The amendments provided for classifying pesticides for "general" or "restricted" use. "Restricted" pesticides may only be applied by or under the direct supervision of a certified applicator. Amendments to this act also authorized experimental use permits and provided for administrative review of registered pesticides and for penalties for violations of the statute. States were authorized to regulate the sale or use of any pesticide within a state provided that such regulation does not permit any sale or use prohibited by the act. The Federal Environmental Pesticide Control Act of 1972 amended the **1947 Federal Insecticide, Fungicide, and Rodenticide Act** (FIFRA). The 1947 statute (FIFRA) prohibited the sale or distribution of "*economic poisons*," provided for the registration of such materials, and authorized penalties for violation of the act. The Endangered Species Act later amended FIFRA to define “imminent hazard” to include situations involving *unreasonable hazard to the survival of a species declared by the Secretary of the Interior to be endangered or threatened*.

Federal Fire Prevention and Control Act of 1974 (15 U.S.C. 2201 et seq.), as amended: This authorizes reimbursement to state and local fire services for costs incurred in firefighting on Federal property.

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.

Federal Property and Administrative Services Act of 1949 (40 U.S.C. 471-535), as amended: Sets forth requirements for the management and disposal of government property, including excess property (property under the control of any Federal agency but

which it no longer needs) and surplus property (excess property not required for the needs of any Federal agency).

Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j, not including 742 d-l), as amended: This established a comprehensive national fish and wildlife policy and broadened the authority for acquisition and development of refuges. The policy emphasizes the commercial fishing industry, but also with a direction to administer the act with regard to the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment, and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, the act directs a program of continuing research, extension, and information services on fish and wildlife matters, both domestically and internationally. A 1974 amendment to the Fish and Wildlife Act of 1956 abolished the "Bureau of Sport Fisheries and Wildlife" and re-designated it as the "United States Fish and Wildlife Service"(Public Law 93-271). In 1978, the Fish and Wildlife Act was amended to allow the Service to accept donations of both real and personal property. In 1998, the Fish and Wildlife Act of 1956 was further amended to promote volunteer programs and community partnerships for the benefit of national wildlife refuges. This also required the Secretary of the Interior to develop refuge education programs to provide outdoor classroom opportunities for students to promote understanding of the National Wildlife Refuge System and to improve scientific literacy in conjunction with both formal and informal education programs.

Fish and Wildlife Conservation Act of 1980 ("Nongame Act")(16 U.S.C. 2901-2911), as amended: Authorizes financial and technical assistance to the states for the development, revision, and implementation of conservation plans and programs for nongame fish and wildlife. A 1988 amendment requires the Service to monitor and assess migratory nongame birds, determine the effects of environmental changes and human activities, identify likely candidates for endangered species listing, identify appropriate actions, and report to Congress one year from enactment. It also requires the Service to report at five-year intervals on actions taken.

Fish and Wildlife Coordination Act (1934), as amended: Authorizes the Secretary of the Interior to assist Federal, state, and other agencies in development, protection, rearing and stocking fish and wildlife on Federal lands and to study effects of pollution on fish and wildlife. The Act also requires consultation with the U.S. Fish and Wildlife Service and the wildlife agency of any state wherein the waters of any stream or other water body are proposed to be impounded, diverted, channelized, or otherwise controlled or modified by any Federal agency or any private agency under Federal permit or license; with a view to preventing loss of, or damage to, wildlife resources in connection with such water resource projects. The act further authorizes Federal water resource agencies to acquire lands or interests in connection with water use projects specifically for mitigation and enhancement of fish and wildlife.

Fish and Wildlife Improvement Act of 1978 (16 U.S.C. 7421; 92 Stat. 3110), as amended: Authorizes the secretaries of the Department of the Interior and Commerce to establish, conduct, and assist with national training programs for state fish and wildlife law enforcement personnel. It also authorized funding for research and development of new or improved methods to support fish and wildlife law enforcement. The law provides authority to the secretaries to enter into law enforcement cooperative agreements with state or other Federal

agencies and authorizes the disposal of abandoned or forfeited items under the fish, wildlife, and plant jurisdictions of these secretaries. It strengthens the law enforcement operational capability of the Service by authorizing the disbursement and use of funds to facilitate various types of investigative efforts.

Flood Control Act of 1944, as amended: This act, supplemented by other flood control acts and river and harbor acts, authorizes various Corps of Engineers water development projects. The Flood Control Act expressed Congressional intent to limit the authorization and construction of navigation, flood control, and other water projects to those having significant benefits for navigation and that could be operated consistent with other river uses. This authorized the construction of numerous dams and modifications to previously existing dams. Several provisions of this act affect the responsibilities of the Service under the **Fish and Wildlife Coordination Act**.

Food Security Act of 1985 "Farm Bill" (99 Stat. 1354), as amended by the Food, Agriculture, Conservation, and Trade Act of 1990: This contains several provisions that contribute to wetland conservation. The "Swampbuster" provisions stated that farmers who produce an agricultural commodity on wetlands converted after enactment are ineligible for most farmer program subsidies. Administration of the program through the USDA requires consultation with the service on matters relating to wetland identification, determination of exemptions to the wetland conservation provisions, issuance of implementing regulations, mitigation, and restoration of values and functions on converted wetlands. This act also authorized the Secretary of Agriculture to grant or sell conservation easements, which may include wetlands, to state or local governments or private non-profit organizations for conservation purposes. In addition, the 1985 Act also established a Conservation Reserve Program, providing incentives to private landowners (e.g., farmers) to return farmland to permanent vegetative cover and for applying soil conservation prescriptions such as wildlife habitat development. The program was expanded in 1988 by regulation to make cropped wetlands eligible for the program, with the intended result of wetland restoration (i.e., The Wetland Reserve Program).

Freedom of Information Act (1966; 5 U.S.C. 552): Requires all Federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions; official, published, and unpublished policy statements; final orders deciding case adjudication; and other documents. Special exemptions have been reserved for nine categories of privileged material, including, but not limited to confidential matters relating to national defense or foreign policy, law enforcement records, and trade or commercial secrets. The act requires the party seeking the information to pay reasonable search and duplication costs.

Historic Sites, Buildings and Antiquities Act (16 U.S.C. 461-462, 464-467), as amended: Also known as the Historic Sites Act, this declared a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provided procedures for designation, acquisition, administration, and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this act. As of January, 1989, 31 national wildlife refuges contained such sites, including Tishomingo NWR.

Lacey Act of 1900 (16 U.S.C. 701), as amended: Makes it unlawful to import, export, sell, acquire, or purchase fish, wildlife or plants taken, possessed, transported, or sold: 1) in violation of U.S. or Indian law, or 2) in interstate or foreign commerce involving any fish, wildlife, or plants taken possessed or sold in violation of state or foreign law. The Lacey Act covers all fish and wildlife and their parts or products, and plants protected by the Convention on International Trade in Endangered Species and those protected by State law. Commercial guiding and outfitting are considered to be a sale under the provisions of the act. The act also includes prohibitions on the importation of wild vertebrates and other animals listed in the act or declared by the Secretary of the Interior to be injurious to man or agriculture, wildlife resources, or otherwise, except under certain circumstances and pursuant to regulations. The Lacey Act includes penalties and fines for violations involving imports or exports or violations of a commercial nature.

Land and Water Conservation Fund Act (1965): Authorizes the use of the receipts from the sale of surplus Federal land, outer continental shelf oil and gas sales, and other sources for land acquisition. Section 7(a)(l) of this act provides authority to use Land and Water Conservation Fund money for acquisition of refuge areas under paragraph (5) of section 7(a) of the Fish and Wildlife Act of 1956.

Migratory Bird Conservation Act (1929; 16 U.S.C. 715-715d, 715e, 715f-715r), as amended: This established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712), as amended: The Migratory Bird Treaty Act (MBTA) is one of the earliest Federal wildlife management laws enacted to protect migratory birds, which were rapidly declining from unregulated sport and commercial hunting. Specific provisions in the MBTA include the establishment of a Federal prohibition, unless permitted by regulations, to "*...pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention ...for the protection of migratory birds...or any part, nest, or egg of any such bird.*"

Migratory Bird Hunting and Conservation Stamp Act (1934; 16 U.S.C. 718-718j), as amended: Known as the "Duck Stamp Act," this requires each waterfowl hunter 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are deposited in a special U.S. Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations. Funds appropriated under the Wetlands Loan Act (16 U.S.C. 715k-3 - 715k-5), as amended, are merged with duck stamp receipts and provided to the Secretary of the Interior for the acquisition of migratory bird refuges under provisions of the Migratory Bird Conservation Act (16 U.S.C. 715 et seq), as amended, and since August 1, 1958, for acquisition of "Waterfowl Production Areas."

National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), as amended: The National Environmental Policy Act (NEPA) requires that all Federal agencies prepare

detailed environmental impact statements for "every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment. NEPA stipulates factors to be considered in environmental impact statements, and requires that Federal agencies employ an interdisciplinary approach in related decision making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations.

National Historic Preservation Act of 1966 (16 U.S.C. 470-470b, 470c-470n), as amended: Provides for preservation of significant historical features (buildings, objects, and sites) through a grant-in-aid program to the states. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468-468d). The act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in 1976. That act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register. As of January 1989, 91 historic sites on national wildlife refuges have been placed on the National Register.

National Wildlife Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd-668ee. (Refuge Administration Act): Defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of a refuge, provided such use is compatible with the 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, and environmental education and interpretation); establishes a formal process for determining compatibility; establishes 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 Wildlife Refuge System Improvement Act (1997): Sets the mission and administrative policy for all refuges in the National Wildlife Refuge System. 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, and environmental education and interpretation); establishes the responsibilities of the Secretary of the 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.

Native American Graves Protection and Repatriation Act (1990): Requires Federal agencies and museums inventory, determine ownership of, and repatriate cultural items under their control or possession.

North American Wetlands Conservation Act (1989; 16 U.S.C. 4401-4412), as amended: Provides funding and administrative direction for implementation of the North American

Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, the U.S., and Mexico.

Protection Act (1922; 16 U.S.C. 594): Provides for the Secretary of the Interior to protect and preserve—from fire, disease, or the ravages of beetles or other insects—timber on the public lands owned by the United States.

Reciprocal Fire Protection Act of 1955 (42 U.S.C. 1856), as amended by the Wildfire Suppression Assistance Act of 1989 (102 Stat. 1615): Provides authority for Federal agencies to enter into mutual assistance agreements with foreign, state, and local governments for combating wildfires, and to provide emergency assistance when no agreement exists.

Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4), as amended: Authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use when such uses do not interfere with the area's primary purposes. The act provides for public use fees and permits, and penalties for violation of regulations. It also authorizes the acceptance of donations of funds and real and personal property to assist in carrying out its purposes. Amendments to the act authorize acquisition of lands and interests suitable for: 1) fish and wildlife-oriented recreation, 2) protection of natural resources, 3) conservation of endangered or threatened speciesand 4) carrying out two or more of these tasks. Such lands were required to be adjacent to or within an existing conservation area. Acquisition was not permitted with "duck stamp" receipts for these purposes.

Refuge Revenue Sharing Act of 1935 (16 U.S.C. 715s), as amended: Provides for payments to county governments in lieu of taxes, using revenues derived from the sale of products from refuges. Revenues received from refuge products, such as animals, timber and minerals, or from leases or other privileges, are required to be deposited in a special U.S. Treasury account and net receipts distributed to counties. Remaining monies are required to be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act. The act was later amended to expand the revenue sharing system to include National Fish Hatcheries and Service research stations. It also included in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as: 1) on acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land, and 2) on land withdrawn from the public domain, 25 percent of net receipts and basic payment, in lieu of taxes on public lands. Amendments to the act authorized appropriations to make up any difference between the amount in the Revenue Sharing Fund and the amount scheduled for payment in any year. Counties are also required to pass payments along to other units of local government within the county that suffers losses in revenues due to the establishment of Service areas.

Refuge Trespass Act of 1948 (18 U.S.C. 41): This consolidated penalty provisions of various acts from 1905 through 1934, establishing and protecting fish and wildlife areas, and restating the intent of Congress to protect all wildlife within Federal sanctuaries, refuges, fish hatcheries, and breeding grounds.

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.

Rivers and Harbors 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.

Secretarial Order No. 3226; Evaluating Climate Change Impacts in Management Planning (2001): Directs each Department of Interior bureau to consider and analyze potential climate change impacts when undertaking long-range planning efforts or multi-year management plans.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948 (16 U.S.C. 667b-d), as amended: This act 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 the Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.

Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. 4601 et seq.), 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.

Volunteer and Partnership Enhancement Act (1998): This amended 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.

Waterfowl Depredations Prevention Act (1956; 7 U.S.C. 442-445), as amended: This act authorizes the Secretary of the Interior to use surplus grain owned by Commodity Credit Corporation in feeding waterfowl to prevent crop damage. Findings regarding possible crop damage are to be made by the Secretary of the Interior, and grain is to be used to lure waterfowl away from crops while not exposing them to shooting over areas to which they have been lured. Such grain may be made available to Federal, state, or local governments, or to private organizations or individuals. Appropriations are authorized to reimburse the Commodity Credit Corporation for packaging and transporting such grain.

Water Resources Planning Act (1965), as amended: This established a Water Resources Council to be composed of Cabinet representatives, including the Secretary of the Interior. The council was empowered to maintain a continuing assessment of the adequacy of water supplies in each region of the U.S. In addition, the council was mandated to establish principles and standards for Federal participants in the preparation of river basin plans and in evaluating Federal water projects. Upon receipt of a river basin plan, the council was required to review the plan with respect to agricultural, urban, energy, industrial, recreational, and fish

and wildlife needs. This also established a grant program to assist states in participating in the development of related comprehensive water and land use plans.

Wetlands Reserve Program: The Wetlands Reserve Program (WRP) is a voluntary program. It provides technical and financial assistance to eligible landowners to address wetland, wildlife habitat, soil, water, and related natural resource concerns on private lands in an environmentally beneficial and cost-effective manner. The program provides an opportunity for landowners to receive financial incentives to restore, protect, and enhance wetlands in exchange for retiring marginal land from agriculture. There are three enrollment options for landowners: 1) a permanent easement, 2) a 30-year easement, and 3) a restoration cost-share agreement. The WRP was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill). The Natural Resources Conservation Service administers the program (*See Also: Food Security Act of 1985*).

Wilderness Act of 1964 (16 U.S.C. 1131): The purpose of this act is to preserve and protect wild lands in their natural condition "*...to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.*" This directed Federal agencies such as the U.S. Fish and Wildlife Service to survey their roadless lands for possible wilderness designation. Wilderness areas are protected from development and the operation of motorized equipment. A Wilderness Area is defined as an area with at least 5,000 acres of undisturbed, undeveloped land affected by the forces of nature and may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

ENVIRONMENTAL ASSESSMENT

FOR THE

TISHOMINGO NWR

COMPREHENSIVE CONSERVATION PLAN

Prepared by:

U.S. Fish and Wildlife Service

National Wildlife Refuge System

Division of Planning

(This page intentionally left blank.)

Table of Content

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION C-5
Purpose C-5
Need C-5
Decision to be Made C-6
Authority, Legal Compliance, and Compatibility C-6
Appropriate Refuge Uses Policy C-6
Compatibility C-6
Public Involvement and Issues C-7
Issue 1. Habitat Management C-7
Issue 2. Public Use and Recreational Opportunities C-8
Issue 3. Cultural Resources Management C-9
Issue 4. Interagency Coordination and Relationships C-9

2.0 DESCRIPTION OF THE ALTERNATIVES C-9
Formulation of Alternatives C-9
Alternatives Considered But Eliminated From Detailed Analysis C-9
Alternatives Analyzed in Detail C-10
Alternative A (No Action Alternative/Current Management): Continuation of Ongoing Management Activities C-10
Alternative B (Proposed Action): Expansion of Habitat Management and Restoration Activities, Efforts to Address Regional Ecosystem Threats, and Improvements to Public Use Facilities Combined with Expansion of Refuge Environmental Education Programs C-12
Alternative C: Expansion of Habitat Management and Restoration Activities, combined with an Expanded Public Use Development and an Expanded Farming Program C-15

3.0 AFFECTED ENVIRONMENT C-16

4.0 ENVIRONMENTAL CONSEQUENCES C-18
Effects Common to All Alternatives C-19

5.0 ANALYSIS OF IMPACTS BY RESOURCE C-21
Impacts on Air Quality C-21
Impacts on Water Quality C-22
Impacts on Soils C-23
Biological Resources C-24
Impacts on Habitat C-24
Impacts on Wildlife C-25
Impacts on Threatened and Endangered Species C-27
Impacts on Public Use C-28
Socioeconomic Environment C-29
Impacts on Socioeconomic Resources C-29
Impacts on Aesthetic and Visual Resources C-30
Impacts on Archeological and Historical Resources C-31

6.0 CUMULATIVE ASSESSMENT C-32
Projects and Activities Considered C-32
Cumulative Impacts Analysis C-34
Impacts on Wildlife and Habitat C-34
Impacts on Endangered Species C-34

Impacts on Public Use C-35
Impacts on Air and Water Quality C-35
Impacts on Aesthetic and Visual Resources C-35
Impacts on Cultural and Historic Resources C-36
Impacts on Socioeconomic Resources C-36
Environmental Justice C-36
Conclusions C-36

7.0 CONSULTATION AND COORDINATION C-37

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

Purpose

The U.S. Fish and Wildlife Service's Refuge Manual states that the purpose of comprehensive conservation planning is to "provide long range guidance for the management of national wildlife refuges" [4 RM 1.1, Planning]. Refuge comprehensive conservation plans provide the set of issues-based management goals, objectives, strategies, and actions proposed for the short- and long-term. These constitute a proposed "management program" that is designed to address refuge issues (problems and opportunities) that will lead to the achievement of the refuge purposes, and ultimately, the mission of the National Wildlife Refuge System. Planning facilitates the kind of coordination that is necessary to enhance the efficiency of implementing management actions designed to benefit the Tishomingo National Wildlife Refuge (Tishomingo NWR, Refuge) and the surrounding area of ecological concern.

The Federal action is the development of a Comprehensive Conservation Plan with a 15-year planning horizon for Tishomingo NWR. The Plan facilitates continuity of management and effective decision making and is intended to provide long-range guidance for the management of this Refuge based on careful consideration of the physical and biological characteristics of the land base. It is designed to facilitate achievement of the Service mission and Refuge goals, which center on the protection and enhancement of wildlife and their habitats and the provision of appropriate compatible public recreation. The Service supports ecosystem management. Therefore, a primary focus of Refuge programs is to contribute toward the accomplishment of the goals of the Arkansas/Red River Ecosystem Plan.

Need

This action addresses both the needs of the Service to meet its trust responsibilities and the needs of the local community and the public.

The Service has responsibility for stewardship over species that occupy Service lands and for the protection of cultural resources on these lands. Tishomingo NWR was established in 1946 by Public Land Order 312. The purpose of the Refuge is to "provide refuge and breeding grounds for migratory birds and other wildlife."

The Refuge Recreation Act (16 U.S.C. 460-1) states that the Refuge is "suitable for incidental fish and wildlife-oriented recreational development, the protection of natural resources, and the conservation of endangered or threatened species" by the authority of the Migratory Bird Conservation Act (16 U.S.C. 712d) "for use as an inviolate sanctuary...for any other management purposes...for migratory birds."

Specifically, this Plan proposes a planned management program to implement actions that meet the operational needs of the Refuge to conduct management to benefit wildlife, particularly the fall and spring needs of migratory waterfowl populations and endangered species.

To meet its trust responsibilities, the Service needs to provide a diversity of quality habitats for wildlife and protection for the species using these habitats. The Service also needs to ensure that all recreational activities occurring on the Refuge are compatible with the purposes for which the Refuge was established. To facilitate management and ensure these ends are achieved, the Service needs to develop plans that will maximize the cost-benefit ratio of management actions.

The needs of the public, primarily the local area communities, are for a place where traditional recreational activities such as hunting, fishing, and wildlife observation can be enjoyed. There is increased public interest for more interpretive and educational activities on the Refuge, such as interpretive hiking trails, canoeing areas, display exhibits, wildlife viewing areas, and outdoor classrooms for field ecology investigations.

This Environmental Assessment (EA) will accompany the Tishomingo draft Plan. Both of these documents will be available for public review and comment prior to the issuance of a final Plan.

Decision to be Made

Based on the assessment described in this document, the Service will select an alternative to implement the Plan for Tishomingo NWR. The Final Plan will include a Finding of No Significant Impact (FONSI), which is a statement explaining why the selected alternative will not have a significant effect on the quality of the human environment. This determination takes into consideration the Service and Refuge System mission, the purpose(s) for which the Refuge was established, and other legal mandates. Assuming no significant impact is found, implementation of the Plan will begin, and it will be monitored annually and revised when necessary.

Authority, Legal Compliance, and Compatibility

The Service developed this draft Plan/EA in compliance with the Refuge Improvement Act of 1997 and Part 602 of the Fish and Wildlife Service Manual (National Wildlife Refuge System Planning). The actions described within this draft Plan/EA also meet the requirements of NEPA. The Plan's overriding consideration is to carry out the purpose for which the Refuge was established. The Refuge purposes are stated in the laws that established the Refuge and provided the funds for acquisition. Fish and wildlife management is the first priority in refuge management, and the Service allows and encourages public use (wildlife-dependent recreation) as long as it is compatible with, or does not detract from, the Refuge's mission and purposes.

Appropriate Refuge Uses Policy

The Appropriate Refuge Uses Policy (Service Manual 603 FW 1) clarifies and expands on the compatibility policy (Service Manual 603 FW 2.10D), which describes when refuge managers should deny a proposed use without determining compatibility. When a use is determined to be appropriate, the refuge manager must then determine if the use is compatible before it may be allowed on the refuge. With the exception of the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) and the take of fish and wildlife under State regulations, the refuge manager will decide if a new or existing use is an appropriate refuge use. If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a new use is not appropriate, the refuge manager will deny the use without determining compatibility.

Compatibility

The National Wildlife Refuge System Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, states that national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans can enjoy Refuge System

lands and waters. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be compatible. A compatible use "… will not materially interfere with nor detract from the fulfillment of the mission of the Refuge System or the purposes of the refuges." In addition, "wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

Compatibility determinations have been completed for the following activities and are provided in Appendix D of the draft Plan/EA.

- Hiking on Nature Trails
- Feral Pig Live Trapping by Special Use Permit
- Eastern Red Cedar Tree Removal
- Refuge Controlled Deer Hunting for Biological Management Purposes
- Boating and Sport Fishing
- Auto Touring (historical and wildlife observation)
- Camping, Picnicking, and Group Shelter

Public Involvement and Issues

To begin the Plan process, a "Notice of Intent to Prepare a Plan" for the Refuge was published in the *Federal Register* on November 17, 1999 [Vol.64, pages 62683-62684]. Major issues related to the management of the Refuge were actively solicited from the public, local public officials and governmental entities, State and Federal agencies, the Chickasaw Nation, Murray State College, private organizations, and Service staff specialists. The public scoping included a series of briefings with public officials, meeting with the USACE, meeting with representatives of the ODWC, a briefing for the Chickasaw Nation, and a scoping meeting for the public. These public scoping activities were conducted during the month of October 2007. After the briefings, the Service held a public scoping meeting October 25, 2007, at 7:00 p.m. in the Chickasaw Community Center in Tishomingo, Oklahoma. The meeting was advertized in the local newspaper and the Refuge mailed out notices to local individuals and organizations. The meeting had a small attendance, nine people, and the lead planner and Refuge manager made a presentation explaining the Plan and NEPA processes with a short conceptual description of management goals, objectives, and strategies. Following the presentation, the planning team answered several questions and received comments and suggestions from those in attendance. The Service received several written comments as a follow up to the announcement of the scoping meeting. An additional two meetings were held at the Durant Lions Club and the Ardmore Kiwanis Club, averaging about 25 people per meeting.

