U.S. Fish & Wildlife Service

Hagerman National Wildlife Refuge

Comprehensive Conservation Plan

April 2006

United States Department of the Interior

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

In Reply Refer To:
R2/NWRS-PLN

JUN 05 2006

Dear Reader:

The U.S. Fish and Wildlife Service (Service) is proud to present to you the enclosed Comprehensive Conservation Plan (CCP) for the Hagerman National Wildlife Refuge (Refuge). This CCP and its supporting documents outline a vision for the future of the Refuge and specifies how this unique area can be maintained to conserve indigenous wildlife and their habitats for the enjoyment of the public for generations to come.

Active community participation is vitally important to manage the Refuge successfully. By reviewing this CCP and visiting the Refuge, you will have opportunities to learn more about its purpose and prospects. We invite you to become involved in its future.

The Service would like to thank all the people who participated in the planning and public involvement process. Comments you submitted helped us prepare a better CCP for the future of this unique place.

Sincerely,

Tom Baca
Chief, Division of Planning

Hagerman
National Wildlife Refuge
Comprehensive Conservation Plan

Sherman, Texas

Prepared by:

United States Fish and Wildlife Service
Division of Planning
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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 Service's 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 plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

COMPREHENSIVE CONSERVATION PLAN APPROVAL
for the
Hagerman National Wildlife Refuge, Sherman, TX

The attached Comprehensive Conservation Plan for the Hagerman National Wildlife Refuge has been prepared by Regional Office and Refuge Staff. The contents and format are found to be in compliance with Service Policy on the preparation of Comprehensive Conservation Plans, and is hereby submitted for approval.

Submitted by:

Biologist/Natural Resource Planner — Date 3/30/06

Approved by:

Refuge Manager/Project Leader — Date 4/3/06

Concurrence by:

Refuge Supervisor, TX/OK — Date 4/26/06

Regional Chief, NWR System, Region 2
Acting — Date 5/2/06

Concurrence by:

ACTING
Regional Director, Region 2
U.S. Fish and Wildlife Service — Date 5/9/06

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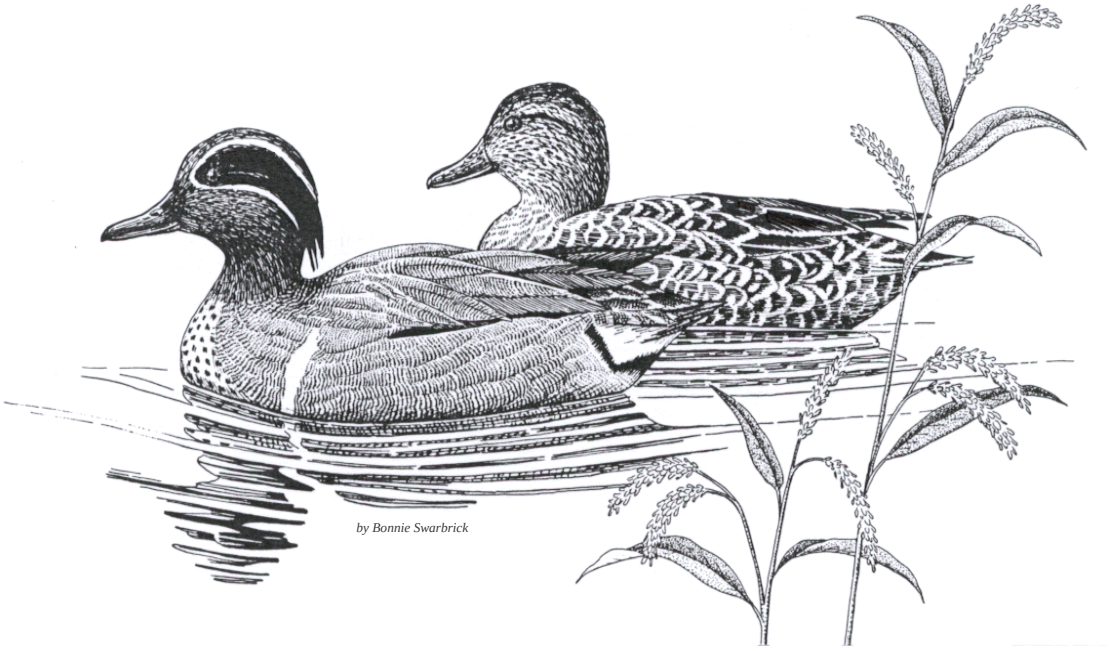
VISION

For the next 15 years, the Hagerman National Wildlife Refuge will continue to manage for native biological diversity of fish and wildlife species with an emphasis on migratory birds. In partnership with private landowners, conservation organizations and governmental agencies, Refuge management will focus on enhancing and restoring the mosaic of native grasslands, riparian forests, woodlands, and wetland communities for the benefit of fish and wildlife resources. Public use programs will continue to promote the public's enjoyment of the outdoors and provide visitors with a greater understanding and appreciation for fish and wildlife species and their habitats. A new visitor center will provide opportunities for visitors to learn about this unique wildlife haven on Lake Texoma through expanded educational and interpretive programs. In addition to a visitor center, the Refuge will provide the public with quality roads and trails, an auto tour loop, and an observation deck overlooking Lake Texoma. People of all ages will be able to enjoy the Refuge and its inhabitants through quality wildlife-oriented recreational opportunities such as wildlife observation, photography, hunting and fishing activities.

Mutual stewardship is key to successful wildlife conservation. Through effective management and partnering, the Refuge will continue to conserve the fish, wildlife and plant resources of north-central Texas for the continuing benefit of the American people for present and future generations. It is hoped that when visitors leave the Refuge, they will not only have enjoyed an outdoor experience, but will have gained a better understanding and appreciation of their natural heritage.



by Bonnie Swarbrick

CHAPTER 1: INTRODUCTION AND BACKGROUND

This Draft Comprehensive Conservation Plan and Environmental Assessment (CCP/EA) has been prepared for the Hagerman National Wildlife Refuge (Refuge). The goals and objectives contained in this document reflect a "wildlife first" management theme. The National Wildlife Refuge System Improvement Act of 1997 established the primacy of the management of wildlife on the nation's National Wildlife Refuges and focus on issues pertaining to the Refuge. The Refuge will manage for biodiversity with emphasis on protection and enhancement of habitat for waterfowl and other wildlife. The Refuge, along with adjacent lands, form an area that will be considered in this plan as the "Area of Ecological Concern" (USFWS 1985).

Cattle egret (photo by Rick Cantu).

The Purpose and Need for Action

The management actions proposed in this document are intended to result first and foremost in achievement of the refuge purposes, and the mission of the National Wildlife Refuge System (Refuge System or System). The purpose of comprehensive management planning is to "provide long range guidance for the management of national wildlife refuges." As such, all lands of the Refuge System are to be managed in accordance with an approved CCP that will guide management decisions and set forth strategies for achieving refuge purposes. The National Wildlife Refuge System Improvement Act of 1997 requires all refuges to have a CCP and provides the following legislative mandates to guide refuge management and planning:

- Wildlife has first priority in the management of refuges.
- Wildlife-dependent recreation involving compatible hunting, fishing, wildlife observation and photography, environmental education and interpretation are the priority public uses of the Refuge System.
- Other uses have lower priority in the Refuge System and are only allowed if they are compatible with the mission of the Refuge System and the purpose of the individual refuge.

This Draft CCP provides management direction to present and future Refuge managers for the next 15 years. As noted earlier, the actions proposed are designed to help the Refuge achieve its official purposes. It describes all management activities that occur on the Refuge and provides management goals, measurable objectives, and management actions or strategies designed to enhance and protect existing habitats and restore degraded habitats for the benefit of wildlife including threatened and endangered species. The goals and objectives shall guide management toward the Refuge vision or the ecologically desirable outcome for the Refuge.

The Service's goals for the CCP process are to:

- provide a clear statement of desired future conditions (vision) for each refuge or planning unit;
- provide a forum for the public to comment on the type, extent, and compatibility of uses on refuges-proved refuge neighbors and visitors with a clear understanding of the reasons for management actions on and around the refuge;
- ensure that the refuge is managed to fulfill the mission of the System as well as ensure public involvement in refuge management decisions by providing a process for effective coordination, interaction, and cooperation with affected parties, including Federal agencies, State conservation organizations, adjacent landowners, and interested members of the public;

- encourage refuge planning that considers an ecosystem approach;
- demonstrate support for management decisions and their rationale by sound professional judgement, biological initiatives, and public involvement;
- provide a uniform basis for budget requests for operational, maintenance, and capital improvement programs.

Coordination with Texas Parks and Wildlife Department

This CCP recognizes that both the Service and the State fish and wildlife agencies have authorities and responsibilities for management of fish and wildlife species on national wildlife refuges, as described in 43 CFR 24. Consistent with the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, the Director of the Service will interact, coordinate, cooperate and collaborate with the State fish and wildlife agencies in a timely and effective manner on the acquisition and management of national wildlife refuges. Under the National Wildlife Refuge System Administration Act of 1966 and 43 CFR 24, the Director and the Secretary's designee will ensure that Refuge System regulations and management plans are to the extent practicable, consistent with State laws, regulations and management plans.

Legal, Policy, and Administrative Guidance

Administration of national wildlife refuges is governed by the designated purpose of the refuge unit as described in establishing legislation or executive orders, Service laws and policies and international treaties. A list of most of the pertinent statutes establishing legal parameters and policy direction for the Refuge System is included in Appendix E, along with a summary of those laws that provide special guidance of the Service and national wildlife refuges. Many of the summaries have been taken from *The Evolution of National Wildlife Law* by Michael J. Bean. For the bulk of applicable laws and other mandates, legal summaries are available upon request.

Key concepts and guidance of the Refuge System are covered in the National Wildlife Refuge System Administration Act of 1966, the Refuge Recreation Act of 1962, Title 50 of the Codes of Federal Regulations, Executive Order 12996 (Management and General Public Use of the National Wildlife Refuge System), the Fish and Wildlife Service Manual, and most recently, through the National Wildlife Refuge System Improvement Act of 1997.

The National Wildlife Refuge System Improvement Act of 1997 amended portions of the Refuge Recreation Act and the National Wildlife Refuge System Administration Act of 1966 by including a unifying mission for the Refuge System, a new process for determining compatible uses on refuges, and a requirement that each refuge will be managed under a CCP. The National Wildlife Refuge System Improvement Act of 1997 states that wildlife conservation is the priority of System lands and that the Secretary of the Interior shall ensure that the biological integrity, diversity, and environmental health of refuge lands are maintained. Each refuge must be managed to fulfill the Refuge System mission and the specific purposes for which it was established. The National Wildlife Refuge System Improvement Act of 1997 requires the Service to monitor the status and trends of fish, wildlife, and plants on each refuge. Additionally, the National Wildlife Refuge System Improvement Act of 1997 identifies and establishes the legitimacy and appropriateness of six wildlife-dependent recreational uses. These uses are hunting, fishing, wildlife observation and photography, environmental education and interpretation. As priority public uses of the Refuge System, these uses will receive enhanced consideration over other uses in planning and management. Furthermore, a CCP must be in place for each refuge by the year 2012 and that the public have an opportunity for active involvement in plan development and revision. It is Service policy that CCPs

are developed in an open public process and that the agency is committed to securing public input throughout the process.

Lands within the Refuge System are different from other multiple-use public lands in that they are closed to all public uses unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgement of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge. Sound professional judgement is further defined as a decision that is consistent with the principles of fish and wildlife management and administration, available science and resources, and adherence with law. Priority public uses, and other uses, can be allowed on refuges if they are compatible with the purpose of the refuge and funding is available to support them. Uses may be allowed through a special regulation process, individual special use permits, and sometimes through State fishing and hunting regulations.

U.S. Fish and Wildlife Service Mission and Goals

Mexican hat (photo by Johnny Beall).

Since the early 1900s, the Service mission and purpose has evolved, while holding on to a fundamental national commitment to threatened wildlife ranging from the endangered bison to migratory birds of all types. The earliest national wildlife refuges and preserves are examples of this. Pelican Island, the first refuge, was established in 1903 for the protection of colonial nesting birds such as herons and egrets, which were then under threat of extinction due to the demands for their plumes for the millinery trade. The National Bison Range was instituted for the endangered bison in 1906. Malheur National Wildlife Refuge was established in Oregon in 1908 to benefit all migratory birds with emphasis on colonial nesting species on Malheur Lake. Thus began the commitment of public lands for the preservation of migratory birds and other wildlife. The Service's responsibility broadened during the 1930s. As a result of drought, populations nationwide became severely depleted. Passage of the Migratory Bird Hunting and Conservation Stamp Act in 1934 made funds available to purchase acreage for waterfowl habitat. During the next several decades, the special emphasis of the Service (then called the Bureau of Sport Fisheries and Wildlife) was restoration of critically depleted migratory waterfowl populations.

The passage of the Endangered Species Act of 1973 refocused the activities of the Service as well as other governmental agencies. This Act mandated the conservation of threatened and endangered species of fish, wildlife, and plants both through federal action and by encouraging the establishment of State programs. In the late 1970s, the Bureau of Sport Fisheries and Wildlife was renamed the U.S. Fish and Wildlife Service to broaden its scope of wildlife conservation responsibilities to include endangered species, as well as game and non-game species. Lands continued to be added to the Refuge System for various wildlife protection purposes including endangered species conservation. A myriad of conservation-oriented laws were passed throughout the 1970s. The Fish and Wildlife Conservation Act of 1980 emphasized the conservation of non-game species and broadened management responsibilities for non-game migratory birds on national wildlife refuges.

The Service mission has always been derived in consideration of the various laws and treaties that collectively outlined public policy concerning wildlife conservation.

The mission of the Service is:

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

The goals of the Service, which are aimed at fulfilling this mission, are: 1) sustaining fish and wildlife populations including migratory birds, endangered species, anadromous fish, and marine mammals; 2) conserving a network of lands and waters including the National Wildlife Refuge System; 3) providing Americans opportunities to understand and participate in the conservation and use of fish and wildlife resources.

By law and treaty, the Service has national and international management and law enforcement responsibilities for migratory birds, threatened and endangered species, fisheries and many marine mammals. The Service assists state and tribal governments and other Federal agencies in helping to protect America's fish and wildlife resources, and the National Wildlife Refuge System plays an important role in fulfilling many of these responsibilities.

National Wildlife Refuge System Mission and Goals

The Refuge System is the only existing system of federally owned lands managed chiefly for the conservation of wildlife. Established in 1903 by President Theodore Roosevelt, the Refuge System consists of over 92 million acres in over 530 refuges and 38 wetland management districts in all 50 states and the 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: 1) fulfill our statutory duty to achieve refuge purpose(s) and further the System mission; 2) conserve, restore where appropriate, and enhance all species of fish, wildlife, and plants that are endangered or threatened with becoming endangered; 3) perpetuate migratory bird, interjurisdictional fish and marine populations; 4) conserve a diversity of fish, wildlife and plants; 5) conserve and restore, where appropriate, representative ecosystems of the United States, including the ecological processes characteristic of those ecosystems; and 6) foster understanding and instill appreciation of fish, wildlife, and plants, and their conservation, by providing the public with safe, high-quality, and compatible wildlife-dependent public use. Such use includes hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

Individual refuges provide specific requirements for the preservation of trust resources such as migratory birds. For example, waterfowl breeding refuges in South and North Dakota provide important wetland and grassland habitat to support breeding populations of waterfowl as required by

the Migratory Bird Treaty Act and North American Waterfowl Management Plan. Other refuges such as Bosque del Apache NWR provide migration and wintering habitat for these populations. The network of lands is critical to these birds' survival. A deficiency in one location can affect the species and the entire network's ability to maintain adequate populations.

Other refuges may provide habitat for threatened and endangered plants or animals. Refuges in these situations ensure that populations are protected and habitat is suitable for their use. Refuges, by providing a broad network of lands throughout the United States, help prevent species from being listed as threatened or endangered by providing secure habitat for their use and providing recovery habitats in portions or all of a species range.

Resource management programs on refuges include water, grassland, forest, natural area, and cropland management; historical/archaeological resource management, wilderness management; and wildlife law enforcement activities. National wildlife refuges are extensively used for biological research to benefit wildlife and to improve understanding of our environment. Scientific programs of wildlife management, wetlands management, forestry, agriculture, and soil conservation are combined for the enhancement and management of wildlife populations, In addition to protecting the nation's natural resources, national wildlife refuges offer the public a wide variety of recreational and educational opportunities through fishing, hunting, wildlife trails, wildlife observation, nature photography, visitor centers, and environmental education programs, all of which attract millions of visitors each year.

The Ecosystem Approach to Management

In 1994, the Service adopted an ecosystem approach to more effectively achieve its mission of fish and wildlife conservation for future generations. The ecosystem approach is defined as "protecting or restoring the natural function, structure, and species composition of an ecosystem while recognizing that all components are interrelated".

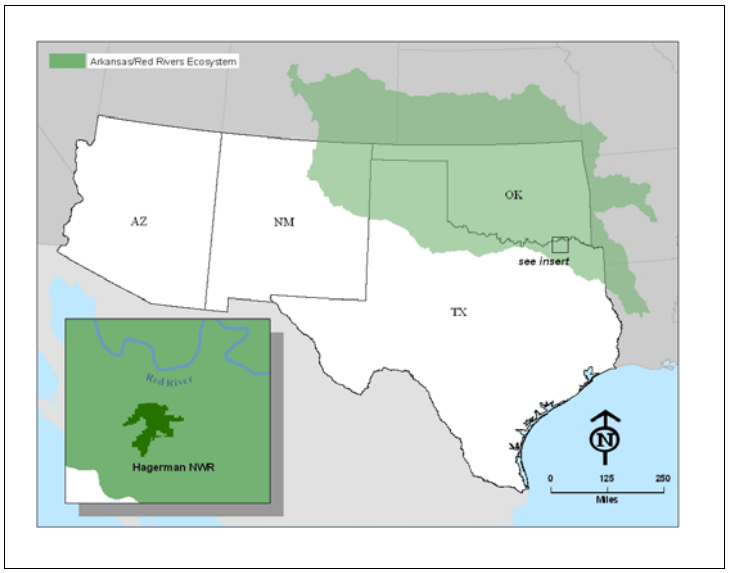
Ecosystem management includes preservation of the natural ecological integrity, ecosystem health, and sustainable levels of economic and recreational activity. This approach emphasizes the identification of goals that represent resource priorities on which all parts of the Service will collectively focus their efforts. These cross program partnerships within the Service and partnerships with outside entities assist in the identification of common resource goals and contribute to the accomplishment of those goals in an effective and timely manner.

The Service has defined 52 ecosystems within the United States, based primarily on watershed designations. In order to implement the ecosystem approach, the Service has established ecosystem teams consisting of members representing the various field stations and programs within the Service in any given area. These teams are helping the Service present a more unified approach and will work closely with traditional partners, as well as expanding partnerships with others. The Refuge plays an integral role in the coordination of, and is an active participant in, projects identified by the ecosystem team as priority projects in order to accomplish the overall goals of the team. Management decisions incorporate pertinent biological and socioeconomic parameters within the ecosystem. Each team has developed an ecosystem plan with input from its partners. This plan is used to implement collaborative projects across Service programs and with partners. The ecosystem that the Refuge falls within is the Arkansas/Red Rivers Ecosystem (Ecosystem).

The Arkansas/Red Rivers Ecosystem

The Arkansas/Red Rivers Ecosystem contains approximately 245,000 square miles and extends from the Rocky Mountains to the bayous of Louisiana. It contains all of Oklahoma and parts of seven other states, and sprawls over four Service Regions (2, 3, 4, and 6). Elevations within the Arkansas/Red Rivers Ecosystem range from over 14,000 feet above mean sea level (msl) to less than 300 feet msl along the Red River in Louisiana. Because of the diversity in land forms, soils, average annual precipitation, and other factors, the Arkansas/Red Rivers Ecosystem supports the greatest diversity of fish and wildlife resources of any Service ecosystem nationwide (USFWS 2000).

Portions of four Service Regions (Regions 2,3,4, and 6) occur within the Arkansas/Red Rivers Ecosystem. Twenty-four Service field stations are located here, including 16 National Wildlife Refuges, four National Fish Hatcheries, three Law Enforcement Offices, and one Ecological Services Field Office. The Ecosystem Plan identifies 15 ecoregions, as defined in Omerick (1987), that occur within the Arkansas/Red Rivers Ecosystem. Each of these is discussed briefly in the Ecosystem Plan (USFWS 2000), as a background to the management of objectives and strategies identified in the plan.



Arkansas/Red Rivers Ecosystem Boundary

The Refuge is within the Central Oklahoma/Texas Plains ecoregion which is found from north-central Oklahoma to southern Oklahoma, and includes much of the Red River drainage in northern Texas. The natural vegetation consists of a mixture of post oak-blackjack oak forest and savannah and tallgrass prairie communities. The topography is generally rolling to hilly, with the Arbuckle Mountains of south-central Oklahoma forming a distinct feature of this ecoregion (USFWS 2000).

The proposed management priorities for the Arkansas/Red Rivers Ecosystem focus on managing Federal trust fish and wildlife resources, including traditional recreational opportunities and more recent directions involving ecological integrity, water conservation issues, and private lands initiatives. The following objectives have been determined by the Service for the Arkansas/Red Rivers Ecosystem, which includes the Refuge:

- Water quantity maintenance and improvement
- Water quality maintenance and improvement
- Focus species conservation and restoration
- Conserve and restore focus habitats
- Increase public outreach efforts relative to Service programs
- Improve outdoor recreational opportunities

The Refuge staff and Service are integral to the development and implementation of the Arkansas/Red Rivers Ecosystem Plan. Recognizing that it does not exist in isolation of its surroundings, the Refuge continues to work towards initiating new partnerships with private landowners, state and federal agencies, corporations, conservation groups and volunteers in an effort to meet the challenges of resource management needs both on the Refuge and within the Arkansas/Red Rivers Ecosystem.

Area of Ecological Concern

While there is a larger defined area known as the Arkansas/Red Rivers Ecosystem, this CCP will focus primarily on Service lands within an Area of Ecological Concern encompassing portions of the Red River Basin. An area of ecological concern can be defined as "an essentially complete ecosystem (or set of interrelated ecosystems) of which one part cannot be discussed without considering the remainder" (USFWS 1985).

The Refuge encompasses more than 11,000 acres in Grayson County, located in north-central Texas. Refuge lands consist of Blackland Prairie which is gently undulating to moderately rolling hills. The Eastern Cross Timbers form a gently rolling sandy belt, and rugged topography marked by deep, steep walled ravines closer to the Red River. At an average elevation of 650 feet above msl, the Refuge is situated on the south central edge of the Red River Basin, on Lake Texoma, at the confluence of the Red and Washita Rivers. Because land use and land management practices conducted by the Refuge have an effect on the hydrology and natural resources within the Red River watershed, the broader area of ecological concern is the Red River Basin.

The Red River Basin includes parts of the Llano Estacado of the High Plains, which is a nearly level, practically undissected, high tableland with slow to moderate surface drainage and many small, shallow lakes or playas. The area east of the High Plains is a broad, nearly level to rolling grass and brush covered plain with moderate to rapid surface drainage and entrenched streams. Undulating prairies and nearly level valleys characterize the eastern portion of the basin. The topography of the basin ranges from flat prairie in the western reach at an elevation of approximately 4835 feet to rolling hills in eastern Texas at an elevation of about 495 feet above sea level (Red River Authority of Texas 2003).

The Red River is among the most unusual river systems in North America (American Rivers 2002). It is an interstate stream originating in the high plains of Curry County, New Mexico as Tierra Blanca Creek and flows to the eastern boundary of Childress County, Texas. From this point, the south bank of the river becomes the boundary between Texas and Oklahoma. The Red River then continues its southeasterly direction into southwestern Arkansas and then turns south where it joins the Atchafalaya River in Louisiana, where it discharges into the Mississippi (Red River Authority of Texas 2003). Its name comes from its color, which in turn comes from the fact that the river carries large quantities of red soil in flood periods. The Spanish called the stream Rio Rojo. It was also known in frontier times as the Red River of Natchitoches and the Red River of the Cadodacho (Red River Authority of Texas 2003). The river also has a high salt content. Ten natural salt sources, including seeps, springs, and salt flats, contribute about 4100 tons of salt per day. The river hosts a wide variety of unusual species and provides habitat for several endangered species, including the interior least tern and the whooping crane (American Rivers 2002).

Refuge Purposes and History

Formal establishment of a unit of the National Wildlife Refuge System is usually based upon a specific statute or executive order specifically enumerating the purpose of the particular unit. However, refuges can also be established by the Service under the authorization offered in such laws as the Endangered Species Act of 1973 or the Fish and Wildlife Act of 1956. In these cases, lands are identified by the Service that have the right elements to contribute to the recovery of a species or the maintenance of habitat types. Often, the Service works in cooperation with private nonprofit organizations in efforts to acquire suitable lands. Each refuge in the system is managed to fulfill the mission of the Refuge System as well as the specific purposes for which the refuge was established. Purpose statements are used as the basis for determining primary management activities, and for determining allowable uses of refuges through a formal "compatibility" process.

Pintails (photo by Rick Cantu).

Hagerman NWR Purpose

The Hagerman NWR is an overlay project of the COE and was established by Public Land Order (PLO) 314 on February 9, 1946, "*....for refuge and breeding ground purposes for migratory birds and other wildlife....reservation as a wildlife refuge....shall not interfere with any existing or future uses....in the operation and maintenance of the Denison Dam and Reservoir Project....*" Canada, snow, white-fronted, and Ross' geese are the main management thrust of the Refuge. Wading birds, shorebirds, white-tailed deer, coyote, bobcat, and others thrive on the Refuge as well. Visitors from around the country and the world come to observe the varied and abundant wildlife of the north-central Texas area.

Nocona Unit Purpose

The Nocona Unit was established on April 1, 1992 under the authority of the Food Security Act of 1985 and the Consolidated Farm and Rural Development Act (CFRDA–The First [1985] Farm Bill) (7 U.S.C. 2002) which provides for suitable Farmers Home Administration (FmHA) lands to be set aside "for conservation purposes," including soil, water, vegetation, and wildlife. Taken in conjunction with the Fish and Wildlife Act of 1956, the Service is permitted to accept transfers of land principally for the preservation of wetlands, endangered species habitat, and floodplain areas. Lands so acquired are administered in accordance with the National Wildlife Refuge Administration Act (16 U.S.C. 668dd). Accordingly, the Nocona Unit was desired for its potential for native prairie restoration and wetland and riparian habitat values. In addition, the Nocona Unit falls within the narrow migration corridor of the endangered whooping crane.

Refuge Overview: Past and Present

In cooperation with the COE, the Refuge was established in 1946 on lands originally purchased by the U.S. Department of the Army (formally the War Department) for the Denison Dam Project. Authorized by the Flood Control Act of 1938 (Public Law No. 761, 75th Congress, 3rd Session), Denison Dam is a rolled, earthfilled embankment with a rock-protected upstream slope, measuring approximately 15,200 feet long and 165 feet high. It was built for the purposes of flood control and generation of hydroelectric power. Prior to the construction of Denison Dam, flood damage in the Red River valley was chiefly confined to agricultural lands and crops. Very few man-made structures,

such as cities, villages, highways or railway bridges, or even farm buildings and dwellings, were located in the floodplain (Higginbottam 1971).