As part of the planning process, a number of management issues were identified. The Plan associated with this EA addresses those issues, acknowledging that within the next 15 years, the refuge will be faced with challenges and opportunities, including but not limited, to the following.

Issue 1. Habitat Management

There are three separate, but interrelated issues related to habitat management on the Refuge: water resources and their management, grasslands management, and the need for baseline biological inventories.

The Washita River, Pennington Creek, and Big Sandy Creek are the major potential water sources for the Refuge, and current Refuge water management is very limited. Cumberland Pool and Rock Creek Lake, the two large water bodies within the Refuge, are under the primary jurisdiction of the Corps as part of their Lake Texoma project. The primary purpose of Lake Texoma, in addition to flood control, recreation, and electric generation, is to provide municipal, domestic, and industrial water for surrounding towns. The Refuge does not control the waters in the portions of Lake Texoma within its boundaries. Currently, there are 400 acre-feet allotted to the Refuge from Big Sandy Creek. The current water impoundments on the Refuge are primarily and significantly affected by water levels in Lake Texoma. Wetland areas could be enhanced through efficient water delivery, water level control, and expansion of moist soil management units.

The quality of Refuge grasslands is in rapid decline. Inadequate burning is affecting grassland quality for native wildlife and migratory birds. Funds are needed to conduct a five-year study to determine soil, vegetation, and wildlife response to prescribed fire. Prescribed fire serves to maintain and encourage native grasses and forbs, and to cycle nutrients through the ecosystem. Fallowed croplands on the Refuge require extensive and expensive management to be successfully restored to native grasslands. These same fallowed croplands have also been degraded by invasive species, including eastern red cedar.

Complete biological information is needed to enhance fish and wildlife habitat for resident and migratory animal species. There is a need to inventory the Refuge habitats and identify those areas where natural biological diversity can be restored. A thorough database of biological information would enhance resource decision making. This information would be integral for the implementation of planned management programs that protect, maintain, and restore native habitats within the Refuge, in particular wintering waterfowl habitats.

Issue 2. Public Use and Recreational Opportunities

Fishing is the second largest public use program on the Refuge, with 22,500 fishing visits each year. The majority of these fishing activities occur on and around Cumberland Pool, the largest water body on the Refuge. Since the completion of Lake Texoma in 1945, the Washita River has been depositing silt during flood events into the 5,100-acre Cumberland Pool within the Refuge. Cumberland Pool is part of the Lake Texoma's project design to slow heavy flows of water, thereby preventing large quantities of silt from being deposited in the lower portions of Lake Texoma. Under normal conditions, the river bypasses the pool; however, during flood periods, the river overflows its banks and spills into Cumberland Pool. Sedimentation deposition on the west side of Cumberland Pool has created a delta and shallow water area that is ideal for some migratory bird species. However, continuing siltation will also further reduce fishing quality and opportunities in Cumberland Pool in the future. Cumberland Pool will eventually become completely filled in by sediment and silt. This will cause a change in functional use by wildlife and recreational use by the public. The primary jurisdiction over Cumberland Pool lies with the Corps as part of its Lake Texoma project.

The majority of hunting opportunities on the Refuge are found in the Wildlife Management Unit (WMU) jointly managed by the Service and ODWC.

Although the Refuge is within 40 miles of Interstate 35 and U.S. Highway 75, there are no signs on either of these highways indicating the location of the Refuge. The Refuge would benefit by increasing the public's awareness of its existence and location.

Issue 3. Cultural Resources Management

Tishomingo hosts a variety of historic cultural sites. There is a need to identify and monitor cultural resource sites and actively protect these sites from disturbance and degradation for the benefit of present and future generations.

Issue 4. Interagency Coordination and Relationships

Interagency coordination and cooperative partnerships with public agencies, local communities, and private stakeholders are essential components of the effort to preserve and improve natural resources for the benefit of the ecosystem. As anticipated increases in public use of the Refuge are realized, increased coordination with cooperating agencies will be required to protect Refuge resources and regulate public use. The Refuge currently enjoys many excellent interagency and community relationships. Strengthening current relationships while developing additional partnerships will be an ongoing process.

The Refuge has many opportunities to increase community involvement and assistance in natural resource programs, enhance wildlife compatible recreation opportunities, and expand wildlife education and community outreach. The Refuge has the greatest potential to grow if provided staff and funding to put forth a long-term consistent outreach effort in the community. Community outreach and environmental education would be instrumental in building a supportive constituency and furthering the understanding, appreciation, and stewardship of our natural resources.

2.0 DESCRIPTION OF THE ALTERNATIVES

Formulation of Alternatives

Alternatives are different approaches or combinations of management actions designed to achieve a refuge's purposes and vision, the goals identified in the Plan, the goals of the Refuge System, and the mission of the Service. Alternatives are formulated to address the significant issues, concerns, and problems identified by the Service and the public during public scoping.

A wide variety of alternatives were considered in this EA. Several alternatives considered but eliminated from detailed analysis are discussed in subsequent text.

Three alternatives are identified and analyzed in detail in this assessment. These alternatives represent different approaches or management scenarios for the future protection, restoration, and management of the Refuge's fish, wildlife, plants, habitats, and other resources, as well as compatible wildlife-dependent recreation. Refuge staff assessed the biological conditions of Refuge habitats and analyzed the external relationships affecting each refuge unit. This information contributed to the development of Refuge goals and, in turn, helped formulate the alternatives. Each alternative was evaluated based on how much progress it would make and how it would address the identified issues related to wildlife, habitat, and people as described in previous text.

Alternatives Considered But Eliminated From Detailed Analysis

Manage the entire Refuge the same as the WMU is managed. This was eliminated from further consideration because the WMU is managed specifically for hunting and remains closed to all other activities during these times. Under this alternative, the Refuge would

eliminate all other Refuge activities and manage solely for hunting; therefore, this alternative was eliminated from further consideration.

Alternatives Analyzed in Detail

The following alternatives were developed to comply with NEPA and to provide ways to represent a number of issues, concerns, and opportunities that were identified during the public and internal scoping process. Although the alternatives may have a different emphasis, habitat maintenance, restoration, and preservation are common elements of each alternative. The alternatives are intended to provide a range of public uses and access and to respond to significant issues or concerns identified during the planning process.

Alternative A (No Action Alternative/Current Management): Continuation of Ongoing Management Activities

Under the No Action Alternative, the Refuge would continue current Refuge management activities, providing existing levels of public use, visitor services, ecological enhancement, and overall Refuge improvement. Under the No Action Alternative, the Refuge would continue to be managed as it has been for the last 10 years. The Refuge currently has no integrated unit-wide plan to guide the management of all of its resources and uses. The Refuge has been guided by a Planning Needs Assessment plan and other Refuge-specific management plans to guide the management of different resources and uses on the Refuge. Current management efforts focus on farming, maintenance and/or enhancement of biological diversity, preservation of native prairie, and management of public use.

The Refuge encompasses 16,464 acres. It consists of approximately 102 acres of administrative lands (roads, parking areas, public use facilities, buildings, and grounds); 419 acres of grasslands and prairies; 1,000 acres of croplands; 1,566 acres of upland timber; 4,801 acres of seasonally flooded flats; 156 acres of wetlands; and 8,420 acres of floodplain, riparian, and open water.

The Refuge's current land management activities are designed and implemented not only to improve waterfowl habitat, but also to benefit all other species that use the Refuge, which includes over 284 species of birds, 30 species of mammals, 65 species of reptiles and amphibians, and 62 species of fish. While the primary purpose of the Refuge is providing habitat for migratory birds, it also provides habitat for a variety of rare and declining species, including several federally listed (proposed, threatened, and endangered species) and other species of concern (see Section 3.3, Biological Environment, for a complete discussion of the species that have been documented and/or have potential habitat on the Refuge). Current management of threatened and endangered species consists of habitat protection, protection of individuals from disturbances, providing adequate food resources, and limited monitoring. Other special status species or species of concern benefit from availability of protected habitat on the Refuge, but special management considerations are limited by staff size and funding.

Under the No Action Alternative, resource management would continue to include farming, mechanical and chemical control of invasive plants, periodic prescribed burning, and very limited monitoring and species inventories.

The Refuge maintains up to 1,000 acres of cropland. The primary purpose of establishing the Refuge was to aid in the restoration of this section of Oklahoma as an important Canada goose and duck migration area. The Refuge's farming program goes "hand in hand" with the reason for its establishment. Refuge farming produces crops to feed migrating and overwintering

ducks and geese, as well as other wildlife for the critical period of December and January. Crops grown include winter wheat, corn, milo, sunflower, millet, and cowpeas. Green browse and/or cereal grains are grown to be available to wintering waterfowl from October through February. White-tailed deer also utilize these areas for food and cover. The program is sufficient to meet waterfowl food requirements and is thought to be optimal.

The Refuge practices low input sustainable agriculture, which incorporates crop rotation for soil enrichment. Fallow fields are planted in legumes to provide erosion protection, organic material, and increased soil fertility. The Refuge uses herbicides as a component of Integrated Pest Management (IPM) practices, but more often employs mechanical methods of weed control. The Refuge plans to obtain a sweep (stubble mulch) plow that cuts weeds two to four inches below the surface without disturbing the soil-holding thatch on the surface. The Refuge periodically uses fertilizer as a way to improve the fertility of the soils. Where possible, crops are drilled through the remnants of last year's planting, reducing the need to disturb the soil and reducing fuel consumption. Refuge personnel conduct the farming practices at the Refuge.

Historically, fire was a natural factor in the developing and shaping of prairie ecosystems. Recent fire management efforts have been to combat all wildfires on the Refuge. Limited controlled burning would continue. The fire program would also continue to involve suppression of all wildfires. Staff and funding shortages have precluded an active prescribed fire program.

Alternative A would provide for the enhancement and restoration of grasslands habitats at a rate and degree equivalent to existing restoration practices. However, under this alternative, there would be no new extensive restoration of grassland habitats, or development of moist soil units, beyond current capabilities.

This alternative would result in access roads remaining as they are and only incurring routine maintenance. Recreational opportunities would continue to be limited to traditional programs under existing approved hunting and fishing plans. The Cumberland Pool would continue to provide public fishing from the bank on an annual basis, and boating would continue from March 1 through September 30. The primary Refuge hunt area would remain the 3,170-acre cooperative WMU to the west and would remain with three hunts, including a non-ambulatory, youth, and a regular draw hunt under Oklahoma State hunting regulations.

Public use facilities would remain essentially the same except for maintenance. New directional or interpretive sign development has recently been initiated, but future signage efforts would not take place. Existing facilities would not be upgraded, and viewing opportunities for wildlife would be limited to the existing roads and trails that are open to the public (Craven Nature Trail, the Arboretum, and the Sandy Creek Trail) unless money becomes available from outside friends groups. The Eagle Cove Observatory tower would continue to provide two spotting scopes overlooking the lake and fields. The current headquarters facilities would not be improved or expanded to accommodate more visitors. This alternative would assume no significant increases in public use; therefore public use would remain at approximately 130,000 visitors annually. Improvements to roads, interpretive services, and administrative facilities would continue according to current capabilities; however, no new improvement or expansion efforts would take place.

Water is a prime component in any wildlife management regime. The Refuge has more than 15 small impoundments constructed in draws and small wet weather streams. Most of these small impoundments have water control structures, which are primarily for the purpose of

drainage for management of aquatic growth and rough fish control; however, many have become non-functional due to siltation. Total wetland acres would remain at 156 acres unless increased by natural flooding. There are five moist soil units, including: Eagle Cove Unit (five acres), 5C Dike Units (two units totaling five acres), Cottonwood Unit (50–70 acres, depending on adequate rainfall), and Kachlers Unit (two acres). Water management of lakeshore impoundments are seriously affected by lake (Texoma) levels; however, the Refuge does not have control over the lake's water levels.

Management actions that protect wildlife habitat, such as law enforcement, would continue at current levels. Additional biological information on Refuge resources would be obtained through incidental surveys, and appropriate information would not necessarily be available to evaluate current management decisions.

Under this alternative, the Refuge would continue to place emphasis on management for migratory and wintering waterfowl, other migratory birds, and threatened and endangered species. There would be no expansion of habitat and ecosystem management, public recreation, interpretation, environmental education, or infrastructure development. The public use program would remain at current levels, and no new facilities would be planned. There would be some alterations and changes to current practices as new information becomes available or in response to deterioration of Refuge infrastructure. Significant climatic events (drought, for example) might also cause alterations to current practices. The Refuge would retain the same staffing and funding levels, but occasionally might receive one-time funding for specific activities or enhancements. Current base funding and staffing levels provide for the Refuge to focus on limited habitat management and maintenance projects. The Service would rely primarily on partnerships with local and State agencies, organizations, universities, and volunteers to accomplish many of its resource protection and monitoring goals.

There are opportunities for the Refuge to expand its operations to restore native habitats, encourage visitation, and serve the community by increasing the public's awareness, understanding, and appreciation of the area's natural resources. These opportunities would not be realized through implementation of the No Action Alternative.

Alternative B (Proposed Action): Expansion of Habitat Management and Restoration Activities, Efforts to Address Regional Ecosystem Threats, and Improvements to Public Use Facilities Combined with Expansion of Refuge Environmental Education Programs

Alternative B, referred to as the Proposed Action, would adopt and implement the management efforts presented in the Tishomingo NWR Plan. The goals, objectives, and strategies detailed in the Plan would provide for short- and long-term conservation and enhancement of Refuge resources and values while improving the overall quality of visitor services and addressing primary threats to the ecosystem. Under this alternative, existing habitat management activities would be expanded, including the improvement or creation of grassland habitats and moist soil units. This alternative would also utilize the management efforts detailed in the Plan to improve or expand visitor services programs and public use facilities on the Refuge. Additionally, under this alternative the use of adaptive management practices would contribute to ongoing monitoring and modification of Refuge resources for years to come.

Adaptive management is a systematic approach for improving resource management by learning from management outcomes. The goal of adaptive management is a structured, but flexible decision making process that can be adjusted based on uncertainty of outcomes from

management actions or external events. This process involves continuous learning and awareness, following stakeholder involvement, management objectives, management alternatives, and predictive models; monitoring plans; monitoring responses to management actions; and adjustment to management actions. With the completion and implementation of a Refuge-specific Plan, stakeholders are more actively engaged in all phases of a project, thereby facilitating mutual learning and reinforcing commitments to learning-based management. Under this alternative, increased adaptive management practices would contribute to the completion of measurable objectives and further contribute to overall improvement of Refuge resources and quality of visitor services.

The Refuge habitat management program would continue to implement active management practices to address ecosystem threats such as mechanical removal of eastern red cedar, prescribed fire, and chemical and mechanical control of weed species to accelerate restoration of native species and enhance the quality of these habitats for wildlife. However, under this alternative these programs would be improved or expanded to more effectively utilize Refuge resources for habitat improvement. An example of this may include ongoing efforts to use an IPM approach, including prescribed fire, mechanical removal, herbicides, and other methods, to control invasive species.

The increased use of prescribed fire as a management tool would be emphasized for invasive brush and tree control. The plan calls for targeting and prioritizing problem areas for restoration using herbicides and prescribed fire as management tools. Existing areas of native bluestem and tallgrass prairie, naturally occurring low water areas, riparian, timber, floodplain, and hardwood forest, as well as the aquatic riverine habitats, would be further protected and enhanced through planned management strategies.

The Refuge's biological program would become more focused and include comprehensive inventories of wildlife species and habitats, thereby improving the Refuge's baseline biological information. This would allow staff to better evaluate habitat management decisions in the future and reevaluate the local and regional threats to the ecosystem. Approximately 1,000 acres of Refuge lands, optimal for crop production, would continue to be farmed to provide forage for migratory birds and resident wildlife.

Local waterways, particularly the Washita River and Pennington Creek, are threatened with increasing pollution, diversion for municipal or industrial use, decreasing water flows, and the spread of non-native invasive species. Pennington Creek is the primary inflow source of water for the 4,500-acre Cumberland Pool and is the only all-season flow of water to Cumberland Pool in the absence of flood events from the Washita River. These riparian waterways also provide miles of habitat that serve as migration corridors for numerous Neotropical migrants. Continual monitoring for waterway pollutants through the State of Oklahoma's volunteer based Blue Thumb Program would be conducted under this alternative to provide the Refuge insight into the challenges that lay ahead to maintain high quality waterways. Additionally, the Refuge will develop a monitoring program in the Cumberland Pool to determine siltation rate and levels, as well as develop a habitat modeling program to determine future changes to Cumberland Pool. The invasion of salt cedar into the Washita River watershed and the Refuge is also a primary threat to the local ecosystem. Although the extent of this invasion is currently limited, it is extremely important to remove this invader before it has the ability to spread. Under this alternative, the Refuge would coordinate a salt cedar detection and prevention program that includes public education; work with upstream refuge (Washita NWR) and the ODWC to expand this program along the entire Washita River drainage in Oklahoma; and address salt cedar in the development of a Refuge IPM Plan.

The Refuge would gradually enhance or expand educational and outreach programs to meet the increasing visitation and public interest in Refuge environmental education programs. This would include expanding and improving existing nature trails and developing new materials and programs for outreach and education. Hunting for migratory birds, upland game, and big game would continue to be restricted on the Refuge WMU as it currently exists and within compliance of the regulations of the State of Oklahoma. Fishing regulations and access points would also remain the same. Hunting and fishing programs would be reviewed for opportunities to improve the quality of these public uses while remaining compatible with the purpose of the Refuge in maintaining wildlife resources. Management strategies would continue to be implemented to control the population of feral hogs. The law enforcement program would become more effective with the additions to the Refuge staff.

The Refuge would increase opportunities for recreational activities such as hunting, fishing, and wildlife observation. The Cumberland Pool would continue to provide public fishing, and the primary Refuge hunt areas will remain the same. Existing roads would have upgrades and maintenance. Public use facilities would be expanded and improved. New directional or interpretive signs would be installed, facilities would be upgraded, and the current headquarters facilities would be improved or expanded to accommodate more visitors. With facility upgrades, increased signs, and implementation of outreach programs, public use is expected to increase 50 percent during the next 15 years.

Additional upgrades for public use that are supported by the Proposed Action include, but may not be limited to:

- Developing a fishing pier (dock) consistent with the Public Use Management Plan (1997) on various areas of the Refuge to include Headquarters Area and Murray 23 Boat Ramp.
- Developing a fishing brochure (RONS #97022).
- Continuing to stock channel catfish in cooperation with the Tishomingo National Fish Hatchery on WMU and Refuge ponds.
- Continuing to assist the ODWC with improving their hunting plan with Refuge staff expertise.
- Reviewing, evaluating, and adjusting existing white-tailed deer hunt plan to improve hunting opportunities on the Refuge based upon known wildlife population levels and habitat relationships.
- Working with the Tishomingo Refuge Ecology and Education Society to develop and improve educational opportunities on the Refuge.
- Developing conceptual and construction plans for uniform design of recreational facilities, including associated cost estimates (RONS #97005).
- Continuing to seek funding to complete the implementation of the Public Use Management Plan (RONS #97022).
- Purchasing and installing interpretive signs for the headquarters exhibit area (RONS #98006).
- Developing and implementing an IPM Plan for the control of invasive insects that pose a risk to Refuge visitors (i.e., fire ants).

- Developing a primitive camping area at Murray 23 based on available water levels for fishing and boat launching.
- In cooperation with the ODWC, developing and managing five campsites on the WMU.
- Establishing an additional five miles of hiking trails on the Skyline Trail with parking and pull outs.

Existing roads would continue to be maintained and improved at or above current levels, and roads would be expanded as necessary to accommodate increasing recreational use of the Refuge. As recreational use of the Refuge increased, improvements would be made to accommodate additional traffic, including more parking areas, automobile pullouts, and placement of informational and educational signs.

This alternative was selected and developed based on public input and the best judgment of the planning team. This alternative would best achieve the Refuge purposes, vision, and goals, and would best contribute to the Refuge System mission. Alternative B, with associated goals, objectives, and strategies, comprises the Comprehensive Conservation Plan for the Tishomingo NWR.

Alternative C: Expansion of Habitat Management and Restoration Activities, combined with an Expanded Public Use Development and an Expanded Farming Program

This alternative would incorporate the habitat and wildlife management components called for in Alternative B (Proposed Action). However, this alternative would include more concentrated efforts in developing the Refuge's public use programs and facilities beyond the existing program and would occur at the effort and expense of the Refuge. The ODWC would simultaneously expand the hunting program services, but this expansion would only occur on the ODWC-managed WMU and would continue to comply with all applicable State hunting and wildlife regulations. No additional hunting would occur within any portion of the Service-managed Refuge under this alternative.

This alternative would primarily expand visitor services by developing extensive public use facilities, including hiking, wildlife observation, photography, and interpretive systems. Proposed project expansion afforded by this alternative would consist of the following features:

- Approximately 10 miles of new hiking trails with parking and pull outs.
- An eight-mile interpretive canoe trail along the Washita River with parking.
- Put-in and take-out areas at either end of the trail.
- Development of two additional motorized tour routes, which will require additional road improvement on 12 miles of road.

Additionally, the existing farming program would be expanded to produce increased hot foods sources for migrating waterfowl within the Refuge. Local populations of Canada geese are reportedly occurring in much fewer numbers than in previous years, largely due to the result of decreased agricultural activities within the region. With fewer supplemental food sources within the region, the Refuge is less capable of supporting the historically larger populations of geese. However, the expansion of the farming program would come at the expense of native

grassland prairie restoration, either through conversion of fallow grasslands to farm fields or by simply reducing the number of potential agriculture to grassland restoration sites.

Management efforts to develop the Refuge's public use and farming programs with this level of intensity would require a substantial increase in annual operational funding and the addition of one or two ORPs or public use specialists within five years. Additional miles in hiking trails, as well as motorized tour routes, would fall under areas of annual inundation and would require heavy maintenance and upkeep. This alternative may or may not be feasible under the existing budgetary constraints.

3.0 AFFECTED ENVIRONMENT

Tishomingo NWR is located on the Washita River arm of Lake Texoma in Johnston and Marshall Counties (Oklahoma), encompassing the Cumberland Pool. The Refuge was established in 1946 and originally consisted of 13,450 acres. In 1957, an additional 3,170 acres were added to the Refuge for use as a Wildlife Management Unit. Through deletions during the past 20 years, the current acreage stands at 16,464 acres of land within the Red River watershed, including lands classified as tallgrass prairie, eastern Cross Timbers, and riparian/wetland habitat types (see Figure 1-1 in this draft Comprehensive Conservation Plan). This mixture of ecotypes encourages a diversity of plant and animal species, including migratory waterfowl. The Service manages the lands through a Public Land Order. Nearby towns include Tishomingo, Ardmore, and Durant. Tishomingo NWR is readily accessible to nearly six million Oklahomans and Texans within a 120-mile radius of the Refuge from such major cities as Oklahoma City, Dallas, Fort Worth, and Wichita Falls (see Figure 1-2 in this draft Comprehensive Conservation Plan).

The Refuge habitats consist of wooded riparian areas along the Cumberland Pool, Washita River, and Pennington Creek; river floodplain; and seasonally flooded and permanent wetlands (annually flooded lands), grasslands, hardwood forest, brushland, and croplands. The Refuge hosts a diversity of wildlife on these habitats. Management of these habitats for migratory waterfowl in fall and spring is a primary focus of the Tishomingo NWR. Many other species benefit from this management, such as shorebirds, marshbirds, amphibians, fish, aquatic plants, and insects. Grain production for geese and ducks also provide forage for white-tailed deer and habitat for quail, turkey, and many small mammals. Riparian, grassland, and forested areas provide a variety of valuable habitats for Neotropical migratory birds, raptors, mammals, and reptiles. These varied habitats are also home to the bald eagle and interior least tern.

The major recreation activities in the area include hunting, fishing, and boating on the Cumberland Pool and Lake Texoma. In addition to Lake Texoma, there are several other lakes within 60 miles of the Refuge. The existing recreational activities occurring on the Refuge are not necessarily unique to the area, as these activities can be found at other nearby facilities.

Historically, this is an area where the great bison herds once roamed. The large buffalo herds are long since gone, but the area still holds many of the native and migratory species that were present in recent geological history. The lands that comprise the present day Refuge were periodically inundated by naturally occurring floods. Denison Dam now impounds the Red River downstream from the Refuge. Depending on the flood pool of the reservoir, portions of the Refuge are inundated with water for extended periods during the rainy season. As a

result, many plant communities on the Refuge are vulnerable to the invasion of weed species and exotics. Depending on the extent and duration of inundation, the flooding can disrupt management operations and destroy habitat restoration projects.

The summers are usually dry, with the rainy seasons being spring and fall, but low evapotranspiration rates make winter soil conditions wet. The relatively impermeable nature of the clay soils, together with the potential for disastrous runoff events connected with frontal passage in spring and fall, creates a high potential for severe erosion on denuded soils.

Grasslands are spread over several range sites. Tallgrass prairie is the major climax type on clay soils, but it is heavily invaded by brush species, such as bois d'arc (*Maclura pomifera*), honey locust (*Gleditsia triacanthos*), winged elm (*Ulmus alata*), and mesquite (*Prosopis glandulosa*). Eastern red cedar (*Juniperus virginiana*) is becoming a serious problem. Post oak (*Quercus stellata*) and blackjack oak (*Quercus marilandica*) characterize the Cross-Timbers areas, while pecan (*Carya illinoinensis*), hackberry (*Celtis occidentalis*), cottonwood (*Populus deltoides*), and American elm (*Ulmus americana*) are found in the wooded bottomlands.

Parts of the Tishomingo area remain a grassland prairie with only a few remnant tracts of native prairie. Native prairie, as a biome, is one of the most threatened habitat types in the United States. As grasslands are converted at an increasing rate to other uses, the flora and fauna dependent on the prairie biome also disappear. Tishomingo NWR is strategically situated near the southern extension of the Great Plains. Any endeavors to preserve this part of the tallgrass prairie are to provide habitat for a rapidly diminishing natural diversity of plants and animals. This can only be done if the habitat is preserved in its most natural state.

The region had a history of frequent fires prior to statehood in 1907 (Ladd 1991; Hoagland 2000). The plains bison (*Bison bison*), historically common in this region, was eradicated by hunters and trappers pre-Louisiana Purchase (1803). Human disturbance of the natural cycles has caused the deterioration of these grasslands. There may even be subtle changes in local climate that prevent succession to the typical climax vegetation. To maintain the vegetative composition in desirable condition, the staff must perform habitat manipulations that emulate or replace those activities and cycles that historically led to the evolution of the tallgrass prairie.

The 1,000 acres of cropland have been under cultivation for more than 80 years. With the exception of the south and east sides of the Refuge, which are almost completely limestone with a light cover of earth, all of the Refuge upland soil is a conglomeration of pure sand, blackland, light clay, heavy clay, gravel, and sandy loam. Fertility is low and soils are highly erodible. A majority of the Refuge soils have moderate to slow permeability and moderately deep and deep texture in the sandy to loamy categories. Upland soils are generally mapped as Konawa-Dougherty with loamy or sandy soils or as Gasil-Stephenville loamy soils. Bottomlands are mapped as frequently flooded Verdigris-Gracemont-Oklared soils.

Konawa-Dougherty soils make up about 40 percent of the Refuge and are located primarily on the northwest side of the Refuge. Their potential is fair to good for cultivated crops and fair to good for pasture. Verdigris-Gracemont-Oklared is another prominent soil unit (30 percent), located along the Washita River. These soils can also be used for cultivated crops and for pasture with a poor to good potential for cultivated crops and a fair to good potential for pasture.

Refuge croplands are made up of six major soil types: Oklared (33 percent), Dela (34 percent), Dougherty (17 percent), Konawa (10 percent), Counts (3 percent), and Verdigris (3 percent). Several farm fields have been withdrawn from agricultural production, largely because some fields have been classified as Highly Erodible Land (HEL) and have specific plans written for them by the NRCS (formerly SCS) to meet Farm Bill requirements. These fields are farmed in compliance with HEL guidelines and have been so certified by the NRCS.

The 500 acres of cropland in the cooperative WMU are primarily used for feeding waterfowl as a green browse, as well as game and furbearer species. Farming also benefits northern bobwhite quail (*Colinus virginianus*), wild turkey (*Meleagris gallopavo*), white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), virginia opossum (*Didelphis virginiana*), swamp rabbits (*Sylvilagus aquaticus*), eastern cottontails (*Sylvilagus floridanus*), waterfowl, and many other species. Feed grains, small grains, and legumes furnish a diversity of food items to sustain resident species.

Endangered species found at Tishomingo NWR are associated primarily with the wetlands and shoreline along the lake; they are only incidental users of the Refuge with the notable exception of the bald eagle. Eagles are winter residents and are regularly observed on the Refuge during this season. The interior least tern (*Sternula antillarum*), peregrine falcon (*Falco peregrinus*), piping plover (*Charadrius melodus*), and snowy plover (*Charadrius alexandrinus*) are other endangered or threatened species that are documented on the Refuge infrequently. Threatened and endangered species known to occur on the Refuge are provided in Table 1. A full description of the Refuge, its resources, and its economic setting are included in the Plan.

Table C-1. Known or suspected federally listed threatened and endangered fauna species of the Refuge.

GENUS	SPECIES	COMMON	FEDERAL STATUS	STATE STATUS
Charadrius	*melodus*	Piping Plover	Endangered	Threatened
Falco	*peregrinus*	Peregrine Falcon	Delisted	Threatened
Grus	*americana*	Whooping Crane	Endangered	Endangered
Haliaeetus	*leucocephalus*	Bald Eagle	Delisted	Threatened
Sterna	*antillarum*	Interior Least Tern	Endangered	Endangered

4.0 ENVIRONMENTAL CONSEQUENCES

This section analyzes and discusses the potential environmental effects or consequences that can reasonably expected by the implementation of each of the three alternatives described in Chapter 3 of this EA. For each alternative, the expected outcomes are portrayed through the 15-year life of the Plan.

This chapter identifies, describes, and compares the physical, biological, and human environment of the three alternatives proposed in this draft Plan and EA. Current management (Alternative A, the No Action Alternative) provides the basis for comparing the effects of the action alternatives (Alternatives B and C). The direct, indirect, and cumulative effects of each alternative are analyzed in this chapter.

Direct effects are the impacts that would be caused by the alternative at the same time and place as the action. *Indirect effects* are impacts that occur later in time or farther in distance from the triggering action. *Cumulative effects* are incremental impacts resulting from other past, present, and reasonably foreseeable future actions, including those taken by Federal and non-federal agencies, as well as undertaken by private individuals. Cumulative impacts may result from singularly minor, but collectively significant actions taking place over time.

An analysis of the effects of management actions on the physical environment has been conducted for soils, water, and air quality.

Analysis of the effects of management actions on the biological environment has been conducted for vegetation, wildlife, and threatened and endangered species. Although all plant, animal, and fish species on the Refuge are important, many species are not expected to experience any change or at most, a negligible one as a result of implementing any of the alternatives. For that reason, not all refuge species are discussed in this chapter.

An analysis of the effects on the socioeconomic environment has been conducted for local populations and economy, recreational uses, and cultural resources, including estimates on how much money the Refuge bought into the local community. The economic area for the Refuge is Johnston and Marshall Counties in Oklahoma. In 2006, total expenditures were $4.5 million, with non-residents accounting for $3.3 million or 79 percent of total expenditures. Expenditures on non-consumptive activities accounted for 79 percent of all expenditures, followed by fishing and hunting at 19 and 2 percent respectively (USFWS, Banking on Nature 2004 & 2006 Reports).

Effects Common to All Alternatives

A few potential effects will be the same under each alternative and are summarized under the following categories: environmental justice climate change, Refuge revenue sharing, land acquisition, cultural resources, other management, and other effects.

Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," was signed by President Clinton on February 11, 1994, to focus Federal attention on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directed Federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment, and to provide minority and low-income communities with access to public information and opportunities for participation in matters relating to human health or the environment.

None of the management alternatives described in this environmental assessment will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. Implementation of any action alternative that includes public use and environmental education is anticipated to provide a benefit to the residents residing in the surrounding communities.

Climate Change

The U.S. Department of the Interior issued an order in January 2001 requiring Federal agencies under their direction that have land management responsibilities to consider potential climate change impacts as part of long-range planning endeavors.

The increase in carbon within the earth's atmosphere has been linked to the gradual rise in surface temperatures, commonly referred to as "global warming." In relation to comprehensive conservation planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact to be considered in planning. The U.S. Department of Energy's *Carbon Sequestration Research and Development* (U.S. Department of Energy 1999) defines carbon sequestration as "…the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts—grasslands, forest, wetlands, tundra, perpetual ice, and desert—are effective in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon monoxide. The conclusions of the U.S. Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this draft Plan/EA would conserve or restore land and water, and would thus enhance carbon sequestration. This, in turn, contributes positively to efforts to mitigate human-induced global climate changes.

Cultural Resources

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on cultural and historic resources. Potentially negative effects could include construction of new facilities and associated utilities. In most cases, these management actions would require review by the Service's Regional Archaeological Program in cooperation with the State of Oklahoma Historical Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. Therefore, the determination of whether a particular action within an alternative has the potential to affect cultural resources is an ongoing process that would occur during the planning stages of every project.

Service acquisition of land with known or potential archaeological or historical sites provides two major types of protection for these resources: protection from damage by Federal activity and protection from vandalism or theft. The National Historic Preservation Act requires that any actions by a Federal agency that may affect archaeological or historical resources be reviewed by the State Historic Preservation Office and that the identified effects must be avoided or mitigated. The Service's policy is to preserve these cultural, historic, and archaeological resources in the public trust and avoid any adverse effects whenever possible.

Refuge Revenue-Sharing

Annual Refuge revenue-sharing payments to Calhoun, Refugio, and Aransas counties would continue at similar rates under each alternative. If lands are acquired and added to the Refuge, the payments would increase accordingly.

Other Management and Effects

All management activities that could affect the Refuge's natural resources, including utility lines and easements, soils, water and air, and historical and archaeological resources, would be managed to comply with all laws and regulations. In particular, any existing and future oil and gas exploration, extraction, and transport operations on the Refuge would be managed identically under each of the alternatives. Thus, the impacts would be the same.

Each of the alternatives would have similar effects to negligible effects on soils, noise, transportation, human health and safety, children, hazardous materials, and aesthetic and visual resources.

5.0 ANALYSIS OF IMPACTS BY RESOURCE

This section analyzes the direct, indirect, and cumulative environmental and social impacts or consequences that can be reasonably expected by the implementation of each of the proposed alternatives with respect to physical environment (soils, water, and air quality); biological environment (fish and wildlife habitat, migratory birds, threatened and endangered species); and socioeconomic environment (local population, economy, recreational and public use, archaeological and cultural resources, and aesthetic and visual resources).

Impacts on Air Quality

Alternative A: No Action Alternative/Current Management

Some Refuge habitat management and recreational activities (i.e., prescribed burning, equipment and vehicle operation) may affect air quality; however, impacts are expected to be minimal for the following reasons. 1) Habitat management involving prescribed burning will occur only under ideal weather conditions. Smoke management practices will be implemented during all burning events. 2) An approved prescribed burn plan, favorable weather conditions, and adequate firefighting resources all work together to prevent pervasive air pollution or prevent significantly affecting air and water quality. Automobile traffic through the Refuge would not be at levels that could result in measurable air pollution. Mechanical operations involving invasive species control and farming might cause a very slight, temporary profusion of particulate matter into the air. No other management actions in Alternative A would negatively affect air quality.

Alternative B: Proposed Action

Alternative B calls for increased use of prescribed fire as a management tool. This could cause some local and short-term impacts (degradation) to air quality (more than Alternative A). The program would be managed and monitored in accordance with Service policy and within local and State air quality standards. Burns would be scheduled to coincide with periods of acceptable air ventilation and optimum conditions of low relative humidity and fuel moisture for more complete combustion of fuels. Mechanical control operations might cause a very slight, temporary profusion of particulate matter into the air.

This alternative involves improving visitor services and facilities, which would increase the volume of traffic on the Refuge roads. Automobile traffic through the Refuge is not likely to increase to such levels that would result in measurable air pollution. These public uses would be periodic with recovery possible between high use periods.

Alternative C

This alternative involves improving visitor services and facilities, which would increase the volume of traffic on the Refuge tour route. Air pollution and oil leaks could also affect vegetation and water quality. It is anticipated that these public uses would be periodic with recovery possible between high use periods. As in Alternative B, this alternative involves expanded use of fire as a management tool on the Refuge, which could cause temporary impacts to the Refuge's air quality. Prescribed fires would be managed and monitored in accordance with Service policy. Lack of good pre-suppression and fire suppression capability would likely result in larger and more intense fires.

Impacts on Water Quality

The Refuge has used, on a limited basis, pesticides to control invasive plant species and grasshoppers. Under all the alternatives, pesticides would continue to be applied at label recommended rates and in accordance with the IPM Plan. Herbicide used to control and manage invasive plant species will occur only under ideal weather conditions. Acceptable application practices and guidelines will be implemented during all prescription events and under an approved plan to prevent affecting water quality.

No known negative impacts to water quality are occurring now or would be expected to occur from continued efforts to control invasive species (all alternatives). Current management includes converting old farming plans, such as Kacklers, Airport, and Goosepen, that were experiencing high erosion rates and converting them back to native grass areas.

Alternative A: No Action Alternative/Current Management

No short- or long-term effects are anticipated under Alternative A.

Alternative B: Proposed Action

Alternative B provides for the general improvement of the Refuge's grassland and riparian habitat. Implementation of this alternative would allow reintroduction of fire (low to moderate intensity burns) that would minimize potential impacts to water quality. Post-fire rainfall may temporarily increase nitrate, bicarbonate, phosphate, and calcium levels in surface waters adjacent to burn blocks. This increase is expected to be minimal and of short-term duration. Although sediment and turbidity are generally the most dramatic and important water quality responses associated with fire, threats to water quality on the Refuge are not expected because the relatively flat terrain within the Refuge is not conducive to soil runoff, and minimal impact prescribed burning techniques can be used to significantly reduce threats to water quality. The Refuge would also set up water quality monitoring programs on the Washita River, at Cumberland Pool, and at other locations to detect changes in water quality to better manage this resource.

Alternative C

Impacts to water quality may be greater than in alternatives A and B with additional miles of auto tours proposed under this alternative. Areas planned for additional miles experience annual water inundations, which may increase the potential to affect water quality. This alternative has an additional five miles of auto tours from the preferred alternative, with each of these miles under greater susceptibility to inundation and potential negative impacts to water quality.

Impacts on Soils

Alternative A: No Action Alternative/Current Management

Current farming practices have minimal negative impacts on the soils. The current Refuge farming program utilizes techniques to reduce wind erosion and enhance soil fertility. The farming program practices low input, sustained agriculture which involves a three- to six-year crop rotation for soil enrichment. Sweep plowing is employed, which cuts weeds three to four inches below the surface without disturbing the soil-holding thatch on the surface. Where possible, crops are drilled through the remnants of the prior year's planting, which avoids the need to disk and cultivate. Current management effectively reduces and/or eliminates potential soil erosion.

With the reversion of retired farmlands to low-level succession plants and failure to restore upland, riparian, and wetlands, water quality would deteriorate through erosion and sedimentation, contributing to the establishment of non-native vegetation. With current management, the Refuge is planting native grass seeds such as little bluestem, big bluestem, Indian grass, and switchgrass, and native forbs such as Indian paintbrush, Indian blanket, and standing cypress to reduce invasion of non-native vegetation and to build upon current levels of sedimentation, which has a beneficial effect on soil management.

Soil impacts on trails would remain the same with no additional trails or roads proposed under this alternative.

Alternative B: Proposed Action

Implementation of Alternative B would vary from Alternative A by using increased prescribed burning to improve grasslands conditions. More grasslands would be enhanced or restored. With improved habitat conditions, soil stability in the long term should be improved. Impacts from the farming program would be the same as Alternative A.

Soil impacts may be slightly greater with an addition of approximately five miles of new trails and approximately five miles of additional roads proposed under this alternative. Impacts would be anticipated only on walking and driving paths and would be designed to minimize soil, vegetation, and wildlife impacts through direct trampling and disturbances.

Alternative C

Increased farming would result in loss of native grasslands and the establishments of non-native invasive species such as Johnson grass, multiflora rose, and Bermuda grass, as well as an increase in erosion. Increased farming under this alternative would also decrease bird species diversity on Neotropical migrants dependent on native grasslands. Many of these Neotropical migrants are currently declining throughout the region.

Under this alternative, impacts to soil would be greater than in the proposed action with the addition of five more miles of new hiking trails and seven miles of new roads in addition to the proposed action. Additional trail and road miles from the proposed action would be vulnerable to annual water inundation and would require additional time, money, and manpower to maintain, which would result in additional soil trampling in use and maintenance of these trails and roads.

Biological Resources

Impacts on Habitat

Alternative A: No Action Alternative/Current Management

Under this alternative, current management practices on the Refuge would not change.

Alternative A offers a strong level of protection for biological resources on the Refuge without a planned long-term management approach. Continuing existing strategies and approaches at current levels would maintain or slowly improve habitat conditions over the long term. Management would continue using the PNA and other management plans without benefit of organized objectives and strategies. The lack of a strategic context of publicly accepted goals and resource priorities would make it more difficult for management to implement resource priorities and obtain funding to make needed improvements. This would slow progress toward improving habitat and wildlife resources.

The Refuge's vegetation management programs (farming, moist-soil management, invasive species control, and limited prescribed burning) have resulted in habitat conditions that provide food and cover for a wide array of wildlife species.

Under the No Action Alternative, fire management would remain reactive, and only periodic prescribed burning would be implemented. Invasive plant species could be expected to remain a problem, resulting in less desirable vegetative communities. Red cedar and non-native, invasive species would burgeon in areas where they are becoming established and/or in areas frequently inundated by floodwater. Invasive species currently receive limited management, but efforts are made to improve current conditions as resources (staff and funds) are available.

Generally, implementation of the No Action Alternative would represent a continuation of current management activities and trends. Although management activities would not result in direct adverse impacts to fish and wildlife habitats, restoration and improvement of wildlife habitats and trends would not increase significantly, and in some cases, progress may slow towards improving the ecological integrity of the Refuge. The lack of publicly accepted goals and resource priorities would make it more difficult for management to implement those priorities and obtain funding to make needed improvements. Indirectly, this could slow progress toward improving habitat and wildlife conditions.

Alternative B: Proposed Action

This alternative offers a planned long-term approach for the active management of the Refuge wildlife populations, habitats, and public use opportunities. It involves the expansion of existing efforts for habitat restoration and enhancement. Active management will primarily involve providing food, sanctuary, and water needs to meet the Refuge wildlife population objectives and the objectives of the North American Waterfowl Management Plan. This alternative includes the implementation of strategies, such as moist soil wetland management, and control of weeds and exotic species that will benefit nesting grassland birds, foraging raptors, and migrating and nesting waterfowl, geese, marshbirds, and Neotropical migrants. Please refer to Chapter 4.0, Refuge Management Direction: Goals, Objectives, and Strategies of the Draft Comprehensive Conservation Plan for a more detailed description of the Proposed Action Alternative.

Alternative C

As in Alternative B, this alternative involves implementing active management strategies in a planned effort to protect, restore, and enhance Refuge habitats to increase biological diversity and benefit wildlife populations. Like Alternative B, this alternative involves expansion of existing efforts to restore habitats, including the control of non-native species and weeds, riparian and grassland restoration, and enhancing wetland habitats through the implementation of moist soil management strategies. However, the expansion of the farming program would have an adverse impact on habitat enhancement and restoration efforts within the Refuge. The creation of new supplemental wildlife food crops would limit or eliminate native grassland prairie restoration, either through conversion of fallow grasslands to farm fields or by simply reducing the number of potential agriculture-to-grassland restoration sites. Additionally, the expansion of the hunting program on the WMU would likely reduce the size of native wildlife populations on the Refuge, including waterfowl, thereby reducing the Refuge's ability to meet the requirements of the NAWMP and carry out its goal to promote ecological integrity and achieve natural diversity.

This alternative would potentially increase disturbance to feeding and resting wildlife by increasing wildlife observers in the field and increasing traffic on tour routes. The expansion of wildlife observation, photography, educational opportunities, hunting, and fishing, even if determined compatible, would have certain negative impacts on habitat, plants, and wildlife species, depending on locations selected for development, the level of control imposed on the hunting, and the duration of hunts. These management approaches would also make it nearly impossible to meet the requirements of the NAWMP. According to this management plan, waterfowl populations in North America had plummeted to record lows by 1985. Recognizing the importance of waterfowl and wetlands to North Americans and the need for international cooperation to help in the recovery of shared resources, the Canadian and United States governments developed a strategy to restore waterfowl populations to levels seen in the 1970s through habitat protection, restoration, and enhancement. The strategy was documented and effectively implemented in 1986.

Compatibility determinations for the expansion of any such proposed uses beyond the current program would have to be undertaken prior to implementation. Coordination with the ODWC would need to take place.

Impacts on Wildlife

Alternative A: No Action Alternative/Current Management

Under Alternative A, management activities will continue to have limited beneficial impacts on wildlife, including special-status species (due to staffing and funding limitations).

The farming program benefits waterfowl, the purpose for which the Refuge was founded, and other wildlife, as well as the public use program by enhancing wildlife viewing opportunities. Green browse and/or cereal grains are planted for, and used by, wintering waterfowl and cranes from October through February. White-tailed deer also utilize these areas for food and cover. Winter wheat and barley provide green browse for geese. Corn is a "hot" food for waterfowl during the coldest time of year. A variety of other species, such as the bald eagle and other predators that feed on waterfowl, also benefit (indirectly) from crops grown on the Refuge.

Under Alternative A, monitoring, data collection, and analysis would not be appreciably increased, resulting in less capability to adjust management as necessary to meet long-term goals.

Disturbance to wildlife at some level is an unavoidable consequence of any public use program, regardless of the activity involved. However, the current level of impact from recreation activities is minimal. Boating activities are a concern during times when waterfowl and cranes are using the area. The use of boats during certain times of the year can disturb and displace birds off the lake.

Alternative B: Proposed Action

Implementation of Alternative B would have no known, long-term negative consequences to wildlife on the Refuge and would produce positive benefits in most key environmental areas. This alternative involves using a variety of management tools to achieve long-term goals and objectives in the most efficient and timely manner. Management of the Refuge would be balanced between efforts directed toward threatened and endangered species, species of special concern, migratory birds (including waterfowl), and resident wildlife that currently or historically occurred on the Refuge.