Discussion about a dam on the Red River began nearly a hundred years ago. From a low flow of less than 2000 cubic feet per second (cfs) under normal conditions, the "mighty Red" flowed at 470,000 cfs in 1908, and at 600,000 cfs in 1843 (Higginbottam 1971). After the devastating flood of 1908, intensive studies for flood control on the Red River became a priority issue. Early efforts focused primarily on navigation along the Red River but when the idea of a hydroelectric flood control dam surfaced, it began to attract the attention of many influential people. For several years, numerous individuals campaigned on behalf of the project, sending committees to Washington to almost every meeting which dealt with waterway improvement. Even Congressional leaders began spearheading the movement in Washington. While numerous individuals supported the development of a dam, there is general agreement that the person largely responsible for bringing about the realization of what often seemed a dream is the late, Honorable Sam Rayburn, Speaker of the U.S. House of Representatives. Speaker Rayburn of Texas promoted and persistently worked for a dam across the Red River in this vicinity. His long-time, first-hand knowledge of the effects of the devastating floods on the Red River and the urgent need for flood control at this point account to a great extent for his support of the project. Speaker Rayburn coaxed the necessary legislation through years of Congressional hearings until Congress appropriated $5.6 million for the project in 1938 (Denison Dam 2003). In August 1939, the COE began preliminary construction of the dam with the use of German war prisoners captured by the British in North Africa and brought to America for internment. Considered to be the first prisoner of war work project, these German prisoners began clearing the initial 630 acres of timber at the proposed dam site. Eventually, more than 7300 acres of timberland were cleared making this one of the largest land clearing projects in American annals.

The area to be affected by the creation of the dam consisted primarily of farming and grazing land with large fruit and pecan orchards located in the valleys. The area was suffering from a serious economic depression. Jobs were hard to find and many people were simply existing - living on government relief or raising vegetables, hogs, cattle, and other farm products in an effort to feed their families and have enough left over to sell and purchase other necessities (Higginbottam 1971).

Creation of the reservoir prompted the relocation of railroads, highways, and utilities to maintain services equivalent to those existing before construction of the reservoir. It also necessitated the complete relocation of three towns. But the most unusual and by no means the simplest phase of the project, was the removal of graves to higher ground beyond the reach of the reservoir. Three thousand graves were moved from 49 cemeteries, ranging from family plots to community cemeteries. Most of the graves were relocated to new cemeteries built by the COE, and others were taken at the request of relatives, to various existing burial grounds. The actual cemetery and grave removal work started in June 1942 and was completed in July of the following year.

At the time of its completion in February 1944, Denison Dam eventually served as a prototype for dam construction in future COE projects throughout the arid plains of the American Southwest (American Society of Civil Engineers 2002). When the reservoir began to fill in 1944, over 89,000 acres of land, including the small town of Hagerman, became submerged and formed what is now known as Lake Texoma. On September 13, 1944, the reservoir impounded by Denison Dam was officially named Lake Texoma by the Senate (Higgingbottam 1971).

Before the lake was completely filled, a proposal by the Service to the COE suggesting the creation of two wildlife refuges along Lake Texoma was initiated in late 1944 by former Chief of Refuges, J. Clark Salyer. One area encompassing approximately 10,000 acres would be established on the Upper Arm of Lake Texoma in south-central Oklahoma, and another area of approximately 9000 acres would be established on the south shore of Lake Texoma in north-central Texas. It had already been

decided that the refuge in Texas would be named after the town of Hagerman (USFWS 1995). Over the next year, both agencies worked towards accomplishing this endeavor and on January 24, 1946, PLO 312 was approved and signed by Secretary of the Interior Harold L. Ickes establishing the Tishomingo NWR in south-central Oklahoma. Two weeks later, PLO 314 was signed on February 9 establishing the Hagerman NWR in north-central Texas. The fact that Lake Texoma was strategically located within the Central Flyway was an important factor in the establishment of these Refuges. Significant waterfowl use began shortly after the creation of Lake Texoma.

Refuge lands remain under ownership and overall jurisdiction of the COE. The Service has secondary jurisdiction subject to the following original COE project purposes as stated in PLO 314....*"The lands herein reserved have been acquired or are being acquired in connection with flood control and improvement of the Red River, and are under the primary jurisdiction of the War Department. Their reservation as a wildlife refuge and use by the Department of the Interior, and enforcement of laws and regulation thereon by said Department, shall not interfere with any existing or future uses or regulations of the War Department in the operation and maintenance of the Denison Dam and Reservoir Project for purposes of flood control, power development, navigation, or with any other uses by the War Department.*

In the administration of these lands as a wildlife refuge, the Department of the Interior shall have the authority to utilize and dispose of the economic resources of the land in accordance with the laws and regulations governing national wildlife refuges, and to administer and develop the lands in a manner necessary for the proper management of wildlife, including the construction or use of administrative buildings, fences, trails, fire breaks, check dams, control structures, but none of these things shall be done prior to submission of plans to, and approval thereof by, the District Engineer, Engineer Department at Large, in charge of the locality."

Nocona Unit

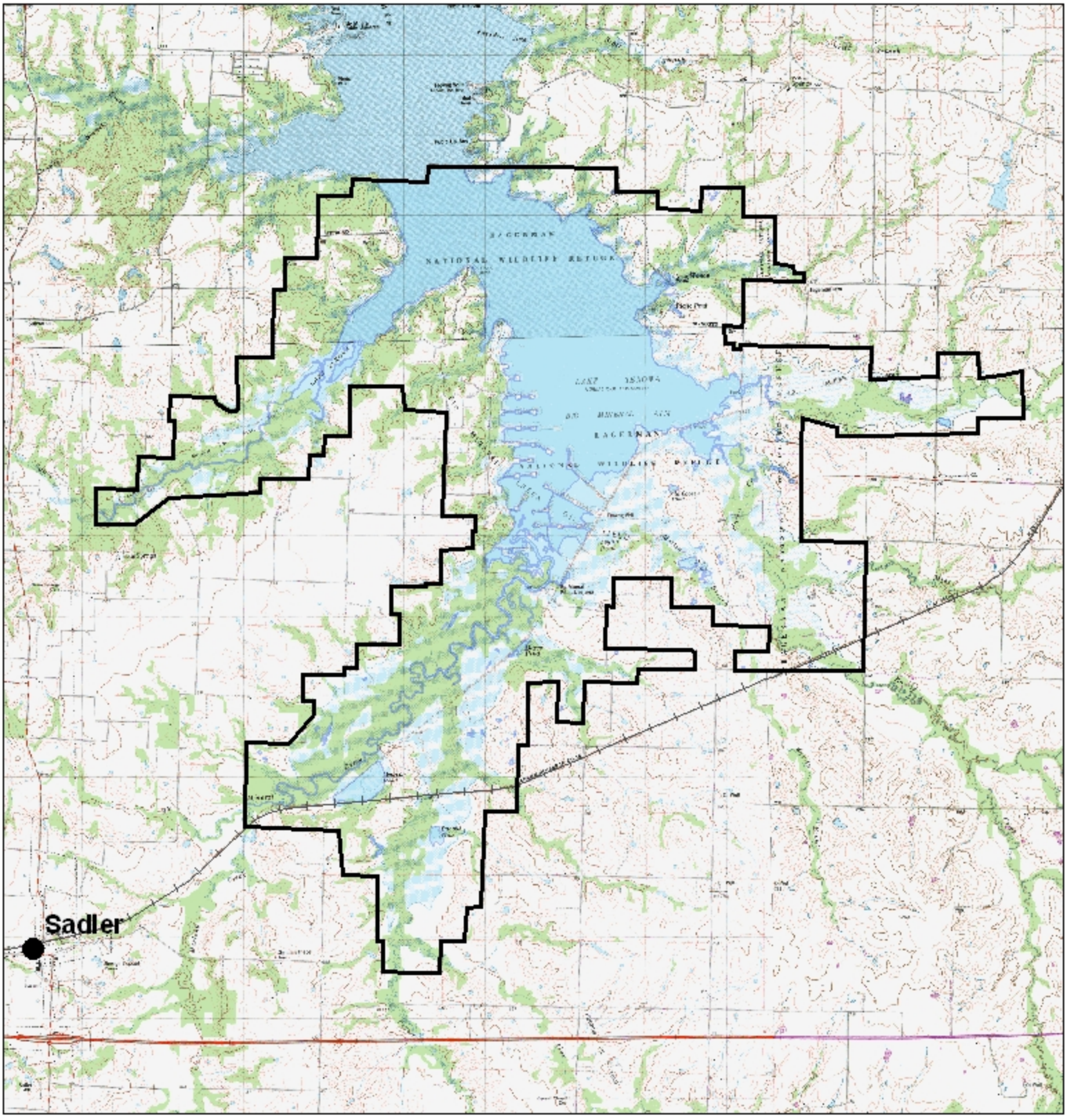
On April 1, 1992, the Secretary of Agriculture transferred approximately 822 acres of land in Montague County, Texas to the Secretary of Interior as an addition to the Hagerman NWR. The Service received this tract of land from the Farmers Home Administration. Acquisition of these lands by the Service was the result of Farm Bill guidelines that specified establishment of wetland conservation easements or fee title wetlands. Located approximately 80 miles from the Refuge headquarters, the Nocona Unit encompasses a segment of East Belknap Creek, a corridor of forested bottomlands, as well as natural wetlands that with development and management, will provide valuable habitat for waterfowl and other wildlife species. The transfer of this tract to the Service meets the goals of the North American Waterfowl Management Plan, the Migratory Bird Treaty Act, and the mandates of the Endangered Species Act. It also allows the retention of permanent vegetative cover which will control erosion thus promoting the goals of the Food Security of Act of 1985 regarding soil conservation and wetlands.

Today, this 11,320 acre Refuge continues to provide sanctuary and breeding ground habitat for migratory birds and other wildlife species in addition to providing wildlife-oriented recreational activities for the visiting public. The biological value of the Refuge to this region is apparent by the fish and wildlife species utilizing this area every year. The area has historically been an important migration route for migrating waterfowl in this section of the Central Flyway. The Refuge's farming program provides grain and browse for migrating waterfowl and assists in reducing crop depredation on adjacent lands.

Lake Texoma

The lake and dam have approximately 1250 miles of shoreline and protect approximately 1,127,000 acres of land. Lake Texoma is a key feature in the main flood control plan for properties in Texas, Oklahoma, Arkansas, and Louisiana. With a holding capacity of nearly 6-million acre-feet of water, it contributes significantly to recreational opportunities and water-supply storage in the neighboring areas of Texas and Oklahoma (American Society of Civil Engineers 2002). Power generation, water supply, regulation of streamflows, improvement of navigation in the lower reaches of the Red River, and fish and wildlife recreational opportunities are additional benefits of Lake Texoma. It is one of the few reservoirs in the nation where striped bass reproduce naturally. Lake Texoma is considered to be one of the most popular Federal recreation facilities in the country, with almost 6 million visitors annually. In 1999, Lake Texoma ranked first among COE lake projects nationwide, with visitors spending over 90 million hours at the lake (USACE 2001).

Lake Texoma (map courtesy of U.S. Army Corps of Engineers).



U.S. Fish & Wildlife Service

Hagerman NWR

Background image from 1:100,000 scale USGS quadrangle maps.

Projection: UTM, NAD83, Zone 14.

January 2006

Refuge Boundary

Hagerman NWR boundary

Missouri-Kansas-Texas Railroad

0 0.5 1 2 miles

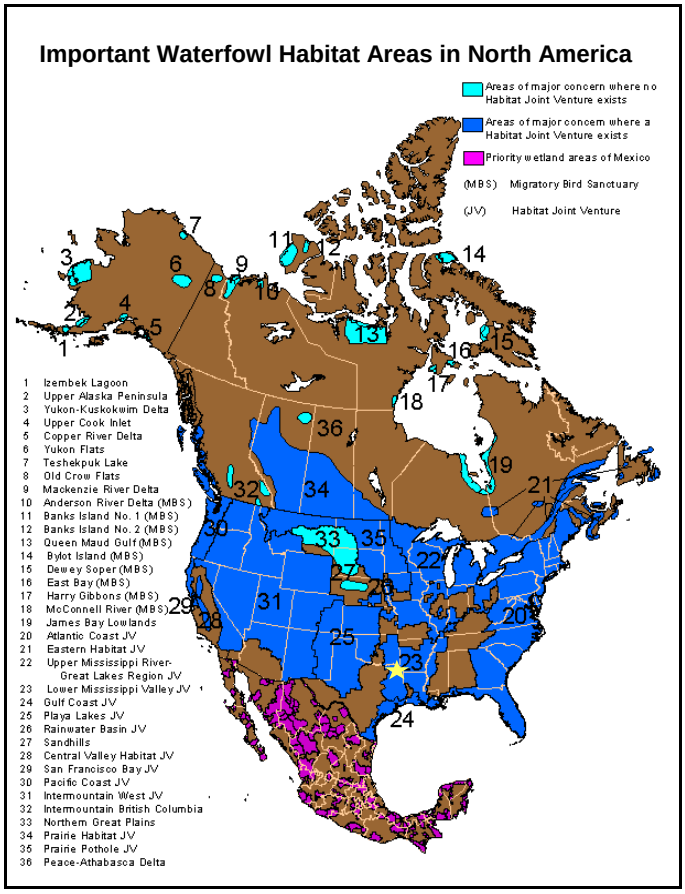
Prepared by: Division of Technical Services
Office of Geographic Information Systems
USFWS - Southwest Region Albuquerque, NM

Relationship to other Migratory Bird Conservation Initiatives

There are several ongoing migratory bird conservation initiatives that all refuges should participate in to the extent applicable and practical. The following documents influence the future management of the Refuge as well as the Area of Ecological Concern. The Refuge is important to the following initiatives and contributes significantly to their goals and objectives. The Refuge provides wintering habitat and a stopover point for waterfowl species within the Central Flyway.

North American Waterfowl 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 in the North American Waterfowl Management Plan (NAWMP) and was signed in 1986 by both countries. In 1994, Mexico joined as a signatory when the plan was updated.



Refuge location within the Lower Mississippi Valley Joint Venture

The plan's success depends upon partnerships involving federal, state, provincial, and local governments, businesses, conservation organizations, and individual citizens. These partnerships are called joint ventures. Through these joint ventures, NAWMP is able to achieve its objectives with the assistance of its partners to collectively accomplish what is often difficult or impossible to do individually.

Implementation of the plan is at the regional level, through 12 regional habitat "Joint Ventures" in the United States. The Refuge is within the Lower Mississippi Valley Joint Venture area. The lakes, ponds, marshes, and wetland fringes on the Refuge provide vital habitat for migratory birds and resident wildlife. These areas are important for resting, breeding, nesting and/or winter residency for many species. The lakes of northern Texas are an important winter region for waterfowl in the Central Flyway. Additional information on NAWMP and joint ventures can be found at http://northamerican.fws.gov.

Partners in Flight

Partners In Flight (PIF)/*Companeros en Vuelo/Partenaires d'Envol* was organized in 1990 in response to growing concerns about declines in the populations of many landbird species, and in order to emphasize the conservation of birds not covered by existing conservation initiatives. The initial focus was on species that breed in the Nearctic (North America) and winter in the Neotropics (Central and South America and the Caribbean), but the focus has since expanded to include all of the land birds of the continental United States. The goal of the plan is to focus the combined resources of agencies, academia, and private organizations on the improvement of monitoring, research, management, and education programs relating to neotropical migratory birds. Implicit in the plan is the need to identify, protect, manage and restore essential habitats.

The Refuge is within the PIF Oaks and Prairies Physiographic Area, which extends from the Red River of Oklahoma south to San Antonio, Texas, east to the sandy soils of the East Texas Pineywoods and west to the Eastern Cross Timbers. Within this area, the Texas Blackland Prairie represents the southernmost extension of the North America tallgrass prairie. Eleven plant associations have been described in the Blackland Prairie, and dominant vegetation includes big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*) and brownseed paspalum (*Paspalum plicatulum*). Also present in the Oaks and Prairies physiographic area are bottomland hardwood forests, where bur oak (*Quercus macrocarpa*), Shumard oak (*Q. shumardii*), black walnut (*Juglans nigra*), American elm (*Ulmus americana*), cedar elm (*U. crassifolia*), and white ash *(Fraxinus americana*) are common components. Riparian forests include cottonwood (*Populus* spp.), sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), and green ash (*Fraxinus pennsylvanica*). Common trees of upland hardwood forests include Texas oak (*Quercus texana*), Mexican plum (*Prunus mexicana*), and cedar elm. A dense scrub layer is often associated within these forests and includes species such as aromatic sumac (*Rhus aromatica*), poison oak (*Toxicodendron*), Carolina buckthorn (*Frangula californica*), and coral berry (*Symphoricarpos orbiculatus*). There are occasional wetlands and freshwater marshes in the Oaks and Prairies area, primarily associated with the peripheral areas of streams, rivers and reservoirs. Priority bird populations and habitats in this Physiographic Area include: for *Grassland/Scrub* - greater prairie chicken (*Tympanuchus cupido*), Bewick's wren (*Thryomanus bewickii*), scissor-tailed flycatcher (*Tyrannus forficatus*), Bell's vireo (*Vireo bellii*), painted bunting (*Passerina ciris*), and northern bobwhite (*Colinus virginianus*). These species are indicators of the condition of the grasslands, bottomland hardwood forests, and scrub habitats within this area. Their populations have been emphasized as a priority for monitoring. Most of these species (except for the greater prairie chicken) occur on the Refuge and, except for the Bell's vireo, regularly nest on the Refuge. According to the PIF document, over 99 percent of Blackland Prairie within the Oaks and Prairies Physiographic Area has been converted to agricultural uses. Therefore, large "islands" of native habitats such as the Refuge play a critical role in sustaining these bird populations. Additional information on PIF and species priorities for this area can also be found at: http://www.partnersinflight.org.

North American Colonial Waterbird Conservation Plan

The North American Colonial Waterbird Conservation Plan (NACWCP) was initiated in July 1998 to advance the conservation of colonial-nesting waterbirds and their habitats in North America. It is a partnership of non-governmental agencies, researchers, private individuals, academia, and federal and state governmental agencies. The goal is to develop a plan whose implementation will result in sustainable populations, distributions, and habitats of colonial-nesting waterbirds throughout North America, including breeding, migratory and wintering ranges. The plan is still under development, but when completed the plan may have impacts on future Refuge planning. Additional information on the NACWCP can be found at: http://www.nacwcp.org/.

U.S. Shorebird Conservation Plan

The U.S. Shorebird Conservation Plan is a partnership involving organizations throughout the United States committed to the conservation of shorebirds. The organizations and individuals working on the plan have developed conservation goals for each region of the country, identified critical habitat conservation needs and key research needs, and proposed education and outreach programs to increase awareness of shorebirds and the threats they face. The plan has three major goals at different scales. At a regional scale, the goal of the plan is to ensure that adequate quantity and quality of habitat is identified and maintained to support the different shorebirds that breed in, winter in, and migrate through each region. At a national scale, the goal is to stabilize populations of all shorebird species known or suspected of being in decline due to limiting factors occurring within the U.S., while ensuring that common species are also protected from future threats. At a hemispheric scale, the goal is to restore and maintain the populations of all shorebird species in the Western Hemisphere through cooperative international efforts.

The plan was developed by state and federal agencies, non-governmental organizations (NGOs), and individual researchers throughout the country. Major partners include all 50 states, the Service, the North American Waterfowl and Wetlands Office, most of the Joint Ventures established through the North American Waterfowl Management Plan, the Bureau of Land Management, the U.S. Geological Survey, the U.S. Forest Service, the International Association of Fish and Wildlife Agencies, The Nature Conservancy, National Audubon Society, Ducks Unlimited, the Canadian Wildlife Service, the Western Hemisphere Shorebird Reserve Network, Point Reyes Bird Observatory, and many other regional organizations. The Manomet Center for Conservation Sciences initiated the project, obtained the funding to develop the plan, and hired the coordinator who oversaw all aspects of the project to date as well as publication of reports.

The Shorebird Plan is designed to complement the existing landscape scale conservation efforts of the North American Waterfowl Management Plan, PIF, and the North American Colonial Waterbird Conservation Plan. Each of these initiatives addresses different groups of birds, but all share many common conservation challenges. One major task is to integrate these efforts to ensure coordinated delivery of bird conservation on the ground in the form of specific habitat management, restoration, and protection programs. Additional information on the U.S. Shorebird Conservation Plan may be found at: http://shorebirdplan.fws.gov/USShorebird.htm.

North American Bird Conservation Initiative

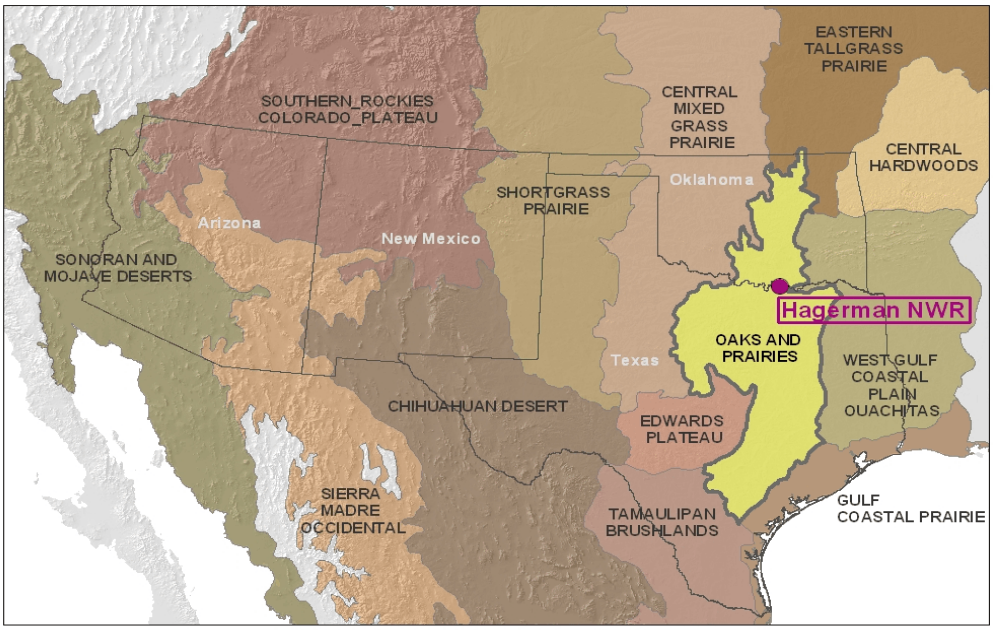
The primary role of the North American Bird Conservation Initiative (NABCI) is to coordinate, not duplicate, the efforts of the four major land bird plans: North American Waterfowl Management Plan, Partners in Flight, U.S. Shorebird Conservation Plan, and North American Colonial Waterbird Plan. Many of the birds targeted by these plans share the same habitats. By leveraging the plans limited resources, both human and financial, we will improve the outlook for bird conservation across all of North America. 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 on this or any other continent.

The purpose of the NABCI is to ensure the long-term health of North America's native bird populations by increasing the effectiveness of existing and new bird conservation initiatives, enhancing coordination among the initiatives, and fostering greater cooperation among the continent's three national governments and their people. All of this will be done with appreciation of the cultural and biological differences that make each country unique.

This conservation approach is expressed through NABCI's goal of delivering the full spectrum of bird conservation through regionally based, biologically driven, landscaped-oriented partnerships. "Regionally based" partnerships involve all stakeholders across ecoregions and are the proven means of effectively delivering bird conservation. "Biologically driven" means that there must be explicit linkages among population objectives, habitat goals, and conservation actions. It also means that evaluation and adaptability are critical components of successful conservation efforts. "Landscaped oriented" recognizes the response of bird populations to habitat conditions across broad ecoregions and the need for conservation to operate at multiple geographic scales.

The NABCI vision is one of habitat partnerships, based upon the North American Waterfowl Management Plan's joint venture model, 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 (BCR) as the ecological unit in which to achieve their goals.

The Refuge is located within the Oaks and Prairies BCR. This transition zone between the Great Plains and the forests of the eastern United States is a complex mix of prairie, savannah, cross timbers, and shrubland. Some of the continent's priority bird species that use this mix of woodland and open country are the scissor-tailed flycatcher, painted bunting and Mississippi kite with a small population of black-capped vireos inhabiting areas of denser shrub. Agriculture and urbanization have made tremendous impacts on this region, leaving very little natural habitat available for healthy priority bird populations. Additional information on NABCI can be found at http://www.nabci-us.org.



Location of Refuge within the Oaks and Prairies BCR.

CHAPTER 2: PLANNING PERSPECTIVES, PUBLIC INVOLVEMENT AND REFUGE ISSUES

The Refuge represents one unit of a multi-faceted system of lands dedicated to the conservation and management of wildlife resources. The development of this CCP has incorporated the directives, policies, and regulations of the Service, the Refuge System, and the purpose for which the Refuge was established, to assist in providing guidance to the Refuge for long-range management decisions.

Planning Perspectives

This comprehensive planning effort will integrate three perspectives so that management direction over the next 15 years will produce holistic management approaches for the Refuge. The plan includes:

1. A broad perspective for overall environmental contextual issues including endangered species, ecological integrity, water issues, inter-jurisdictional cooperation, and socioeconomic considerations.

2. A focused perspective for the Refuge System related to policy issues which affect the Refuge's programs (compatibility, endangered species management, water rights, water quality, etc.).

3. A local perspective for Refuge related activities and programs affecting land and species management (habitat management, land protection, endangered species management, research, contaminants, recreational use, etc.).

An understanding of these perspectives and the relationship between them have led to the formulation of an integral set of Refuge goals, objectives, and management actions for the next 15 years.

Public Involvement

To ensure that future management of the Refuge is reflective of the issues, concerns and opportunities expressed by all interested parties, a variety of public involvement techniques are being used. To begin the CCP process, the Service and its contractor, Research Management Consultants, Inc. (RMCI) prepared and distributed a fact sheet. The fact sheet described the CCP process and defined the comment period. The fact sheet was mailed to interested parties on October 18, 1999 and the Notice of Intent and comment period was published in the Federal Register on November 17, 1999. Two open houses were held to inform interested parties about the CCP process. The first open house was held November 16, 1999 at the Refuge near Sherman, Texas. The second open house was held November 18, 1999 at the Montague County Courthouse in Montague, Texas to discuss issues concerning the CCP process and the addition of the Nocona Unit to the Refuge. The fact sheets, drafts, and other relevant information for public review have been available at the Refuge headquarters. Public comments have been reviewed and considered throughout the CCP process. Comments received during the review of the draft CCP have been included in the final document as an appendix.

Draft CCPs and Environmental Assessments (EA) are made available for public review and comment, providing the public an opportunity to discuss issues and offer solutions. Draft CCPs include public comments received prior to release of the drafts and the final EA will reflect public input into the process. Public meetings are provided based on public response to the CCP process.

Special mailings, newspaper articles, and announcements will inform interested parties and people in the general area of the current status of the project as well as the time and place of any meetings considered throughout the planning process.

The CCP must be formally revised within 15 years (or earlier, if it is determined that conditions affecting the Refuge have changed significantly). Implementation of the CCP will be monitored to ensure that the strategies and decisions noted within are accomplished. Data collected in association with routine inspections or programmatic evaluations will be used to continually update and adjust management activities.