Impacts from the farming program would be the same as Alternative A. Development and/or enhancement of grasslands would increase benefits for a variety of species.

The enhancement of opportunities for wildlife observation, photography, interpretation, and education identified in Alternative B are expected to have little or no effect on biological resources except to improve the public's awareness and understanding. Construction of kiosks, interpretive panels, and signs would be of limited scope and would cause only short-term disturbance during construction. All proposed public use activities have been carefully planned to avoid unacceptable levels of impact. The known and anticipated level of disturbance from existing types of recreational activities is not considered significant and is well within the tolerance level of known wildlife species and populations present in the area. General wildlife observation and/or photography activities may result in minimal disturbance to wildlife. There could be a disruption of foraging or roosting activities in some areas if visitors try to venture too close to the wildlife. To minimize these potential disturbances, all visitor trails and observation points will be constructed with a buffer around key wildlife forage and resting areas, and visitors will be educated through signs and brochures to avoid disturbing wildlife. Disturbance to wildlife and habitat during construction of any new facilities, observation points, and interpretive sites is also expected to be insignificant and/or minimal.

When site development activities are proposed, each activity would be given the appropriate NEPA consideration during pre-construction planning. At that time, any required mitigation activities, if necessary, would be incorporated into the specific project to reduce the level of impacts to the human environment and to protect fish and wildlife and their habitat. Monitoring activities through wildlife inventories and assessments of public use levels and activities would be utilized, and public use programs would be adjusted as needed to limit disturbance to acceptable levels. Overall, the proposed public use developments will mean that the Refuge will be better able to control and direct public activities to minimize biological resource impacts.

Under Alternative B, the existing biological program would be enhanced by the development of habitat inventory and management plans and through additional wildlife inventories and monitoring. Collecting baseline data, conducting field censuses and/or surveys and field habitat analysis, and monitoring of management impacts and outcomes, including field surveys, would have minimal, short-term impacts on the resource. Enhancing existing data collection and analysis efforts would result in positive consequences to Refuge biological

resources. The improved program would assist efforts to improve and adjust management techniques for optimum programs, having maximum positive impact while producing minimal negative effect on non-targeted habitats and species.

Alternative C

Impacts would be similar to the proposed action with an additional five miles of trails and seven miles of roads over what is being proposed under the preferred alternative. These additional impacts and wildlife disturbances would be in the expanded use of these trails and roads, as well as in the additional maintenance of the trail and road, which is annually inundated by water. The expanded areas in the proposed action are not generally inundated with water on a regular basis and do not require the additional maintenance and upkeep, as are the areas proposed under this alternative.

Impacts on Threatened and Endangered Species

Alternative A: No Action Alternative/Current Management

Under Alternative A, threatened and endangered species would continue to be protected based on their observed occurrences, and adequate food sources would continue to be available. Specific monitoring and surveys for the occurrence and distribution of species of special interest would not be conducted. Continued implementation of habitat management activities (farming, moist soil management, and invasive species control) are not expected to have any negative direct impacts on species of concern. The timing, duration, and magnitude of these activities do not currently cause disturbance to the species that use the area. Recreation is the only ongoing activity that may result in minor amounts of disturbance, particularly to bald eagles that feed or rest near public use areas (roads, trails, etc.). Existing hunting and fishing programs have been reviewed, and these uses were determined not to affect bald eagles and other endangered and threatened species or their habitats. Under current Refuge management strategies, the protection of bald eagles and interior least terns are a primary concern; future conflicts regarding public use development would always be resolved in favor of the endangered species.

Alternative B: Proposed Action

Under this alternative, listed species would be provided added protection through increased surveillance and law enforcement. The Service will actively pursue opportunities to strengthen or improve partnerships and cooperative efforts with other agencies and individuals to improve habitat protection for endangered species. Also, under this alternative systematic biological surveys and inventories of Refuge resources may identify other threatened and endangered species using the Refuge. Management actions could then be implemented to protect any newly identified residents and enhance their habitats.

The Refuge has a winter migrating population of bald eagles, an occasional peregrine falcon, and a non-nesting population of least terns that utilize Refuge lakeshore and sandbar habitats.

The development and implementation of the proposed action alternative would establish biological goals, objectives, and strategies for habitat management of Tishomingo NWR. Endangered, threatened, and Oklahoma Species of Special Concern would be included within focal species of each habitat type on the Refuge. The Habitat Management Plan would assist with defining how the Refuge can best contribute to maintaining biological diversity and

determining biodiversity objectives within the southern Great Plains and Cross Timbers Ecosystem.

Under Alternative B, management of listed species and species of concern would continue with habitat protection, protection of individuals from disturbance, and expanded monitoring of populations and habitat where necessary. Emphasis would be placed on long-term habitat improvement for bald eagles and other species of concern that regularly use the Refuge. Those species that are migrants or accidental visitors will also benefit by virtue of the existence of the Refuge. Indirect effects of improved grassland conditions should be beneficial. Potential impacts of public use are expected to be similar to Alternative A.

Alternative C

Under this alternative, listed species would be provided added protection through increased surveillance and law enforcement. The Service would actively pursue opportunities to strengthen or improve partnerships and cooperative efforts with other agencies and individuals to improve habitat protection for endangered species. Also, under this alternative, systematic biological surveys and inventories of Refuge resources would identify any additional threatened and endangered species using the Refuge. Management actions could then be implemented to protect them and enhance their habitats. Expansion of fishing and hunting opportunities could affect endangered species recovery efforts if these opportunities occur in areas used by bald eagles and interior least terns. Although important habitats for endangered species would be protected from the impacts of increased and expanded public use programs, all developments would necessitate analysis with respect to the requirements of Section 7 of the Endangered Species Act. Compatibility determinations for hunting, fishing, and other public uses would be revised.

Impacts on Public Use

Alternative A: No Action Alternative/Current Management

The Refuge would not increase opportunities for recreational activities such as hunting, fishing, and wildlife observation. No new trails or major visitor facilities would be built under this alternative. Public facilities would remain essentially the same except for maintenance or necessary improvements. New directional or interpretive signs would not be installed, and except for addressing safety hazards, facilities would not be upgraded. The Cumberland Pool would continue to provide public fishing, and the primary Refuge hunt areas would remain the same. Approximately 10 miles of existing roads would have only minimal maintenance activities. Public use facilities would remain essentially the same except for maintenance. New directional or interpretive signs would not be installed, facilities would not be upgraded, and the current headquarters facilities would not be improved or expanded to accommodate more visitors, unless outside funding was provided by friends groups. Without facility upgrades, increased signs, and implementation of outreach programs, public use is expected to remain at approximately 210,000 visitors annually. Although the Refuge staff will continue to improve the outreach program within current budget limitations, improvements to the Visitor Services Program would most likely occur opportunistically. Currently, the wildlife management unit consists of primitive camping sites captured throughout the 3,000-acre unit and 11 primitive campsites located at the Refuge headquarters.

Alternative B: Proposed Action

The Refuge would increase and improve opportunities for recreational activities such as hunting, fishing, and wildlife observation. The Cumberland Pool would continue to provide public fishing, and the primary Refuge hunt areas will remain the same. Existing roads would have upgrades and maintenance. Public use facilities would be expanded and improved. New directional or interpretive signs would be installed, facilities would be upgraded, and the current headquarters facilities would be improved or expanded to accommodate more visitors. With facility upgrades, increased signs, and implementation of outreach programs, public use is expected to increase 50 percent during the next 15 years. The proposed action would develop primitive camping sites and five managed campsites, improving the camping experience for visitors. Recreational facilities would be designed, developed, and implemented to improve the visitor experience. Educational and interpretive opportunities would be expanded, giving the visitor improved opportunities to learn about the natural resources managed by the Refuge. Existing roads to campsites on the Refuge are gravel, but the proposed action is to upgrade to asphalt. Improvement would make one campsite handicapped accessible.

Alternative C

While this alternative is similar to Alternative B, it does involve more concentrated efforts in developing the Refuge's public use programs and facilities beyond the level proposed in Alternative B.

The Refuge would increase opportunities for recreational activities such as hunting, fishing, and wildlife observation. The Cumberland Pool would continue to provide public fishing, and the primary Refuge hunt areas would remain the same. Existing roads would have upgrades and maintenance, and new roads would be built. Public use facilities would be expanded and improved. New directional or interpretive signs would be installed, facilities would be upgraded, and the current headquarters facilities would be improved or expanded to accommodate more visitors. With facility upgrades, increased signs, and implementation of outreach programs, public use is expected to increase well over the current 210,000 annual visitors during the next 15 years. However, this alternative would potentially increase the frequency of adverse human and wildlife interactions, thereby potentially leading to reduced visitor safety, reduced wildlife safety, disturbance to feeding and resting wildlife, and increased environmental disturbance due to increased traffic on auto tour routes.

Socioeconomic Environment

Impacts on Socioeconomic Resources

Alternative A: No Action Alternative/Current Management

No significant change in the local economy or tourist visitation over current levels would be expected as a result of implementing the No Action Alternative. The Refuge will continue to be very important to the local community.

Under Alternative A, current management programs would continue to be implemented, and no change in Refuge staffing would be required. The economic and social condition of the area would remain the same. The presence and operation of the Refuge provides economic benefits to the surrounding communities within a 30-mile radius in several directions. The Refuge attracts local, national, and some international visitors; by attracting visitors to the area, the

Refuge generates revenue for the local economy. Much of the Refuge's annual budget is recycled into local businesses through Refuge staff, purchases of equipment and supplies, as well as contracts for local labor to accomplish Refuge projects. The Refuge provides full-time employment for seven individuals that live in or near Tishomingo, and the Youth Conservation Corps program provides work and income for a limited number of youths in the area. In addition, the Refuge staff makes available educational opportunities for local schools and universities. The Corps also returns annual revenue sharing monies to Johnston County. This economic impact would be the same for all the alternatives.

This alternative provides for continuation of existing hunting and fishing opportunities for citizens. Under this alternative, the Refuge would not have any new programs or facilities to encourage more visitors to the area and would not generate additional revenue to the community.

Refuge croplands would continue to be farmed for the benefit of wildlife and to reduce cropland depredation by waterfowl on neighboring lands by the most efficient means.

Alternative B: Proposed Action

Alternative B would have a positive impact on the local economy through expansion of programs, staff, and budget, as well as a resultant increase in refuge visitation. Under Alternative B, short- and long-term benefits to employment would occur. Short-term benefits include local employment of contractors to construct improvements to structures and facilities associated with the development of the Plan. Long-term employment benefits would occur through the hiring of additional staff members (three full-time and two seasonal employees), which would more than double the existing staff.

This alternative provides for continuation of existing hunting and fishing opportunities for citizens. Under this alternative, the Refuge would have new programs to encourage more visitors to the area and would generate additional revenue to the community.

Refuge croplands will continue to be farmed for the benefit of wildlife and to reduce cropland depredation by waterfowl on neighboring lands by the most efficient means. Under this alternative, the Refuge would not seek to withdraw lands from production.

Alternative C

Expansion and development of visitor services, outreach efforts, educational programs, and facilities would encourage more public use opportunities and more visitors to the area. The addition of 7 miles of roads will be established to incorporate a total of 12 miles as indentified in this alternative would have to be consistently maintained and improved since these additional areas would be consistently inundated with seasonal waters. The Refuge would seek partnerships with the local community in developing the public use program and facilities. By promoting the Refuge as an asset to local tourism, this partnership would benefit the Service by providing local support for its mission and benefit the surrounding communities by generating revenue for the local economy.

Impacts on Aesthetic and Visual Resources

Alternative A: No Action Alternative/Current Management

The No Action Alternative would have minimal impacts to aesthetic and visual resources on the Refuge. Limited change would occur from the current conditions with the exception of

natural changes; however, without additional funding, staffing, and resources, future improvements to degrading and aesthetically poor facilities would not be likely.

Alternative B: Proposed Action

Development of various educational, interpretive, or public use sites on the Refuge would reduce the natural atmosphere that many visitors seek. Open vistas or overviews might be degraded by the addition of a parking area or directional signs, but when done properly, this impact should be minimal. Interpretive signs and displays would help increase public awareness and foster appreciation for natural resources and habitat management techniques.

Alternative C

Development of various educational, interpretive, or public use sites on the Refuge would reduce the natural atmosphere that many visitors seek. Open vistas or other views might be degraded by the addition of a parking area or directional signs.

Impacts on Archeological and Historical Resources

Alternative A: No Action Alternative/Current Management

This alternative would have no known adverse impact on archaeological and historical resources; however, without additional funding, staffing, and resources, future research and preservation of archaeological and historical resources would not be likely.

Alternative B: Proposed Action

Under this alternative, a cultural resource survey would be conducted and landmarks and cemeteries on the Refuge would be identified and protected. Impacts on cultural and historic resources would be evaluated at the time of construction of roads, parking areas, hiking trails, and other developed public use areas. However, such development would be designed to have little or no impact.

Alternative C

Impacts on cultural and historic resources would be evaluated at the time of construction of roads, parking areas, outdoor classrooms, hiking trails, and other developed public use areas. However, development most likely would have little or no impact.

6.0 CUMULATIVE ASSESSMENT

The Cumulative Impact Assessment, which is required by NEPA and the Council on Environmental Quality, defines cumulative impacts as "…the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or nonfederal) or person undertakes such other actions." Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

For this analysis, a "reasonably foreseeable future action" must be a project or activity that has been formally proposed by a specific project proponent. This cumulative impact analysis has been conducted with the following approach and analytical perspective.

- The focus of analysis is on the identification and disclosure of potential cumulative impacts.
- The analysis is primarily qualitative in nature, and no quantitative modeling has been done.
- Projects or activities included in the cumulative impact analysis are those that have the highest potential for having identifiable cumulative impacts.
- The analysis considered all potential project and activities (e.g., Federal, other governmental entities, and private).
- The analysis is based on the Proposed Action.

Projects and Activities Considered

US Army Corps of Engineers (Corps)

The Corps' management of their Lake Texoma project is for the purposes of flood control, municipal and industrial water use, hydroelectricity, and recreation. The Corps manages the water level on Lake Texoma to achieve these project purposes. In managing the water level for flood control, a substantial portion of the Refuge is often flooded. These floodwaters are sometimes held at the higher levels for longer periods of time to prevent downstream flooding and to maximize water use for hydroelectric power generation. With the modifications of climate patterns caused by climate change and the growing need for renewable energy sources, these flood events are likely to continue or even increase in the future. Of course, the backed-up waters of Lake Texoma provide many of the wetland resources that make the area important for migratory waterfowl.

Also, the Corps, as part of its water management activities, has been issuing permits to oil companies and/or contractors to use lake water for oil and gas well completion activities, specifically well fracturing operations. The number of these water permits will likely increase in the future with the drilling of additional wells planned for the Refuge area.

Tishomingo National Fish Hatchery (NFH)

The Tishomingo NFH is one of the largest federal fish hatcheries in the nation and the only Federal hatchery in Oklahoma. The hatchery was established in 1929 and has 56 ponds, three holding houses, eight large concrete raceways, and six, 20-foot diameter fiberglass tanks for use in producing or holding a variety of aquatic species. The station's primary water source is water diverted from Pennington Creek, and the station has had the right to divert 10 cubic

feet per second since it began in 1928. The hatchery is located about 10 miles northwest of the town of Tishomingo on State Highway 7.

Although the hatchery's primary focus is rearing paddlefish for re-introduction into the Arkansas and Red rivers, the hatchery also rears alligator snapping turtles, which are considered imperiled within their native ranges. State agencies in Oklahoma, Illinois, and Tennessee have requested captive reared alligator snapping turtles for re-introduction in their waters, which are within the native ranges for the turtles.

For several years, alligator snapping turtles have been released into the waters on or near Tishomingo NWR, where they were considered to have been extirpated for many years. Release of captive-reared alligator snapping turtles from the hatchery began in 2007. Sixteen three-year-old turtles fitted with radio transmitters are being monitored for several years as part of a graduate research project by students from Oklahoma State University. Monitoring will help determine critical components of life histories and captive breeding requirements for the alligator snapping turtle.

The hatchery also provides excess channel catfish, when available, for stocking in ponds on the WMU and other parts of the Refuge.

Oklahoma Department of Wildlife Conservation (ODWC)

ODWC manages the approximately 10,000-acre Texoma-Washita Arm Wildlife Management Unit (WMU) adjoining the Refuge, manages the hunting and fishing program on the WMU portion of the Refuge, and sets the statewide hunting and fishing regulations for the State of Oklahoma, which are applicable to the Refuge.

Texoma-Washita Arm WMA contains about 10,000 acres of mainly floodplain and river bottom habitats along the Washita River in southern Johnston County, Oklahoma. Management efforts focus on extensive agricultural plantings and production of native foods such as ragweed and sunflower. In addition, some small wildlife plots are planted annually, and prescribed burns are conducted when conditions permit. Two designated primitive camping areas are offered on the WMA, and a 100-yard shooting range with shooting benches is located in the southern part of the area.

On the upper end of the WMA, ODWC manages the 150-acre Turkey Creek Waterfowl Development Unit. This is an area of old oxbow lakes and river overflow areas improved with Federal "Duck Stamp" funding about 30 years ago. This area provides exceptional wetland habitats for waterfowl and excellent waterfowl hunting opportunities. When water conditions allow, aerial seeding of millet in late summer on some 1,200–1,800 acres of wetlands within the WMA provides excellent food sources for migrating ducks and geese later in the year. Aerial seeding of millet is also done in the WMU and the rest of the Tishomingo NWR when water conditions and ODWC budget allow.

ODWC has proposed changes to the hunting program that they manage on the WMU portion of the Refuge. There would be small expansions to the seasons for quail, squirrel, rabbit, crow, dove, rail, and gallinule. Also, the WMU would have open seasons for common snipe, woodcock, and predator or furbearer calling, which had all been previously closed. More significantly, deer hunting would be changed from "archery only" season to archery, muzzleloader, and rifle seasons. Another significant change is opening the WMU to vehicle access at all times except during the deer muzzleloader and rifle seasons. The WMU had previously been closed to vehicle access from October 1 until March 1.

Additionally, ODWC is in the process of proposing changes to the statewide fishing regulations, which apply to fishing on the Refuge. One of the proposed changes would reduce the limit on blue catfish, a very popular catch for anglers in Cumberland Pool. It would restrict angler harvest to one (1) blue catfish greater than or equal to (>) 30 inches.

Other Regional Activities Considered

- Water management
- Cropland management
- Grazing management
- Economic development, including oil and gas activities

Cumulative Impacts Analysis

This section summarizes the potential impacts of the projects, activities, and other management responses identified previously, combined with the potential impacts from implementation of Alternative B (Proposed Action). Impact discussions are somewhat general in nature, because of the regional perspective of the cumulative impact analysis.

Impacts on Wildlife and Habitat

Regional impacts to wildlife are primarily dependent upon the health and availability of wildlife habitat and associated management of land and vegetation. Habitat serves as the source of food and shelter for fish and wildlife and it provides the wintering, migration, and breeding grounds for numerous migratory birds. If habitat is lost or fragmented, the direct impacts are not only to vegetation, but also to fish and wildlife. Habitat fragmentation occurs when discrete habitat units are broken into smaller pieces; it can be caused by land use conversion, urbanization, invasive species, and infrastructure projects.

Local populations of Canada geese are reportedly occurring in much fewer numbers than in previous years, largely due to the result of decreased agricultural activities within the region. The loss of regional supplemental food sources for migratory waterfowl is only offset in a small part by the Refuge's farming program, the farming program on ODWC's WMA, and aerial seeding of millet in wetlands. The more intensely managed moist soil units on the Refuge and areas like the Turkey Creek Waterfowl Development Unit on the WMA provide exceptional wetland habitats for waterfowl. The prescribed burn programs on the Refuge and WMA also improve the quality of habitat for a large number of species.

The region-wide conversion of native grasslands—first to cropland and then to "improved" pastures with imported grasses for livestock—resulted in the heavy loss of necessary native grassland habitats for many species of birds and other wildlife. Some of these fallow croplands were heavily taken over by eastern red cedar, further limiting their wildlife habitat value. Another region-wide invasive species problem is the proliferation of feral hogs, which do serious damage to agricultural land and wildlife habitat, creating problems for conservation managers and commercial agricultural operations. The hogs are hunted and/or trapped on private lands and the conservation areas managed by ODWC and Service with limited overall effect.

Impacts on Endangered Species

The Refuge has few listed endangered species issues with a relatively small winter migrating population of bald eagles, an occasional peregrine falcon, and a non-nesting population of interior least terns utilizing lakeshore and sandbar habitats. Refuge lands and ODWC lands

are managed to provide the required biological diversity necessary for these endangered and threatened species and the area's other species of special management concern.

Impacts on Public Use

There are many hunting opportunities on public land in the region on ODWC managed lands, Corps project lands, and the WMU unit of the Refuge. In addition, there is considerable private land hunting in the area for deer, feral hogs, waterfowl, and upland game species. The balance of the Refuge, with very limited hunting, provides a much needed sanctuary area for waterfowl and other game species. Cumberland Pool, other areas of Lake Texoma, and the Washita River provide the public with many great fishing opportunities in the local region. Many people in the local area participate in fishing, but many anglers travel here from different parts of Oklahoma and Texas to enjoy the recreational fishing the area provides. Although the Refuge provides very limited public camping opportunities, the Corps' many recreational areas around the lake, along with ODWC's limited camping areas, carry most of the burden of providing public camping. The combined public lands in the area provide extensive wildlife viewing opportunities, and the Lake Texoma area is well known as an area for bird watching.

Recreational land use will continue to be important in economic and social terms to those who live and work in the region; however, there are many ecological threats to these uses, including habitat loss and/or fragmentation, changes in land uses, and the results of economic development. Increased public use, specifically expanded hunting on the WMU, could potentially increase the frequency of adverse human and wildlife interactions, thereby potentially leading to reduced visitor safety, reduced wildlife safety, disturbance to feeding and resting wildlife, and increased environmental disturbance due to increased traffic.

Impacts on Air and Water Quality

The major sources of air pollution in the region are oil and gas production and/or refining, agriculture, manufacturing, transportation, and fires (both wild and prescribed). Prescribed burning is conducted by the Refuge, ODWC, and some private landowners as part of agricultural practices and habitat management. Prescribed burning is conducted by the government agencies only under specific meteorological conditions and permits to burn. Regional air quality would be affected by prescribed burning only when many acres are burned at exactly the same time. Each individual project or activity in the region that produces air emissions would affect the region's air quality.

Surface water quality in the region is influenced by agricultural practices, contamination from upstream petroleum refineries, and industrial chemicals. This ever-growing threat needs be addressed by Federal agencies, State agencies, and private landowners working as partners. The State of Oklahoma's Blue Thumb Program is an excellent example of how local volunteers can make a difference in water protection.

Because permits are being issued by the Corps for use of Lake Texoma water in oil and gas well completions, additional vigilance is needed to monitor and control the return of this potentially contaminated water to the region's watershed.

Impacts on Aesthetic and Visual Resources

Because the region is still predominantly rural, much of the natural atmosphere and open vistas remain. However, it is being affected by changes in land use, urbanization, and visitor

use. Facility development on the Refuge, ODWC managed lands, and Corps project lands could and should be designed to minimize these types of impacts.

Impacts on Cultural and Historic Resources

Because only a small percentage of the region has been systematically studied, the full extent of the cultural resources in the area has not been determined. Within the Refuge, impacts on cultural and historic resources would be evaluated before construction of road or facilities, and before other developments of public use areas. For other projects in which a governmental agency is the proponent, protection of cultural resources is enhanced because the agency is required to undergo a cultural resource survey and/or clearance as part of the permitting or approval processes before land is disturbed.

Impacts on Socioeconomic Resources

Outdoor recreation plays a large role in contributing to the regional economy. Increasing and enhancing recreational facilities and opportunities in the region generally encourage more frequent visitation and attract more diverse groups of users.

Regional agricultural activity is still an important land use but is perhaps in general decline in regional economic importance. The regional agricultural industry is most affected by national and economic developments (i.e., changes in farm subsidy programs and changes in agricultural commodity uses).

Oil and gas development, production, and refining are an important part of the regional economy. Generally, natural gas production has shown increasing trends in recent years, and even with the cyclical nature of the oil and gas industry, oil and gas development will continue to be a major regional economic force.

Environmental Justice

Executive Order (EO) 12898 requires that the Service conduct an environmental justice analysis for the management alternatives proposed in this Plan. It requires an assessment as to whether minority or low-income populations within the project area might be disproportionately affected by these management alternatives.

Based on the results of the environmental and socioeconomic impact analysis conducted for these alternatives, it can be concluded that those persons who reside within the project area would bear possibly both some negative and beneficial effects from Refuge management. However, any identified environmental and socioeconomic effect from the management alternatives would not be localized nor primarily placed on any identified minority and/or low-income population component. Overall, the identified minority and/or low-income populations would not be disproportionately affected compared to other segments of the general population in the area. Additionally, persons of all races and income levels were invited to participate in the scoping process, and comments and input from any minority or low-income individuals was considered equally with all other persons. Therefore, implementation of any management alternative would be in compliance with EO 12898.

Conclusions

Following an analysis of the preferred action and reasonably acceptable alternatives for the implementation of the Plan, there does not appear to be any reasonably foreseeable adverse environmental impacts associated with the proposed action. The ecological, social, economic,

and environmental evaluations conducted thus far indicate that no significant environmental effects would occur; therefore, no further action is needed.

7.0 CONSULTATION AND COORDINATION

U.S. Fish and Wildlife Service Tulsa Ecological Services
U.S. Army Corps of Engineers (Corps) Texoma Project Office
Oklahoma Department of Wildlife Conservation
Johnston County Commissioner
Johnston County Chamber of Commerce
Tishomingo City Manager
Governor of the Chickasaw Nation
Marshall County Commissioner
Provost of Murray State College

(This page intentionally left blank.)

D. Draft Compatibility Determinations

Use: Auto Touring (wildlife and historic observation)

Refuge Name: Tishomingo National Wildlife Refuge

County: Johnston and Marshall Counties, Oklahoma

Establishing and Acquisition Authorities:

Public Land Order 312 dated January 24, 1946; Refuge Recreation Act (16 USC 460k-460k-4); Migratory Bird Conservation Act (16 USC 715d); Fish and Wildlife Coordination Act (16 USC 664); Cooperative agreement for the management of public hunting (Department of Army, May 19, 1958).

Refuge Purpose(s):

"…for refuge and breeding ground purposes for migratory birds and other wildlife…" Public Lands Order 312, dated Jan. 24, 1946

"…shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements… and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, …" 16 U.S.C. 460k-1 "… the Secretary …may accept and use… real.. property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors…" 16 U.S.C. 460k-2 (Refuge Recreation Act (16 U.S. C. 460k-460k-4), as amended).

"…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory bird Conservation Act).

National Wildlife Refuge System Mission:

The mission of the National Wildlife Refuge System 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.

Description of Use:

A Compatibility Determination completed in 1994 found auto touring to be compatible on Tishomingo National Wildlife Refuge. Approximately 55,000 people per year visit the Refuge and take part in wildlife observation. Specific areas would include the Entrance Roadway 1.5 miles, West Roadway 1.0 mile, and Sandy Creek Roadway .5 miles. Habitat type is hardwood bottomland and agriculture fields for migratory geese. Vehicle access to Refuge headquarters and other designated areas is essential to the operation of the Refuge and the public use program. Supporting areas would include the Eagle Cove Observation Tower located on Sandy Creek Roadway and the refuge Welcome Center and Heritage Center located on the entrance roadway all year around during daylight hours only. These roadways provide incidental opportunities to view wildlife such as geese and native big-game species, such as deer, when present.

The Public Use Management Plan and accompanying environmental assessment completed in 1997 called for the development of an interpretive plan for the Washita Farm to include a brochure and driving loop of farm sites near headquarters. The Refuge, with regional office support, developed a brochure for the Washita Farm in 2008 that provides information to visitors about the seven major farm structures located adjacent to Refuge roadways.

To curtail nighttime and non-wildlife dependent use of the headquarters area entrances at Airport and Cottonwood, roadways were closed in the 1990s. This closure affords the Refuge a one-way in and out control point. The Refuge, in 2002, also started strictly enforcing the nighttime closure regulation. The Refuge is the only local sanctuary zone where the migratory birds and native wildlife spend most of their time. Other areas are hunted, and wildlife flee quickly from these sites.

Availability of Resources:

Tishomingo NWR currently has a staff of seven full-time employees to oversee this program. Tishomingo Refuge Ecology and Education Society is the Refuge friends group and provides several programs throughout the year. Refuge funding in fiscal year 2009 is at the 75/25 level, allowing for 25 percent of funds to be available to Refuge management to oversee maintenance needs of this and other programs.

The Refuge has also taken steps to improve law enforcement presence at the Refuge by allowing the Oklahoma Department of Wildlife Conservation to office two state game wardens within the Tishomingo NWR headquarters. This cooperative law enforcement presence provides ample resources to enforce auto touring regulations.

Anticipated Impacts of the Use:

Under current regulations, auto touring poses minimal impacts on the purpose for which Tishomingo NWR was established. Regional and Refuge management coordination in development of the Public Use Management Plan (1997) has taken into consideration disturbance, public safety, program oversight, etc. There will be some limited disturbance to wildlife such as migratory geese and native resident wildlife due to human activity, but this expected limited use by the public should not create unreasonable impacts.

Public Review and Comment:

The period of public review associated with this compatibility determination will occur as part of the Comprehensive Conservation Plan and Environmental Assessment for Tishomingo NWR. The draft Compatibility Determination will be published with the draft Comprehensive Conservation Plan and Environmental Assessment.

Summarize comments received and any actions taken or not taken because of comments received:

Determination:

____Use is not compatible

__X__**Use is compatible with the following stipulations**

Stipulations Necessary to Ensure Compatibility

1. Continue to allow auto touring during daylight hours only.
2. Continuation of prohibition of off roadway driving.
3. Continuation of enforcement of set speed limit regulations.

Justification:

Auto touring enhances the wildlife experience by allowing reasonable access for the young, elderly, and disabled visitors wishing to engage in wildlife observation activities. Auto touring is a legitimate wildlife-oriented recreational pursuits and this limited use is consistent with Service policy. When conducted in accordance with the above stipulations this activity will not "materially detract from or interfere with" the purposes for which the refuge was established.

Signatures:

Refuge Manager _____

Signature and Date

Concurrence:

Regional Chief _____

Signature and Date

Mandatory Re-evaluation Date: 2024

Use: Boating and Sport Fishing

Refuge Name: Tishomingo National Wildlife Refuge

County: Johnston and Marshall Counties, Oklahoma

Establishing and Acquisition Authorities:

Public Land Order 312 dated January 24, 1946; Refuge Recreation Act (16 USC 460k-460k-4); Migratory Bird Conservation Act (16 USC 715d); Fish and Wildlife Coordination Act (16 USC 664); Cooperative agreement for the management of public hunting (Department of Army, May 19, 1958).

Refuge Purpose(s):

"…for refuge and breeding ground purposes for migratory birds and other wildlife…" Public Lands Order 312, dated Jan. 24, 1946

"…shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements… and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, …" 16 U.S.C. 460k-1 "… the Secretary …may accept and use… real.. property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors…" 16 U.S.C. 460k-2 (Refuge Recreation Act (16 U.S. C. 460k-460k-4), as amended).

"…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory bird Conservation Act).

National Wildlife Refuge System Mission:

The mission of the National Wildlife Refuge System 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.

Description of Use: All boating activities are directly related to fishing on the Refuge and are permitted from March 1 through September 30. Boat fishing and shoreline fishing are allowed on the Refuge during this time frame. Game fish are stocked by the Tishomingo National Fish Hatchery, and a cooperative effort between the Johnston County Sheriff's Department, the Oklahoma Department of Wildlife Conservation, and the Refuge enforce all Oklahoma State fishing regulations. No fishing boat usage is allowed from October 1 through February 28, which creates a sanctuary zone for wading birds along the lake.

The Refuge continues to implement the following regulations in association with boating and sport fishing:

Continue boating season from March 1 to September 30. However, protecting the shallow water and mudflat sites (Pennington Creek Outlet, Sandy Creek Delta, and a portion of the Washita Delta) pinpointed by the survey as areas of high shorebird use, resulting in restricted sanctuaries allowing no entry by any users. Two sanctuary zones were established in 2004: Pennington/Washita Delta and Sandy Creek Delta.

Maintain the current restrictions on shore, wade, and tube fishing and not extend tube fishing into the months of October through January, which were listed as peak waterbird use months at Tishomingo NWR.

Management of moist soil units on Tishomingo NWR is dependent upon water levels of Lake Texoma, which reside under the Corps of Engineers' primary jurisdiction. During normal pool elevations, the Refuge is able to manipulate water levels in several units with stop log and gate structures to manipulate shorebird habitat.

The following is a listing of current Refuge regulations in the *Code of Federal Regulations* Title 50 Wildlife and Fisheries 2008 under 32.55 Tishomingo National Wildlife Refuge for Sport Fishing – Fishing with hook and line is permitted on designated areas of the refuge subject to the following conditions and exceptions:

1. Anglers may bank and wade-fish with pole and line or rod and reel year-round in areas open for public fishing access.
2. Anglers may use boats from March 1 through September 30 in designated refuge waters and Wildlife Management Unit.
3. Anglers may use trotlines and other set tackle only in the Cumberland Pool and between the natural banks of the Washita River. Anglers must attach set tackle, used in Cumberland Pool, only to anchored floats.
4. Anglers may not use limb lines, throw lines, jug lines, and yo-yo's.
5. Anglers may not use any containers (jugs, bottles) as floats.
6. Anglers must remove fishing tackle at the end of the boating season.
7. Anglers may no-wake boat fish during the boating season with line and pole or rod and reel in (a) open areas south and west of the Cumberland Pool shallow water line buoy line; (b) lakes south and west of the Washita River; and (c) the Wildlife Management Unit.
8. Anglers may night fish from boat (during boating season) in the Cumberland Pool, except not in the no-wake area south and west of the buoy line. Anglers may night fish at the headquarters area, including Sandy Creek Bridge, Murray 23, Nida Point, and the Wildlife Management Unit.
9. You may only take bait for personal use while fishing in the refuge in accordance with Oklahoma State law. We do not allow removal of bait from the refuge for commercial sales. You cannot release bait back into the water.
10. Anglers may bow fish only in the Wildlife Management Unit.
11. Anglers may not take fish by the use of hands (noodling) in any refuge waters.
12. Anglers may not take frogs, turtles, or mussels.

Availability of Resources:

Existing funding and staffing are adequate to maintain the Refuge boating and sport fishing program with the assistance of law enforcement presence at the Refuge from the Oklahoma Department of Wildlife Conservation (ODWC), with two wardens that are housed (along with a vessel) at the Refuge headquarters.

Anticipated Impacts of the Use: Short-term disturbance, both direct and indirect, of wildlife occurs as a result of boating and sport fishing. Special sanctuaries have been established to minimize disturbances to shorebirds by closing all entry into both the Pennington/Washita Delta and the Sandy Creek Delta from October 1 through February 28. Sanctuary zones have a yearlong closure. Short-term impacts of boating and sport fishing on shorebirds and waterfowl include noise, harassment, and displacement.

Public Review and Comment:

The period of public review associated with this compatibility determination will occur as part of the Comprehensive Conservation Plan and Environmental Assessment for Tishomingo NWR. The draft Compatibility Determination will be published with the draft Comprehensive Conservation Plan and Environmental Assessment.

Summarize comments received and any actions taken or not taken because of comments received:

Determination:

___Use is not compatible

__X__**Use is compatible with the following stipulations**

Stipulations Necessary to Ensure Compatibility

1. Continuation of sanctuary zones - Pennington/Washita Delta and Sandy Creek Delta
2. Continuation of prohibition of boat use from October 1 until the end of February
3. Continuation of prohibition on water sports, personal watercraft, and airboats
4. Continuation of prohibition on limb lines, throw lines, jug lines, and yo-yo's

Justification:

Sport fishing and the associated boating are traditional, wildlife-dependent recreational uses on Tishomingo National Wildlife Refuge. When conducted in accordance with the above stipulations, these activities will not "materially detract from or interfere with" the purposes for which the Refuge was established. In addition, the provision of these wildlife-dependent recreational uses on the Refuge is in direct compliance with Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System.

The National Wildlife Refuge System Improvement Act of 1997 defines and establishes wildlife-dependent recreational uses such as hunting, fishing, wildlife observation and photography, and environmental education and interpretation. These priority public uses, if found compatible ,will receive enhanced and priority consideration in Refuge planning and management over other general public uses.

Signatures:

Refuge Manager _____

Signature and Date

Concurrence:

Regional Chief _____

Signature and Date

Mandatory Re-evaluation Date: 2024

Use: Camping, Picnicking, and Group Shelter

Refuge Name: Tishomingo National Wildlife Refuge

County: Johnston and Marshall Counties, Oklahoma

Establishing and Acquisition Authorities:

Public Land Order 312 dated January 24, 1946; Refuge Recreation Act (16 USC 460k-460k-4); Migratory Bird Conservation Act (16 USC 715d); Fish and Wildlife Coordination Act (16 USC 664); Cooperative agreement for the management of public hunting (Department of Army, May 19, 1958).

Refuge Purpose(s):

"…for refuge and breeding ground purposes for migratory birds and other wildlife…" Public Lands Order 312, dated Jan. 24, 1946

"…shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements… and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, …" 16 U.S.C. 460k-1 "… the Secretary …may accept and use… real.. property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors…" 16 U.S.C. 460k-2 (Refuge Recreation Act (16 U.S. C. 460k-460k-4), as amended).

"…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory bird Conservation Act).

National Wildlife Refuge System Mission:

The mission of the National Wildlife Refuge System 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.

Description of Use:

Compatibility Determinations completed in 1994 linked then current camping, picnicking, and group shelter use with negative impacts on the Refuge. Following this determination, Refuge management put into place significant changes to this program including eliminating primitive camping on outlying refuge areas, closing and removing the nine site campgrounds at the headquarters area, placing the group shelter under a Special Use Permit system, and eliminating picnicking at the headquarters area. Environmental consequences such as destruction of vegetation, soil and shoreline erosion, off road vehicles, lack of sanitation, uncontrolled road cruising, wildlife disturbance, and vandalism to government property were cited as the main concerns.

An Environmental Assessment was conducted for camping and picnicking activities on Tishomingo National Wildlife Refuge in August of 1994. The assessment analyzed the impacts of current uses and alternative considerations. The preferred alternative focused on removing camping and picnicking from the refuge and developing the group shelter into an environmental education shelter. The 30-day public comment period for the environmental assessment drew concerns from U.S. Congressman Brewster and U.S. Senator Nickels. The

Refuge, by the end of the year, was locked in turmoil and public controversy after removing the nine site campgrounds, camping activities, and picnicking.

Involvement of the regional director ensued during 1995 and culminated in 1997 during the development of a Public Use Management Plan for the Refuge. An Environmental Assessment for the Public Use Management Plan was developed in February 1996 and proposed changes to the 1994 camping, picnicking, and group shelter regulations to allow in modified form, some of the activities previously prohibited. The Public Use Management Plan amended changes included allowing limited, semi-developed, and primitive camping on the Headquarters Unit and within the Wildlife Management Unit associated with fishing and other wildlife-dependent uses. Camping outside of the Refuge Headquarters Unit and the cooperative Wildlife Management Unit continued to be prohibited. A non-refundable $25.00 reservation fee was established for the group shelter to allow private use of the pavilion or at no cost when not reserved. Picnicking was permitted with wildlife-dependent uses on the refuge at areas feasible to be kept clean with limited resources. The plan also called for the rehabilitation of the headquarters building interior including the restroom.

The 1997 Compatibility Determination developed for the Headquarters Camping Area listed the following actions: Development of a camping area near the boat ramp at the refuge headquarters, complete with sanitation and refuse facilities; implementation of a user fee to defray the costs of managing the campgrounds; and monitoring and regulation of the camping program. Therefore, the Refuge, in 1998, established seven free primitive campsites with a potable water source, a pit vault toilet compliant with the Americans with Disabilities Act, and a refuse dumpster at the Headquarters Area. A self registration program was also started to check in all campers.

Refuge management and Oklahoma Department of Wildlife Conservation officials agreed, in 2004, to reduce primitive camping on the cooperative Wildlife Management Unit from the entire 3,000 (or more) acres to five designated primitive campsites: 1) McAdams River Access, 2) McAdams Pond, 3) Clifton River Access, 4) Reeves Ravine Pond, and 5) Rattlesnake River Access.

Picnicking is currently allowed at the group shelter area under the fee program at Headquarters Unit, Murray 23, and Nida Point.

Availability of Resources:

Tishomingo NWR currently has a staff of seven full-time employees to oversee this program. Refuge funding in fiscal year 2009 is at the 75/25 level, allowing for 25 percent of funds to be available to Refuge management to oversee maintenance needs of this and other programs. The refuge has also taken steps to improve law enforcement presence at the Refuge by allowing the Oklahoma Department of Wildlife Conservation to office two state game wardens within the Tishomingo NWR headquarters. This cooperative law enforcement presence provides ample resources to enforce camping and picnicking regulations.

Anticipated Impacts of the Use:

Under current regulations, camping, picnicking, and group shelter use pose minimal impacts on the purpose for which Tishomingo NWR was established. Regional and Refuge management coordination in development of the Public Use Management Plan has taken into consideration disturbance, public safety, program oversight, etc. There will be some limited disturbance to wildlife due to human activity, but this expected limited use by the public should not create unreasonable impacts.

Public Review and Comment:

The period of public review associated with this compatibility determination will occur as part of the Comprehensive Conservation Plan and Environmental Assessment for Tishomingo NWR. The draft Compatibility Determination will be published with the draft Comprehensive Conservation Plan and Environmental Assessment.

Summarize comments received and any actions taken or not taken because of comments received:

Determination:

____Use is not compatible

__X_**Use is compatible with the following stipulations**

Stipulations Necessary to Ensure Compatibility

1. Continue to regulate the number of campers: seven sites at Headquarters and five sites at the Wildlife Management Unit.
2. Continuation of prohibition on ground fires.
3. Continuation of prohibition of camping outside of Headquarters and the Wildlife Management Unit.
4. Continuation of user fee for group shelter reservation use.

Justification:

Camping and picnicking enhances the wildlife experience by allowing the visitor a better chance to view and interact with wildlife. Camping is a vehicle for legitimate wildlife-oriented recreational pursuits such as wildlife photography, bird watching, fishing, hunting, etc. This limited camping and picnicking is consistent with Service policy to permit activities that are clearly in support of or needed to sustain approved wildlife and/or wildlands oriented recreational activity. Fishing opportunities on Cumberland Pool are unique from that available elsewhere on Lake Texoma. Public lands on the Refuge portion of the lake do not charge for entry and/or fishing, whereas Corps public lands charge an entry fee and some a fishing fee. The many shallow areas of the pool adjacent to the headquarters provide excellent habitat for fish and is one of the favorite areas for fishing. The uniqueness of this fishing opportunity, its close proximity to the Town of Tishomingo, and the community's close cultural and traditional based ties to the Refuge all provide a strong rationale for allowing limited camping and picnicking. When conducted in accordance with the above stipulations, these activities will not "materially detract from or interfere with" the purposes for which the refuge was established.

Signatures:

Refuge Manager _____

Signature and Date

Concurrence:

Regional Chief _____

Signature and Date

Mandatory Re-evaluation Date: 2024

Use: Eastern Red Cedar Tree Removal

Refuge Name: Tishomingo National Wildlife Refuge

County: Johnston and Marshall Counties, Oklahoma

Establishing and Acquisition Authorities:

Public Land Order 312 dated January 24, 1946; Refuge Recreation Act (16 USC 460k-460k-4); Migratory Bird Conservation Act (16 USC 715d); Fish and Wildlife Coordination Act (16 USC 664); Cooperative agreement for the management of public hunting (Department of Army, May 19, 1958).

Refuge Purpose(s):

"…for refuge and breeding ground purposes for migratory birds and other wildlife…" Public Lands Order 312, dated Jan. 24, 1946

"…shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements… and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, …" 16 U.S.C. 460k-1 "… the Secretary …may accept and use… real.. property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors…" 16 U.S.C. 460k-2 (Refuge Recreation Act (16 U.S. C. 460k-460k-4), as amended).

"…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory bird Conservation Act).

National Wildlife Refuge System Mission:

The mission of the National Wildlife Refuge System 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.

Description of Use:

Eastern red cedar tree removal by mechanical means is authorized under the Pest Control Plan for Tishomingo National Wildlife Refuge dated February 7, 2001. Eastern red cedar tree removal is also authorized under Title 50 CFR, Part 29.1, as it contributes to the achievement of the National Wildlife Refuge System mission. Economic use includes removing timber, firewood, or other natural products of the soil. Eastern red cedar trees are invading an estimated 5,000 acres of Tishomingo NWR.

Eastern red cedar tree removal permits will be issued by public drawing. Permittees will be required to comply with all Special Use Permit Conditions. The Refuge will be divided into four management units for the purpose of cedar tree removal: Headquarters, Nida, Rock Creek, and Wildlife Management Unit. Permittees will be allowed the right to remove all sizes of cedars for saw timber, lumber, furniture, post, mulch, etc. The economic value to the permittee is outweighed by the benefit to the resource and cost of contracting the services. Eastern red cedar trees will be cut down to within four inches of the soil, which allows the use of brush hogs in the area. Eastern red cedars will not regenerate from the root system if the tree is cut below the last green limb. Therefore, the tree is eliminated after being cut off at the ground.

Chickasaw National Recreation Area, a local unit of the National Park Service, has been contracting eastern red cedar tree removal for the past several years with the following costs: $450 per acre to cut cedars on site and leave them for burning, and $1200 per acre to completely remove the trees as mulch. Therefore, the use of utilizing private individuals under Special Use Permits versus contractors will save Tishomingo NWR thousands of dollars.

Availability of Resources:

Mechanical cost for clearing cedars ranges from $50–$500 per acre depending on the amount of cedars per acre. Tishomingo NWR has an estimated $250,000 to $2,500,000 in cedar removal needs. Tishomingo NWR does not have the resources or funding to control the rising invasive cedar tree numbers. Therefore, the only available resources are by permit issued to private individuals.

Anticipated Impacts of the Use:

Eastern red cedar tree removal poses minimal impacts on the purpose for which Tishomingo NWR was established. Special Use Permit Conditions (attached) take into consideration, disturbance, invasive species, public safety, etc. Damage to habitat will be limited to cutting and removing cedar trees. There will be some limited disturbance to wildlife due to human activity on the land. The expected sporadic and limited use by the public should not create unreasonable impacts.