Refuge Issues and Challenges

The following is a list of issues and challenges related to the management of the Refuge. The questions were derived from ongoing management concerns since the Refuge's establishment. Goals and objectives (pp.75) have been designed to effect habitat restoration and protection of existing habitat for the benefit of a diversity of wildlife and plants. The questions under the issues that follow are addressed in the text of the CCP and/or within the goals and objectives section.

Issue 1. Inventories and Monitoring

Biological baseline information for the Refuge is incomplete. A thorough inventory of the Refuge's vegetation communities and wildlife species should be completed so that areas for restoration can be identified. A thorough database of biological information would enhance resource decision-making. The following questions evoke the interrelationship between developing a biological baseline and the resource decision-making process.

- 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 should be adopted to improve the monitoring and evaluation of plant and wildlife resources on the Refuge?
- To what degree should recreational impacts on plant and wildlife resources be formally assessed?
- To what degree should the Refuge establish long-term monitoring programs to better understand the present and future status of sensitive or species of concern?

Issue 2. Grassland Management

Throughout the last century, improper grazing and inadequate burning activities have resulted in declines in grassland quality for native wildlife and migratory birds. New fencing is necessary throughout the Refuge. This includes interior as well as boundary fencing. Properly managed grazing and prescribed fire serve to maintain and encourage native grasses and forbs, and to cycle nutrients through the ecosystem. Key issue questions include:

- What strategies should the Refuge implement to restore, maintain, and protect grasslands to benefit native plant and animal communities?
- What are the minimum, appropriate tools necessary to better inventory, monitor and evaluate resources?
- Should a permanent monitoring program be established to evaluate the transition from a degraded grassland habitat to a restored grassland habitat?

Issue 3. Water Management

Active water management is limited. The Big Mineral Creek is the major water source in the area. The primary purpose of Lake Texoma is to provide municipal, domestic, and industrial water for surrounding towns. Changes in local and regional water flows have affected the natural communities within the Red River Basin and Big Mineral Creek. Initial creek restoration can be achieved by implementing water quality monitoring studies on Lake Texoma and Big Mineral Creek. Wetland areas can be enhanced through efficient water delivery, distribution, and implementation of moist soil management. Key issue questions include:

- What are the minimum appropriate tools necessary to better inventory, monitor, and evaluate resources?
- Should a permanent monitoring program 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 Red River tributaries to benefit native plant and animal communities?
- What other strategies could be used to protect valuable riparian habitat?
- Should additional water rights for the Refuge be obtained to permit better wetland management?
- What is the best way to coordinate water management activities with other water users?

Issue 4. Nocona Unit - Management

Initiate management of the Nocona Unit to provide protection and enhancement of wildlife habitats for the benefit of the public. The Nocona Unit has potential for prairie restoration, waterfowl habitat enhancement, and limited public use.

- What baseline surveys are necessary to inventory existing biological resources, including vegetative species at the Nocona Unit?
- What types of compatible uses and land management activities should be developed and implemented for the Nocona Unit?
- What staffing and funding may be required in order to achieve the goals and objectives of the Nocona Unit plan?

Issue 5. Environmental Education and Community Outreach

The National Wildlife Refuge System Improvement Act of 1997 encourages managers to incorporate compatible environmental education and interpretation opportunities for the public. The Refuge has many opportunities to increase community involvement and assistance in natural resource programs, enhance compatible wildlife-dependent recreation opportunities, and expand wildlife education and community outreach. Community outreach and environmental education would be instrumental in building a supportive constituency and furthering the understanding, appreciation, and stewardship of our natural resources. Key questions include:

- What environmental education and interpretation programs and products should be offered?
- What information should be included in brochures and other literature distributed by the Refuge?
- What interpretive efforts can be implemented for the Refuge?
- What educational services/experiences should the Refuge offer to area schools and teachers?
- What emphasis should be given to off site educational and informational programs?
- What accessibility arrangements are needed on the Refuge?

- What additional inventory, analysis, and monitoring is necessary to adequately understand public use activities and their impacts on the Refuge?
- What strategies should be adopted to improve the monitoring and evaluation of public use activities on the Refuge?

Issue 6. Funding and Staffing

Current base funding and staffing levels only provide for Refuge operations to focus on habitat management and maintenance projects. There are many opportunities for the Refuge to expand its operations to include programs that engage the visitor, encourage visitation, and serve the community by increasing public awareness, understanding, and appreciation of the area's natural resources. Implementation of any of these opportunities may be dependent on additional funds and staff. Key issue questions include:

- What staffing and funding is required in order to achieve the goals and objectives of the CCP?
- What specific staffing should be identified for the near term that will help in plan implementation?
- To what degree is the current funding adequate to meet the long-term goals of the Refuge?
- What could be done to improve staff accessibility to the public?
- What opportunities should the Refuge pursue to enhance and expand existing Refuge management and public use programs?
- Are current Refuge facilities adequate?

Issue 7. Oil and Gas Activities

Ongoing oil and gas activities occur on the Refuge that affect the quality of wildlife habitat. Though most of the major oil companies are environmentally conscientious, seasonal disturbances to wildlife can occur with certain oil and gas operations. Potential impacts to nesting shorebirds and/or sensitive species, such as federally-listed least terns, may occur from people and equipment disturbances within lakeshore-oil pad sites. There is the potential for oil spills, gas leaks, and brine pipeline spills, all of which can seriously threaten wildlife and their habitats. An integrated plan is needed to address oil and gas operations on the Refuge. Key questions include:

- What is the appropriate oil/brine spill protocol in the event of a major spill?
- Who are the key contacts in the event of an oil or brine spill?
- What wildlife treatment facilities and equipment are needed to adequately respond to and treat contaminated wildlife?

Wilderness Designation

Armadillo (photo by Chris Perez).

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)) is "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 five thousand 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 historical value".

Designated wilderness areas are set aside for preservation through strict limitations on use of mechanized transportation or tools. Motorized vehicle use is generally prohibited in wilderness areas, as is use of power tools. Exceptions to these restrictions are typically allowed only for emergency or other unusual conditions, on a case-by-case basis.

Per policies of the National Wildlife Refuge Improvement Act of 1997, all Refuge CCPs must include a review of the Refuge's potential suitability for wilderness designation. The Refuge has reviewed its lands for the potential of designating wilderness areas. The Refuge does not conform to the definition of a wilderness, as described in the Wilderness Act. The Refuge as a whole was evaluated for the presence of physical structures, legal requirements/constraints, and management priorities that would preclude such designation. The area has been noticeably affected by humans (historic homesteads and farming). 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. In conclusion, the Service has determined that designation of wilderness areas on existing Refuge lands is not appropriate at this time.

Expected Planning Outcomes

The following components specific to comprehensive conservation planning should evolve from this planning effort:

1. Ensure that the management of the Refuge reflects the policies and goals of the Refuge System and the purposes for which the Refuge was established.

2. Ensure that the Refuge contributes to the conservation of ecological integrity and to the structure and function of the ecosystem in which it is located.

3. Provide a clear statement of desired future conditions for the Refuge as a result of the successful accomplishment of the Refuge's stated goals and objectives.

4. Provide a systematic process to aid decision making by identifying opportunities, issues, and concerns; collecting, organizing, and analyzing information, and developing and considering a range of management alternatives.

5. Provide a forum for determining the compatibility of uses on the Refuge.

6. Assure National Environmental Policy Act (NEPA) compliance on all public activities and Service management programs.

7. Ensure that other Service programs, other agencies, and the public have opportunities to participate in management decisions for the Refuge.

8. Provide a consistent approach for budget requests for operational, maintenance, and capital development programs that accomplish Refuge and Service purposes.

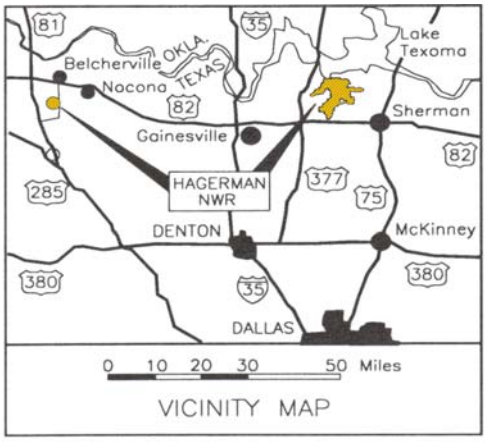
9. Provide a basis for monitoring progress and evaluating plan implementation on the Refuge.

10. Provide long-term continuity in the management of the Refuge.

CHAPTER 3: REFUGE ENVIRONMENT

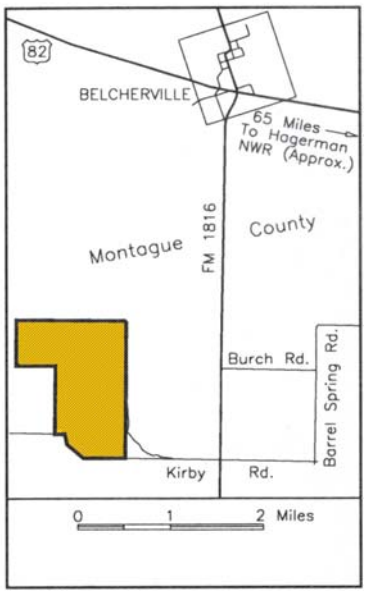
Refuge General Description

The Refuge is located in Grayson County, Texas approximately 75 miles north of Dallas and within 15 miles of both Sherman (population 31,600), and Denison (population 22,600), Texas. Strategically situated on the Red River between Texas and Oklahoma, the Refuge provides valuable sanctuary for the natural resources of the Great Plains. The Refuge is located on the Big Mineral Arm of Lake Texoma where the gently rolling prairies meet the south side of Lake Texoma and the hilly terrain of Sandy Creek. The Refuge is located at the heart of a culturally diverse community in rural north-central Texas with increasing influences from the nearby urban areas of Dallas and Forth Worth. 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 nature-oriented recreational activities for the public. The Tishomingo NWR, another key component within the Central Flyway, is located on the north side of Lake Texoma, approximately 10-miles north of the Refuge.



Nocona Unit

This 822 acre tract of land is located in Montague County approximately 80 miles west of the Refuge headquarters. This parcel was transferred to the Service for its wildlife habitat values. The Nocona Unit is mostly open, gently rolling topography with a variety of native grasses on the uplands and riparian areas along East Belknap Creek. At the present time, Service activity at this location has been limited to protection by posting boundary signs and gates. Existing roads at the Nocona Unit are in poor condition. Future management of this area is dependent on access. This area must, by statute, remain closed to public access until specifically opened for those uses authorized by regulation.



The Nocona Unit.

This northcentral area of Texas has always been a historic waterfowl area. Farming of grain crops, and the availability of small lakes and stock tanks, provided the necessary habitats for migrating birds, especially waterfowl. Today, the Refuge continues to offer food and sanctuary to migratory waterfowl in the fall, winter and spring. The value of these lands that were set aside and dedicated to providing waterfowl habitat, benefit other migratory bird species throughout the year. Each spring and fall sees thousands of shorebirds thronging the mudflats on the lakeshore. Hundreds of wading birds flock to the Refuge to feed on food resources left by falling water levels in late summer.

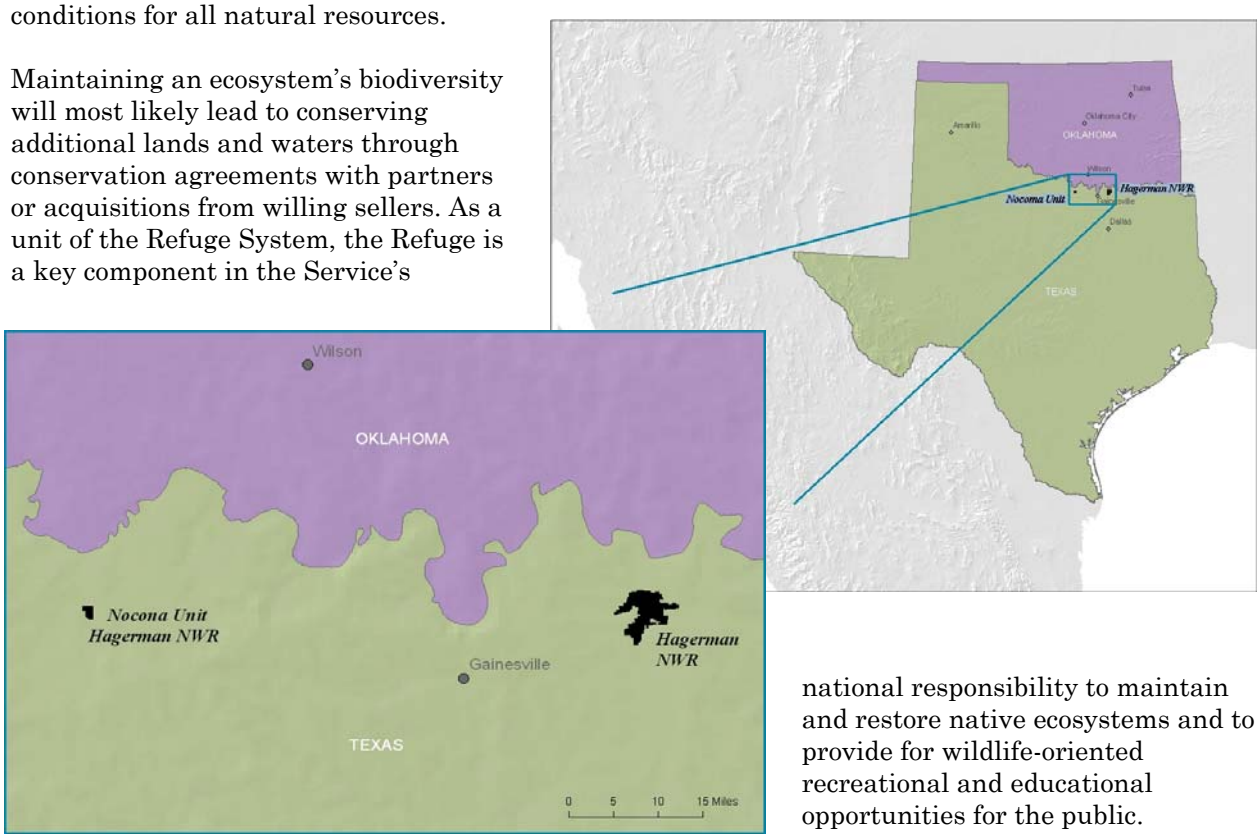
The Refuge's land and water restoration activities are designed and implemented to improve waterfowl habitat, and to benefit more than 270 species of birds, 34 species of mammals, 65 species of

reptiles and amphibians and 62 species of fish. While the primary challenges on the Refuge have centered primarily on restoration of habitat for migrating waterfowl, the Refuge also provides habitat for federally listed threatened and endangered species, and several other species of concern, including the least tern (*Sterna antillarum*), bald eagle (*Haliaeetus leucocephalus*), piping plover (*Charadrius melodus*), peregrine falcon (*Falco peregrinus*), loggerhead shrike, white-faced ibis (*Plegadis chihi*), Texas-horned lizard (*Phrynosoma cornutum*), paddlefish, and the canebrake/timber rattlesnake (*Crotalus horridus atricaudaus*).

The Service has long recognized the importance of maintaining and restoring biodiversity on refuges. According to the Service Manual, biological diversity is the variety of life and its processes, including the variety of living organisms and the genetic differences between them and the communities and ecosystems in which they occur.

The Refuge recognizes it does not exist in isolation of its surroundings. Habitat on the Refuge can be threatened by external factors such as contaminated air and water or altered or depleted surface and subsurface water supply. In order to keep the Refuge healthy, it will continue to be managed in concert with adjacent lands. Nearly 70 percent of all fish and wildlife habitat in the United States is in private ownership. The Refuge will continue to maintain a close partnership with private land owners and will work to improve the conditions for all natural resources.

Maintaining an ecosystem's biodiversity will most likely lead to conserving additional lands and waters through conservation agreements with partners or acquisitions from willing sellers. As a unit of the Refuge System, the Refuge is a key component in the Service's national responsibility to maintain and restore native ecosystems and to provide for wildlife-oriented recreational and educational opportunities for the public.



Location of the Refuge and the Nocona Unit.

Refuge Resources

The Refuge is located in a transitional zone between two major vegetational areas known as the Blackland Prairies and the Eastern Cross Timbers and within a minor vegetational area (found in North Central Texas) identified as the Red River Area (Diggs, Lipscomb and O'Kennon 1999). The Blackland Prairies, comprised of black, waxy, clay soils, are found to the east and south of the Refuge while the sandy soils of the Eastern Cross Timbers are located west of the Refuge. Of the 11,320 acres that make up the Refuge, approximately 2600 acres are classified as wetlands and 7278 acres are uplands. Of the uplands, 3740 acres are grasslands, 1500 acres are woodlands, and 700 acres are croplands with 350 acres as administrative lands. The Nocona Unit is comprised of approximately 822 acres of former rangelands with uplands and bottomlands consisting of grasses and forbs in the uplands and oak, pecan (*Carya illinoensis*), and cottonwoods in the bottomland and riparian areas.

Management of Refuge habitats involves a variety of techniques to control and enhance habitat conditions. The primary objective of habitat management is to provide wildlife species with diverse habitats to meet a variety of requirements for resting, feeding and nesting. Habitat is fundamental for self-sustaining populations of wildlife and plants as well as for functional ecosystems. The Refuge's goal is to conserve wildlife species by protecting and restoring the habitat on which they depend.

Vegetation

The influences of the Blackland Prairies and Eastern Cross Timbers contribute to the diversity of plant species on the Refuge. Stream banks and overflow floodplains support typical bottomland hardwood vegetation. The Blackland Prairies and Eastern Cross Timbers encompass approximately 26,000 square miles in north and central Texas and represents the primary ecological region of north-central Texas (TPWD 2002).

Eastern Cross Timbers
The Eastern Cross Timbers is comprised of a narrow band of black jack and post oak, separating the region of Black Prairies on the east from the Grand Prairies on the west. The Eastern Cross Timbers are formed by a narrow band of woodland extending along the Red River (Cross Timbers 2002). Early travelers through north Texas coined the name "Cross Timbers" by their repeated crossings of these timbered areas that proved to be a barrier to their travel on the open prairies to the east and west. The location of the East and West Cross Timbers was well known by these early travelers (TPWD 2002).

The soil of the Eastern Cross Timbers is very fertile, producing large trees and a wider variety of trees and shrubs. In pioneer times the band of timber was a famous landmark. It was also a formidable obstacle to travelers because of the density of growth. It served as a dividing line between the hunting grounds of the Plains Indians and East Texas Indians (Cross Timbers 2002). Cross Timbers oaks are used for firewood, railroad ties, and poles, but the most important function of the timber belt is preserving water. The timber prevents rain water from immediately running off the surface and causes much of it to soak into sand that supplies artesian water for hundreds of wells to the east and south of the Cross Timbers (Cross Timbers 2002). Today, few large tracts of undisturbed woodlands remain in the Eastern Cross Timbers which is perhaps the most fragmented vegetative region in Texas (TPWD 2002).

Blackland Prairies

The Blackland Prairies constitute a true prairie ecosystem and have some of the richest, naturally fertile soils in the world. Characterized by gently rolling to nearly level topography, the land is well dissected and marked by rapid surface drainage. Pecan, cedar elm, various oaks *(Quercus* spp.), soapberry (*Sapinus* spp.), honey locust (*Gleditsiam triacanthos*), hackberry (*Celtis* spp.) and Osage orange (*Maclura pomifera*) are scattered throughout the landscape, with some mesquite invasion. A true tall-grass prairie, the dominant grass is little bluestem. Other important grasses include big bluestem, Indiangrass, eastern gammagrass (*Tripsacum dactyloides*), switchgrass and sideoats grama (*Bouteloua curtipendula*). Scientists believe the richness of the prairie soils is derived from the abundant invertebrate fauna and fungal flora found in the soils themselves. The Blackland Prairies are today almost entirely brought under the plow, with only 5000 acres of the original 12 million remaining. For this reason, many authorities believe that the Blackland Prairies represent some of the rarest landscapes in Texas. The Blackland Prairies harbor few rare plants or animals. What is so special and unique about this ecosystem today, are the grassland communities themselves (TPWD 2002).

Black-eyed Susans (photo by Johnny Beall).

The following general plant communities are found on the Refuge: wetlands, native prairie and introduced grassland-cropland, and woodland.

Uplands

While much of the uplands were historically prairie grassland, woody species existed along streams and in protected areas, presumably where moisture levels were higher and fires did not carry through wooded areas. On the Refuge, the upland landscape is characterized by gently rolling grasslands with invading brushy growth. Hardwoods are found in the lowland valleys. Some steep bluffs of low relief are found along 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 cedar elm and pecan, and brushy invaders such as honey locust and Osage orange. Post (*Quercus stellata*) and blackjack oak (*Q. marilandica*) are found in sandy soil in the western portion of the Refuge. No timber stand improvement or grazing is practiced, but partial control of woody invaders is accomplished by controlled burning. This habitat provides a niche for white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), bobcat (*Lynx rufus*), and raccoon (*Procyon lotor*).

Native Prairie

A mixture of short, intermediate, and tallgrass species comprise the vegetation on approximately 3740 acres of grasslands. Less than 18 percent of this is native grassland. There is a preponderance of big bluestem, little bluestem, Indiangrass, purpletop tridens (*Tridens flavus*), switch grass, and sideoats grama, with meadow dropseed (*Sporobolus asper hookeri*) invading. Native forbs include Maximilian sunflower (*Helianthus maximiliani*), bundleflowers (*Desmanthus* spp.), heath aster (*Aster ericoides*), and milkweeds (*Asclepias* spp.). The vegetation supports ideal habitat for eastern and western meadowlarks, bobolinks (*Dolichonyx oryzivorus*) and various sparrows. It also provides nesting cover for wild turkeys.

An overall decrease in the diversity of native grasslands has occurred in north-central Texas as a result of agricultural expansion and overgrazing. It is well-documented by numerous historical accounts that grasslands dominated the early landscape. These rich native grasslands were magnets for cultural activities, including livestock grazing and farming (USFWS 2002). By the middle 1920s more than 80 percent of the original vegetation had been lost to cultivation. In the second half of the century urbanization continued to reduce the remaining prairie. Another activity with dramatic effect on the vegetation has been the suppression of fire activity, virtually eliminating the primary force that maintained the grasslands by periodically eliminating encroaching woody vegetation as it swept across the landscape. In recent decades, in the absence of fire, much of the Refuge uplands that once supported grassland has now been invaded by woody vegetation and transformed into increasingly dense stands of relatively young woody growth. Cultural influences have led to the proliferation of woody species and the sharp decline in the quality and abundance of tall grass prairie. As a result, the distribution and types of vegetation found on the Refuge today bare only faint similarity to what was found in the area by early settlers, and comparatively little grassland exists today (USFWS 2002). The majority of remaining prairie is under private ownership (World Wildlife Fund 2001).

American lotus (photo by Rick Cantu).

Wetlands

The riparian-palustrine community occurs near and adjacent to the drainage of Big Mineral Creek. The surrounding terrain of the creek is generally flat with occasional shallow depressions, surfaced by clay and sandy loams that support water-tolerant hardwoods, conifers, and various grasses (Big Mineral Creek 2002). The creek channel itself has riparian species such as box elder (*Acer negundo*), black willow, and Plains cottonwood (*Populus deltoides var. occidentalis*). Vegetation in wetland areas include sedges (*Carex* spp.), saltgrass (*Distichlis* spp.), narrow-leaf *(Populus angustifolia)* and broad-leaf cottonwoods *(P. deltoides)*. Various species of aquatic plants such as native millet (*Panicum miliaceum*), pondweed (*Potamogeton nodosus*), smartweed (*Polygonum* spp.), arrowleaf *(Sagitaria* spp.), cattail (*Typha* spp.), rushes (*Juncus* spp.), bulrush (*Scirpus pendulus*), and sedges grow in seasonally flooded and permanent wetlands if moist soil conditions are conducive for seed germination. Lush wetlands help create the unique diversity of habitat on the Refuge that makes the area so attractive to a variety of breeding migratory birds. Open water areas serve as loafing areas for waterfowl, year-round habitat for marsh birds, and seasonal habitat for shorebirds. At least eight impoundments afford shallow, seasonally flooded wetlands and deepwater lakes, vegetated wetland marshes for nesting and brood rearing, and aquatic plants and invertebrates for forage.

Introduced Grasses-Cropland

The Refuge currently farms approximately 700 acres of cropland. Approximately 280 acres of this is farmed adjacent to the lakeshore and is subject to heavier goose use than the remaining fields. Management objectives are primarily to provide browse for wintering and spring feeding needs, but also includes "hot foods" (i.e., grains of high caloric value like corn utilized during high stress periods) production to hold geese after hunting season to alleviate depredation off Refuge. Crops currently grown include Japanese millet, winter wheat, and corn. Other wildlife species such as white-tailed deer, northern bobwhite quail and wild turkeys, benefit and utilize the foodstuffs planted for migrating waterfowl.

Exotic, Invasive and Pest Plants

Invasive plant species are a threat to the Refuge because they can displace native plant and wildlife species, degrade wetlands and other natural communities, and reduce natural diversity and wildlife habitat values. They have the potential to out compete native species by dominating light, water, and nutrient resources. Once established, getting rid of invasive plants is expensive and labor-intensive. Unfortunately, their characteristic abilities to establish easily, reproduce prolifically, and disperse readily, make eradication difficult. Many of these plants can cause measurable economic impacts, particularly in agricultural fields. Preventing new invasions is extremely important for maintaining biodiversity and native plant populations. The control of existing, affected areas will require extensive partnerships with adjacent landowners, state, and local governments.

The altered, disturbed and fragmented landscape of the Refuge provides an ideal situation for the introduction, establishment and proliferation of invasive plant species. Several invasive plant species, or noxious weeds, are well established on and around the Refuge, requiring action on the part of management to restore and maintain habitat useful to migratory birds, other species and general ecosystem health. Exotic species (non-native) comprise roughly 13 percent of the total of 684 total plant species documented on the Refuge. Of these exotic species, several are known to be invasive, including curly dock (*Rumex crispus*), field bindweed (*Convolvulus arvensis*), henbit (*Lamium amplexicaule*), pigweed or lambsquarter (*Chenopodium album*), Chinese bust clover (*Sericia lespedeza*), Johnson grass *(Sorghum halepense*), jointed goat grass (*Aegilops cylindrica*), several mustards of assorted genera, brome grasses (*Bromus* spp.), wild oats (*Avena fatua*), and old world bluestems of various genera.

Some native plants pose management problems due to their negative effects on habitat and are considered pest species. Cocklebur (*Xanthium strumarium*), sunflower (*Helianthus* spp.), ragweed (*Ambrosia* spp.) devil's claw (*Proboscidea louisianica*), and balloon vine (*Cardiospermum halicacabum*) are among the most notable of these native pest species.

Numerous native woody species are also considered pest species due to their habit of invading grasslands in the absence of fire, drastically changing the habitat type and quality through plant succession. This group includes eastern red cedar (*Juniperus virginiana*), winged elm (*Ulmus alata*), cedar elm, honey locust, honey mesquite (*Prosopis glandulosa*), and Osage orange.

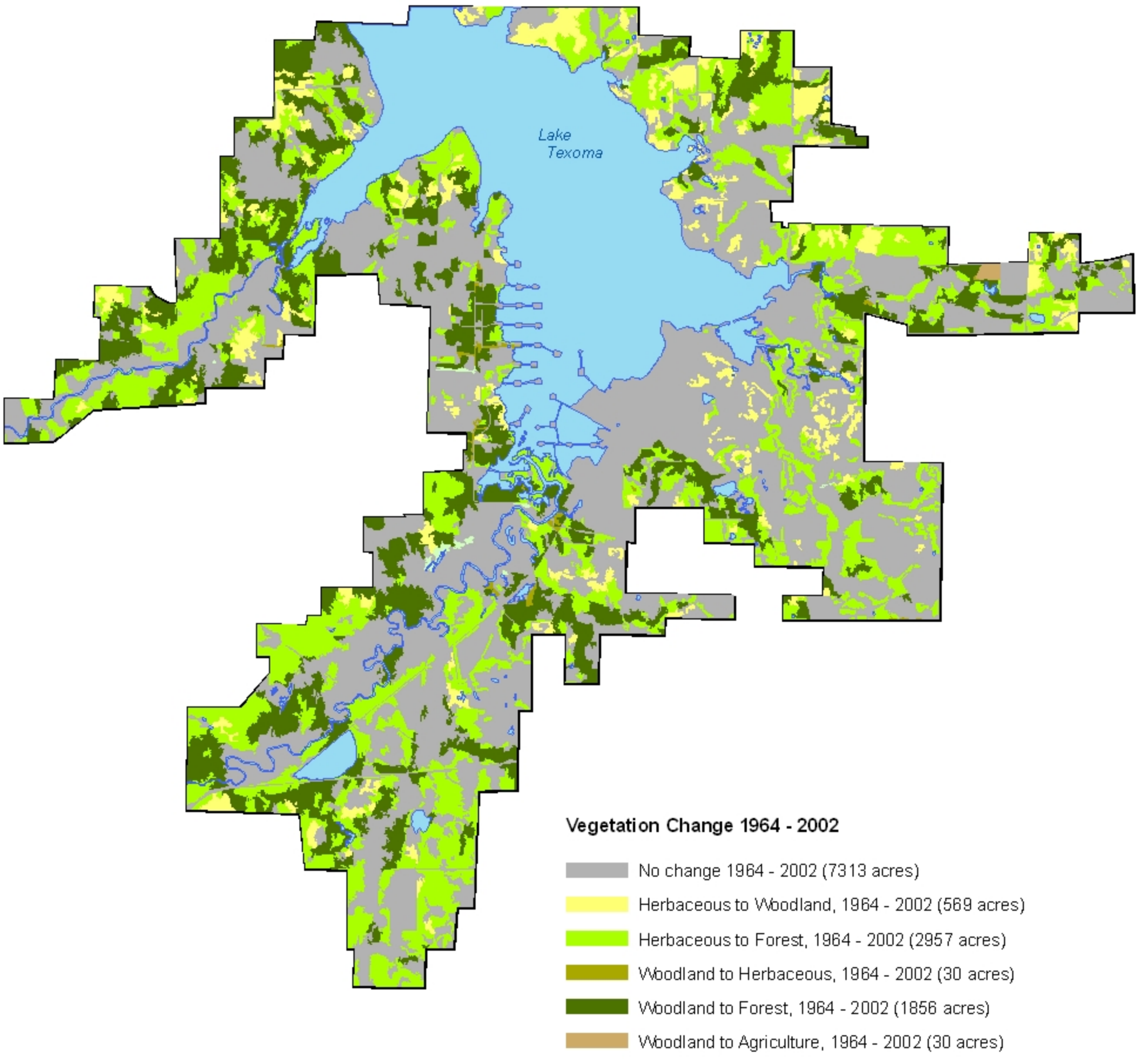
The success of control efforts depends largely on the soundness of the control strategy employed. Understanding the biology of each invading species, how it got there and how it spreads is critical to designing an effective control regime. Developing an integrated strategy for control based on these variable factors will provide a strategy utilizing the best management practices for each species and location.

Integrated pest management is incorporated into all aspects of Refuge operations. Refuge farming operations utilize mechanical and chemical means when warranted. The Refuge's cooperative farmer uses Roundup for Johnson grass control. Venoco Oil Company also uses Roundup to control weeds around their oil facilities.

In addition to control and eradication of invasive species currently found, the Refuge recognizes additional steps need to be taken to prevent the inadvertent spread of those species to other parts of the Refuge and the introduction of additional species or infestations brought in from outside the Refuge. Chapter 5 discusses the steps the Refuge is proposing to implement for control and eradication of invasive species.

U.S. Fish & Wildlife Service

Hagerman *National Wildlife Refuge*



Vegetation Change of Hagerman National Wildlife Refuge from 1964 to 2002

Change detection derived from vegetation classifications to the Physiognomic Class of the National Vegetation Classification System (NVCS). Data representative of field condition changes from 1964 to 2002. Overall map accuracy exceeds 80%.

Hagerman NWR boundary

kilometers
0 0.5 1 2

miles
0 0.5 1 2

Nocona Unit

No recent evaluations have been conducted on the status of habitats at the Nocona Unit. However, prior to acquisition by the Service, the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS) completed a conservation plan for the landowner at the time. Range evaluations were done and indicated fair to poor range conditions on the greater part of the parcel. Vegetation was composed of small amounts of sideoats grama, hairy grama (*Bouteloua hirsuta*), silver bluestem (*Bothriochloa laguroides*), buffalograss (*Buchloe dactyloides*), Texas winter grass (*Nassella leucotricha*), and more than 50 percent annual grasses and forbs such as broomweed (*Gutierrezia* spp.) and ragweed. The uplands are beginning to see an invasion of honey mesquite. Remnants of higher quality prairie plants are present and could be encouraged with proper management.

Wildlife

The Refuge supports a diversity of plants and animals of the Red River Basin. These species, including plants, game and nongame vertebrates, and invertebrates, are important contributors to the overall biodiversity on the Refuge. Conservation of migratory birds is often considered the central connecting theme of the Refuge System. Approximately 50 species of waterfowl and other migratory gamebirds have been Service priorities since the 1930s. The Refuge was established primarily to provide habitat for "migratory birds and other wildlife," such as ducks, shorebirds, geese and cranes. Species that depend on the Refuge, especially during the winter or as migratory bird stopover habitats include bald eagles (*Haliaeetus leucocephalus*), snow geese (*Chen caerulescens*), Ross' geese (*C. rossii*), Canada geese (*Branta canadensis*), and white-fronted geese (*Anser albifrons*). The Refuge has documented 316 species of birds, 34 species of mammals, 65 species of reptiles and amphibians, and 62 species of fish. Management of many of these species remains a collaborative effort with the TPWD. The Refuge's rich mixture of tall grass prairie, riverine bottomland hardwoods, and wetland habitats also support other rare and declining migratory birds, particularly neotropical songbirds and federally listed species. The Refuge also represents the largest tract of contiguous native habitat in Grayson County.

Nocona Unit

No recent wildlife surveys have been conducted on the Nocona Unit. Prior to acquisition, the Service conducted a cursory survey and determined the area to have valuable wildlife resources worthy of protection. The property consists of riparian habitat, prairie grasslands, forested bottomlands and wetlands. The riparian corridor habitat is essential for migratory birds, waterfowl and game species, such as white-tailed deer. The forested bottomlands with its natural wetlands, provides resting cover and feeding habitat for waterfowl and other migratory birds. The uplands contain prairie grasslands that would benefit wildlife species which depend on this habitat.

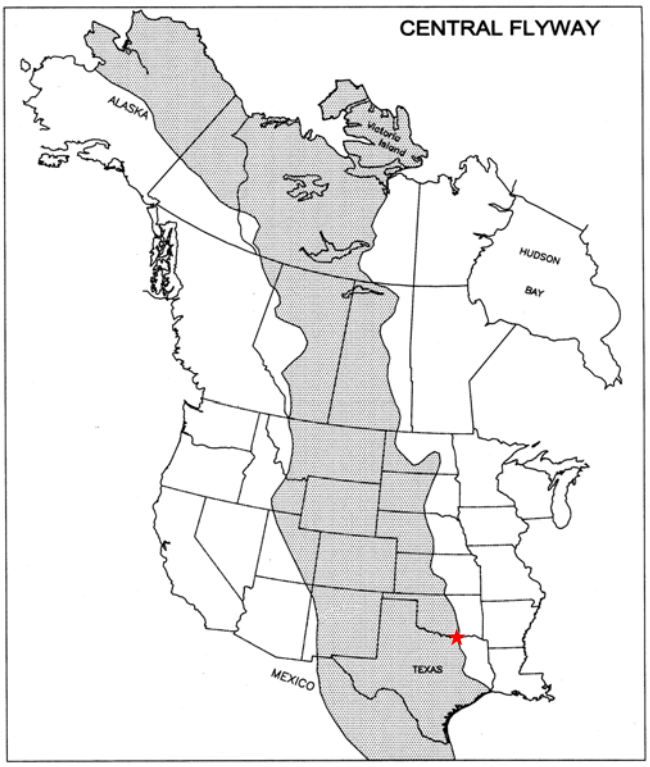
Birds

The Refuge is located within the Central Flyway, a route traveled annually by numerous species of waterfowl and migratory birds. The Refuge enjoys a reputation as a birding mecca in north-central Texas. Although a total of 316 bird species have been recorded on the Refuge since it was established in 1946, recent surveys show 273 different bird species regularly occur on the Refuge, of which 80 species nest and 193 are migratory. Painted buntings (*Passerina ciris*), cardinals (*Cardinalis cardinalis*), scissor-tailed flycatchers (*Tyrannus forficatus*), blue grosbeaks (*Guiraca caerulea*), eastern meadowlarks (*Sturnella magna*), northern mockingbirds (*Mimus polyglottos*), blue jays (*Cyanocitta cristata*), northern bobwhites, and red-bellied woodpeckers (*Melanerpes carolinus*) are common nesting birds. Neotropical migrants such as warblers, flycatchers, tanagers, orioles, sparrows, and others pass through the Refuge each spring and fall with many of these species

remaining to nest. Game birds on the Refuge include mourning dove (*Zenaida macroura*), northern bobwhite quail and wild turkey. The wild turkey population numbers about 200-300 birds and are not hunted on the Refuge. Many declining species either occasionally or commonly occur on the Refuge, including the American golden plover (*Pluvialis dominica*), prothonotary warbler (*Protonotaria citrea*), painted bunting and Hudsonian godwit (*Limosa haemastica*). Other rarely seen birds that occur on the Refuge include the peregrine falcon, king rail (*Rallus elegans*), cinnamon teal (*Anas cyanoptera*), snowy plover (*Charadrius alexandrinus*), Bell's vireo (*Vireo bellii*) and least bittern (*Ixobrychus exilis*).

The Refuge attracts 15 species of raptors during the fall and spring migration period including ospreys (*Pandion haliaeetus*), rough-legged (*Buteo lagopus*) and Swainson's hawks (*B. swainsoni*), northern harrier (*Circus cyaneus*), sharp-shinned (*Accipiter striatus*) and Coopers' hawks (*A. cooperii*). The Refuge provides excellent wintering habitat for bald eagles and several to many are seen each year, particularly along Lake Texoma. Nesting raptors include red-tailed (*Buteo jamaicensis*) and red-shouldered hawks (*B. lineatus*), northern harriers, Mississippi kites (*Ictinia mississipiensis*), and American kestrels (*Falco sparverius*). Broad-winged hawks (*Buteo platypterus*) also occasionally nest on the Refuge. Other raptors infrequently observed on the Refuge include the golden eagle (*Aquila chrysaetos*), peregrine, merlin (*Falco columbarius*) and prairie falcons (*F. mexicanus*).

Migrating and Wintering Waterfowl



Refuge location within the Central Flyway route.

The Flyway System was initiated in 1948 to allow for differing regulations in the management of waterfowl populations migrating through each "flyway". The term "flyway has long been used to designate the migration routes of birds. For management purposes, four waterfowl flyways - Pacific, Central, Mississippi, and Atlantic, were established in the United States. This was the beginning of large-scale species management. Further efforts towards species management came into effect when bag limits were reduced or seasons were closed on specific species that were in danger of being over hunted. Flock management within flyways was put into effect to allow more refinement in regulations for specific groups of birds (USGS 2000). To varying degrees the waterfowl populations using each of these flyways differ in abundance, species composition, migration pathways, and breeding ground origin. There are differences also in levels of shooting pressure and harvest. The Refuge is located within the Central Flyway. The portion of this flyway within the United States is comprised of Kansas, Nebraska, North Dakota, South Dakota, Oklahoma, Texas, and portions of Colorado, Montana, New Mexico, and Wyoming.

The management objectives of the Refuge contribute to the objectives of the Central Flyway Management Program. The Refuge serves the objectives of its establishment by providing a protected

roost site for geese and quality winter habitat to sustain the condition of migratory waterfowl for spring migration and reproductive success. Many factors within the lands of the Central Flyway can affect migratory birds. Conversely, management activities that occur on these refuges can have wide ranging effects on the bird populations of the entire Central Flyway. Maintaining the health and condition of the birds wintering at the Refuge affects their spring migrational and reproductive successes each year. Other factors influencing the bird use of this area include the activities of other countries, local farming practices on neighboring farms, the activities of federal and state agencies, private organizations, local governments, the influence of treaties affecting migratory species and wildlands, and finally, natural factors such as climate patterns.

Snow geese (USFWS photo).

One of the Refuge's outstanding features is the high concentrations of wintering and migratory waterfowl. Up to 7500 Canada geese, 10,000 snow geese, and several hundred white-fronted and Ross' geese winter on the Refuge. Canada geese show up around October followed by snow geese in November. They remain until about March where they return to their northerly breeding grounds. 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 numbers of ducks are in the fall and spring with peak numbers approaching 20,000 in October.

Long-legged wading birds attract almost as much attention on the Refuge as the waterfowl. Great blue herons (*Ardea herodias*) and great egrets (*Casmerodius albus*) are the most numerous and are found year-round. Little blue herons (*Egretta caerulea*), green herons (*Butorides striatus*), cattle egrets (*Bubulcus ibis*) and snowy egrets (*Egretta thula*) are common. Night herons (black-crowned, *Nycticorax nycticorax* and yellow-crowned, *N. violaceus*), and white-faced ibis are also seen each year.

Little blue heron (photo by Rick Cantu).

Spring and fall migrations are highlighted by thousands of white pelicans (*Pelecanus erythrorhynchos*) moving through the Refuge. More than 30 species of shorebirds migrate through the Refuge with peak numbers occurring in April and August.

Shorebird numbers rise and fall with the lake levels. If receding water levels coincide with the migration, numbers and diversity of shorebirds can be impressive. Killdeer (*Charadrius vociferus*) and Baird's (*Calidrus bairdii*), western (*C. mauri*) and spotted sandpipers (*Actitis macularia*) are the most abundant shorebirds. The Refuge consistently ranks among the Top Twenty locations to see high numbers of several species, including upland, buff-breasted (*Tryngites subruficollis*) and solitary sandpipers (*Tringa solitaria*), and willets (*Catoptrophorus semipalmatus*).

Mammals

The Refuge provides habitat for some 34 species of mammals including: white-tailed deer, bobcat, coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), swamp rabbit (*Sylvilagus aquaticus)*, racoon, striped skunk (*Mephitis mephitis*), muskrat (*Odantra zibethicus*), beaver (*Castor canadensis*), longtail weasel

(*Mustela frenata*), mink (*M. vison*), nine-banded armadillo (*Dasypus novemcinctus*), and the thirteen-lined ground squirrel *(Spermophilus tridecemlineatus*).

White-tailed deer, the only "big game" mammal on the Refuge, vary in numbers between 400 to 600, which seems to be within the carrying capacity of the Refuge. In recent years, feral hogs have become a concern on the Refuge because they tend to damage crops and destroy wildlife habitat. Since feral hogs are considered a non-game species, there is no state-regulated hunting season or bag limit. Currently, feral hogs may be taken on the Refuge during the deer archery hunt and hog trapping by special permit also helps to reduce the population.

Reptiles and Amphibians

The exceptional mosaic of upland, bottomland, and wetland habitats on the Refuge supports a wide variety of reptiles and amphibians. Reptiles and amphibians most often seen (or heard) on the Refuge include: western cottonmouth (*Agkistrodon contortrix laticinctus*), western pygmy rattlesnake (*Sistrurus miliarius streckeri*), canebrake (timber) rattlesnake, western diamondback rattlesnake (*Crotalus atrox*), eastern glass lizard (*Ophisaurus ventralis*), Texas blind snake (*Leptotyphlops dulcis dulcis*), ground skink (*Scincella lateralis*), broad-headed skink (*Eumeces laticeps*), eastern collared lizard (*Crotaphytus collaris collaris*), northern fence lizard (*Sceloporus undulatus hyacinthinus*), Texas spiny lizard (*S. olivaceus*), Texas spiny softshell turtle (*Trionyx spiniferus emoryi*), ornate box turtle (*Terrapene ornata ornata*), Mississippi mud turtle (*Kinosternon subrubrum hippocrepis*), stinkpot (common musk turtle) (*Sternotherus odoratus*), common snapping turtle (*Chelydra serpentina serpentina*), three-toed box turtle (*Terrapene carolina triunguis*), western narrow-mouthed toad (*Gastrophryne olivacea*), bullfrog (*Rana catesbeiana*), leopard frog (*Rana pipiens*), spotted chorus frog (*Pseudacris clarki*), gray tree frog (*Hyla versiclor*), East Texas toad (*Bufo woodhousii velatus*), Rocky Mountain toad (*Bufo woodhousii woodhousii*), small-mouthed salamander (*Ambystoma texanum*), and barred tiger salamander (*A. tigrinum mavortium*). At least 65 reptiles and amphibians have been observed, and several are documented by specimen in university collections. Another nine species are expected to range in the area but have not been confirmed by specimen collection.

Gray tree frog (photo by Johnny Beall).

Fish and Invertebrates

The Lake Texoma fishery is abundant and varied with about 62 fish species known from the Refuge. The lake is highly regarded as the place to go for big "stripers" or striped bass (*Morone saxatilis*). Free-flowing current in the Red River makes Lake Texoma one of the few lakes in Texas with a self-sustaining population of striped bass, and one of only eight inland freshwater reservoirs worldwide where this species has spawned (TPWD 2003). Baseline fish data indicate that the dominant species in the Refuge lakes are: shad (*Dorosoma* spp.), gar (*Lepisosteus* spp.), sunfish (*Lepomis* spp.), largemouth bass (*Micropterus salmoides*), white bass (*Morone chrysops*), crappie (*Pomoxis* spp.), striped bass, and several species of catfish (*Ictalurus* spp.).

Common aquatic invertebrates of the Refuge include damselfly (Order *Odonata*), diving beetles (Order *Coleoptera*), water fleas (Subphylum *Crustacea*), dragonfly nymphs (Order *Odonata*)

backswimmers (Order *Hemiptera*), snails (Phylum *Mollusca*), crayfish (Order *Decopoda*), and a variety of species common to brackish and freshwater habitats. Chironomids (non-biting midges (Order *Diptera*), are particularly important marsh species, as the larvae furnish an important waterfowl food source.

Rare or Declining Species

The Refuge provides habitat for a variety of rare or declining species, including several federally proposed, listed (threatened or endangered) and candidate species and other species of concern. Declines are often related to loss and fragmentation of suitable habitat, increasingly large areas being cultivated for crops, lack of 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. There are no known federally listed or other rare or sensitive plants on the Refuge. Management actions taken on the Refuge adhere to compatibility standards, NEPA, Endangered Species Act (ESA) compliance, and Service regulations to ensure that endangered species are not adversely impacted.

Federally 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". Endangered means a species is in danger of extinction throughout all or a significant portion of its range. Threatened means a 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. Proposed species means any species of fish, wildlife, or plant that is proposed in the Federal Register to be listed under section 4 of the ESA. The Refuge has no documented resident endangered or threatened species. The least tern, bald eagle, and piping plover utilize the Refuge during migrations or as nesting or wintering grounds.

Least tern (photo by Rick Cantu).

Least Tern

Least terns were fairly common through the late 1880s, but were nearly extirpated by market hunters around 1900 for their delicate plumate 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 of tern nesting beaches for housing, resorts, 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 prompted the Service to list the least tern as endangered on May 28, 1985. Texas also lists this species as endangered.

This colony-nesting waterbird is a species that seldom swims, spending much of its time on the wing (Hubbard 1985). The flight is light, swift, and graceful, and it is developed to the point that allows the birds to easily snatch fish, crustaceans, and insect food from the surface, almost without missing a beat. They nest on the ground, on sandbars in rivers, lakes or pond edges, typically on sites that are

sandy and relatively free of vegetation. Least terns are migratory and breed along the Red, Mississippi, Arkansas, Missouri, Ohio, and Rio Grande river systems.


Bald eagle (USFWS photo).

Least terns arrive on the Refuge about May and nest successfully in fair numbers within the Big Mineral Area along Lake Texoma's shorelines. Up to 22 nests have been documented on the Refuge in a given year. They nest on the gravel oil company roads that jut out into Lake Texoma. The lakeshore is also used as a migration staging area and terns depart from the Refuge about August and head south to winter mostly in Central and South America.

Bald Eagle

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 Texas, due to nationwide recovery efforts (USFWS 1995a). In 1999, the bald eagle was proposed for de-listing (USFWS 1999). Texas currently lists the bald eagle as threatened.

As many as 10 bald eagles have wintered on the Refuge, arriving between October and November with a population peak around January. Eagles traditionally roost in the cottonwood trees along the shores of Lake Texoma. Cottonwood roost sites, open water, abundant waterfowl, and fish on or near the Refuge make it an attractive and protected haven for wintering bald eagles.

Piping Plover

The piping plover is a bird of sandy beaches or sandflats along the ocean or inland lakes preferring exposed, gravelly, sparsely vegetated sites for nesting. Texas wintering habitat is comprised of beaches, sandflats, mudflats, algal mats, and dunes along the Gulf Coast and adjacent offshore islands, including spoil islands. Piping plovers are "site tenacious" or consistently return to the same breeding and wintering areas each season. They feed on freshwater and marine invertebrates washed up along the shoreline. Their diet also includes terrestrial invertebrates such as beetle and fly larvae.


Piping plover (USFWS photo).

Piping plovers suffered significant population declines due to the loss and/or modification of their habitat and from detrimental human activities (Haig 1992). Beach development, dune stabilization, damming and channelization of rivers, and wetland drainage are factors directly associated with habitat losses. Other threats include harassment of destruction of birds or nests by people, vehicles, and domestic pets. River damming and channelization have adversely affected the species' habitat by eliminating sandbars or shoreline habitat, allowing vegetation encroachment, and altering water flow regimes. This prompted the Service to list the Great Lakes watershed populations of piping plovers as endangered in 1985, while the remaining populations were listed as threatened. Piping plovers occurring in Texas are federally and state threatened. Currently, the Great Lakes and northern Great Plains populations are continuing to decline (Haig 1992).

Piping plovers begin migrating from their breeding grounds around July to September. Those that winter along the Texas Gulf Coast arrive by late July to November. By March to mid-April, the birds make their way back north. Piping plovers are seen occasionally within the Refuge's shoreline habitat during these migratory stopovers on their way to and from the Gulf Coast.

Other federally listed species that may occur but are "accidentals" on the Refuge include the endangered whooping crane and brown pelican (*Pelecanus occidentalis*). To date, there has been only one tentative sighting of a whooping crane that occurred during the migrational period. Additionally, whooping cranes were also observed in the proximity of the Nocona Unit, which lies squarely within their migration corridor.

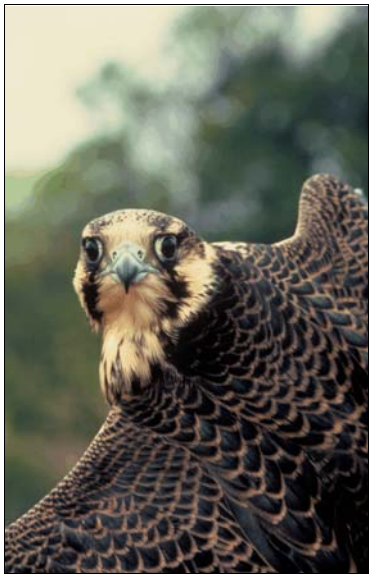
Federally and state endangered brown pelicans have also been documented on the Refuge on Lake Texoma. Brown pelicans inhabit coastal beaches and lagoons and rarely occur in freshwater habitats, particularly this far inland. More frequently, they are turning up in places they do not normally occur (i.e., reservoirs all over Texas, Oklahoma, New Mexico, and Arizona) (B. Howe, pers. comm.). It is thought to be an indication of overall population increases and post-breeding wandering (B. Howe, pers. comm.). Still a straggler inland, brown pelicans may irregularly occur on the Refuge and at other sites across the state.

Candidate Species

Candidate species are those species for which the Service has enough information to warrant proposing them for listing as endangered or threatened, 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. Currently, there are no federally proposed or candidate species that occur on the Refuge.

Other Species of Concern

Species of concern are species for which further biological research and field study are needed to resolve their conservation status or are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, state wildlife agencies, other Federal agencies, or professional scientific societies. This includes state-listed endangered or threatened species not included above. The following species of concern are known to occur and/or there is potential habitat on the Refuge:



Peregrine falcon (USFWS photo).

<u>Peregrine Falcon</u>
Peregrine falcons are mostly migratory, medium-sized hawks that are found along mountain ranges, river valleys, and coastlines. Peregrines usually nest on cliff ledges but have readily accepted urban nesting sites such as on the ledges of tall buildings or bridges. Peregrines feed primarily on other passerine birds that opportunity presents (Craig 1986). When hunting, the peregrine will dive or "stoop" on prey striking them in mid-air, sometimes at speeds of over 180 miles-per-hour. Peregrines also use a wide variety of habitats for foraging, including riparian woodlands, coniferous and deciduous forests, shrublands, and prairies (Finch 1992).

Although peregrines were never very abundant, populations began to suffer a rapid decline in the late 1940s. This was coincident with the widespread use of hydrochlorinated pesticides such as DDT. Scientists discovered high levels of DDT in peregrine body tissues and determined that the source was by feeding on birds that had eaten DDT-contaminated insects or seeds (USFWS 1995b). DDT interferes with eggshell formation causing reproductive failure. By June 1970, the peregrine falcon was federally listed as endangered. In 1972, DDT was banned for most uses in the U.S. Nonetheless, peregrine falcon populations continued to decline and were reduced by 80 to 90 percent by the mid-1970s (USFWS 1995b). However, the Service established falcon recovery teams comprised of federal, state, and independent biologists to undertake necessary recovery efforts, such as a captive breeding and release program. As part of a private and multi-agency cooperative restoration effort, over 4000 peregrine falcons were released from 1974 to the early 1990s. The banning of DDT and breed-release recovery efforts led to the federal de-listing of the Arctic peregrine subspecies in October 1994, and the American subspecies on August 25, 1999 (USFWS 1999a). The peregrine falcon is still listed as state endangered in Texas.