Public Review and Comment:

The period of public review associated with this compatibility determination will occur as part of the Comprehensive Conservation Plan and Environmental Assessment for Tishomingo NWR. The draft Compatibility Determination will be published with the draft Comprehensive Conservation Plan and Environmental Assessment.

Summarize comments received and any actions taken or not taken because of comments received:

Determination:

____Use is not compatible

__X__Use is compatible with the following stipulations

Stipulations Necessary to Ensure Compatibility

1. Only by Special Use Permit

Justification:

This use has been determined compatible because special use permit eastern red cedar tree removal will not materially interfere with or detract from Refuge purposes. The associated disturbance to wildlife is temporary and minor. Invasive eastern red cedar trees are degrading wildlife habitat and producing a significant fire danger. Eastern red cedars are increasing at an estimated rate of 762 acres a day or 300,000 acres a year according to the USDA Natural Resources Conservation Service. The cedar infestation is predicted to reach 12.6 million acres

by 2013, covering 28 percent of Oklahoma's landscape. Oklahoma State University research shows that one acre of cedar trees can absorb 55,000 gallons of water per year. In 2000, it was estimated that red cedars cost Oklahoma $218 million dollars annually through catastrophic wildfires, loss of cattle forage, loss of wildlife habitat, recreation, and water yield. It is expected to reach $447 million by 2013.

Chickasaw National Recreation Area, a local unit of the National Park Service, has been contracting Eastern Red Cedar Tree removal for the past several years with the following costs: $450 per acre to cut cedars on site and leave them for burning and $1200 per acre to completely remove the trees as mulch. Therefore, the use of utilizing private individuals under Special Use Permits versus contractors will save Tishomingo NWR thousands of dollars.

Signatures:

Refuge Manager _____

Signature and Date

Concurrence:

Regional Chief _____

Signature and Date

Mandatory Re-evaluation Date: October 2022

Use: Feral Pig Live Trapping by Special Use Permit

Refuge Name: Tishomingo National Wildlife Refuge

County: Johnston and Marshall Counties, Oklahoma

Establishing and Acquisition Authorities:

Public Land Order 312 dated January 24, 1946; Refuge Recreation Act (16 USC 460k-460k-4); Migratory Bird Conservation Act (16 USC 715d); Fish and Wildlife Coordination Act (16 USC 664); Cooperative agreement for the management of public hunting (Department of Army, May 19, 1958).

Refuge Purpose(s):

"…for refuge and breeding ground purposes for migratory birds and other wildlife…" Public Lands Order 312, dated Jan. 24, 1946

"…shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements… and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, …" 16 U.S.C. 460k-1 "… the Secretary …may accept and use… real.. property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors…" 16 U.S.C. 460k-2 (Refuge Recreation Act (16 U.S. C. 460k-460k-4), as amended).

"…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory bird Conservation Act).

National Wildlife Refuge System Mission:

The mission of the National Wildlife Refuge System 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.

Description of Use:

Live trapping and transfer by special use permit is authorized under Title 50 CFR, Part 31, Section 14 (a)—Animal species that are surplus or detrimental to the management program of a wildlife area may be taken in accordance with Federal and State laws and regulations by Federal or State personnel or by permit issued to private individuals; Title 50 CFR, part 30, section 11 (a)—Feral animals, including swine without ownership that have reverted to the wild form a domestic state, may be taken by authorized Federal or State personnel or by private persons operating under permit in accordance with applicable provisions of Federal or State law or regulation.

Live trapping and transfer would involve issuing special use permits to members of the public by public drawing. Refuge lands will be divided into four zones consisting of Refuge Headquarters Zone, Wildlife Management Unit Zone, 5C Dike to Nida Point Zone, and Rock Creek Zone. Special use permits will be issued to the public for specific zones until the areas are sufficiently covered. Permittees will be required to comply with all Special Use Permit Conditions. Permittees must also comply with the Oklahoma Feral Swine Control Act.

The Oklahoma Feral Swine Control Act, enacted in 2007 to provide aggressive measures to reduce the number of feral swine in Oklahoma, states under Section 9 B: All persons that transport live feral swine in the State shall be required to obtain a transporter license from the Oklahoma Department of Agriculture, Food, and Forestry; and Section 9 C: Live feral swine shall only be transported to one of the following: 1.) a licensed sporting facility; 2.) a licensed breeding facility; 3.) a licensed buying station; 4.) a licensed gathering station; 5.) an approved market or slaughter facility; or 6.) pursuant to an order issued by the State Veterinarian.

Availability of Resources:

The United States Department of Agriculture,Wildlife Services, was contacted to provide a proposal for reduction of feral pig numbers on the Refuge in November 2000. The proposal was to reduce the pig numbers to a level that would not conflict with the Refuge's objectives and would not compromise a safe and quality wildlife recreational experience for the public. The proposal would provide reduction by shooting pigs on sight, live trapping, and aerial shooting from helicopters. The cost of the program was estimated at $70,000 for the first year and $50,000 for each year after the first year.

Tishomingo NWR does not have the resources or funding to spend a considerable amount of time or funding to reduce pig numbers to acceptable levels. Therefore, the only available resources, at this time, are by permit issued to private individuals.

Anticipated Impacts of the Use:

Feral pig live trapping poses minimal impacts on the purpose for which Tishomingo NWR was established. Special Use Permit Conditions (attached) take into consideration, disturbance, invasive species, public safety, etc. Damage to habitat will be very limited to check and maintain feral pig live traps. There will be some limited disturbance to wildlife due to human activity on the land. The expected sporadic and limited use by the public should not create unreasonable impacts.

Public Review and Comment:

The period of public review associated with this compatibility determination will occur as part of the Comprehensive Conservation Plan and Environmental Assessment for Tishomingo NWR. The draft Compatibility Determination will be published with the draft Comprehensive Conservation Plan and Environmental Assessment.

Summarize comments received and any actions taken or not taken because of comments received.

Determination:

____Use is not compatible

_X_Use is compatible with the following stipulations

Stipulations Necessary to Ensure Compatibility

1. Only by Special Use Permit

Justification:

This use has been determined compatible because special use permit live trapping will not materially interfere with or detract from Refuge purposes. The associated disturbance to wildlife is temporary and minor. Feral pigs are degrading wildlife habitat and competing directly with native wildlife for food. The pigs are being sighted throughout Tishomingo NWR on a regular basis, where they are damaging bottomland plant communities and agricultural crops by extensive rooting. The severity of the impact includes agricultural crop destruction (planted for migrating waterfowl); disruption of native flora, causing habitat changes; direct competition with native wildlife; and loss of nest and eggs of native birds by foraging feral pigs. Feral pig population control on the Refuge will also provide a benefit to neighboring farmers who experience costly damage caused by feral pigs.

Signatures:

Refuge Manager _____

Signature and Date

Concurrence:

Regional Chief _____

Signature and Date

Use: Hiking on Nature Trails (Craven ¾ mile, Arboretum ¼ mile, and Sandy Creek ¼ mile)

Refuge Name: Tishomingo National Wildlife Refuge

County: Johnston and Marshall Counties, Oklahoma

Establishing and Acquisition Authorities:

Public Land Order 312 dated January 24, 1946; Refuge Recreation Act (16 USC 460k-460k-4); Migratory Bird Conservation Act (16 USC 715d); Fish and Wildlife Coordination Act (16 USC 664); Cooperative agreement for the management of public hunting (Department of Army, May 19, 1958).

Refuge Purpose(s):

"…for refuge and breeding ground purposes for migratory birds and other wildlife…" Public Lands Order 312, dated Jan. 24, 1946

"…shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements… and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, …" 16 U.S.C. 460k-1 "… the Secretary …may accept and use… real.. property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors…" 16 U.S.C. 460k-2 (Refuge Recreation Act (16 U.S. C. 460k-460k-4), as amended).

"…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory bird Conservation Act).

National Wildlife Refuge System Mission:

The mission of the National Wildlife Refuge System 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.

Description of Use:

A Compatibility Determination completed in 1994 found hiking to be compatible on the Refuge. The accompanying environmental assessment for wildlife observation, photography, and hiking stated that hiking allowed the only opportunity for bird watchers to leave the roadside and see species common to a dense canopy area.

The Public Use Management Plan and accompanying environmental assessment completed in 1997 called for the rehabilitation of Craven Nature Trail and associated parking area, development of additional interpretive signs, and replacement of the dilapidated observation deck on Dick's Pond. The plan also called for a teacher's guide for the trail and guided tours to be offered. The public use plan also called for landscaping and interpretation at the pavilion area, wildflowers and interpretations at the Silo area, and the development of a five-mile (or longer) "skyline" hiking trail at Nida Point.

The Refuge, in 1999, spent $15,000 to replace the Craven Nature Trail observation deck and, in 2003, spent $43,900 to resurface the trail. The first quarter mile was brought up to Americans with Disabilities Act (ADA) standards by overlaying with asphalt.

The Oklahoma Legacy Arboretum Trail was developed in 2002 and is a quarter mile concrete trail (compliant with Americans with Disabilities Act) with patios, butterfly garden, and a birding wall. The trail was developed to provide for the Public Use Management Plan interpretation area called for near the pavilion and silo areas.

The quarter-mile Sandy Creek Trail was resurfaced in 2008 with the support of the Chickasaw Nation and the Refuge friends group, Tishomingo Refuge Ecology and Education Society.

Availability of Resources:

Tishomingo NWR currently has a staff of seven full-time employees to oversee this program. Refuge funding in fiscal year 2009 is at the 75/25 level, allowing for 25 percent of funds to be available to Refuge management to oversee maintenance needs of this and other programs. The Refuge has also taken steps to improve law enforcement presence at the Refuge by allowing the Oklahoma Department of Wildlife Conservation to office two State game wardens within the Tishomingo NWR headquarters. This cooperative law enforcement presence provides ample resources to enforce hiking regulations.

Anticipated Impacts of the Use:

Under current regulations, hiking poses minimal impacts on the purpose for which Tishomingo NWR was established. Regional and Refuge management coordination in development of the Public Use Management Plan has taken into consideration disturbance, public safety, program oversight, etc. There will be some limited disturbance to wildlife due to human activity, but this expected limited use by the public should not create unreasonable impacts.

Public Review and Comment:

The period of public review associated with this compatibility determination will occur as part of the Comprehensive Conservation Plan and Environmental Assessment for Tishomingo NWR. The draft Compatibility Determination will be published with the draft Comprehensive Conservation Plan and Environmental Assessment.

Summarize comments received and any actions taken or not taken because of comments received:

Determination:

____Use is not compatible

_X_Use is compatible with the following stipulations

Stipulations Necessary to Ensure Compatibility

1. Continue to allow hiking only along trails--no skateboards, bicycles, horses, etc.
2. Continuation of prohibition of off-trail hiking.
3. Continuation of prohibition on collecting plants and animals along trails.

Justification:

Hiking enhances the wildlife experience by allowing the visitor a better chance to view and interact with wildlife. Hiking is a legitimate wildlife-oriented recreational pursuit, and this

limited use is consistent with Service policy. The uniqueness of Cross Timbers hiking and its close proximity to the Town of Tishomingo, and the community's close cultural and traditional based ties to the Refuge, provide a strong rationale for allowing limited hiking. When conducted in accordance with the above stipulations, these activities will not "materially detract from or interfere with" the purposes for which the refuge was established.

Signatures:

Refuge Manager _____

Signature and Date

Concurrence:

Regional Chief _____

Signature and Date

Mandatory Re-evaluation Date: 2024

Use: Refuge Controlled Deer Hunting for Biological Management Purposes

Refuge Name: Tishomingo National Wildlife Refuge

County: Johnston and Marshall Counties, Oklahoma

Establishing and Acquisition Authorities:

Public Land Order 312 dated January 24, 1946; Refuge Recreation Act (16 USC 460k-460k-4); Migratory Bird Conservation Act (16 USC 715d); Fish and Wildlife Coordination Act (16 USC 664); Cooperative agreement for the management of public hunting (Department of Army, May 19, 1958).

Refuge Purpose(s):

"…for refuge and breeding ground purposes for migratory birds and other wildlife…" Public Lands Order 312, dated Jan. 24, 1946

"…shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements… and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, …" 16 U.S.C. 460k-1 "… the Secretary …may accept and use… real.. property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors…" 16 U.S.C. 460k-2 (Refuge Recreation Act (16 U.S. C. 460k-460k-4), as amended).

"…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory bird Conservation Act).

National Wildlife Refuge System Mission:

The mission of the National Wildlife Refuge System 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.

Description of Use:

A compatibility determination completed in 1994 found the use compatible with the following stipulations: Number of annual permits based on population census and analysis coordinated with State deer biologist to ensure that the hunt remains a biological tool rather than a recreational hunt.

An Environmental Assessment for Controlled Deer Hunting on Tishomingo National Wildlife Refuge was completed in 1994, stating that the preferred alternative of controlled deer hunting would continue in accordance with the 1987 Refuge Deer Hunt Plan. The Refuge is closed to all other public use on the days when a controlled rifle hunt is taking place. The annual hunt consists of a series of one-day hunts with a maximum of 40 hunters per day. The number of one-day hunts is determined by the total number of permits issued, i.e., if 160 permits were issued, we would hold four, one-day hunts. The Oklahoma Department of Wildlife Conservation selects hunters via a lottery as part of their statewide Bonus Hunt Program. The 1987 Refuge Deer Hunt Plan was amended in 1993 to reduce the number of permits to 80 for that year and to change from an "antlerless only" hunt to an "either sex" hunt. The 1993 plan received regional office approval in March of that year.

Currently, the number of controlled deer hunt permits is based on biological data gathered by the Refuge biologist during several spotlight counts conducted in accordance with State spotlight survey guidelines. The surveys are conducted during August and September to allow deer fawns to be large enough to be seen during the count.

All lottery selected hunters receive a safety and procedural briefing before being taken to their respective hunt area by either a Refuge or State employee. Controlled hunt staff routinely travel Refuge roadways to assist hunters and bring harvested deer to the check station. Oklahoma Department of Wildlife Conservation (ODWC) staff assist in operating the check station at the refuge to record sex and weight, and to remove the jaw bone for subsequent age determination. Upon completing the process, each deer is tagged in accordance with ODWC regulations.

The controlled hunt process allows the Refuge to maintain a healthy deer population that is balanced with the habitat to prevent habitat loss and disease spread. The alternative of eliminating this deer population control effort entails many negative and far reaching environmental consequences for Refuge resources, public use of those resources, and private lands adjacent to the Refuge. Without control, the deer herd would rapidly surpass the nutritional needs of the population and would exceed the habitat's ability to provide those needs. Severe over-browsing would change herbaceous ground cover and cause declines in understory vegetation and hardwood tree seedling height, density, and diversity. Dramatic and unnatural changes in succession would occur. Small mammal communities would decline as forbs were replaced by graminoid plants. Bird species composition would change, as species associated with understory would disappear. Higher deer densities would result in higher occurrence of parasites and disease. Deer ticks would become more prevalent, therefore increasing the risk of Lyme disease contraction. High deer densities would result in more deer–motor vehicle accidents, especially along areas where the Refuge adjoins state highways.

Depredation of Refuge crops could impact the amount of food that is available for waterfowl during the fall migration. This depredation would also spread to private property crops adjacent to the Refuge as deer seek to meet their nutritional needs. Adverse public relations and law enforcement problems would result from increased depredation kills by local farmers and increased poaching based on the abundant availability of deer.

Availability of Resources:

Tishomingo NWR currently has a staff of seven full-time employees to help oversee this program. Refuge funding in fiscal year 2009 is at the 75/25 level, allowing for 25 percent of funds to be available for Refuge management to oversee maintenance needs of this and other programs. The Refuge has also taken steps to improve law enforcement presence at the Refuge by allowing the Oklahoma Department of Wildlife Conservation to office two State game wardens within the Tishomingo NWR headquarters. This cooperative law enforcement presence provides ample resources to enforce hunting regulations.

The State of Oklahoma also takes responsibility for maintaining the public process of registering and selecting hunters, notifying those hunters, collecting user fees, and providing the appropriate paperwork and harvest tags for the check station at Tishomingo NWR.

Anticipated Impacts of the Use:

Under current regulations, controlled deer hunting poses minimal impacts on the purpose for which Tishomingo NWR was established. Regional and Refuge management coordination in development of the Tishomingo NWR Deer Hunt Plan have taken into consideration

disturbance, public safety, program oversight, etc. Refuge visitors will be impacted on hunt days when a portion of the Refuge is closed for the special controlled hunts. The Refuge maintains open areas at the Rock Creek and Bell Creek Units to allow visitors the opportunity to access a portion of the Refuge during the temporary hunt closure. Therefore, controlled deer hunting should not create unreasonable impacts.

Public Review and Comment:

The period of public review associated with this compatibility determination will occur as part of the Comprehensive Conservation Plan and Environmental Assessment for Tishomingo NWR. The draft Compatibility Determination will be published with the draft Comprehensive Conservation Plan and Environmental Assessment.

Summarize comments received and any actions taken or not taken because of comments received:

Determination:

___Use is not compatible

_X_Use is compatible with the following stipulations

Stipulations Necessary to Ensure Compatibility

1. Continuation of designated open areas during controlled hunts for other visitors – Rock Creek and Bell Creek Units.
2. Continuation of the process for which annual hunting permits are based on population census data.
3. Continuation of coordination with State deer biologist to ensure that the hunt remains a biological tool rather than a recreational hunt.

Justification:

This hunt serves the biological function of keeping the deer herd in balance within the ability of the habitat to support it while producing a healthy representative population. Control of deer will also lessen crop depredations planted for migratory birds on the Refuge and on private crops adjacent to the Refuge. Deer-vehicle collisions will be reduced on adjacent highways by reducing the number of deer. When conducted in accordance with the above stipulations, the activity will not "materially detract from or interfere with" the purposes for which the Refuge was established.

The National Wildlife Refuge System Improvement Act of 1997 defines and establishes the wildlife-dependent recreational uses such as hunting, fishing, wildlife observation and photography, and environmental education and interpretation. These priority public uses, if found compatible, will receive enhanced and priority consideration in Refuge planning and management over other general public uses.

Signatures:

Refuge Manager _____

Signature and Date

Concurrence:

Regional Chief _____

Signature and Date

Mandatory Re-evaluation Date: 2024

E. RONS and SAMMS Projects

Refuge Operational Needs (Rons) List For Tishomingo NWR

#1

OrgCode	Project #	Activity	Category
21650	97022	7.a. Provide Visitor Services	
			People
Measures			
Units1	5,000	# of new visitors to be served	
Units2	75,000	# of existing visitors to be served	
Units3	100	support for 6 priority public uses	
Units4	0	support for non-priority public uses	
Units5			
Units6			
Units7			

Title: Improve Refuge Visitor Services and Outreach Capabilities

Description

Complete a customer survey to determine visitation numbers and needs; purchase a freestanding portable display to be used at festivals and outreach programs; and develop and reprint all Refuge brochures, including the general information brochure and the hunting and fishing regulations brochures. This project will also include developing large type, Braille, and audio versions of brochures, which will enhance the accessibility of the Refuge. The display will be an important part of the Refuge 's outreach efforts with the local community. The objectives are to assure that public use facilities and programs meet goals and objectives and minimize disturbance to wildlife, and ensure that each visitor receives a quality recreational experience. These projects are identified in the 1997 Public Use Management Plan.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equipment Cost			
Facility Cost			
Service/Supplies	$30	$3	
Miscellaneous Costs	$2	$3	
Total Operations Cost	$32	$6	$38

Outcomes: Public Education

Check if Applies

	Station Plan approved October 1997
X	Station Plan/equivalent pre-October 1997
X	Station Goal/Objective
	Station Step-down Management Plan
	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan
	Other Major Plan
X	Legal Mandate

Planning Link: 1997 Public Use Management Plan - Goal J - Improve universal accessibility—including to the elderly and persons with disabilities—to recreational programs and facilities on the Refuge. Action required to meet legal requirements under NEPA and the Refuge Improvement Act.

Rankings:

Station Rank:	4	Regional Rank:	999
National Rank:		Geographic area:	85

#2

OrgCode	Project #	Activity	Category
21650	98007	3.d. Farming	
			Habitat
Measures			
Units 1	0	# of new areas to be farmed	
Units 2	0	# to be cooperatively farmed	
Units 3	700	# of existing acres to be farmed more effectively	
Units 4	0		
Units 5			
Units 6			
Units 7			

Title: Improve Equipment storage facilities.

Description

Improve storage facilities at Tishomingo NWR by purchasing a Morton-type equipment storage building that will be placed at the Hog Barn storage area. The storage shed will decrease the potential for theft and vandalism. In addition, the storage shed provides a safe environment for maintenance activities.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost			
Facility Cost	$135		
Service/Supplies	$15	$4	
Misc Costs	$16	$16	
Total Ops Cost	$166	$20	$186

Outcomes: Waterfowl

Check if Applies

	Station Plan approved 10/97+
X	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	FWS Recovery Plan
X	FWS Ecosystem Goal/Plan
	Other Major Plan
X	Legal Mandate

Planning Link: This project would address all Refuge goals by providing protection of equipment we use to achieve those goals.

Rankings:

Station Rank:	8	Regional Rank:	999
National Rank:	13	Geographic area:	126

#3

OrgCode	Project #	Activity	Category
21650	98006	7.a. Provide Visitor Services	
			People
Measures			
Units 1	10,000	# of visitors to be served	
Units 2	80,000	# of existing visitors to be better served	
Units 3	100	% support for 6 priority public use	
Units 4	0	% support for non-priority public uses	
Units 5			
Units 6			
Units 7			

Title: Improve environmental education opportunities

Description

Purchase and install interpretive signs for the newly renovated headquarters exhibit area. Adding interpretive signs in the office will enhance the visitor's experience, increase environmental education opportunities, and provide important orientation and regulation information. The Refuge is within a 1.5-hour drive of over four million people in the Dallas/Fort Worth to Oklahoma City areas. Currently, demand exceeds the program's capabilities. This project is critical for compliance with the 1997 Public Use Management Plan Goals and Action Items. There is high expectation from the community that these Goals and Action items will be accomplished. Based on the latest Service data available, the additional visitors attracted to this area are expected to contribute $111,524 annually to the local economy.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost			
Facility Cost			
Service/Supplies	$31	$3	
Misc Costs	$4	$4	
Total Ops Cost	$35	$7	$42

Outcomes: Public Education

Check if Applies

	Station Plan approved 10/97+
X	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	FWS Recovery Plan
X	FWS Ecosystem Goal/Plan

X	Other Major Plan
X	Legal Mandate

Planning Link: 1997 Public Use Management Plan - Goal H7 - Develop and install 1-2 interpretive panels. Action required to meet legal requirements under NEPA and the Refuge Improvement Act.

Rankings:

Station Rank:	12	Regional Rank:	999
National Rank:		Geographic area:	225

#4

OrgCode	Project #	Activity	Category
21650	91004	7.a. Provide Visitor Services	
			People
Measures			
Units1	15,000	# of visitors to be served	
Units2	75,000	# of existing visitors to be better served	
Units3	100	% support for 6 priority public use	
Units4	0	% support for non-priority public uses	
Units5			
Units6			
Units7			

Title: Enhance compatible recreational and educational opportunities on the refuge

Description

Enhance recreational and educational opportunities on the Refuge by adding an outdoor recreation planner to improve communication between the Service and the community, to welcome and orient visitors to the Refuge, to enhance recreational and educational opportunities, and to expand partnerships. The Refuge is within a 1.5-hour drive of over four million people in the Dallas/Fort Worth to Oklahoma City areas. Currently, demand exceeds the program's capabilities. This position is critical for compliance with the 1997 Public Use Management Plan Goals and Action Items, and there is high expectation from the community that these Goals and Action items will be accomplished.