In Texas, peregrines nest in the far western portion of the state, primarily on high, vertical cliffs. According to TPWD (2002b), the American peregrine subspecies is a resident of the Trans-Pecos region, including the Chisos, Davis and Guadalupe mountain ranges. Adequate nesting places are essentially unavailable in the north-central part of Texas. Peregrines are infrequently observed during the spring and fall migrations on the Refuge. They use the Refuge as resting and feeding stopovers during migration. Aptly named "duck hawks," peregrines are attracted to the abundant duck and other waterfowl populations occurring on the Refuge.

White-faced Ibis

The white-faced ibis is a chestnut-colored long-legged wading bird of marshes, swamps, ponds, and rivers. It is generally seen in association with shoreline and marsh habitats that border open water. Vegetation within these areas often consists of cattails and bulrush, but other plants (including occasional woody shrub and tree species) are frequently present. The white-faced ibis may also occur in flooded hay meadows, agricultural fields, and estuarine wetlands (Ryder *et al.* 1994). Nesting colonies are located in shrubs and low trees or in dense standing reeds and cattails near or in marshes. They are sensitive to human disturbances and may abandon their nests resulting in reproductive losses. They feed on earthworms, crayfish, frogs, grasshoppers, and other invertebrates in shallow ponds, marshes, irrigated lands, and wet meadows (Finch 1992). The white-faced ibis is declining throughout North America, where continuing threats include the draining of wetlands and the widespread use of pesticides (TPWD 1996). The white-faced ibis is a species of management concern and is state threatened in Texas.

The white-faced ibis is locally common and nests in several marshes in the western United States, particularly in the Great Basin, and winters in large flocks in Mexico, western coastal Louisiana, and eastern Texas (Ryder *et al.* 1994). In Texas, they winter and nest mostly along the Gulf Coast. Northernmost populations regularly undertake north-south migrations but Texas (and Louisiana) nesting birds are mainly resident (Ryder *et al.* 1994). The Refuge provides migration, resting, and feeding sites for the white-faced ibis. This species is usually found within the moist soil management areas from spring through fall.

Texas-horned Lizard

The Texas horned lizard, the state reptile, has declined in abundance in spite of a fairly wide geographic range including south central U.S. to northern Mexico and is found in arid and semiarid habitats in open areas throughout much of Texas, Oklahoma, Kansas, and New Mexico. The horned lizard has virtually disappeared in eastern and central portions of its range in Texas resulting from human disturbances such as habitat conversion to agriculture and urban development (Hodges 1996). The use of pesticides to kill ants and invasions of the imported fire ant (*Solenopsis invicta*) are

additional factors responsible for declines of horned lizards (Hodges 1996). As a result, the horned lizard is listed as threatened by the State of Texas. Open habitats on the Refuge provide suitable habitat for the species. However, horned lizards are extremely rare and have not been documented recently.

Texas-horned lizard (USFWS photo).

Paddlefish

The primitive paddlefish is one of the oldest surviving species in North America and one of only four native Texas cartilaginous fishes (TPWD 2002a). The Spanish explorer Hernando de Soto first documented the paddlefish in the Mississippi River in 1542 (Springer 2000). It was thought to be a new species of freshwater shark and like sharks, they lack a bony skeleton. Paddlefish are swimming dinosaurs that measure up to 87 inches long and can live up to 30 years. They can weigh as much as 200 pounds but most are usually between 10-15 pounds (TPWD 2002a). This species feeds on tiny plant and animal plankton and prefers slow-moving water of larger rivers as well as oxbows and lakes.

The paddlefish ranges from the Mississippi River basin to as far south as the Gulf of Mexico. In Texas, they occurred in the Red River's tributaries, Sulphur River, Big Cypress Bayou, Sabine River, Neches River, Angelina River, Trinity River, and the San Jacinto River (TPWD 2002a). However, paddlefish populations steeply declined around the early to mid 1900s, following a period of dam building, and were absent from many parts of their former range by the late 1970s. Paddlefish need large amounts of flowing water for successful spawning and the construction of dams has limited their spawning runs (from March through June) and dispersal. Other factors associated with their decline include excessive habitat loss and commercial harvest. In Texas, the paddlefish is a state threatened species and fishing of the species is not allowed while Oklahoma does allow paddlefish fishing.

Recently, Tishomingo National Fish Hatchery biologists and involved states restored paddlefish to the Red River above Denison Dam after a 50-year hiatus; this involved cesarean spawning and captive rearing. Restoration efforts in Oklahoma and Kansas created fishing opportunities where none existed for years. In 1999, 5400 paddlefish were placed in Lake Texoma along/near the Refuge, as part of this restoration effort.

Canebrake/Timber Rattlesnake

The canebrake/timber rattlesnake is widely distributed across the lowlands of southeast Virginia to northern Florida and west to central Texas; north to the Mississippi Valley and southern Illinois down to southeast Texas. Habitat of the species includes can thickets, swamplands, rocky wooded hillsides or heavy timber and dead tree hollows (Houston Zoo 2001). The species feeds on small mammals such as rodents. Sometimes called the "velvet tail" rattlesnake, this snake is less aggressive than other rattlers and will remain motionless and quiet when approached. This rattlesnake, as with other reptiles, was state listed as threatened mostly to protect it from commercial harvest (B. Ortego, pers. comm.). On the Refuge, the canebrake/timber rattlesnake is uncommon but may occur in the shrub zones and woodlands portions of the Refuge.

Research

Research on the Refuge is conducted for wildlife and the habitats that support them, as well as other resources such as cultural resources and water quality. Research is conducted by Refuge staff, academia, volunteers and other federal and state agencies.

Research Natural Areas (RNA)

Federal agencies use RNAs as a land management category to designate lands permanently reserved for research and educational purposes. Natural processes are supposed to dominate in these tracts which preserve natural features. Principal goals in protecting these lands are:

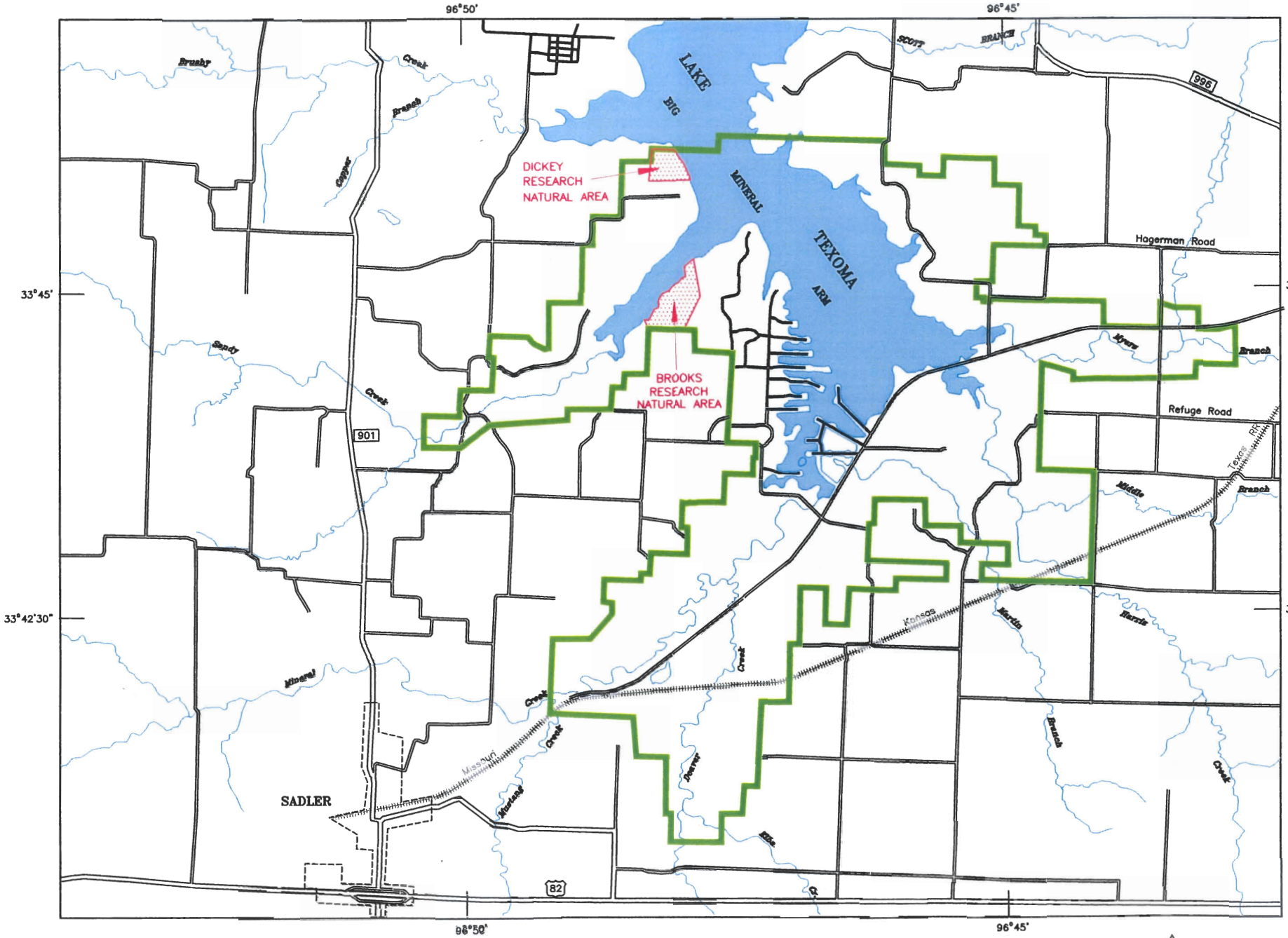
- To preserve a representative array of all significant natural ecosystems as sources of baseline data against which the effects of human activities in similar environments can be measured.
- To provide sites for studies of natural processes in undisturbed ecosystems.
- To provide gene pool reserves for plant and animal species, especially rare ones.

Both the Brooks RNA (50 acres) and Dickey RNA (40 acres) represent the Eastern Cross Timbers (post and blackjack oak) features. Separated by approximately one mile, both are located in the northwest section of the Refuge. Sandy Creek separates the two RNAs. Elevations within the RNAs range from 650 feet to 680 feet above msl. The RNAs generally slope toward the east draining into Lake Texoma.

HAGERMAN NATIONAL WILDLIFE REFUGE
GRAYSON & MONTAGUE COUNTIES, TEXAS

UNITED STATES
DEPARTMENT OF THE INTERIOR

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF REALTY
FROM USGS QUADRANGLE MAPS AND
OTHER OFFICIAL RECORDS.

ALBUQUERQUE, NEW MEXICO AUGUST 2004

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0 500 1000 2000 3000 METERS

NAD 1927
TEXAS NORTH CENTRAL

NORTH

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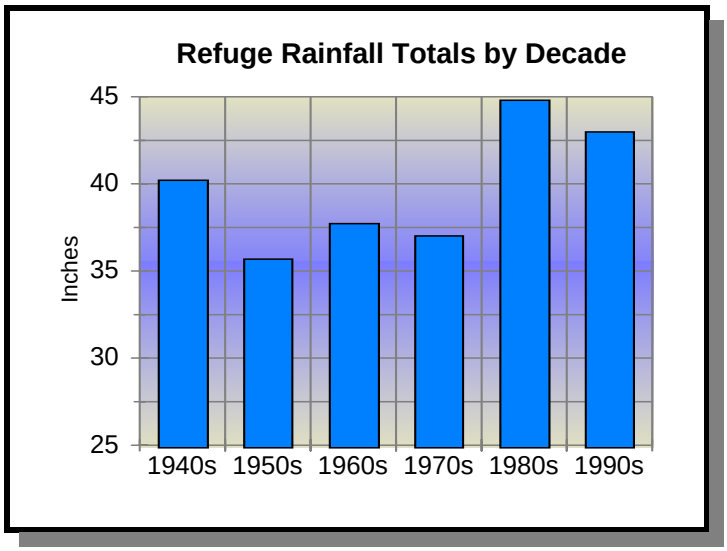
Climate



The climate of north-central Texas has a broad range of both temperature and precipitation. Situated at elevations ranging from approximately 600 to 700 feet above msl in elevation, the Refuge has hot summers with temperatures exceeding 100 degrees Fahrenheit during the day and averaging 75 to 80 degrees Fahrenheit at night. Winters are mild with an occasional surge of cold air causing a drop in temperature. Snowfall, or other frozen precipitation, is infrequent, but not uncommon. Winter day temperatures average 44 degrees Fahrenheit, with an average daily minium of 33 degrees Fahrenheit. The Refuge receives most of its rain during the spring and fall. However, influence from the Gulf of Mexico can produce large amounts of rainfall. Winters and summers are drier. Recent average annual rainfall has been approaching 40 inches, although 32 to 35 inches is closer to historical records. The total annual precipitation is usually adequate for production of small grains. Of the total annual precipitation, 22 inches, or 55 percent, usually falls in April through September. The 55 year rainfall average for the Refuge is 39.69 inches.

Physiography and Geology

Away from the main lake and watershed, the topography is mainly gently rolling grassland with invading brush. Hardwoods are located in the lowland valleys. Steep bluffs of low relief are found along Sandy Creek. Numerous drainages bisect the Refuge and surrounding area.

The Refuge lies on the border between the lower Cretaceous and upper Cretaceous rock formations that were laid down between 66 and 144 million years ago. Lower Cretaceous rock formations virtually blanket the center half of Texas. Upper Cretaceous formations are found in a band from the Red River southward through Dallas/Fort Worth to San Antonio and westward to Del Rio (Spearing 1991). The lower Cretaceous portion is divided into the Washita, Fredericksburg, and Trinity groups from top to bottom, while the upper Cretaceous rocks are assembled into Navarro, Taylor, Austin, and Eagle Ford groups.

Soils

Refuge soils are closely tied to the underlying geologic formations which provide the corresponding parent material. Situated in an area of transition between the Blackland Prairie to the east and south, and Cross Timbers and Prairies to the west, soils vary from heavy clays on the southern and eastern portion of the Refuge to light sandy soils on the northern and western portion. The Eastern Cross Timbers soils are slightly acidic, sandy or sandy loam. They contain fairly uniformed dark-colored alkaline clays, often referred to as “black gumbo,” and are interspersed with some gray acidic sandy loams (TPWD 2002c).

Thirty-nine soil types occur on the Refuge as illustrated on a soil survey map from the NRCS. Eight major range sites occur on the Refuge: claypan prairie, tight sandy loam, sandy loam, loamy bottomland, blackland, eroded blackland, clayey bottomland, and clay loam. The majority of the Refuge soils have moderate to very slow permeability, and moderately deep and deep texture in the loamy to clayey categories. Upland soils are generally mapped as Crockett loam, Wilson silty clay loam, Normangee clay, and Vertel clay. Bottomlands are mapped as frequently flooded Bunyan and Whitesboro soils.

Normangee-Crockett-Wilson soils make up about 40 percent of the Refuge and are located primarily on the northeast and southwest side of the Refuge. Their potential is medium for cultivated crops and high for pasture, as these soils erode easily. Vertel-Heiden is another prominent soil unit (30 percent), located on the south end of Lake Texoma. These soils can also be used for cultivated crops and for pasture with a medium potential for both cultivated crops and for pasture. These soils also erode easily. Terraces can help control erosion in areas of cropland and leaving crop residue on the surface of this soil helps to conserve moisture.

To the west and northwest, the soils consist primarily of the Crosstell, Konsil, and Aubrey fine sandy loams. Potential for pasture and cultivated crops is medium, but these light soils are at extreme risk for erosion. These soils also have a definite acid reaction, as opposed to the above soils, which are alkaline to neutral.

Nocona Unit

Six soil types and five major range sites occur on the Nocona Unit: loamy prairie, claypan prairie, shallow clay, loamy bottomland, and sandstone hills. These soils have moderate to very slow permeability. Upland soils are generally mapped as Renfrow loam and Vernon clay, with smaller acreage of Anocon, Stoneburg, and Truce-Owens sandy loam soils. Bottomlands are mapped as frequently flooded Gowen soils.

Renfrow-Stoneburg-Anocon soils make up over 50 percent of the soil at the Nocona Unit. These soils have medium potential for cultivated crops and medium to high potential for pasture with a moderate hazard for erosion. Gowen soils are located in the bottomlands along Belknap Creek. Their potential is medium for cultivated crops and high for pasture and erosion is moderate.

Land Use

Refuge grasslands evolved with grazing by native ungulates as an inherent part of the environment and have been grazed by domestic livestock since the arrival of early settlers. 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 suitable for crop production and considerable erosion occurred. Prior to Refuge acquisition and for 20 years after, continuous grazing was the rule, and stocking rates were heavy, causing steady deterioration of plant vigor and eventually eliminating many of the warm season perennial grasses that are the hallmark of the tallgrass prairie. 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, in a patchwork pattern of use providing the greatest diversity of microhabitats achievable.

Croplands

Agricultural practices on the Refuge are primarily aimed at providing forage for wintering geese. Refuge cropland use is planned and implemented to produce at least 150,000 pounds of "hot foods", and about 175,000 pounds of browse to meet the forage requirements of geese, ducks, and other wildlife for the critical period of December and January (up to three-quarters of a million use days). Approximately 700 acres of the Refuge are planted with winter wheat, millet, and corn. The crops are grown to be made available to wintering waterfowl and other wildlife from October through February. White-tailed deer also utilize these areas for food and cover.

The Refuge does not irrigate its cropland. The Refuge farming program (in-house/force account) favors mechanical and biological methods of weed control but will also use herbicides when necessary. For example, Roundup may be used on the corn crop to reduce Johnson grass competition. The cooperative farmer has applied Dual (metolachlor) as a pre-emergent herbicide and Roundup for Johnson grass control. The cooperative farmer farms approximately 200 acres.

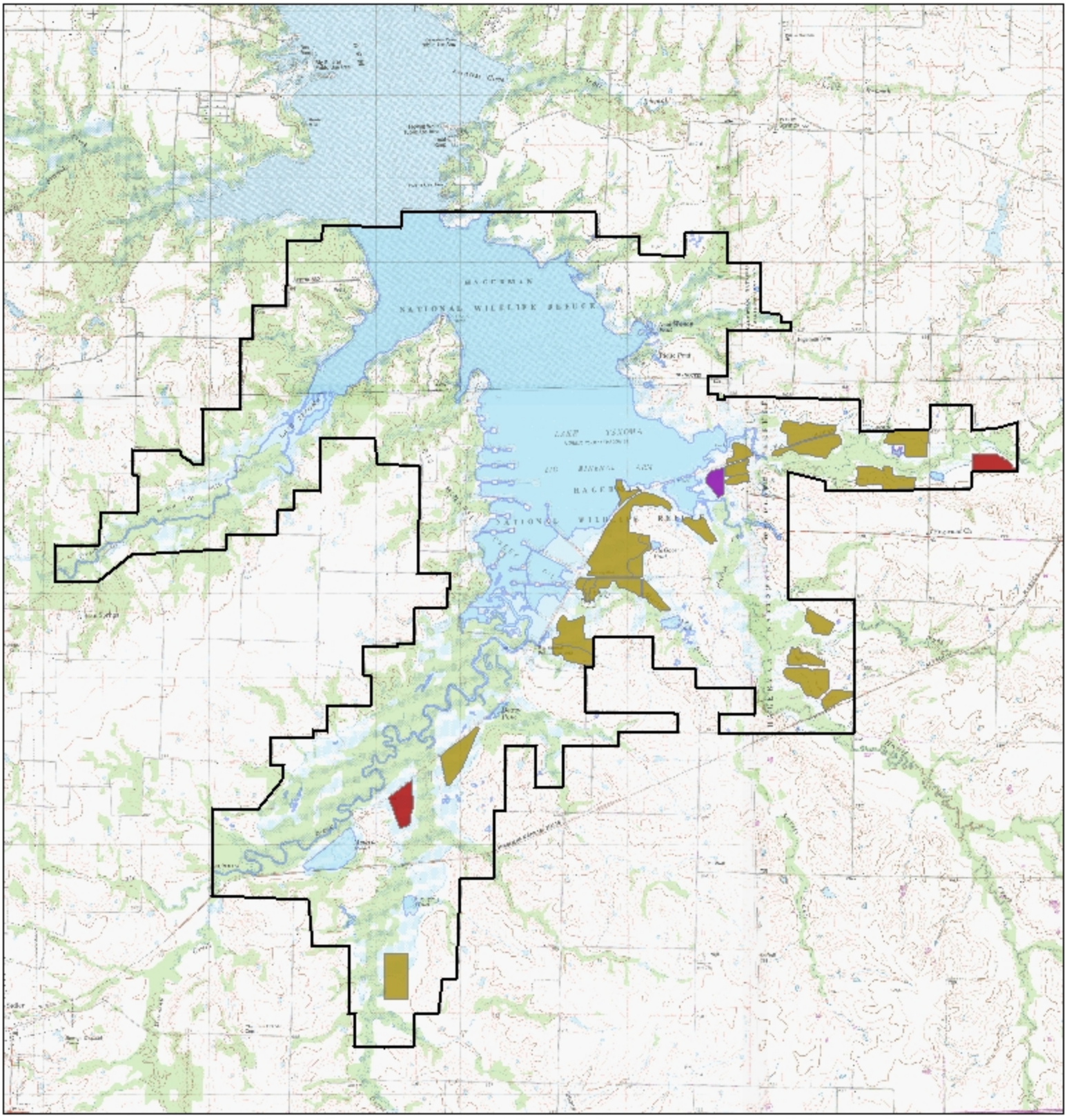
Grazing

Approximately 3000 acres of Refuge lands are grazed. Grazing serves to maintain and encourage native grasses and forbs, and to cycle nutrients through the ecosystem otherwise devoid of large grazing ungulates, and to efficiently utilize a renewable resource. Grazing is determined by a bidding process and management needs.

When Refuge land acquisition began in 1946, a total of 38 landowners were within the proposed boundary. Rangelands were overgrazed and in deteriorated condition. As the Service acquired land, rangelands were placed under a permitted grazing program to former landowners who continued grazing much as they had prior to acquisition. The focus of the Refuge was, after all, waterfowl, and the upland areas did not receive much management attention. Once a controlled grazing program was implemented, over the years, natural grassland communities slowly returned, enhanced by a prairie restoration program that began in the 1960s. The Service recognized its stewardship responsibility for nongame migratory birds, and the importance of grasslands in providing nesting and wintering habitat for them as well.

Rangelands that evolved with native ungulates present require some type of utilization as recovery progresses. Livestock grazing is a habitat management tool used to enhance, support, and achieve established wildlife management objectives. Controlled cattle grazing can approximate the effects of bison on grasslands. Hoof action results in the aeration and compaction of soils, and reseeding of native plants prevents plant stagnation and promotes plant succession towards climax. Improved range conditions from effective grazing practices can provide the widest diversity of animal populations and plant species including a larger variety of forbs, a desirable forage base for deer, seed for nongame migratory birds, and a food source for rodents and other cohorts of the ecosystem. Additionally, the short-term adverse effects to wildlife habitat are not as severe with controlled grazing as with prescribed fire.

Rangeland on the Refuge is presently grazed in a rotational pattern that allows maximum rest. The Refuge manages four grazing units, each with three sets of pastures in a deferred rest-rotation grazing program. Each set of pastures is grazed once in every two to three year cycle, in what is commonly referred to as a switchback rotation. Stocking rates are based on range site information specific to the unit and vary from year to year, depending on the condition of each unit.



U.S. Fish & Wildlife Service

Hagerman NWR

Background image from 1:100,000 scale USGS quadrangle maps.

Projection: UTM, NAD83, Zone 14.

Prepared by: Division of Technical Services
Office of Geographic Information Systems
USFWS - Southwest Region
Albuquerque, NM

January 2006

miles
0 0.5 1 2

kilometers
0 0.5 1 2 3

Agricultural Management Units

- Hagerman NWR boundary
- clover
- fallow
- winter wheat

Haying

A haying plan was drafted in 1996 for the purpose of harvesting native grass seed and as needed for grassland management. Although conducted intermittently, the objective is prairie restoration by precluding brush invasion. Haying is now conducted by Refuge staff.

Water Management

The Refuge is located within the flood pool of Lake Texoma. Forming the border between Texas and Oklahoma, the Red River flows into the west end of Lake Texoma. The Big Mineral Creek is a southern tributary and flows into the south end of Lake Texoma.

The COE operates both Lake Texoma and the water distribution system. Project purposes include flood control, navigation, municipal and industrial water, and recreation. Water resources in the lake are subject to the Red River Compact, and are heavily allocated. The purpose of the Red River Compact, authorized by Congress in 1955 and signed by the member states in 1978, was to resolve and prevent disputes over waters of the Red River Basin that are shared between the neighboring states of Arkansas, Louisiana, Oklahoma and Texas, and to assure the receipt by member states of adequate surface flows and releases. The Texas Commission on Environmental Quality (TCEQ), (formerly the Texas Natural Resources Conservation Commission) also exercises jurisdiction over lake water. The TCEQ protects the State's air, water, and waste management that includes permitting and enforcement of water quality issues.

Water from the lake flows via underground pipes to the lakeside marshes, while ponds and moist soil units are flooded from tributaries of Big Mineral Creek for wetland management. The primary objective for marsh and water management is to provide wintering habitat for migratory waterfowl. Specifically, to provide wintering habitat capable of supporting an average population of 6000 mallards and 5000 Canada geese from December to January. Secondary objectives are to provide habitat for shorebirds, waterbirds and resident wildlife. Of the numerous unnamed ponds at the Refuge, 19 ponds or marshes are actively managed. Most have a system of screw gates, dikes, culverts, and gauges to allow for moist soil management regimes, water storage, and/or periodic drawdowns to enhance the biological productivity of each pond for maximum wildlife benefit. To assure that there is enough water for those impoundments that are managed as moist soil units, no more than half are drained in the same year. Impoundments that are drained are dispersed across the Refuge rather than centrally located. Planned work projects also take this management regime into account. Transects are established to monitor vegetation production value, invertebrate sampling, and water quality.

Management of lakeshore impoundments is seriously impacted by lake levels; too low and there is no water to flood the impoundments, too high and de-watering is impossible. Flooding usually occurs in the spring and fall and has resulted in damage to waterfowl food crops and prolonged inundation of the moist soil units. In addition, flooding has destroyed water control structures, deposits silt in the moist soil ponds, and leaves logs and other debris strewn across roadways and public use areas.

Water is a prime component in any wildlife management regime. The Refuge has rights to store the Service's allotment of project water in ponds, marshes, and lakes within the Refuge. Approved water rights applications, their type, and acre-feet authorized are listed in the following table. Adjudicated water right for 342 acre-feet each year refers to the right to impound for wildlife purposes. The impoundments are permitted by the TCEQ. Adjudicated water right for 208 acre-feet each year refers to the right to divert in order to irrigate 99.1 acres at a flow rate not to exceed five cubic feet per second.

Water Rights Permits for Hagerman NWR

WATER UNIT	PERMIT NUMBER	TYPE	DIVERSION TYPE	ACRE-FEET
Meadow Pond	D-1255	Wildlife	Gravity	30
Deaver Pond	D-1258	Wildlife	Gravity	22
Elm Pond	D-1262	Wildlife	Gravity	28
Taylor Pond	D-1282	Wildlife	Gravity	36
Mineral Marsh	D-1290	Wildlife	Gravity	34
Steedman Marsh	D-1295	Wildlife	Gravity	114
Muleshoe Marsh	D-1300	Wildlife	Gravity	60
Fish Pond 6	D-1320	Wildlife	Gravity	2
Fish Pond 7	D-1340	Wildlife	Gravity	6
Dead Woman Pond	D-1350	Wildlife	Gravity	10

The criterion for listing here is that these facilities hold waters of the state, and are not strictly "Right of Capture" impoundments, like most stock tanks. That is, the water courses upon which these impoundments are located originate beyond the Refuge boundary fence. The impoundments listed in the table are identified in Certificate of Adjudication No. 02-4895, dated June 7, 1987.

Water Quality

All major drainage entering the Refuge, except Sandy Creek, has municipal sewage plant effluent flowing into it. Facilities are listed below, with the stream impacted:

City of Whitesboro	Big Mineral Creek
Town of Sadler	Mustang Creek
Keystone/Sherman Wire	Beaver Creek
Preston Trails Community	Harris Creek
City of Denison	Meyers Branch
Oakcreek Mobile Village	Meyers Branch

In light of this information, water quality of the Refuge could be affected by the discharge of treated water, potentially high in nutrients and other pollutants.

Fire Management

Fire represents an important ecological factor in the development and structure of nearly every terrestrial ecosystem in North America and has been present in natural ecosystems since the origin of climates on earth (Wright and Bailey 1982). Although speculative, it is estimated that the typical fire frequency in the grassland prairie is from 5 to 10 years. This estimate is based on fire frequency

research in ecosystems having types of prairie vegetation mix and topography similar to those features found near the Refuge and adjacent lands (Wright and Bailey 1982).

Probably the major difference between the historical fire regime of the tall grass prairie versus the present is the occurrence of large fires. Before large-scale cultivation of the Great Plains, fires could run for long distances. Presently, with large-scale cultivation in place and the network of roads and highways dividing lands, combined with the lack of continuous grassland fuels, fires cannot make the extensive runs historically recorded. A second probable difference is the human-caused fire frequency. With displacement of the Native-American cultures and lessening of open range cattle ranching practices, most of the historical human causes of fires ceased to be a threat. Today, as in the past, fires tend to be surface fires, occurring with warm temperatures and dry conditions.

Fire management activities on the Refuge consist of prescribed burning and the control of wildfires. The Refuge has one or two wildfires every few years, especially during times of drought. The frequency of fires depends upon annual rainfall. Some fires are caused by passing trains and lightning strikes, but occasional arson fires do occur. Adjacent landowners graze native grasslands and tame grass pastures very close to the ground, so chances of wildfires on private lands is low. Although fire is a natural part of prairie ecology, uncontrolled wildfire can threaten dwellings, livestock, haystacks, field forage and structures such as fences, sheds, feeders, etc. Refuge wildfires are not common and are generally suppressed. Prescribed burning is an important management tool for maintaining the prairie and edge associations by 1) reducing grassland invasion by woody species, 2) reducing accumulated grassland litter, 3) stimulating the growth of warm season perennial grasses, and 4) to reduce flammable accumulations to reduce the wildfire hazard.

A Fire Management Plan (FMP) was developed and completed in 2002. This plan aids in maintaining a diversity of plant communities to accomplish management objectives in support of Refuge purposes for migratory birds. The importance of fire management is reflected in the decisions, findings, and objectives of the FMP (USFWS 2002) which is available upon request. The following information, contained within the plan, briefly discusses the Refuge's fire management programs.

Wildland Fire Management Program

The Wildland Fire Management Program consists of wildfire and prescribed fire. The FMP covers all aspects of the program looking at general preparedness for the Refuge and then focusing on wildfire and prescribed fire aspects of the program. Specific wildland fire management strategies contained within the plan are as follows:

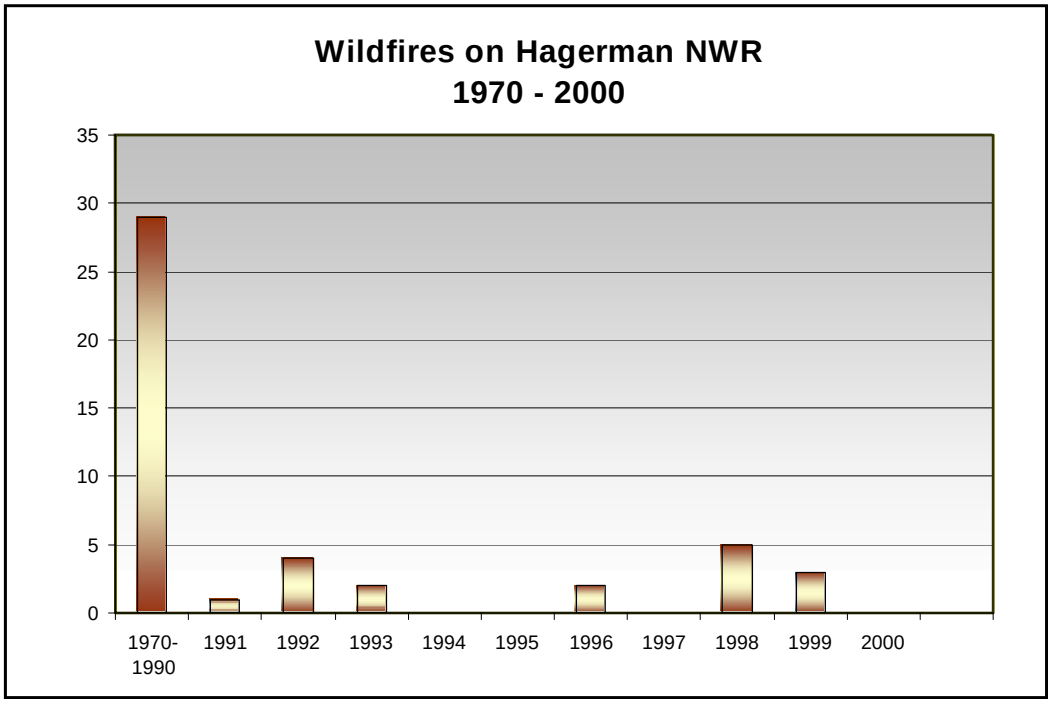
A. Preparedness

- Season - Wildfire is a random event at the Refuge. Although fire has occurred most years, frequency of occurrence does not allow determination of "seasonal" patterns. Rather, the possibility of wildfire occurrence increases as drought conditions worsen. Drought conditions can occur anytime throughout the year.

- Consultation and Coordination - Preparedness includes activities conducted before a fire occurrence to ensure the ability of the Refuge's organization to initiate effective action. This action may include the evaluation of the situation and selection of appropriate management response. Preparedness activities include planning, training, and equipment maintenance. The objective of preparedness is to have a well-trained and equipped organization in place to manage fire situations that confront the Refuge.

B. Suppression

- Firefighter and public safety is the first priority of the Refuge. Except for instances where the life of another is in jeopardy, no one will purposely be exposed, whether Service employee, contractor, or cooperator, to any life-threatening conditions or situations. Every wildfire on Refuge lands requires an initial action using an appropriate management response. The range of appropriate management responses may include high intensity direct efforts or lower intensity indirect efforts. Surveillance to ensure confinement within a designated area is not an appropriate management response.



Prescribed Fire Management Program

Prescribed fires are intentionally ignited under predetermined weather and fuel moisture conditions that permit managers to exert substantial influence over the spread and intensity levels that the fire can achieve. These fires are ignited for purposes of accomplishing resource management objectives. These objectives include, but are not limited to: enhancing wildlife and plant species and populations, reducing hazardous fuels, control of woody invasive plant species, promoting biological diversity, preserving endangered species, and to accomplish basic maintenance needs such as disposal of vegetative waste and debris. All prescription parameters, ranges, and objectives are clearly stated in an individual project plan for management ignited prescribed fire.

A. Strategy and Goals - The goals of the Refuge's prescribed fire program are to:

- Conduct a vigorous prescribed fire program with the highest professional and technological standards, promoting safety and protecting sensitive resource sites.
- Identify the type of prescribed fire that is most appropriate to specific situations and areas.
- Efficiently accomplish management objectives through the application of prescribed fire.

- Continually evaluate the prescribed fire program to meet program goals by refining prescription treatments and monitoring methods, and by integrating applicable technical and scientific advancement.
- Not allow prescribed fire to escape.

B. General Plan for Prescribed Burning - Each prescribed fire must have a complete and approved Prescribed Fire Plan before it is funded and can be carried out. The Prescribed Fire Plan must discuss all key issues and concerns identified during strategic and operational planning.

C. Prescribed Fires Reclassified As Wildland Fires - Prescribed fires that exceed the limits of an approved prescription will be managed as wildfires and handled under appropriate management responses as defined in the contingency section of the Prescribed Fire Plan or by a Wildland Fire Situation Analysis. Once a prescribed fire has been declared a wildfire, a Wildland Fire Situation Analysis will be completed to figure out the appropriate management actions to be taken. Once a prescribed fire has been reclassified as a wildfire, it cannot revert back to prescribed fire status.

D. Required Personnel Qualifications - Only trained and qualified personnel will conduct prescribed fire operations. All personnel are required to wear and use protective clothing and equipment as prescribed in the Service Manuals. Additionally, all positions on prescribed burns will meet all interagency and Fish and Wildlife Service requirements for training, experience, and fitness, as described in the Fire Management Handbook.

E. Fire Behavior and Effects - Fire behavior in grass fuels is broadly described as being easily influenced by wind speed and direction and having rapid rates of spread. Areas with grass fuels characteristically have heavy fine-fuel loading and are fully exposed. The depth of the flaming front will vary in relationship with wind speed, but heat duration is relatively short lived.

Fire behavior in “timber” is predicted based on leaf litter compactness and canopy closure. Areas with compact fuels (or closed canopies) experience slow-burning ground fires with low flame lengths. Occasional “jackpots” of heavy fuel concentration may flare up. Only under severe weather conditions (i.e., high temperatures, low humidities, high winds) do these fuels pose fire hazards. Areas with loose litter experience greater rates of spread and longer flame heights than those with compacted fuels. High winds will cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Concentrations of dead-down woody material will contribute to possible torching of trees, spotting and crowning.

F. Complexity of Prescribed Burning - Complexity elements are used to define the relative complexity of a prescribed fire project. The Refuge will use the rating system described in the Prescribed Fire Complexity Rating System Guide.

G. Smoke Management Screening - Smoke generated by prescribed fires will be managed to reduce degradation of air quality and visibility. Each prescribed fire plan will address smoke management by using the smoke-sensitive area screening process outlined in Wade and Lunsford (1988).

The Refuge has three fire-certified personnel and one fire unit. Volunteer fire departments (i.e., Pottsboro and Sadler) have initial attack responsibilities on private and federal lands and have assisted with fire fighting activities on the Refuge on many occasions. Statewide fire suppression activities are coordinated by the Texas Forestry Service, with support and assistance from various federal agencies. The Refuge receives support from the Wichita Mountains NWR Fire District. They conduct prescribed burning programs on the Refuge for the purpose of brush control and/or grassland management.

Archaeological, Cultural, and Historical Resources

There are few known archaeological features on the Refuge and there is a need to identify and protect any additional prehistoric, historic, and cultural resources. Various Caddo groups, including the Kichai, Ionis and Tonkawa, were the earliest known inhabitants of the area that became Grayson County. These Native Americans, agriculturalists who found the soils of the area suitable to their way of life, traded and negotiated with the Spanish and French, who moved up the Red River during the eighteenth century to establish trading posts (Grayson County 2001). Evidence of their temporary camps is scattered along the uplands which are now the lakeshore. Any permanent occupations by other cultures, such as the Wichitas who were primarily farmers of the alluvial plain, would be inundated by the lake. Due to a general lack of rock in the area, most tools and cultural goods were of nondurable materials, which deteriorate rapidly in the environment, thus leaving no record.

Settlement of the region progressed rapidly in the early 1840s. Legislative action in 1846 designated Sherman as the county seat. It was named in honor of General Sidney Sherman, a commander in the Texas army, credited with the battle cry "Remember the Alamo" at the Battle of San Jacinto. By 1850, Grayson County had a population of 2008, most of whom came from southern states. Throughout the 1850s, the character of the county as a trading and market center gradually emerged. Further impetus to county growth occurred with the designation of Sherman as a station on the Butterfield Overland Mail route in 1858.

From 1870 to 1880 settlement in North Texas flourished. The arrival of the Houston and Texas Central Railroad in Sherman and the Missouri, Kansas and Texas in Denison in late 1872 initiated a period of phenomenal growth and development for Grayson County. Numerous towns sprang up as a result of the coming of the railroad. The number of farms increased and soon Grayson County became a milling and market center for surrounding areas. Although manufacturing and milling interests steadily expanded, the county remained predominantly agricultural.

In 1904, the town of Hagerman was platted by James Patillo Smith and Maurice Smith in a ten acre wheat field. The town of Hagerman was originally named Steedman during the late 1880s, in honor of county judge S.D. Steedman. But when the tracks of the Missouri-Kansas-Texas Railroad reached the community in the early 1900s, its name was changed to Hagerman, to honor railroad attorney James Hagerman.

In 1910, the town had a population of 258 and many of the town citizens worked for the railroad. The town consisted of a church, school, post office, cotton gin, railroad depot and some businesses. The town prospered throughout most of the 1920s and grew to having three churches and a three-teacher school, but was not destined to be a thriving metropolis. By the late 1920s residents began to abandon the area when it became known the creation of Lake Texoma would completely flood the area. The government paid the residents of Hagerman $35.00 an acre, which included the mineral rights to the property. Individuals who chose to retain the mineral rights on their property were paid only $34.00 an acre. However, by retaining the mineral rights, these individuals would soon make a larger profit. Not long after the town had been abandoned, oil was discovered in the area.
As the residents of Hagerman sold their parcels of land, many relocated to the neighboring towns of Pottsboro and Sherman. When the evacuation and abandonment of the town of Hagerman was completed, the construction of Denison Dam began, forming Lake Texoma.

Today, though covered by the lake, the townsite is marked by a few protruding pylons and a Grayson County Historical Survey Committee marker which was erected in 1967. The townsite was included within the Refuge boundary when it was established by PLO 314 in 1946. A ten acre tract denoting

the original town of Hagerman lies within the flood pool of Lake Texoma. A cornerstone marker is located northwest of the Refuge headquarters and is visible when the water table is at its normal level.

The Service has a legal responsibility to consider the effects its actions have on archaeological and historical resources. The Service will comply with Section 106 of the National Historic Preservation Act before conducting any ground disturbing activities. Compliance may require any or all of the following: State Historic Preservation Records survey, literature survey or field survey.

Visitor Services

Providing recreational opportunities and educating and interpreting the unique natural features of the Refuge for visitors are important elements of the Service's mission and the goals and objectives of the Refuge. In the Refuge Improvement Act of 1997, six wildlife-dependent recreational uses were determined priority public uses on national wildlife refuges. These are: hunting, fishing, wildlife observation and wildlife photography, environmental education and interpretation. These six uses, when compatible with the Refuge purpose, are the focus of the Refuge's public use activities.

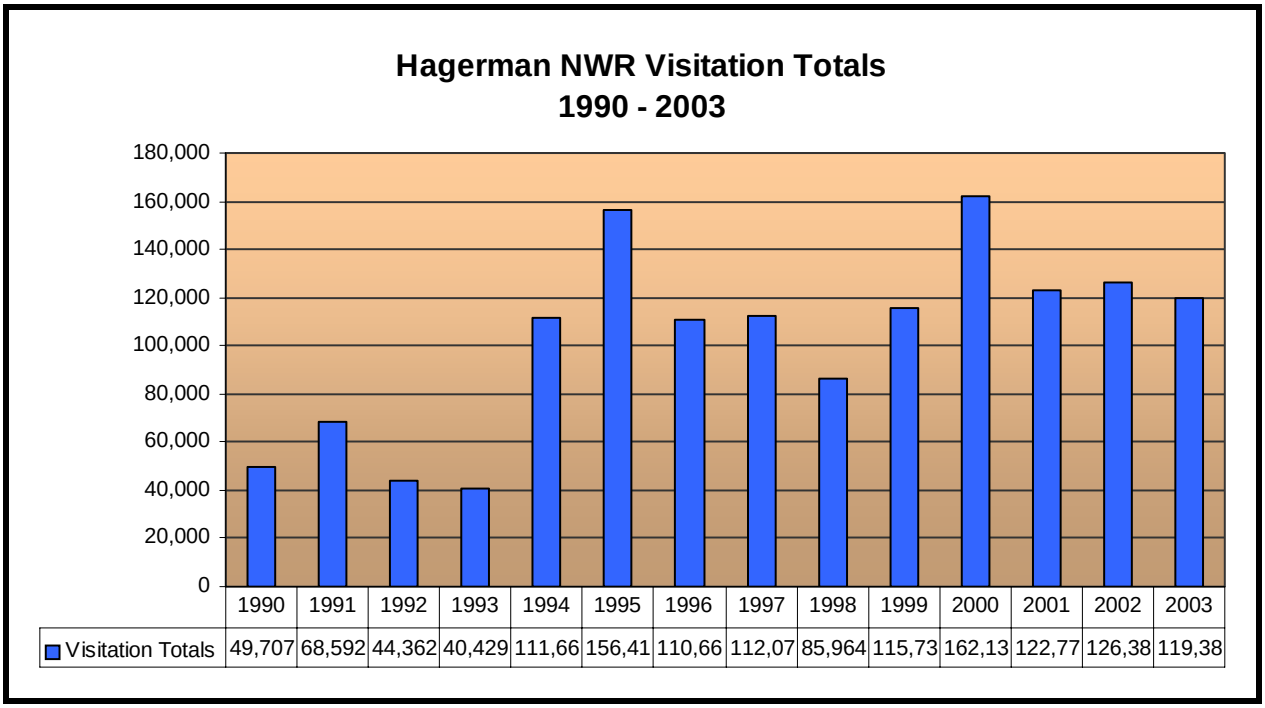
It has been determined that the following public uses are compatible with the purpose for which the Refuge was established: limited dove, quail, squirrel, rabbit, and deer hunting; fishing; wildlife observation; photography; boating; hiking; picnicking; and berry, nut, and mushroom picking. Although there are no designated areas for berry, nut, and mushroom picking, there are three established picnic areas on the Refuge: Goode Unit, Big Mineral Day Use Area, and the Sandy Point Area. Fire pits are not allowed but picnickers may bring their own grills. These uses are accommodated by such facilities as the auto tour route, Crow Hill Interpretive Trail including a wildlife observation platform, the Refuge visitor center, and specific areas opened for special events such as the Refuge hunts and fishing derbies.

The Refuge has seen many changes and has made many improvements since its early beginnings. Refuge personnel manage wildlife species and their habitats for the continued enjoyment of present and future generations. This has been done by fostering an understanding and appreciation for wildlife and other natural resources and by providing opportunities for compatible wildlife-dependent recreation while maintaining an uncrowded nature of the area. Managing public use on national wildlife refuges requires a careful balance of allowing wildlife-dependent recreational activities without compromising the resources the Refuge is responsible for managing. Allowing the public to participate in wildlife-dependent recreational activities on the Refuge can benefit the resource. By providing interpretive information, visitors leave the Refuge with a better understanding of wildlife and their habitats and the mission and goals of the Refuge and the Service.

The Refuge receives approximately 120,000 visitors annually. Visitors can access the Refuge from U.S. Highway 75, a major north-south highway in Texas. The Refuge headquarters is located west of Farm to Market Road (FM) 1417 on Refuge Road, 8-miles northwest from the intersection of U.S. Highway 75 and U.S. Highway 82. The Refuge is also accessible from U.S. Highway 82 via Southmayd Road. Signs are located four miles east of Sadler. Once at the Refuge, there are several nature trails, boat ramps, picnic areas, and a two-mile-long auto tour route. Five roadways serve to provide visitors excellent opportunities to view wildlife, natural habitats, and Refuge management practices on more than 3000 acres. The two-mile self-guided auto tour route through the heart of the Refuge is open seven days a week, 365 days a year.

Several factors will determine the future visitation to the Refuge:

- Continued ease of access to the Refuge.
- Signs on the Interstate and better advertisement/direction signs to the headquarters.
- Methods employed to increase public awareness of the Refuge.
- Interactive displays to draw interest and engage visitors at proposed facilities.
- Activities provided by the Refuge, its partners and other cooperation organizations.
- Partnerships with the local community.
- Volunteers available to assist with visitor services programs and maintenance of facilities.



Hunting

Hunting programs on the Refuge promote understanding and appreciation of the natural resources and their management. Hunting is also an integral part of a comprehensive wildlife management program. Approximately 3700 acres of the Refuge is open to hunting activities. Limited hunts (i.e., less than the state hunting season allows) for dove, quail, squirrel, and rabbit hunting have been determined to be compatible with the purposes for which the Refuge was established. Approximately 1600 acres are open for dove hunting during September. Dove hunting is allowed from September 1 to September 30, shortly before fall and winter bird migration. Squirrels and rabbits may be hunted during the dove hunt. Rabbits are not considered game animals in Texas and state regulations allow hunting year round with no bag limits. Squirrels are considered game animals but there is no closed season on them in Grayson County. The quail hunting area encompasses nearly 1100 acres. Quail hunting is allowed from February 1 to the end of the state season. Squirrels and rabbits may be hunted during the quail hunt. Hunters must check in and out at the entrances to the hunt areas. Small game hunting on the Refuge is by shotgun only using shells no larger than No. 4 shot size. Dogs may be used during small game hunts but must be under the control of the handler at all times.

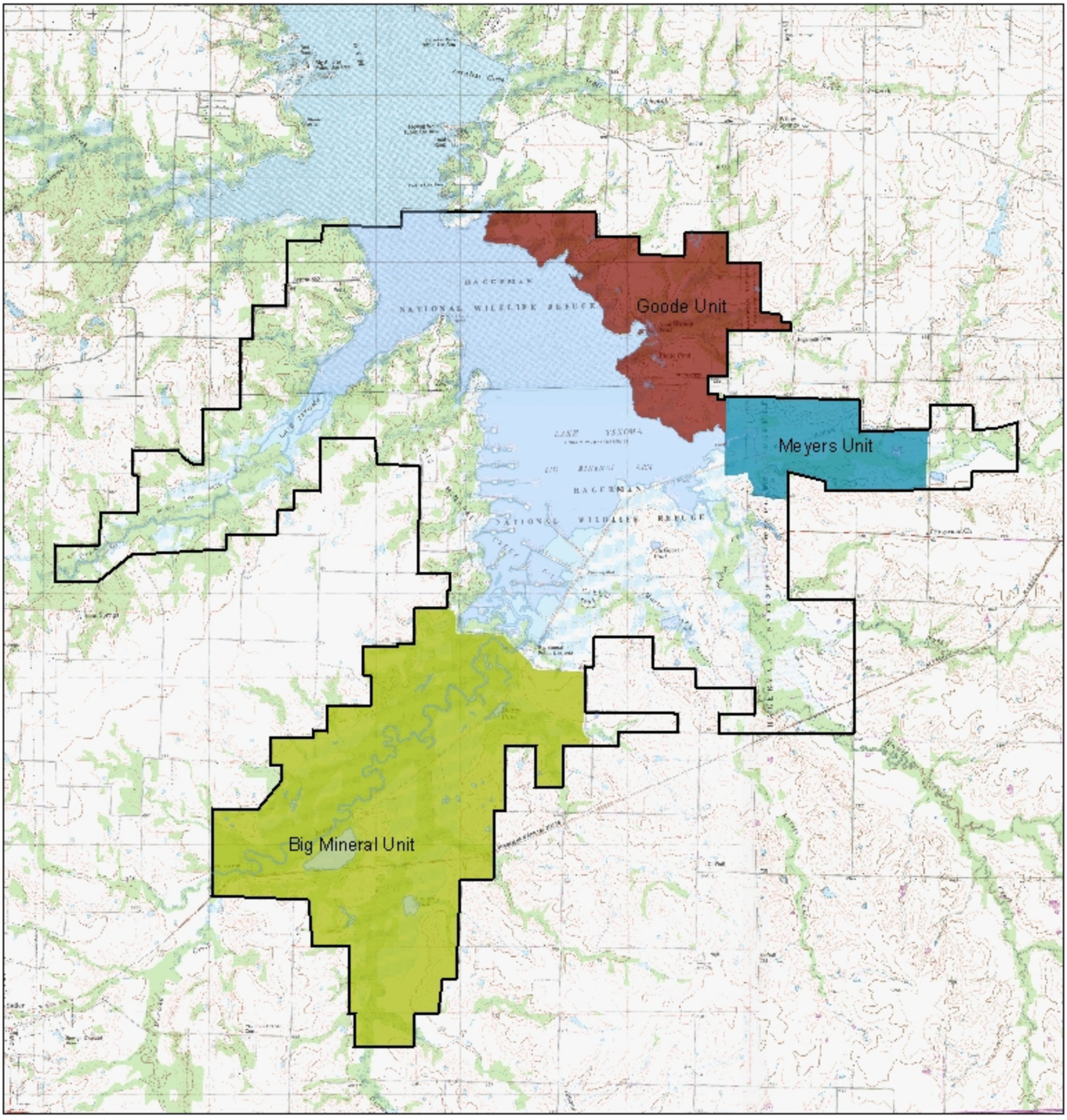
Hunting on the Refuge is limited to two months of small game hunting and four archery hunt segments for white-tailed deer. Doves, rabbits and squirrels are hunted during the month of September in the Big Mineral Unit. During February, the Goode Unit is made available for quail, rabbit and squirrel hunting. The archery deer hunt segments were moved to a November starting date instead of October in order to improve the overall quality of the hunt.

Archery deer hunting occurs during November and December and is divided into four segments with 70 hunters drawn per segment. Feral hogs may also be taken during the deer hunt. The bow hunt is extremely popular, competition is high, and a computer drawing is used to select participants who must also qualify by meeting training requirements and proficiency testing. According to state hunting regulations, rifle hunting for deer is not allowed in Grayson County. Only specific areas of the Refuge are open to hunting and these areas are posted with "Public Hunting Area" signs. There is little to no conflict between hunters and other Refuge visitors since these areas are separated during the hunts. For now, the deer hunts are for recreational purposes and not directed at reducing the deer population. However, deer herd management is an identified research need for the Refuge.

The Refuge has become popular within bow hunting circles in recent years due to the caliber of bucks being harvested during the archery hunt. Because the deer on the Refuge are only hunted for a total of nine days and no rifle hunting is allowed, many animals achieve an age and size not normally seen in other areas of the state. At least one Pope & Young buck is harvested from the Refuge every year. Within the last ten years, three of the top five deer in the Texas record books were harvested from the Refuge.

Quail hunter checking in (USFWS photo).

The annual bow hunting push usually begins in late spring with the Refuge accepting hunting applications from early May through mid-June. Hunters wishing to hunt on the Refuge are required to complete a bow hunter education course prior to applying for the hunt and must show proof of completing the course when applying. Hunter selection is conducted by a random computer drawing. Only one drawing is held and each applicant is assigned a random number. That number is then used to assign an applicant to one of three hunt segments (A, B and C). The fourth hunt segment (antlerless only) is available for any hunter who possess a valid license, anterless tag, has completed a bow hunter education course and presents a signed proficiency card when registering to hunt. Selected applicants for hunt segments A, B and C will be notified by mail and have five weeks in which to submit their hunt fee and provide proof of successful completion of a proficiency test with a minimum score of 80 percent. These requirements are in effect to ensure that the hunters on the Refuge are well versed in the safety and ethical aspects of bow hunting. In addition, a permit is mailed to selected applicants which is required for registration and to hunt. The permit must remain in the hunter's possession at all times while hunting on the Refuge. Hunters must also attend an orientation held the first morning of each hunt segment.