Recurring Staff Needs (FTEs)	Number (1/10s)	Grade	FTE Cost
FTEs managers			$0.00
Resource Specialist			$0.00
Ed/Rec Staff			$0.00
Biologists/BioTechs	1.0	GS-09	$71.00
Law Enforcement			$0.00
Clerical/Admin			$0.00
Maint/Eq Operator			$0.00
Total FTE's	1.0		$71.00

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost		$71	
Equip Cost	$30		
Facility Cost	$5		
Service/Supplies		$5	
Misc Costs	$30	$15	
Total Ops Cost	$65	$91	$156

Clarify Staff: Minimum staffing category identification required for new/expanded stations.

The Refuge is within a 1.5-hour drive of over four million people in the Dallas/Fort Worth to Oklahoma City areas. Currently, demand exceeds the program's capabilities. This position is critical for compliance with the 1997 Public Use Management Plan Goals and Action Items, and there is high expectation from the community that these Goals and Action items will be accomplished.

Outcomes: Public Education

Public Recreation

Check if Applies

	Station Plan approved 10/97+
X	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	FWS Recovery Plan
	FWS Ecosystem Goal/Plan
X	Other Major Plan
X	Legal Mandate

Planning Link: 1997 Public Use Management Plan - Goals - Improve communication between the Service and the community, welcome and orient visitors to the Refuge, enhance compatible recreational and educational opportunities, and improve public involvement and partnership opportunities. Action required to meet legal requirements under NEPA and the Refuge Improvement Act.

Rankings:

Station Rank: 1 Regional Rank: 999

National Rank: _____ Geographic area: _____

#5

OrgCode	Project #	Activity	Category
21650	94001	3.d. Farming	
			Habitat
Measures			
Units1	200	# of new acres to be farmed	
Units2	0	# to be cooperatively farmed	
Units3	700	# of existing acres to be farmed more effectively	
Units4			
Units5			
Units6			
Units7			

Title: Improve Refuge maintenance program

Description

The Refuge has a very active and complex operational program. In addition to extensive force account farming, public use facility maintenance and habitat projects require extensive staff capability. Two maintenance worker positions would assist enhanced visitor experience and improve the overall safety and efficiency of Refuge operations. Current Refuge staff would become more available for habitat and wildlife management activities

Recurring Staff Needs (FTEs)	Number (1/10s)	Grade	FTE Cost
FTEs managers			$0.00
Resource Specialist			$0.00
Ed/Rec Staff			$0.00
Biologists/BioTechs	0.0		$0.00
Law Enforcement			$0.00
Clerical/Admin			$0.00
Maint/Eq Operator	1.0	WG-05	$45.00

Total FTE's 1.0 $45.00

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost	$40	$45	
Equip Cost	$60		
Facility Cost	$10		
Service/Supplies		$10	
Misc Costs	$60	$31	
Total Ops Cost	$170	$86	$256

Outcomes: Waterfowl
Other Migratory Birds
Resident Wildlife

Check if Applies

	Station Plan approved 10/97+
X	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan
	Other Major Plan
X	Legal Mandate

Planning Link: 1997 Public Use Management Plan - Goal C - Welcome all visitors and provide orientation as to opportunities available and location of facilities on Refuge. Goal G - Provide visitors with improved overall wildlife viewing opportunities and the option to receive on-site training in wildlife viewing. Goal H - Provide key resource interpretation opportunities for viewing Refuge species. Goal I - Improve overall access to the Refuge. Action required to meet legal requirements under NEPA and the Refuge Improvement Act.

Rankings:

Station Rank:	2	Regional Rank:	999
National Rank:		Geographic area:	

#6

OrgCode	Project #	Activity	Category
21650	2	4.e. Native Pest Animal and Predator Control	
			Wildlife
Measures			
Units1	1,000	# of mammals to be removed	
Units2	0	# of birds to be removed	
Units3		# of reptiles, amphibians, and/or fish removed	
Units4	4	# of acres to be treated to prevent or control native non-insect invertebrate pest species.	
Units5			
Units6			
Units7			

Title: Feral hog population control

Description

Control the feral hog population that is severely degrading Refuge habitat and wildlife resources. The hog population, which escaped domestication and became wild, has exploded since 1991 to several thousand animals presently. Feral hogs compete for food with virtually all native wildlife and reduce available food for waterfowl. They destroy Refuge corn crops planted for wintering waterfowl. They eat nesting shorebird eggs and chicks and feed on small mammals and reptiles. Hogs uproot native plants, and their rooting provides seed beds for invasive noxious weeds, promoting their spread. A three-year term appointment biotech will be responsible for conducting the removal program, which includes determining the most cost effective and successful means of controlling, trapping, shooting, conducting population surveys, and evaluating data.

Recurring Staff Needs (FTEs)	Number (1/10s)	Grade	FTE Cost
FTEs managers			$0.00
Resource Specialist	1.0	GS-07	$58.00
Ed/Rec Staff			$0.00
Biologists/BioTechs	0.0		$0.00
Law Enforcement			$0.00
Clerical/Admin			$0.00
Maint/Eq Operator	0.0		$0.00
Total FTE's	1.0		$58.00

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost		$58	
Equip Cost	$30		
Facility Cost	$5		
Service/Supplies		$5	
Misc Costs	$30	$14	
Total Ops Cost	$65	$77	$142

Outcomes: Healthy Ecosystems
Waterfowl

Check if Applies

	Station Plan approved 10/97+
	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	USFWS Recovery Plan
	USFWS Ecosystem Goal/Plan
	Other Major Plan
	Legal Mandate

Planning Link: Supports Refuge goals for migratory birds in Planning Needs Assessment, Arkansas and Red River Ecosystem goals, objectives of the 1997 Public Use Management Plan, and Refuge Feral Animal Control Plan.

Rankings:

Station Rank: 5 Regional Rank: 999

National Rank: 999 Geographic area: _____

#7

OrgCode	Project #	Activity	Category
21650	3	3.d. Farming	
			Habitat
Measures			
Units1		# of new acres to be farmed	
Units2	700	# to be cooperatively farmed	
Units3		# of existing acres to be farmed more effectively	
Units4			
Units5			
Units6			
Units7			

Title: Improve refuge farming practices

Description

The Refuge is responsible for providing food and resting areas for migrating and wintering ducks and geese within the Arkansas/Red River Ecosystem. Current Refuge farming operations have been limited by the lack of equipment and supplies. Equipment needs are a grain cart to facilitate seed delivery for planting operations, a no-till grain drill, a four-bottom reversing plow, a rotary hoe for cultivation of row crops, and a portable irrigation pump and irrigation pipe. Farm fields must also be leveled for more efficient irrigation.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost	$88		
Facility Cost			
Service/Supplies		$3	
Misc Costs	$8	$8	
Total Ops Cost	$96	$11	$107

Outcomes: Waterfowl

Check if Applies

	Station Plan approved 10/97+
	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
X	Station Step-down Mgmt Plan
	FWS Recovery Plan
X	FWS Ecosystem Goal/Plan
	Other Major Plan
	Legal Mandate

Planning Link: Supports Refuge goals for migratory birds in Planning Needs Assessment, Arkansas and Red River Ecosystem goals, Refuge Cropland Management Plan, Waterfowl Management Plan, and objectives of the 1997 Public Use Management Plan.

Rankings:

Station Rank:	4	Regional Rank:	999
National Rank:	999	Geographic area:	42

#8

OrgCode	Project #	Activity	Category
21650	97005	7.a. Provide Visitor Services	
			People
Measures			
Units1	20,000	# of visitors to be served	
Units2	75,000	# of existing visitors to be better served	
Units3	100	% support for 6 priority public uses	
Units4	0	% support for non-priority public uses	
Units5			
Units6			
Units7			

Title: Develop recreational facilities concept plan and cost estimates

Description

Develop conceptual and construction plans for uniform design of recreational facilities and associated cost estimates. The Refuge lacks adequate recreational facilities; many are in disrepair or are proposed in the 1997 Public Use Management Plan. The conceptual plans and estimates will be used for proposed public use and interpretive projects. A more uniform look and appearance to the public use facilities at the Refuge will convey a uniform positive message. In doing so, the visitor will better understand the Refuge purpose and the purpose of the Refuge System. The local community has expressed the desire for greater wildlife viewing opportunities and for more quality hunting and fishing access and facilities. The refuge is within a 1.5-hour drive of over four million people in the Dallas/Fort Worth to Oklahoma City areas.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost			
Facility Cost			
Service/Supplies	$65		
Misc Costs	$5	$6	
Total Ops Cost	$70	$6	$76

Outcomes: Public Education
Public Recreation

Check if Applies

	Station Plan approved 10/97+
X	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan

	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan
X	Other Major Plan
X	Legal Mandate

Planning Link: 1997 Public Use Management Plan - Goal A - Assure that public use facilities and programs meet goals and objectives and minimize disturbance to wildlife. Action required to meet legal requirements under NEPA and the Refuge Improvement Act.

Rankings:

Station Rank:	5	Regional Rank:	999
National Rank:		Geographic area:	106

#9

OrgCode	Project #	Activity	Category
21650	98011	3.d. Farming	
			Habitat
Measures			
Units1	0	# of new acres to be farmed	
Units2	0	# to be cooperatively farmed	
Units3	700	# of existing acres to be farmed more effectively	
Units4			
Units5			
Units6			
Units7			

Title: Improve refuge maintenance shop security and capability

Description

The Refuge has a number of old buildings that serve as maintenance and storage areas. These buildings are unsecured and a threat of theft is present. The maintenance program also lacks proper equipment needed in day-to-day operations and maintenance. Installation of security measures and purchase of a wire welder, band saw, recycling high pressure wash rack system, hot water vegetation control system, and Bobcat 873 loader would greatly enhance the security and efficiency of operations.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Personnel Cost			
Equip Cost	$120		
Facility Cost			
Service/Supplies		$1	
Misc Costs	$2	$10	
Total Ops Cost	$122	$11	$133

Outcomes: Waterfowl

Check if Applies

	Station Plan approved 10/97+
X	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan
	Other Major Plan
	Legal Mandate

Planning Link: This project will address all Refuge goals by providing protection of equipment we use to achieve those goals.

Rankings:

Station Rank:	9	Regional Rank:	999
National Rank:		Geographic area:	200

#10

OrgCode	Projnum	Activity	Category
21650	4	1.a. Surveys and Censuses	
			Wildlife
Measures			
Units1	5	# of wildlife surveys to be conducted	
Units2	5	# of habitat surveys to be conducted	
Units3			
Units4			
Units5			
Units6			
Units7			

Title: Expand and enhance habitat management program through monitoring

Description

Conduct essential wildlife and habitat surveys and monitoring projects. The Refuge provides vital wintering and migration habitats for waterfowl, shorebirds, wading birds, Neotropical migrants, and raptors, including several threatened and endangered species. Wetland ecosystems are extremely dynamic and require systematic monitoring to understand ecological relationships. Scientific information is needed to define relationships between management practices, including water management, prescribed burning, and habitat and wildlife management. This information will improve and refine current management practices.

Recurring Staff Needs (FTEs)	Number (1/10s)	Grade	FTE Cost
FTEs managers			$0.00
Resource Specialist	1.0	GS-07	$58.00
Ed/Rec Staff			$0.00
Biologists/BioTechs	0.0		$0.00
Law Enforcement			$0.00
Clerical/Admin			$0.00
Maint/Eq Operator	0.0		$0.00
Total FTE's	1.0		$58.00

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost		$58	
Equip Cost	$30		
Facility Cost	$5		
Service/Supplies		$5	
Misc Costs	$30	$14	
Total Ops Cost	$65	$77	$142

Outcomes: Waterfowl
Other Migratory Birds
Healthy Ecosystems

Check if Applies

	Station Plan approved 10/97+
	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
X	Station Step-down Mgmt Plan
	FWS Recovery Plan
X	FWS Ecosystem Goal/Plan
	Other Major Plan
	Legal Mandate

Planning Link: Supports Refuge goals for migratory birds in Planning Needs Assessment, Arkansas and Red River Ecosystem goals, Refuge Cropland Management Plan, Waterfowl Management Plan, and objectives of the 1997 Public Use Management Plan.

Rankings:

Station Rank:	11	Regional Rank:	999
National Rank:	999	Geographic area:	

#11

OrgCode	Project #	Activity	Category
21650	5	1.a. Surveys and Censuses	
			Wildlife
Measures			
Units1	1	# of wildlife surveys to be conducted	
Units2	1	# of habitat surveys to be conducted	
Units3			
Units4			
Units5			
Units6			
Units7			

Title: Conduct comprehensive survey of bats on the refuge

Description

Conduct a comprehensive survey of all habitats on the Refuge for bat roost sites. It is believed that the Refuge has some important habitat for various bat species. The project would cover all the various habitats on the Refuge to document species occurrence and variation among the species throughout the Refuge. The project would include surveying and censoring bats, and mapping possible and known roosting sites. Surveys would document use of the Refuge by species and the importance for maternity colonies, hibernaculum, or roosting.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost	$2		
Facility Cost			
Service/Supplies	$10	$10	
Misc Costs	$5	$3	
Total Ops Cost	$17	$13	$30

Outcomes: Resident Wildlife
Healthy Ecosystems

Check if Applies

	Station Plan approved 10/97+
	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan

Other Major Plan

Legal Mandate

Rankings:

Station Rank:	12	Regional Rank:	999
National Rank:	999	Geographic area:	277

#12

OrgCode	Project #	Activity	Category
21650	6	4.a. Bird Banding	
			Wildlife
Measures			
Units1		# of waterfowl to be banded	
Units2	500	# of other birds to be banded	
Units3			
Units4			
Units5			
Units6			
Units7			

Title: Band migratory birds

Description

Determine habitat use and abundance of migratory birds with special emphasis on wintering Neotropical birds. Banding data gathered will be collected for 10 years. Data will indicate which species use the Refuge area and how their numbers have increased or decreased over the years. It will provide valuable data on bird migration routes and possibly nesting grounds. This information is vital for understanding the health of the Arkansas/Red River Ecosystem. This will be accomplished through a contract with a university or cooperative research unit.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost			
Facility Cost			
Service/Supplies		$20	
Misc Costs	$2	$2	
Total Ops Cost	$2	$22	$24

Outcomes: Other Migratory Birds

Check if Applies

	Station Plan approved 10/97+
	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan
	Other Major Plan
	Legal Mandate

Rankings:

Station Rank:	13	Regional Rank:	999
National Rank:	999	Geographic area:	278

#13

OrgCode	Project #	Activity	Category
21650	7	1.b. Studies & Investigations	
			Wildlife
Measures			
Units1	1	# of studies and investigations to be conducted	
Units2		# of wildlife studies & investigations to be conducted	
Units3		# of habitat studies & investigations to be conducted	
Units4			
Units5			
Units6			
Units7			

Title: Determine status of Texas horned lizard on Tishomingo NWR

Description

Determine the status of the Texas horned lizard on Tishomingo NWR and analyze habitat, food availability, disturbance, or other factors that may be influencing the population decline. Texas horned lizards are declining throughout their range. It is currently listed on the State endangered species lists for Oklahoma and Texas. This study will enable the Refuge, as an integral part of the ecosystem, to better manage this species on the Refuge by providing knowledge regarding its status and habitat requirements, as well as to aid in the recovery of this unique species. This will be accomplished through a graduate student project.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost	$5		
Facility Cost			
Service/Supplies	$2	$15	
Misc Costs	$2	$4	
Total Ops Cost	$9	$19	$28

Outcomes: Healthy Ecosystems
Resident Wildlife

Check if Applies

Station Plan approved 10/97+
Station Plan/equivalent pre-10/97
X Station Goal/Objective
Station Step-down Mgmt Plan

	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan
	Other Major Plan
	Legal Mandate

Rankings:

Station Rank:	14	Regional Rank:	999
National Rank:	999	Geographic area:	279

#14

OrgCode	Project #	Activity	Category
21650	8	1.b. Studies & Investigations	
			Wildlife
Measures			
Units1	1	# of studies and investigations to be conducted	
Units2		# of wildlife studies and investigations to be conducted	
Units3		# of habitat studies and investigations to be conducted	
Units4			
Units5			
Units6			
Units7			

Title: Study painted bunting habitat and population status

Description

Study habitat utilization, ecology, and population status of the painted bunting, a colorful migratory songbird, on the Tishomingo NWR. Little is known about this species, and information on population status, population trend, and habitat use is needed. This research will provide data to enhance and refine management activities benefiting this species.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost	$3		
Facility Cost			
Service/Supplies	$48		
Misc Costs	$9	$5	
Total Ops Cost	$60	$5	$65

Outcomes: Other Migratory Birds
Healthy Ecosystems

Check if Applies

	Station Plan approved 10/97+
	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan
	Other Major Plan

Legal Mandate

Rankings:

Station Rank:	15	Regional Rank:	999
National Rank:	999	Geographic area:	280

#15

OrgCode	Project #	Activity	Category
21650	9	1.b. Studies & Investigations	
			Wildlife
Measures			
Units1	1	# of studies and investigations to be conducted	
Units2		# of wildlife studies & investigations to be conducted	
Units3		# of habitat studies & investigations to be conducted	
Units4			
Units5			
Units6			
Units7			

Title: Conduct long-term monitoring of fire effects

Description

Conduct a five-year study to determine soil, vegetation, and wildlife response to fire on the Tishomingo NWR. Monitoring will determine fire effects under differing burn frequencies and intensities, burn timing, and among habitat types. Managed wildfire and prescribed burning are key components of Refuge management, and the resulting data will be used to refine the Refuge habitat management program.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost			
Facility Cost			
Service/Supplies	$25	$20	
Misc Costs	$9	$10	
Total Ops Cost	$34	$30	$64

Outcomes: Waterfowl
Other Migratory Birds
Healthy Ecosystems

Check if Applies

	Station Plan approved 10/97+
X	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan

Other Major Plan

Legal Mandate

Rankings:

Station Rank:	16	Regional Rank:	999
National Rank:	999	Geographic area:	281

#16

OrgCode	Project #	Activity	Category
21650	4999	3.h. Invasive Plant Management	
			Habitat
Measures			
Units1	8,000	# of refuge acres infested by targeted invasive plant	
Units2	300	# of acres to be treated	
Units3	0	# of acres to be treated chemically	
Units4	300	# of acres to be treated mechanically or physically	
Units5	0	# of acres to be treated biologically	
Units6			
Units7			

Title: Eastern red cedar tree control

Description

Control invasive eastern red cedar trees that are severely degrading Refuge habitat and wildlife resources. The eastern red cedar tree population has exploded on the Refuge, decimating several hundred acres of what was native grass fields and hardwood bottomlands. A mechanical tree shear is needed to remove existing large cedar trees and open up the understory to allow prescribed fire techniques to remove small cedar trees. Native grass will be reestablished in areas where the cedar trees are removed. Loss of this ecosystem component has negatively affected biological diversity. Grassland restoration will provide important migration and wintering habitat for declining grassland songbirds. This project will restore 300 acres of native grassland.

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost	$15		
Facility Cost	$5		
Service/Supplies	$20	$5	
Misc Costs	$5		
Total Ops Cost	$45	$5	$50

Outcomes: Other Migratory Birds
Healthy Ecosystems
Resident Wildlife

Check if Applies

Station Plan approved 10/97+
Station Plan/equivalent pre-10/97

X	Station Goal/Objective
	Station Step-down Mgmt Plan
	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan
	Other Major Plan
	Legal Mandate

Rankings:

Station Rank:	2	Regional Rank:	999
National Rank:	999	Geographic area:	999

#17

OrgCode	Project #	Activity	Category
21650	5112	1.a. Surveys & Censuses	
			Wildlife
Measures			
Units1		# of wildlife surveys to be conducted	
Units2	1	# of habitat surveys to be conducted	
Units3			
Units4			
Units5			
Units6			
Units7			

Title: Floristic inventory

Description

Completion of a floristic inventory on Tishomingo NWR. The project will support better management decisions in the development of step-down plans and better invasive species management and will develop baseline data for vascular plants on the Refuge.

Oklahoma University - Dr. Bruce Hoagland
Personnel (research)- $6,000
Travel - $2,500
Field Supplies - $400

Funds Needed ($1000s)	One-Time	Recurring Base	First Year Need
Operations:			
Personnel Cost			
Equip Cost	$1		
Facility Cost			
Service/Supplies	$9		
Misc Costs			
Total Ops Cost	$10	$0	$10

OrgCode 21650 **Project #** 5112

Clarify Staff: Minimum staffing category identification required for new/expanded stations.
Contract with Oklahoma University

Outcomes: Healthy Ecosystems
Public Education
Resident Wildlife

Check if Applies

	Station Plan approved 10/97+
X	Station Plan/equivalent pre-10/97
X	Station Goal/Objective
	Station Step-down Mgmt Plan
	USFWS Recovery Plan
X	USFWS Ecosystem Goal/Plan
X	Other Major Plan
	Legal Mandate

Rankings:

Station Rank:	3	Regional Rank:	999
National Rank:	999	Geographic area:	999

Part 2: Service Asset Maintenance Management System (SAMMS) Projects

Work Order #	Project Title and Cost	Project Description
98123685	VFE 2007 CIFP Construct a wildlife observation, floating fishing pier, and boat dock. $101,000	Construct a wildlife observation and floating fishing pier and boat dock accessible to persons with disabilities at the headquarters boat ramp. Improving accessibility at the Refuge was a concern identified during the planning process. The Refuge is within a 1.5-hour drive of over five million people in the Dallas/Fort Worth to Oklahoma City areas. Currently, demand exceeds the program's capabilities. This project is critical for compliance with the 1997 Public Use Management Plan Goals and Action Items. There is high expectation from the community that these Goals and Action items will be accomplished. Based on the latest Service data available, the additional visitors attracted to this area are expected to contribute $111,524 annually to the local economy. (Data entered into SAMMS in 1998)
91107266	Replace 50 deteriorated directional and informational Refuge signs. $24,000	Replace 50 deteriorated Refuge directional and informational signs and supports. These signs are at the Refuge, Murray 23, Nida Point Wildlife Management Unit, and Airport Unit. These signs provide public information to over 80,000 visitors per year. The signs are faded and unreadable due to sun exposure. (Data entered into SAMMS in 1991)
2007729453	VFE 2008 Construct accessible trail loop for Washita Farm site. $47,000	Develop an accessible trail loop to serve as a cultural interpretive site for the Washita Farm site near and at the headquarters. Many residents of the surrounding communities were born and went to school on what is now Tishomingo National Wildlife Refuge. Sites such as Washita Farms serve as a reminder of the link between people, land, and water. The interpretation of this area is important to the local community. The Refuge is within a 1.5-hour drive of over five million people in the Dallas/Fort Worth to Oklahoma City areas. Currently, demand exceeds the program's capabilities. Based on the latest Service data available, the additional visitors that would be attracted to this cultural interpretive site are expected to contribute $55,762 annually to the local economy. (Data entered into SAMMS in 2007)
04135348	Rehabilitate the Murray 23 entrance roadway at Tishomingo NWR. $28,000	Rehabilitate the Murray 23 entrance roadway to promulgate proper drainage and repair damage caused by floodwaters. The runoff from rainfall is not being adequately handled by the current drainage system and could be a safety concern for public accessing the road. Two culverts need to be installed to stop erosion to the gravel roadway. Floodwaters have washed away sections of the last one-tenth of a mile of the road which needs to be covered with riprap along the shoreline and then resurfaced in gravel. The Murray 23 boat ramp is the only ramp usable during periods of low water in the lake. (Data entered into SAMMS in 2004)

Work Order #	Project Title and Cost	Project Description
05138492	Rehabilitate the lookout on Nida Point entrance road. $42,000	Rehabilitate the lookout on Nida Point entrance road to comply with accessibility standards. The lookout does not provide an accessible parking spot, an unloading zone, or access to the overlook. The retaining rock wall is in need of repairs to prevent visitors from falling from the overlook. The current picnic facilities are not accessible. Rehabilitating the overlook would provide a safer overlook access for all, including those disabled. (Data entered into SAMMS in 2005)
05138497	Rehabilitate campground and parking area. $36,000	Rehabilitate the current campground and parking area at Headquarters Boat Ramp to comply with accessibility standards. The campground currently does not have an accessible campsite, accessible parking, or accessible potable water. The informational signs and sign-in station do not comply with accessibility standards and need to be brought up to code. (Data entered into SAMMS in 2005)
2005159438	R2 2005DMFP Repost deteriorated boundary signing $40,000 Tishomingo	Replace 300 existing Refuge signs that delineate the Refuge boundary. These signs have holes and are rusted and faded to the point that they are unreadable. Posting boundary helps prevent resource degradation such as illegal dumping, poaching, and trespass, and they raise awareness of the National Wildlife Refuge System. (Data entered into SAMMS in 2005)
04135278	FWS R2 2006 DMFP Repair leaking Hog Barn Storage Building Roof. $40,000	Repair leaking Hog Barn storage building roof. The building is utilized for storage of mission-critical supplies and equipment. The leaking roof is also a critical safety element based on water coming into contact with lights, outlets, and breaker boxes. The flat roof needs to be sealed with an approved roof coating to prevent leaks. The building is 230 feet by 60 feet and was constructed in the 1920s out of solid concrete. The project will facilitate all operations at Tishomingo NWR. (Data entered into SAMMS in 2004)
95123688	FWS R2 2006VFE CIFP Construct an accessible environmental education facilities. $90,000	Construct an accessible environmental education facilities in building #2 by converting the concrete building into an environmental education structure with freestanding displays. The Refuge is within a 1.5-hour drive of over five million people in the Dallas/Fort Worth to Oklahoma City areas. The 134,000 visitors annually exceed the current program's capabilities. This project will provide educational and outreach opportunities to aid in the understanding of Refuge purposes and wildlife conservation issues and to promote a conservation ethic. The project will also improve universal accessibility to recreational programs and facilities, welcome all visitors, and provide orientation. (Data entered into SAMMS in 1995)

Work Order #	Project Title and Cost	Project Description
04136438	Repair entrance road, parking area, and boat ramp at Rock Creek. $28,485	Repair the entrance road, parking area, and boat ramp at Rock Creek. The entrance road provides access for the public to Rock Creek and the lake. The State of Oklahoma has already made repairs to the joint access portion of the road by paving that section. The remaining Refuge section, consisting of one-half mile, is heavily eroded. Roadway repairs include re-establishing a culvert in the Rock Creek drainage section, replacing base material that has been eroded from the road and parking area, and putting rip rap along the boat ramp to prevent future erosion. The repairs will reinstate public access to Rock Creek and improve public relations. (Data entered into SAMMS in 2004)
97123687	VFE CIFP Construct parking area and walkway at Cottonwood Pond. $35,000	Construct a parking area and walkway and install interpretive displays to improve fishing access for Cottonwood Pond. Anglers in the area have voiced concerns over the quality of the fishing sites at the Refuge, and this project is identified as part of the 1997 Public Use Management Plan. Construction of the parking area will increase safety for all visitors, and it will create a more uniform appearance at the site. The walkway will allow easy access for anglers, and the interpretive displays will provide information to the public. Based on the latest Service data available, the additional visitors the improved fishing access will attract are expected to contribute $13,941 annually to the local economy. (Data entered into SAMMS in 1997)
02122002	RRP R2 Tishomingo PE 12 roads (Route 11, 12, 101, 105-7, 109-14) and 10 parking lots (906, 907, 913-19, 921). $313,000	Preliminary engineering and design. Provide planning and design of public use roads (Route 11, 12, 101, 105-7, 109-14) and parking lots (906, 907, 913-19, 921). This project will include site visits, surveying needs, and site assessment, followed by a design, specifications, and a cost estimate for these proposed road and parking lots at Tishomingo NWR. (Data entered into SAMMS in 2002)
00107271	VFE-2821 2012 CIFP Construct an accessible informational kiosk at Refuge headquarters. $80,000	Construct an accessible informational kiosk at Refuge headquarters to orient visitors, highlight recreational opportunities, and provide interpretation about wildlife resources found on the Refuge. Funding includes construction contract and interpretive panels. The kiosk will be located at building #1 on the Refuge entrance roadway and will replace the current kiosk near the pavilion that is not accessible. The kiosk will provide an accessible information station after hours and on weekends to the 134,000 visitors to Tishomingo NWR. (Data entered into SAMMS in 2000)
02120109	Rehabilitate Nida Point Road by regraveling road surface. $27,430	Rehabilitate Nida Point road, which is used to access a remote part of Cumberland Pool Lake. Rehabilitate deteriorated Nida Point Road by regraveling the road surface. This road provides access to a remote part of Cumberland Pool Lake for Refuge law enforcement, surveyors, and anglers. The road must be maintained if these important activities are to continue. (Data entered into SAMMS in 2002)

Work Order #	Project Title and Cost	Project Description
91110606	Construct Refuge office, visitor center, and maintenance shop. $5,786,000	Construct accessible Refuge office, visitor center, and maintenance shop. The Refuge office was destroyed in a May 1990 flood. This project will replace the structure with construction of a new headquarters and administrative facilities on higher ground out of the flood zone. The new office will enhance Refuge operations and improve visitor enjoyment and understanding of the Refuge. Tishomingo NWR's annual visitation is over 200,000. (Data entered into SAMMS in 1991)
00107267	Rehabilitate or repair storm damaged public restrooms for ADA Compliance. $26,000	Rehabilitate pavilion public restrooms to bring them up to Americans with Disabilities Act standards. These public restrooms have been damaged by storms that caused flooding in June and July 2007; they require modifications to make them accessible to the physically disabled. Rehabilitating the public restrooms will allow all visitors to enjoy the Refuge resources, knowing there is equal access to facilities for those with disabilities, and will repair the storm damage to the restrooms. (Data entered into SAMMS in 2000)
2006502502	RRP Tishomingo Rehabilitate the paved entrance roadway to headquarters. $380,000	Rehabilitate the paved entrance roadway to headquarters. The roadway is beginning to crack and come apart along the first 1.5 miles from the entrance. The roadway provides access to the headquarters, headquarters boat ramp, Goose Pen Pond, Dick's Pond, Sandy Creek, Pennington Creek, East Field Observation Tower, and all of the Refuge 's storage buildings. The damage along the 1.5 miles of the entrance roadway will be repaved by overlay of asphalt. The Refuge annually receives over 200,000 visitors who depend on the entrance roadway to access Refuge headquarters. (Data entered into SAMMS in 2006) Note: This work order replaces old work order #04135327, which was accidently marked as complete.
2006518565	Construct an equipment and materials storage building. $325,000	Most equipment used on the Refuge is stored outside. A building is needed to store equipment and materials inside for protection from the elements. This will increase equipment life span and reduce maintenance costs. A prefabricated metal building (50 feet by 100 feet) with a concrete floor will be constructed under the contract. (Data entered into SAMMS in 2006)

Work Order #	Project Title and Cost	Project Description
2007729459	VFE CI Improve accessibility at the picnic area and flush restroom. $94,000	Construct accessible interpretive signs, remove the accessibility barriers around the picnic area and restroom, and install accessible picnic tables. The Tishomingo Middle School has voiced concerns that the area is not accessible to all visitors. Removing barriers, installing accessible tables, and bringing the restroom up to accessibility standards should be a priority of the Service. Replacing current interpretive signs with accessible signs will enhance the visitor's experience, increase environmental education opportunities, and provide important orientation and regulation information. The Refuge is within a 1.5-hour drive of over five million people in the Dallas/Fort Worth to Oklahoma City areas. Currently, demand exceeds the program's capabilities. This project is critical for compliance with the 1997 Public Use Management Plan Goals and Action Items. There is high expectation from the community that these Goals and Action items will be accomplished. Based on the latest Service data available, the additional visitors attracted are expected to contribute $111,524 annually to the local economy. (Data entered into SAMMS in 2007)
2007720440	Construct Administrative Facility at Tishomingo NWR. $1,260,000	Plan, design, and construct a small administrative and visitor facility (3,052 square feet) per standard design model that was modeled to fit the staffing needs for the Refuge. The facility will greatly increase logistical capabilities for administering natural resource protection and public use programs by providing centrally located office and meeting space for 10 permanent staff, seasonal staff, fire crew, law enforcement, and volunteers, and by providing secure parking and storage. Site development will include vehicular parking for staff (10 spaces) and visitors (10 spaces). Water and septic system are available on-site, with telephone and electric service available from nearby utility lines. Planning, design, and construction can be accomplished in two years. Currently, the Refuge uses a renovated shop building with approximately 2,000 square feet as a headquarters, which does not provide adequate office, storage, and meeting space for the staff. Project scored 40 percent for critical health and safety concerns in this 30-year-old building for staff overcrowding, pest problems, HVAC system, electrical deficiencies, and inadequate parking. Project is scored 60 percent critical resource protection capital improvement because these inadequacies adversely affect the Refuge's ability to conduct its mission of protecting and monitoring the resources with the Refuge. The inadequacy of the space creates undesirable and stressful working conditions. Staff crowding has resulted in overload of electrical circuits and the HVAC system. Secure space is lacking for meeting and audiovisual needs, and for storing administrative files, general office supplies, and biological program equipment. The new administration building would meet the Service's and the President's goals of providing an energy efficient and environmentally sustainable facility within the bureaus. (Data entered into SAMMS in 2007)

Work Order #	Project Title and Cost	Project Description
2007736517	VFE-2821 2013 CIFP Construct visitor observation tower. $56,000	Construct visitor observation tower with scopes and interpretive panels. The observation tower will be located atop the abandoned concrete residence that overlooks Cumberland Pool of Lake Texoma. The tower will be equipped with observation scopes and interpretive panels that will develop wildlife viewing skills and identify key Refuge species. (Data entered into SAMMS in 2007)
2008839018	Rehabilitate eroded North River Road due to flood damage.	Flooding resulting from storms in June and July 2007 has caused erosion of the road. Rehabilitating the North River Road is necessary by grading to ensure proper elevation and ensure that all potholes and damaged areas are repaired. The road will need to be resurfaced, and culverts and low areas repaired and/or replaced as necessary. Repairing the North River Road will provide adequately safe access for staff and visitors. (Data entered into SAMMS in 2008)
2008839770	Repair road damage due to storm on Management Unit Road.	Repair road damage due to storm on Management Unit Road. The road was damaged by storms that caused flooding in the area in June and July 2007. The road will be graded to ensure proper elevation, and all potholes and damaged areas will be repaired. The gravel road will be resurfaced, and culverts and low areas repaired or replaced as necessary. The eroded embankments will be repaired by placement and compaction of suitable material to the required densities to the required elevation. Materials will need to be purchased or salvaged from the surrounding area. Repairing the damaged Management Unit Road will provide safe access for the staff using this road to accomplish Refuge management activities in performing the mission to conserve, manage, and restore wildlife and plant resources and their habitats. (Data entered into SAMMS in 2008)
2008839021	Repair damaged arboretum due to flooding. $6,034 NOT ELIGIBLE FOR DM	Repair arboretum that was damaged in storms occurring in June and July 2007. (Data entered into SAMMS in 2008)
2008839022	Repair concrete boat ramp at headquarters due to flood damage. $13,157 NOT ELIGIBLE FOR DM	Repair flood damaged boat ramp to ensure safety for those using the ramp to launch their boats. Repairing the ramp will allow visitors and staff to launch boats safely without the structure causing any possible damage to boats or people because of poor structural integrity from storm damages. (Data entered into SAMMS in 2008)

Work Order #	Project Title and Cost	Project Description
2008839023	Repair dike damaged from storm by reshaping and restoring to original condition.	Rehabilitate damaged Dike - Five C, East Flat NE, an important area for waterfowl and other migrating and resident bird species. This dike has eroded due to wet conditions and flooding from storms, and it needs to be reshaped and restored to its original condition to be effective. The eroded dike prevents the wetland area from flooding during rainy seasons, and creates runoff and further erosion problems to dikes, roads, and other structures. Also, replace and/or repair water control structures and culverts as needed. (Data entered into SAMMS in 2008)
2008839024	Repair entrance road damage from flooding, causing surface erosion. $7,534 NOT ELIGIBLE FOR DM	Repair damaged road surface and embankments on paved road. Road surfacing and embankments have deteriorated due to wet conditions and erosion from flooding by storms in June and July 2007. The road will need some surface texturing repairs and partial depth patching, and joint repairs may be needed. Eroded embankments will be repaired by placement and compaction of suitable material to required densities to the required elevation. Materials will need to be purchased or salvaged from the surrounding area. Repairing the road surface and embankment will allow safer access to accommodate and achieve resource management activities. (Data entered into SAMMS in 2008)
98122685	Construct a pole shed at the office and shop area. $76,000	Construction of a pole shed at the office and shop area would provide some relief from having to work in extreme weather conditions and also provide safe storage of equipment, decreasing the potential for theft and vandalism. A pole shed over the fuel service area is also needed to protect tanks from the weather and to provide protection from the elements when refueling. The large farm equipment will not fit into the shop building. Unsafe conditions exist when tractor servicing is required, especially in the heat of summer and the cold of winter. (Data entered into SAMMS in 1998)
01116118	Repair deteriorated Cottonwood Pond dam and WCS. 2013 DM $41,908	Repair deteriorated Cottonwood Pond dam and water control structure. Dam and water control structure need repair to regain moist soil management capability. The current water control structure has been severely damaged from floodwaters. It will be replaced with a new butterfly valve water control structure. The earthen dam has been cut by floodwaters, while the water control structure has failed. The earthen dam will need fill material (dirt), compaction, and rip rap to repair a 15-foot washout. With management capability restored, this wetland will be a very productive wetland for waterfowl and other wetland inhabitants. The Refuge 's yearly waterfowl visitation is 27,000 geese and 35,000 ducks. (Data entered into SAMMS in 2001)

Work Order #	Project Title and Cost	Project Description
01116128	Repair deteriorated Tiller Pond dam and WCS. $80,000	Repair the deteriorated Tiller Pond dam and water control structure. The integrity of this dam and structure is crucial to properly manage water control. The dam will be reshaped to a lower height, a 75- foot rip rap dam overflow will be added, and the structure will be completely removed. Materials for the proposed dam and water control structure repair will be 8-inch rip rap, 12-inch rip rap, and fill dirt. A dozer, excavator, back hoe, sheep foot packer, and a farm tractor with disk will be the equipment used for this project. Repairing the dam and water control structure will ensure proper water management to assist in managing natural resources on the Refuge. (Data entered into SAMMS in 2001)
01114751	Rehabilitate Dick's Pond dam and water control structure. 2013 DM $34,000	Rehabilitate eroded Dick's Pond dam and replace water control structure. Dick's Pond is an important waterfowl, public use, and environmental education wetland. The dam is badly eroded and undercut by beavers, and the water control structure is inoperable. Water level control for management purposes cannot be accomplished. The dam needs bulldozer and excavator work to re-slope the sides. (Data entered into SAMMS in 2001)
00107277	Rehabilitate maintenance workers' crew room. 2012 DM $32,000	Rehabilitate 20-year old deteriorated maintenance workers' crew room. The maintenance workers' crew room provides office space and facilities, lunchroom, and restrooms for maintenance staff. This project includes rewiring of the electrical system to prevent fire hazard, rehabilitating the restroom facility for plumbing and sewage systems, and rehabilitating the restroom facility access to make it comply with the Americans with Disabilities Act. The project also needs to include replacing the air conditioning and heating system. This project will alleviate safety concerns related to the condition of the current building. (Data entered into SAMMS in 2000)
2007736498	VFE CIFP Construct accessible welcome center and museum. $88,000	Construct accessible welcome center and historical museum of the 1920s Washita Farm. The welcome center and museum will be constructed by rehabilitating the abandoned concrete residence into an accessible welcome center and historical museum of the 1920s Washita Farm. The building will have interpretive panels, a gift shop, refuge information, and a historical period museum that will serve as the interpretive hub for the Washita Farm. Partners for the project include the Johnston County Historical Society and Tishomingo Refuge Ecology and Education Society. (Data entered into SAMMS in 2007)
2007736526	VFE CIFP Construct visitor contact station from old concrete hatchery building. $198,000	Construct a visitor contact station from the old concrete hatchery building. Rehabilitate the old concrete hatchery building into an accessible visitor contact station, including restrooms, interior exhibit area, and a photo blind. The building will also house administrative personnel and move that location out of the floodplain. (Data entered into SAMMS in 2007)

Work Order #	Project Title and Cost	Project Description
2007736554	VFE Construct picnic and interpretive facility from old concrete residence. $42,000	Construct accessible picnic area with interpretation faciltiy. An accessible picnic and interpretive facility will be constructed by rehabilitating the old concrete residence. The accessible picnic and interpretive facility will provide documentation of the importance of the Cross Timbers Forest and migratory songbirds. Educating the public of this importance will support efforts to preserve the Cross Timbers Forest and migratory songbirds for resource protection. (Data entered into SAMMS in 2007)
2007739507	RRP R2 Tishomingo CN and rehabilitation of five gravel roads and four parking lots. $668,000	Construction and rehabilitation of McAdams Pond Road, Bell Creek South Road, Bell Creek North Road, Nida Point Entrance Road, and Rock Creek Entrance Road (Routes 110-114), and four parking lots (916-919). These roads and parking lots need to be improved to provide improved access and increased recreational opportunities for Refuge visitors. The FHWA – Federal Highway Administration inventory and condition assessment was completed in 2001. (Data entered into SAMMS in 2007)
2008802825	Repair deck damage due to storm washing it out and erosion. $2,213 NOT ELIGIBLE FOR DM	Repair deck damaged from a storm washing it out and from erosion. Storm flooding in June and July 2007 damaged several assets, including this deck, which is used by visitors to the nature area for bird watching and nature observing. The deck needs to be replaced, and materials will need to be purchased or salvaged from the surrounding area. The deck supports will be repaired or replaced as needed. (Data entered into SAMMS in 2008)
2008802853	Repair observation tower and fishing access damage due to storm. $552,380	Repair observation tower and fishing access damage due to a storm that has caused erosion of the road. (Data entered into SAMMS in 2008)

(This page intentionally left blank.)

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM CONSULTATION/CONFERENCE/CONCURRENCE

[Note: This form provides the outline of information needed for consultation. If additional space is needed, attach additional sheets, or set up this form to accommodate your responses.]

Originating Person: Kris Patton
Date: March 12, 2009

I. Region: 2

II. Service Activity (Program): Refuges

III. Pertinent Species and Habitat:

A. Listed species and/or their critical habitat within the action area:

Whooping crane (*Grus americana*), interior least tern (*Sternula antillarum*), Piping Plover (*Charadrius melodus*) and the American burying beetle (*Nicrophorus americanus*)

B. Proposed species and/or proposed critical habitat within the action area:

None known at this time

C. Category 1 candidate species within the action area:

None known at this time

IV. Geographic area or station name and action:

The proposed action is the completion and implementation of the Comprehensive Conservation Plan (CCP) for Tishomingo National Wildlife Refuge.

V. Location (attach map):

A. County and state: Johnston and Marshall Counties, Oklahoma

B. Section, township, and range (or latitude and longitude):

Sections 8-9, 13-17, 19-24, 25-29, 33-36, T 4 S, R 6 E and
Sections 18-20, 29-32, T 4 S, R 7 E and
Sections 1-4, 12-13, T 5 S, R 6 E and
Sections 5-8, 18, T 5 S, R 7 E

C. Distance (miles) and direction to nearest town:

3.0 miles South of Tishomingo, OK (from Refuge Headquarters)

VI. Description of proposed action (attach additional pages as needed):

The proposed action is the completion and implementation of the Comprehensive Conservation Plan (CCP) for Tishomingo National Wildlife Refuge.

VII. Explanation of effects of the action on species and critical habitat listed in item III A, B, and C (attach additional pages as needed):

The occurrence of whooping crane on Tishomingo NWR has never been confirmed. The possibility exists for migrating whooping cranes to utilize the refuge during fall and spring migration, however, they have not been observed or documented on the refuge thus far. The CCP process should have no negative impacts on whooping cranes.

Interior least terns utilize the refuge during the summer months primarily for foraging and are seen sporadically during surveys around Cumberland pool. Nesting populations occur within 50 miles. The CCP process should have no negative impacts on interior least terns.

The occurrence of piping plovers has never been confirmed on Tishomingo NWR. The possibility exists for migrating plovers to utilize the refuge during fall and spring migration, however, they have not been observed or documented on the refuge thus far. The CCP process should have no negative impacts on piping plovers.

Surveys for American burying beetles (ABB) were conducted during the summers of 2005 and 2006. To date, no ABB's have been recorded during our surveys. The nomadic nature of ABBs make continued survey efforts necessary for accurate determinations. Because of this, the refuge will continue ABB surveys as resources are available. Again, the CCP process should have no negative impacts on American burying beetles.

VIII. Effect determination and response requested:

A. Listed species/critical habitat:

Determination	Response requested
no effect (species: _____)	___ concurrence
is not likely to adversely affect (species: *Grus americana, Sternula antillarum, Charadrius melodus, Nicrophorus americanus*.)	_X_ concurrence ___ formal consultation
is likely to adversely affect (species: _____)	___ formal consultation
undetermined effect (species: _____)	___ informal consultation

B. Proposed species/proposed critical habitat:

Determination	Response requested
no effect (species: _____)	___ concurrence
is not likely to adversely affect (species: _____)	___ concurrence
is likely to adversely affect (species: _____)	___ concurrence
is likely to jeopardize/adverse modification of critical habitat (species: _____)	___ concurrence
undetermined effect (species: _____)	___ informal consultation

C. Category 1 candidate species:

Determination	Response requested
no effect (species:_____)	____ concurrence
is not likely to adversely affect (species:_____)	____ concurrence
is likely to adversely affect (species:_____)	____ concurrence
undetermined effect (species:_____)	____ informal consultation

D. Remarks:

IX. Reviewing office evaluation:

A. Concur ____ Nonconcurrence ____

B. Formal consultation required ____

C. Conference required ____

D. Remarks (attach additional pages as needed):

Kennit D. Frazier 9-18-09

Signature Date

U.S. Fish & Wildlife Service
National Wildlife Refuge System
Division of Planning
P.O. Box 1306
Albuquerque, NM 87103
505/248-7458
http://www.fws.gov/southwest/

Tishomingo National Wildlife Refuge
12000 South Refuge Road
Tishomingo, OK 73625
580/371-2402

http://www.fws.gov/southwest/refuges/oklahoma/tishomingo.html

Geese at dusk on Tishomingo National Wildlife Refuge
Photograph © by Larry Hancock

January 2010