U.S. Fish & Wildlife Service

Hagerman NWR

Background image from 1:100,000 scale USGS quadrangle maps.

Projection: UTM, NAD83, Zone 14.

Prepared by Division of Technical Services
Office of Geographic Information Systems
USFWS - Southwest Region
Albuquerque, NM

January 2006

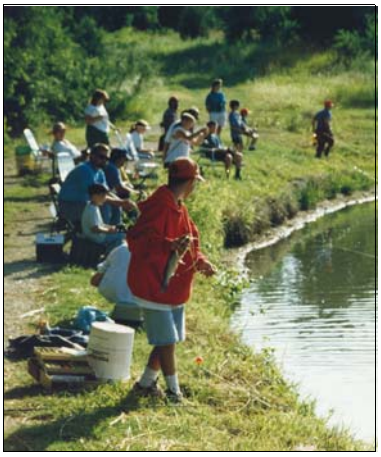
Hunt Units of Hagerman NWR

- Big Mineral Unit
- Goode Unit
- Meyers Unit
- Hagerman NWR boundary

miles: 0 0.5 1 2

kilometers: 0 0.5 1 2 3

Fishing



Kids' Fishing Derby (USFWS photo).

Second to wildlife observation and photography, fishing is the most popular public use activity on the Refuge. In recent years, as many as 83,000 to 85,000 fishing visits were recorded. The Refuge provides good access to Lake Texoma for area fishermen. Thousands of recreation hours are provided by the Refuge to anglers in pursuit of catfish, striped bass, crappie, and white/sand bass. The TPWD occasionally stocks Refuge ponds with catfish. Refuge staff and TPWD, along with corporate sponsors host an annual Kids' Fishing Derby at the Refuge's Picnic Pond. This educational fishing program for kids is conducted the first week of June in association with the National Fishing Week.

Fishing in Lake Texoma is allowed year-round in accordance with State regulations, during daylight hours only. Bank and wade fishing with pole and line or rod and reel are allowed year-round in areas open for public fishing access. However, fishing in Refuge ponds is allowed only from April 1 through September 30, to protect waterfowl using the ponds during the winter. Trotlines are allowed during the boating season but must not be left out for more than 30 days and must be removed by September 30.

Catfish are the preferred catch during the colder months of the year, while crappie and stripers provide springtime and summer fishing opportunities. Good catches of catfish, crappie and stripers are common.

Wildlife Observation and Photography

Wildlife observation and photography are the most popular public use activities on the Refuge. Several programs and facilities provide the public with opportunities to enjoy the Refuge's resources. The Refuge's two-mile Auto Tour Route provides interpretation of the many management activities used on the Refuge. With interpretive panels located at various points along the length of the route, visitors can gain knowledge of the flora and fauna present on the Refuge. In addition to an auto tour route, three foot trails allow visitors the opportunity to view a variety of wildlife species and their habitats or to just "get away from it all". The interpretive Crow Hill Nature Trail is a one-mile loop trail that winds along a hillside allowing visitors to view a variety of habitats. It also features an observation tower with a spectacular view of the Refuge's moist soil units, planted fields and a portion of Lake Texoma. This trail is popular with groups and families. The Harris Creek Trail was rerouted and renovated in Spring 2001 thanks in part to an Eagle Scout project. The trail now winds along a tree line, ending at the five Derby Ponds located in the eastern section of the Refuge. The Big Mineral/Meadow Pond Trail is actually an access road to the Big Mineral Unit but is closed to vehicle traffic. It is approximately 5.5 miles long and allows the more adventurous visitor the opportunity to hike along a variety of habitats including creeks, ponds, prairies and mature forests. Roads on the Godwin Unit (northwest side) are also available for walking/hiking. Most of the Refuge is open to the public for hiking and nature study, except for the shop area, which is closed for public safety reasons.

Hunting areas of the Refuge are closed to public access for a short time during the fall and again in late winter to accommodate the hunting programs. The wildlife drive is always open for visitors to observe the "Fall Flights" of migratory birds resting and feeding on Refuge farm fields and on the lakeshore.

Environmental Education and Interpretation

Due to the public's interest in fish and wildlife, the Service is responding with an increased emphasis on environmental education. The Service's ability to sustain ecosystems and the natural heritage of fish and wildlife resources within them will depend on the public's understanding of and active participation in the stewardship of these resources. The Refuge provides information through outreach, education, and interpretation so the public understands how their well-being is linked to the well-being of fish, wildlife, plants and the habitats where they thrive. The Refuge staff provides limited environmental education programs and outreach efforts due to a small staff and funding.

The Refuge provides education by accommodating requests for classroom presentations, as staffing is available. Local grade school classes complement their environmental education curriculum with a visit to the Refuge. Schools are encouraged to use the self-guided auto tour route for bus tours during field trips. The Refuge also hosts several International Bow Hunter Education Programs every year. This course is designed to increase the knowledge and skills of person who hunt with a bow and arrow, and is a requirement for participants in the Refuge bow hunts. The Refuge has hosted "Teacher Education Workshops"such as Project WILD 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.

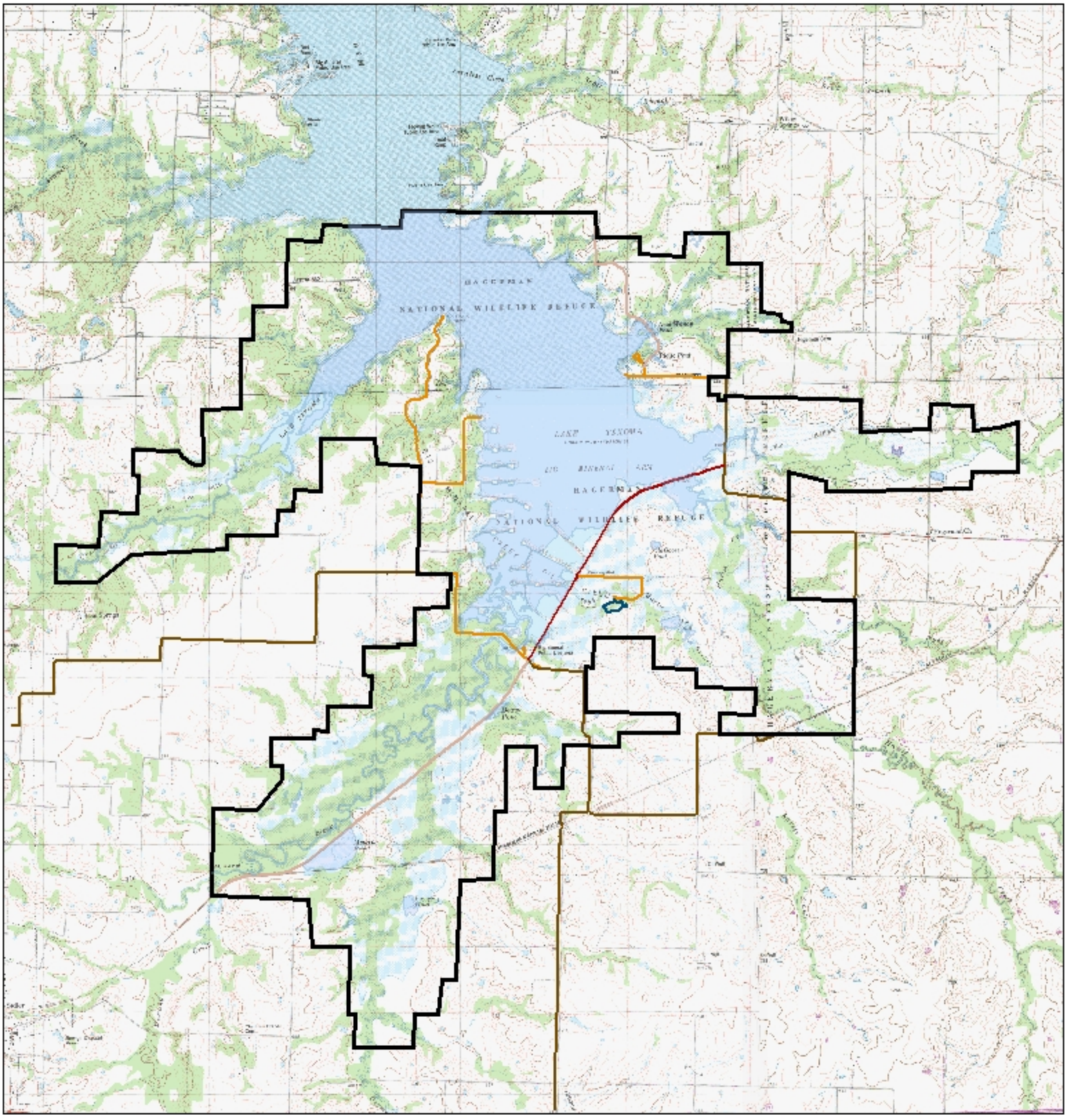
According to Freeman Tilden, considered the "father" of modern national park interpretation and the author of the "interpreter's bible," *Interpreting Our Heritage*, interpretation is "An educational activity which aims to reveal meanings and relationships through the use of original objects, by first hand experience, and by illustrative media, rather than simply to communicate factual information." Interpretation at the Refuge includes programs to groups who are not pursuing a course of study, brochures, exhibits, and interpretive signs. These activities provide a revelation as well as instill a sense of wonder and a sense of place to those participating in the activities.

Community outreach is instrumental in building a supportive constituency, and furthering the understanding, appreciation and stewardship of our natural resources. Between five and ten presentations are conducted annually for civic and other adult groups. The Refuge is a partner in the annual Red River Valley Birding and Nature Festival and provides a field trip location, speakers, and special activities for Refuge visitors.

Volunteers

Volunteers assist in meeting the needs of the Refuge (USFWS photo).

Volunteers are important in their contribution to the overall management of the Refuge. Volunteer help can augment the Refuge's interpretive and recreational programs. The Service's volunteer program increases public understanding and appreciation of refuges and their resources through hands-on experience. Volunteers are used at the Refuge to enhance public use programs, provide help and information to visitors, perform maintenance activities and assist with biological surveys. The value of a volunteer's time is difficult to measure but their assistance in helping meet the operational and maintenance needs of the Refuge is invaluable. The Refuge is deeply indebted to all of its volunteers for their dedication and service rendered for the betterment of our nation's natural resources. The volunteer program is managed by a Volunteer Coordinator who not only oversees the activities of 25 individuals but who also volunteers to fulfill the responsibilities of this position. Four travel trailers are available to individuals to reside in while volunteering on the Refuge. Individuals are required to work a minimum of 32 hours per week in order to reside in Refuge housing.



U.S. Fish & Wildlife Service

Hagerman NWR

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Prepared by Division of Technical Services
Office of Geographic Information Systems
USFWS - Southwest Region
Albuquerque, NM

January 2006

kilometers
0 0.5 1 2 3

miles
0 0.5 1 2

Public Use Roads and Trails

- Hagerman NWR boundary
- Auto tour
- NWR public use road
- Hiking trail
- Crow Hill interpretive trail
- County public use road

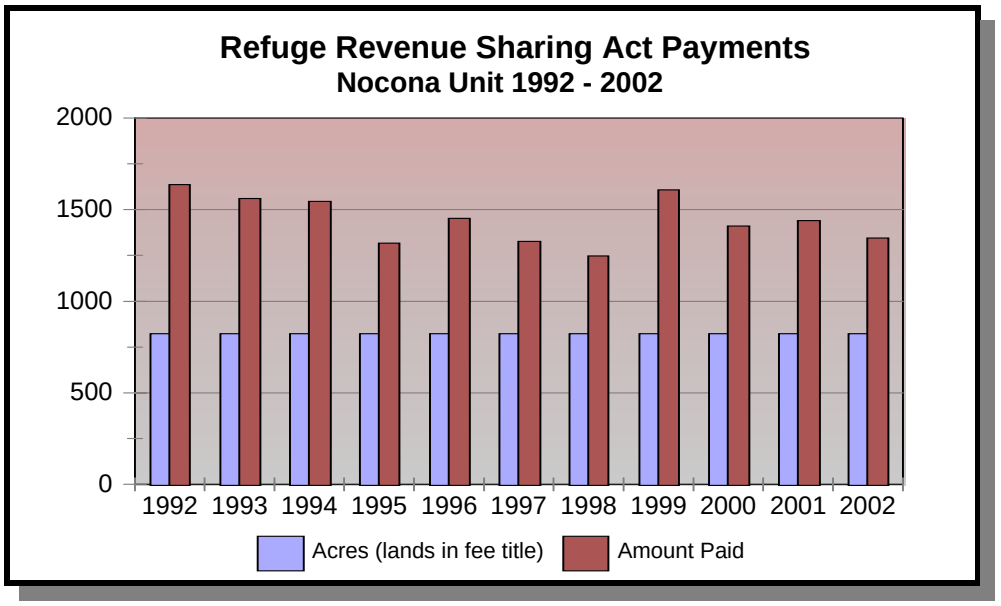
Socioeconomic Features

The Refuge is located in Grayson County (population 103,728), approximately 15 miles from the City of Sherman (population 31,600). Several small towns are within 60 miles of the Refuge. Dallas, with a population of 1,007,000, is within 75 miles of the Refuge. Including Ft. Worth and the Mid-Cities, more than 2,000,000 people live within 100 miles of the Refuge, providing a tremendous potential for delivering the conservation message to the general public.

The socioeconomic impact of Refuge operations is mainly in the neighboring communities of Sherman, Denison, and Pottsboro. The Refuge's annual budget is approximately $500,000, and the majority of this money is recycled in the local economy through the Refuge staff, purchases with local stores for supplies, and service contracts. All five 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 wildlife observation and photography being the most popular, followed by fishing. According to traffic counts, the Refuge receives approximately 120,000 visitors a year. The majority of visitors are from nearby locations, though proximity to the Dallas-Fort Worth metroplex allows for visitors from foreign countries to tour the Refuge.

Revenues generated by the archery hunts amounts to about $6000 annually which is put back into the local economy through the temporary employment of the Hunt Coordinator. Grazing on the Refuge is allowed only as management needs dictate. Grazing privileges are awarded annually to the highest bidder on each lease. Revenues generated from grazing permits average $1500 per year when permits are issued. These programs provide additional positive economic impact on the surrounding communities.

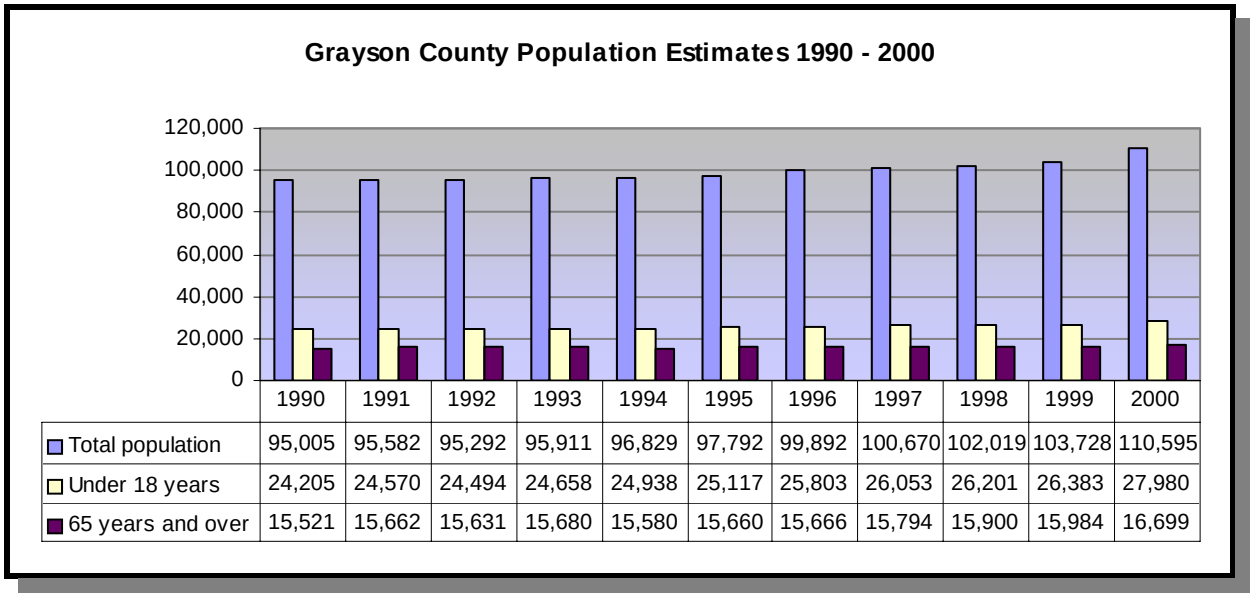


As required by the Refuge Revenue Sharing Act of 1978, Public Law 95-469, the Service annually compensates the county for Service lands taken off county tax rolls. The revenue sharing payment is calculated using a formula taking into account the land's appraised value and money available under the program. Between 1993 and 1999, revenue sharing was $10,089, with payments ranging from $1637 to $1248 awarded to Montague County. Full value would have exceeded $14,000. Grayson County does not receive a payment from the Service, since the lands are considered the property of the COE, who makes a payment to the county in lieu of taxes.

Population

According to the 2000 census report, the State of Texas had a population estimate of 20,851,820. Among the 50 states, it ranked as the second most populous. By 2025, it is projected to have a population above 27 million people. Approximately 110,595 residents resided in Grayson County in 2000. From 1998 to 2000, the county population was ranked thirtieth within the State of Texas.

The 2000 census indicated that 84 percent of the population of Grayson County is Non-Hispanic Whites. African Americans and Hispanics comprise 5.9 percent and 6.8 percent of the population, respectively. Native American and Asian races each contribute approximately one percent of the county population.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total population	95,005	95,582	95,292	95,911	96,829	97,792	99,892	100,670	102,019	103,728	110,595
Under 18 years	24,205	24,570	24,494	24,658	24,938	25,117	25,803	26,053	26,201	26,383	27,980
65 years and over	15,521	15,662	15,631	15,680	15,580	15,660	15,666	15,794	15,900	15,984	16,699

Economic Growth

Grayson County is a rural county, with about 75 percent of land in farms and ranches. Major contributors to the total county are industrial (25 percent), service and technology (24 percent), and retail (22 percent). Medical providers add more than $500 million to the county coffers. By contrast, agriculture provides less than $50 million annually, evidence of the fact that many of the farmsteads are residential/recreational in nature (summer homes, hobby farms, and retirement ranchettes). There are a large number of Fortune 500 companies with plants in Grayson County. Most of these plants are located in Sherman. Early establishment of several colleges earned Sherman the title of "Athens of Texas". Vital to the Sherman economy is the Sherman Economic Development Corporation. This corporation is designed to promote economic development for the Sherman area, create jobs by bringing in new businesses, and provide the common good of the community as a whole. These industries and businesses also represent the economic efforts of the area's Chamber of Commerce and Grayson County Colleges working together to improve the quality of life in the County.

CHAPTER 4: REFUGE ADMINISTRATION

General Administration

Many administrative functions support the operation and maintenance of the Refuge. These include payroll, accounting, budgeting, procurement, acquisition, contracting, and planning. It is anticipated that the complexity of the administrative support function will continue to increase.

Maintenance of the Refuge's infrastructure consists of a visitor contact station and office, shop/maintenance building, a warehouse, and a general storage building which also houses an audiovisual room and a bunkhouse for volunteer/interns. A large metal building is used for farm-related heavy equipment storage. There are approximately 11 miles of two-track dirt/gravel roads maintained by Refuge staff, of which six miles are open to the public. These areas require substantial maintenance to keep them in good condition. Roads are graded several times a year as needed, particularly those open to the public for special events.

Entrance signs are located at the Refuge boundary on U.S. Highway 82 at Southmayd Road, on FM 901 at Brooks Lane, on FM 996 at Keefer Road, on FM 1417 at Hagerman Road, and again at Refuge Road. Refuge boundaries are posted approximately every one-half mile. There are approximately 40 miles of exterior boundary fence and 55 miles of interior fencing.

Refuge Staffing

Adequate staffing is essential to conserving and enhancing the quality and diversity of Refuge wildlife habitats. Funding and staffing shortfalls limit the Refuge's capability to accomplish all the work needed and to provide the best quality experience to the public. In order to enhance current programs and initiate new activities, additional staff positions will be required. Current staffing at the Refuge consists of the following positions:

• Refuge Manager	GS-13	PFT
• Refuge Operations Specialist	GS-12	PFT
• Administrative Assistant	GS-07	PFT
• Invasive Species Biologist	GS-12	PFT
• Engineering Equipment Operator	WG-11	PFT
• Maintenance Worker	WG-08	PFT

In order to accomplish the proposed activities outlined in the goals and objectives for the Refuge, increased and upgraded staffing levels will be required. Please refer to Plan Implementation for current budget and proposed staffing.

Memorandums of Understanding (MOU) and Other Agreements

Memorandums of Understanding (MOU) and other agreements provide the framework for cooperation between branches of the government, and between the government and NGOs. An MOU can be used to delineate management and jurisdictional responsibilities and allow for more efficient use of limited resources. By working with partners, the Refuge is able to maximize limited resources and participate in projects benefitting the ecosystem as a whole. The Refuge recognizes the importance of establishing and maintaining Service approved agreements, with various entities to optimize management strategies.

Current Agreements

The Refuge will continue to work cooperatively with the COE in management of the Refuge. The Service has secondary jurisdiction on the Refuge subject to the original COE project purposes, as described in PLO 314.

The Refuge will continue to maintain a Cooperative Agreement with one cooperative farmer. Approximately 200 acres of grain sorghum and winter wheat are cultivated on the Refuge by a cooperative farmer.

The Refuge has agreements with the local volunteer fire departments along with partnerships and working relationships with a variety of organizations such as Grayson County, TPWD, NRCS, and the Texas Department of Transportation (TxDOT). These agreements allow for cooperative efforts with various entities on a variety of projects to optimize the Refuge's management strategies.

Future Agreements

In the future, establishing relationships with private landowners, conservation organizations, educational institutions, and other government agencies could result in the development of conservation agreements or other options for land protection, habitat enhancement and restoration, and opportunities for wildlife research.

Other Land Management Issues

Contaminants

Several contaminant studies have been conducted over the years, but are not useful in establishing baseline quantities due to the vast differences in protocols used. Studies have included bottom sampling, collection of specimens for tissue analysis for bio-accumulation, and water sampling. In 1999, the Ecological Services Division of the Service conducted a study that may serve as a baseline for future monitoring of potential pollutants. Water, bottom sediment, and bio-assessment were used to gauge environmental health. With sufficient funding, the Refuge would set up a water quality monitoring program on Big Mineral Creek and other locations to detect changes in water quality to better manage this resource. The Refuge currently receives outflow from five sewage treatment plants.

Easements

- There are numerous easements for utility lines on the Refuge. More than 130 oil wells are active on the Refuge and many require the use of a servicing utility line for operation.

- There are numerous access easements for the Big Mineral Production Unit and for the many small independent oil companies operating on the Refuge. The COE maintains all of these easements on the Refuge.

- The Missouri-Kansas-Texas Railroad Company maintains an easement for a 100' wide, single track that runs approximately 3-miles through the southern section of the Refuge. It crosses through the Refuge in two sections and during periods of summer drought, poses a threat of wildfire.

Road Rights-of-Way

Denison County has a right-of-way for six roads that are aligned with approximately three miles of the Refuge boundary. Two county roads comprise an approximately one-half-mile right-of-way inside the Refuge boundary. The county maintains all of these roads.

Reserved Minerals, Oil and Gas Rights

Shortly after the Refuge's establishment in 1946, oil and gas resources were discovered on the Refuge. Exploration and drilling activities soon occurred on the Refuge and throughout the surrounding area. When the COE acquired the lands necessary for the Denison Dam Project, they did not purchase the mineral rights. As a result, the Refuge was established on surface lands owned by the COE with subsurface mineral rights remaining in private ownership. At the time the first well was drilled, no one had any idea of the coming magnitude of oil and gas activities that would eventually occur on the Refuge. From 1951 and for the next six years, oil and gas activities continued to increase. These were considered the "oil boom" years.

Oil and gas operations (photo by Chris Perez).

Oil and gas activities are allowed to take place on Refuges for a number of reasons. On the majority of refuges, oil or gas activities occur where private entities, states, or native corporations, rather than the federal government, own the mineral rights. Owners of these mineral rights have the right to develop, produce, and transport the oil and gas resources located within a refuge (USGAO 2001). However, the Department of the Interior's regulations require mineral owners "to the greatest extent practicable," that "all exploration, development and production operations" be conducted in such a manner as to "prevent damage, erosion, pollution, or contamination to the lands, waters, facilities, and vegetation of the area." Further, "so far as practicable, such operations must also be conducted without interference with the operation of the refuge or disturbance to the wildlife thereon" (50 C.F.R. Part 29.32).

Under the National Wildlife Refuge System Administration Act of 1966, as amended, the Service is responsible for regulating all activities on refuges. The Act requires the Service to determine the compatibility of activities with the purposes of the particular refuge and the mission of the refuge system and not allow those activities deemed incompatible. However, the Service does not apply the compatibility requirement to the exercise of private mineral rights on refuges. Department of the Interior regulations also prohibit leasing federal minerals underlying refuges outside of Alaska, except in cases where federal minerals are being obtained by operations on property adjacent to the refuge. Nevertheless, the activities of private mineral owners on refuges are subject to a variety of legal restrictions, including Service regulations. A variety of federal laws affect how private mineral rights owners conduct their activities. Also, Service regulations require that oil and gas activities be performed in a way that minimizes the risk of damage to the land and wildlife and the disturbance to the operation of the refuge. The regulations also require that land affected be reclaimed after operations have ceased.

Over the years the Service has examined the effects on the Refuge System of secondary activities such as recreation, military activities, and oil and gas activities - which include oil and gas exploration, drilling and production, and transport. Exploring for oil and gas involves seismic mapping of the subsurface topography. Seismic mapping, regardless of the technology employed, requires surface disturbance, often involving small dynamite charges paced in a series of holes, typically in patterned grids. If seismic mapping reveals potential oil or gas deposits exploratory drilling begins. Oil and gas drilling and production often requires constructing, operation, and maintaining industrial infrastructure, including a network of access roads and canals, local pipelines to connect well sites to production facilities, disposal of drilling wastes, and gravel pads to house the drilling and other equipment. In addition, production may require storage tanks, separating facilities, and gas compressors. Finally, transporting oil and gas to production facilities or to users requires transit pipelines. Typically buried, these pipelines vary in size, with some as large as 30 inches in diameter. Pumping stations and storage tanks may also be needed for pipeline operations.

Permits for oil and gas activities on the Refuge are issued by the COE. The Refuge reviews the permits before they are issued and is provided the opportunity to comment on any wildlife and habitat concerns. Special conditions are also included in the permits such as mitigation for habitat destruction, drilling fluids removal from the drilling site, and returning the site to as natural a condition as possible. Refuge personnel have gone to great lengths to establish positive working relationships with the oil companies resulting in their observance of Refuge rules and regulations to help protect fish and wildlife species and their habitats.

Early years of oil and gas drilling operations along the Big Mineral Arm of Lake Texoma (USFWS photo).

The majority of oil production on the Refuge was originally developed by Shell Oil Company. Many leases were sold off over the years and the remaining Big Mineral Production Unit, minerals, and facilities were purchased from Shell by Venoco Inc. in 1999. A number of small independent companies are also operating on the Refuge. There have been over 200 wells drilled on the Refuge, of which more than 130 are still in operation. There is an initiative to form a super unit within the Refuge whereby all parties would get a pro rata share of the production. This would decrease the operating wells by one-half to three-quarters. The unneeded wells would be plugged and abandoned. However, new wells have been drilled as recently as early 2004, and several more are planned for the future. Another well has been drilled on COE property only a few feet outside the Refuge's northern boundary. As the price of oil goes up, there has been a resurgence in drilling activities on the Refuge and in the surrounding area, especially where there are pipeline delivery facilities nearby that companies can tap into.

CHAPTER 5: REFUGE MANAGEMENT PROGRAM - GOALS, OBJECTIVES, AND STRATEGIES

The following goals, objectives and strategies are, unless otherwise noted in the text, expected to be implemented throughout the 15 year term of this plan. Due to the fact that the Refuge CCP 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.

FISH AND WILDLIFE MANAGEMENT

(USFWS photo)

Goal 1: Restore, enhance and protect the natural diversity of the Refuge and the broader Arkansas/Red Rivers Ecosystem for the benefit of trust wildlife (waterfowl, nongame migratory birds, threatened and endangered species) and resident wildlife.

Objective 1: Collect baseline data on species presence and abundance for all Refuge flora and fauna. Develop Refuge inventory and monitoring plan, and Refuge habitat management plan, as well as databases to house all collected data.

Rationale for Objective: There is little supporting data to measure the existing natural diversity, quality of the habitat components, and associated wildlife populations of these Refuge habitats. Updated baseline data is necessary to determine the existing natural diversity and document natural fluctuations in wildlife populations as opposed to those in response to habitat manipulation. Habitat inventories, monitoring, and management plans are integral components of the biological program providing valuable long-term information on dynamic habitats and animal communities. A systematic approach to obtaining resource information and decision making evaluating this information are integral components to the future planning efforts benefitting the Refuge biological resource programs.

Strategies:

1. Develop a thorough updated database of the flora and fauna of wetland, grassland, riparian, and woodland communities including species diversity, distribution, and population levels through baseline surveys by 2007.

2. Develop a database with capabilities to properly store, retrieve, and archive biological data. Develop data management systems to analyze data and provide analyses to Refuge Manager for more informed science-based management decision. Statistically analyze biological survey data to determine species trends periodically once a database has been established. Periodically adjust species management objectives to meet habitat management plans as appropriate.

3. Establish systems to transfer biological data summaries and analysis externally through publications, symposia presentations, biological reports, annual narratives, or other forms of information transfer.

4. Implement habitat monitoring programs in bottomland and riparian areas by 2008 to document results of management actions, evaluate these results in terms of habitat objectives, and focus on bottomland hardwood species composition changes over time.

5. Hire a biologist to initiate essential habitat and wildlife surveys (RONS Tier 2-01001).

Objective 2: Protect the Red River tributaries to benefit native aquatic and riparian plant and animal communities through the establishment of two long-term permanent water quality monitoring sites, one on Big Mineral Creek and one on the Big Mineral Arm of Lake Texoma.

Rationale for Objective: A major element of the Arkansas/Red Rivers Ecosystem Plan is restoring the natural stream morphology and floodplain of the Arkansas/Red Rivers watershed to benefit native aquatic and riparian plant communities. The Service's efforts to directly address this ecosystem goal includes monitoring water quality, reestablishing native riparian vegetation, and protecting restored areas from contaminant-related impacts.

Strategies:

1. Consult and coordinate with Regional Office (RO) hydrologist and technical services to establish one water quality monitoring site with an automated data recorder on the Big Mineral Creek. Seek to mitigate adverse water quality conditions in the future (RONS #91006).

2. Consult and coordinate with RO hydrologist and Technical Services to establish one water quality monitoring site with an automated data recorder on the Big Mineral Arm of Lake Texoma.

Objective 3: Restore and maintain 3740 acres of native grassland communities on the Refuge through appropriate land management techniques.

Rationale for Objective: A great variety of grass species occur in the area as a result of the overlap of the Blackland Prairie and Eastern Cross Timbers biomes. Much of it is heavily invaded with brush or developed. Dominant native grasses include big bluestem, little bluestem, Indiangrass, buffalograss, switch grass, and sideoats grama. Objective species composition should conform to NRCS range site descriptions for climax grassland communities.

Grazing overuse and non-management can be equally damaging to a dynamic system such as native grasslands. Invasive brush species can cause considerable environmental problems by overgrowing areas, usurping native and restored grasslands, disrupting natural water cycles, and generally producing inferior habitat. Brush control efforts are essential to grassland habitat restoration. Management will seek to increase plant and wildlife diversity and plant vigor using a combination of grazing and prescribed burning, while not excluding the possibility of chemical treatment, if necessary.

Strategies:

1. By 2008, target and prioritize problem areas for restoration using prescribed fire, grazing, mechanical control, and/or herbicides, as management tools.

2. By 2008, develop and implement an integrated pest management strategy for the control or removal of invasive exotic weeds and woody plants.

3. Use proper and appropriate grazing by cattle as a tool to increase plant vigor and structural variation to promote plant succession in grassland communities.

4. Develop, implement, and periodically update a new, revised Fire Management Plan for the reestablishment of native mixed grassland species to include forbs and grasses. The plan should emphasize the use of prescribed fire as part of an integrated control strategy of invasive brush and trees. The plan should also emphasize controlled burning schedules to increase plant vigor and structural variation, and promote plant succession in grassland communities.

5. Improve capabilities for fence line maintenance, fire guard maintenance, and brush encroachment through the purchase of a tree shearer and a turf utility vehicle (RONS #98001).

6. Implement a long-term (5-year minimum) habitat monitoring program (range surveys and photo transects) to determine grassland condition and restoration progress in targeted areas to desired species diversity or climax condition. Specific criteria will be developed to measure the success of restoration activities. This effort is dependent on hiring a Biological Technician to support the study (RONS #91004).

7. Hire a Maintenance Worker for fire, moist soil, and grazing management activities (RONS #97008).

Objective 4: Continue to protect populations of endangered and threatened species, and maintain or improve their habitats on the Refuge.

Rationale for Objective: Bald eagles, piping plovers, and snowy plovers utilize the Refuge on their migrations or as their wintering grounds. Currently, the Refuge hosts as many as 10 bald eagles between October and as late as March. The birds rely on waterfowl and fish from open ponds as their primary food source during their stay. Interior least terns nest successfully on the Refuge, and often use the lakeshore as a staging area before migration. Future conditions may lead to other state or federally listed species occurring within Refuge boundaries.

Strategies:

1. Maintain nesting sites for interior least terns, utilizing oil and gas pads on the west side of the Big Mineral Arm.

2. Compile and review available literature on threatened and endangered species using the Refuge, population data, historical Refuge survey information and other appropriate criteria to develop species management priorities and strategies.

3. Hire a law enforcement officer to protect wildlife resources.

4. Develop population monitoring surveys for threatened and endangered species to determine if objectives are being met, and determine population fluctuations and trends in habitat use and responses to management.

5. Ensure federally listed species protection through compliance with section 7 of the ESA by consulting with Ecological Services on any projects/actions which may affect threatened, endangered, or proposed species.

6. Review and incorporate as appropriate national, international, and regional plans for listed species and determine how the Refuge can best contribute to their management and protection.

7. Continue to work with oil and gas interests through voluntary permitting and/or MOUs to minimize impacts of oil and gas access on interior least tern nesting areas of the Refuge in accordance with section 7 consultation advice.

Objective 5: Manage waterfowl populations in accordance with the North American Waterfowl Management Plan, focusing on six waterfowl species: the tallgrass prairie flock of Canada geese, mallard, pintail, wood duck, blue-winged teal, and gadwall.

Rationale for Objective: The Refuge was established to provide habitat along the Central Flyway route for migratory waterfowl. The management objectives of the Refuge provide protected roost sites for geese and quality winter habitat to sustain the condition of migratory waterfowl for spring migration and reproductive success. By continuing to maintain sufficient habitat to support waterfowl populations as part of the original Refuge purpose, the Refuge is complying with the objectives of the North American Waterfowl Management Plan. This objective relies substantially on wetland management (Goal 1, Objective 10) and farming (Goal 1, Objective 9).

Strategies:

1. Develop a refuge inventory and monitoring plan to include waterfowl inventory and monitoring that will provide the essential biological information upon which to base management decisions.

2. Develop habitat monitoring techniques for moist soil units and other areas undergoing active management for waterfowl, 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 amend habitat management plans when monitoring and evaluation data support amended changes.

Objective 6: Identify and monitor the status of bird species of concern by 2006 that use the Refuge for breeding including neotropical migratory birds and other nongame migratory birds. Such species include: loggerhead shrike, painted bunting, and scissor-tailed flycatcher.

Rationale for Objective: The PIF Plan for Texas provides an avifaunal analysis identifying priority groups of birds for management and monitoring consideration. The PIF Plan provides information for determining population objectives for these priority species and their specific habitats.

Strategies:

1. Compile and review available species specific literature, population data, historical Refuge survey information, and other appropriate criteria to develop appropriate species management priorities.

2. Develop and implement long-term breeding surveys to document species diversity, population levels, and trends by habitat type.

3. Amend habitat management plans as appropriate to incorporate new data findings, improved methodologies, and new approaches for monitoring and evaluation.

4. Within the next five years, participate in the PIF grassland species focus group and incorporate new population and habitat information into species objectives and Refuge management strategies.

Objective 7: Manage 3531 acres of uplands and other habitats naturally to sustain populations of resident wildlife, and reduce by 50 percent exotic invader species and feral animals and their impacts on the environment. Monitor the population status of representative species.

Rationale for Objective: Holistic land management practices use natural methods and processes, such as grazing and fire, to restore and maintain native plant communities at or near climax levels. This approach to management benefits resident wildlife in general, and prairie-obligate nesting birds in particular. These tools will provide a variety of niches to increase ecological integrity in Refuge uplands (brush and woodlands). The Refuge is uniquely and strategically located in a portion of the Eastern Cross Timbers area. Because of the uniqueness of this habitat type, two RNAs have been established and registered - the Brooks RNA and the Dickey RNA. The Refuge will continue to preserve and protect these representative areas for the benefit of resident and migratory species which depend on woodland habitat.

Strategies:

1. Delineate, determine, and maintain the optimum appropriate acreage of wooded upland habitats and native shrub communities with grass under story to provide habitat for migrating and nesting migratory birds and other native species dependent on this habitat.

2. Target and prioritize areas for restoration using prescribed fire and/or grazing as a management tool by 2008.

3. Implement long-term habitat monitoring programs to determine grassland condition and restoration progress in targeted areas to desired species diversity.

4. Develop wildlife monitoring surveys for all hunted species and other indicator species, as needed, to determine population fluctuations, trends in habitat use, and responses to management.

Objective 8: Continue to produce (farm) approximately 700 acres of forage crops, at a minimum, for migrating waterfowl and geese through sustained agricultural practices.

***Rationale for Objective*:** The Refuge farming program serves objectives supporting goose and duck migration and overwintering. White-tailed deer and other resident wildlife also utilize these areas for food and cover. Farm fields provide habitat and foraging areas for migratory nongame birds including passerines and raptors. Low input, sustained agricultural practices involve crop rotation systems that increase land productivity by sustaining populations of soil biota. The farming program includes land farmed by the Refuge staff (force account farming) and land farmed by a cooperator, who plants and/or leaves a portion of his crops for wildlife in payment for use of the land.

Strategies:

1. Continue force account farming to sustain about half a million use days of geese and ducks annually through implementation of low input, sustained agricultural practices (ongoing).

2. Continue cooperative farming operations as a way of extending Refuge capabilities to meet waterfowl objectives and provide habitat diversity over a wide area of the Refuge.

3. Expand and improve farming capabilities through the purchase of a grain cart, no-till drill, and rotary hoe (RONS #93004).

4. Construct building (pole shed) for the storage of farm implements, irrigation supplies, fencing, and maintenance materials by 2006 (RONS #97006). By 2015, repair and/or replace other Refuge equipment storage buildings and Refuge infrastructure to support farming efforts.

Objective 9: Improve/Expand wetland management to increase moist soil units and effectively manage water levels to obtain an approximate balance of 20 percent perennial wetlands and 80 percent ephemeral wetlands. Currently, there are about 150 acres of moist soil units and five percent perennial wetlands.

Rationale for Objective: Wetland management involves alternately flooding and de-watering natural and constructed wetlands to provide shallow water feeding areas for a variety of water birds. Availability of water for flooding lakeshore impoundments depends on lake elevations in Lake Texoma. Rainfall and surface runoff provide water for other impoundments. Seasonal flooding and de-watering recreates a natural wetland regime for feeding and migrating waterfowl, shorebirds, and marsh birds.

Strategies:

1. Provide eight to 12 shallow water impoundments for the spring (April, May) and fall (August, September) as shorebird habitats.

2. Develop a moist soil unit and implement moist soil management within the Railroad Pond on the lower end of Refuge Field (RF)- 3. Additional water rights may be required (RONS #95001).

3. Construct diversion structure to provide gravity water to service Moist Soil Unit (MSU) 8 on the Martin Branch (RONS #95001).

4. Build up and re-contour deepwater areas of Muleshoe and Steedman Marshes to restore the usefulness of the marshes (RONS # 91003).

5. Develop a new Fire Management Plan by 2007, to include fire as a tool to manage decadent emergent wetland vegetation and maintain 70 percent open water habitat in wetlands. With the assistance of the RO Fire Management Team, implement prescribed burning as determined in the plan.

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

7. Utilize mowing and disking in MSUs to control undesirable emergent vegetation as needed.

8. Annually clean and repair water control structures prior to the rainy season.

Objective 10: Prevent and control invasive plants and animals from becoming established on the Refuge through integrated pest management and other control methods.

Rationale for Objective: Invasive plant species pose a threat to native habitat communities by outcompeting with native plant species, often forming monocultures, and reducing habitat quality and biological diversity on the Refuge. Biological diversity is essential for healthy habitats for migratory birds and other wildlife and plant species.

Strategies:

1. Biological and maintenance staff will be trained to identify all species on the State noxious weed list, as well as other plants that may be likely to move onto the Refuge, so that control actions can be taken promptly. Hand removal of new infestations will be used where it is an effective technique for eradication.

2. Transportation corridors, public use areas, and water areas will be spot surveyed during each growing season for the possible presence of new invasive plant infestations.

3. Refuge-conducted activities involving use of vehicles, heavy equipment, and other materials brought onto Refuge lands from other sites will be reviewed prior to implementation to determine if actions need to be taken to prevent introduction of invasive plant seeds (e.g., washing vehicles at their original location site prior to transporting them to the Refuge).

4. Contracts that will involve use of heavy equipment, introduction of mulch, sand, gravel, or dirt from other areas, or other materials or activities that might present a risk of introduction of invasive plants will include provisions to prevent the introduction of these species.

5. The Refuge will take rapid action to eradicate new infestations and will follow-up with site monitoring for the appropriate length of time as determined by the Refuge's invasive species biologist for the particular species. Particular emphasis will be given to preventing the spread of seeds.

6. When any ground-disturbing actions are to be taken, the site will be checked of the presence of invasive species, and actions taken to ensure activities do not spread infestation both on site and to other parts of the Refuge.

7. Continue to investigate and experiment with integrated pest management control methods.

8. Map invasive species distribution and acreage on the Refuge.

9. Monitor effectiveness of control efforts.

Objective 11: Improve management and monitoring of oil and gas operations on the Refuge. Ensure that disturbances from oil and gas activities are kept to a minimum for the benefit of fish and wildlife species and their habitats.

Rationale for Objective: Ongoing oil and gas activities occurring on the Refuge can affect the quality of wildlife species and their habitats. Though most of the major oil companies are environmentally conscientious, seasonal disturbances to wildlife can occur with certain oil and gas

operations. There is a potential for oil spills, gas leaks and brine pipeline spills, all of which can seriously threaten wildlife and their habitats.

Strategies:

1. Survey all existing wells, production facilities and pipelines on the Refuge to determine if they are active, inactive, plugged or abandoned.

2. Maintain close working partnerships with oil and gas operators to increase environmental awareness/education of wildlife and habitat management goals on the Refuge.

3. Coordinate with the COE and Railroad Commission of Texas to ensure all practices regarding oil and gas operations are applicable to Refuge and State regulations.

4. Develop and complete an Oil and Gas Management Plan by the year 2010.

5. Develop Environmental Site Assessments and a Spill Prevention, Control and Countermeasures Plan.

6. Ensure that Refuge personnel complete an "Oiled Bird Clean-up Training" course in the event that an oil spill occurs on the Refuge or in Lake Texoma.

7. Continue to work with oil and gas interests through voluntary permitting and/or MOUs to minimize impacts of oil and gas access on interior least tern nesting areas of the Refuge in accordance with section 7 consultation advice.

8. Hire an FTE to concentrate on oil and gas issues including spill prevention, control and countermeasure, environmental site assessments, cost estimates for environmental damage, spill reporting and response, preplanning, geophysical exploration activities, safety and security related to seismic activities, monitoring, special conditions, avoidance and mitigation, drilling, rights-of-way, production coordination and monitoring, monitoring of wells and production facilities, and site restoration.

9. Continue to work closely with the COE to ensure Refuge wildlife and habitat concerns are incorporated into permits issued for mineral exploration and development activities on the Refuge.

10. Monitor impacts of oil and gas operations on wildlife species such as potential impacts of electrical infrastructure on migratory birds.

WATER MANAGEMENT


(USFWS photo)

Goal 2: Facilitate, maintain, and develop an adequate water supply for wetland management on existing Service lands.

Objective 1: Protect existing water rights (342 acre-feet of impoundments, diversionary right of up to 208 acre-feet from Martin Branch) by monitoring and documenting quantities of water delivered, timing, places of use, and complete an annual water use report. Acquire additional water rights as needed for management purposes for the benefit of wildlife.

Rationale for Objective: The Refuge has two water rights permits, one for 342 acre-feet of impoundments and a second to divert up to 208 acre-feet from Martin Branch to irrigate approximately 99 acres for wildlife. The Refuge currently has no means to adequately or accurately measure in-stream flow or actual use.

Strategies:

1. 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.

2. Obtain water rights to divert water from Big Mineral Creek to provide dependable water supply to Meadow Pond (RONS #91006).

3. Acquire additional water rights to irrigate MSU 7.

4. Obtain water rights for the Shell Marsh green tree area.

5. Acquire water rights for the Railroad Pond on the lower end of RF-3 if required by TCEQ guidelines (RONS #95001).

Objective 2: Determine levels of organic and inorganic contaminants in Refuge surface and groundwater and monitor water quality of Refuge wetlands to detect point source or non-point source contamination.

Rationale for Objective: Periodic monitoring of water quality is useful for detecting contaminant problems as well as determining the relative health of the aquatic habitat.

Strategies:

1. Consult and coordinate with an RO hydrologist and technical services to establish one water quality monitoring site with an automated data recorder on the Big Mineral Creek. Seek to mitigate adverse water quality conditions in the future (RONS #91006).

2. Coordinate and consult with the RO hydrologist to design a monitoring program for water quality, select and purchase equipment, and analyze data to document water quality on Refuge wetlands.

3. Continue the monitoring program for water quality devised by Arlington Field Office/Ecological Services Contaminants Specialist to document water quality in all major drainages at risk for pollution from off-Refuge municipal and industrial sites at three year intervals.

CULTURAL RESOURCES

(photo by Chris Perez)

Goal 3: Identify, protect, and interpret the prehistoric and cultural resources on the Refuge for the benefit of present and future generations.

Objective 1: Develop appropriate management practices to protect cultural resources within the scope of Part 614 of the Service Manual and all applicable Federal laws and regulations. By 2008, document, map, and monitor archaeological sites on existing Refuge lands and potential future acquisitions. Ensure all Refuge management activities are in compliance with federal historic preservation mandates and Service policies and procedures.

Rationale for Objective: Within the Refuge boundary, there are several known prehistoric archaeological sites. Interpretation of the prehistory of the area and cultural resources oriented activities, consistent with the natural resources and wildlife objectives of the area, would serve to increase the public's awareness and conservation of the cultural resources of the area.

Strategies:

1. By 2008, conduct a cultural resource survey of the Refuge, which includes global positioning system (GPS) mapping of archaeological and historical sites.

2. Protect all cultural resources on Refuge lands as mandated under ARPA including appropriate law enforcement measures.

3. Avoid damage and deterioration of cultural resources that would result from erosion, abandonment, or neglect.

Objective 2: Document, map, and monitor all resources related to former users of the land to preserve the history, culture, and heritage of the area for posterity.

Rationale for Objective: Land for the Denison Dam project was purchased from private landowners, many of them homesteads. The Refuge has a rich history of former occupation, including the old towns of Hagerman and Steedman, the historic Godwin Ranch, and others. This history should be documented and preserved for future generations to understand former land uses and changing cultures.

Strategies:

1. Identify and protect all cemeteries, roads, home sites, and other evidences of previous occupation; locate GPS; and include in a GIS database by 2010.

2. Encourage study from universities and other Federal and State agencies to conduct research on the former landowners, homesteads, and infrastructures located on the Refuge for cultural and historical preservation.

3. Develop one interpretive program or display incorporating historical information on original inhabitants, early explorers, and settlers to the Hagerman area and their connection to natural resources of the area.

PARTNERSHIPS AND INTERAGENCY COORDINATION

Goal 4: Maintain or strengthen existing interagency and interjurisdictional relationships and establish new partnerships within the community for improving wildlife and habitat resources on the Refuge and within the Arkansas/Red Rivers Ecosystem.

(USFWS photo)

Objective 1: Pursue agreements and strengthen partnerships with other government and local agencies that are mutually beneficial and will ultimately benefit the fish and wildlife resources of the Refuge and surrounding lands within the Arkansas/Red Rivers Ecosystem.

Rationale for Objective: Fish and wildlife resources, public use, and educational opportunities can all be fostered and enhanced through the coordination with state, federal, and local organizations. Coordination and combining efforts of the Service with other agencies would mutually benefit many programs such as public use, ecological integrity, species and habitat management, and law enforcement through better planned, cost efficient, and enhanced management. These partnerships require time to coordinate, develop, and nurture and must be accounted for in the development of annual work plans.

Strategies:

1. Refuge staff will participate and encourage programs involving the cooperation of the COE, TPWD, and other public agencies leading to the protection of natural resources or the resolution of resource issues within the Arkansas/Red Rivers Ecosystem.

2. Work with local school districts and develop relationships with Austin College and other schools to further the awareness of the Service and Refuge mission, and encourage studies on the Refuge.

3. Work with county and local state highway personnel to repair road signs in the area and seek partnerships in the "Adopt-a-Highway" and "Leave No Trace" programs.

4. Work with the oil and gas companies to assist in interpretive displays, signs, and pamphlets, etc. Interpretive panels could illustrate the coexistent relationship between the Refuge and oil and gas operations.

Objective 2: Pursue agreements and partnerships with NGOs, local citizen organizations, and private landowners to work together in ways that are mutually beneficial and ultimately help meet

resource and environmental goals of the Refuge, the area, and the entire Arkansas/Red Rivers Ecosystem.

Rationale for Objective: Refuge, Ecosystem, and Service goals can all be enhanced by working within the community, with organizations, and with citizens and landowners to foster appreciation for natural resources and habitat management techniques. Time, money, and expertise provided by Refuge staff can multiply benefits in biology, environmental protection, public use, and even law enforcement, but must be accounted for in the development of annual budget planning.

Strategies:

1. Develop a partnership with outdoor volunteer associations for trail maintenance and other Refuge maintenance needs.

2. Pursue opportunities with local businesses, schools, scouts, and other organizations to adopt the Refuge for projects or special community programs such as Earth Day, Green Team, etc.

3. Coordinate and cooperate with NGOs in the area on projects both on and off Refuge, for the benefit of wildlife and wildlands, including the National Audubon Society (A.R.K. Program), Ducks Unlimited, Quail Unlimited, National Wild Turkey Federation, Grayson County Youth Hunting Association, and many others.

4. Provide technical assistance to private landowners in managing, developing, and enhancing wildlife habitat and environmental protection measures on their land, in support of Partners for Wildlife, PIF, and other federal programs.

PUBLIC AND RECREATIONAL USES


(USFWS photo)

Goal 4: Further the public's involvement with the Refuge and develop a broader base of public support through wildlife interpretation and education, outreach programs, and quality compatible wildlife-dependent recreational opportunities.

Objective 1: Create a minimum of three new educational and interpretive programs, presented with adequate facilities in a quality setting, that will foster visitors appreciation and understanding of fish and wildlife resources of the Refuge and the mission of the Refuge System by 2010.

Rationale for Objective: The public has few opportunities to understand the role of conservation in perpetuating wildlife species and wildlife habitat. By visiting a refuge, an individual would acquire an image of the Service and an understanding of its mission. Increasing the public's awareness, understanding, and appreciation of fish and wildlife resources can be achieved through interactive environmental education, establishing partnerships, demonstrating management practices, developing site specific curriculum, and providing interpretive materials in several media. Several existing programs and facilities currently in place offer educational/interpretive opportunities for people of all abilities to enjoy while remaining compatible with the primary purpose for which the Refuge was established. An interpretive auto route and hiking trails provide the public

with an opportunity to enjoy the Refuge, learn about its natural resources, and understand management strategies. Interpretive panels with information on area history, resource management, and endangered species have been installed on the Refuge. Many of these efforts can be enhanced to further engage the Refuge visitor.

Strategies:

1. Construct a visitor center to provide public contact, visitor orientation, display area, book store, meeting room, and educational facilities.

. 2. Hire an ORP to begin implementation of the plan and to staff the new visitor center (RONS #91009).

3. Improve access to Crow Hill Nature Trail by re-graveling the road, relocating the parking area. Provide additional interpretive signs emphasizing the importance of the prairie ecosystems to neotropical migrants, as well as resident wildlife (RONS #91005).

4. Develop specific Refuge curriculum and educational trunks which supply instructions, props, activities, and equipment for teacher-led investigations.

5. Develop a Refuge volunteer program for environmental education and interpretive programs, weekend nature walks, special Refuge events, and opportunities to foster wildlife observation programs on the Refuge.

6. Promote environmental education in the community by identifying audiences and providing programs specific to their needs. Develop partnerships with local education institutions, youth groups, and civic groups for opportunities to provide presentations on natural and managed habitats within the Arkansas/Red Rivers Ecosystem, local resource issues, Refuge tours, instructor led outdoor classrooms, and opportunities to assist the Refuge staff with "hands-on" wildlife habitat related projects.

7. The ORP will annually prepare proposals and pursue funding sources through programs such as Challenge Cost Share, Partners in Wildlife, Watchable Wildlife, and other Flexible Funding sources to provide two to three interactive exhibits and/or interpretive panels of key ecosystem habitats and species, and major ecosystem issues for visitors at the headquarters and/or develop additional wildlife viewing opportunities on the Refuge.

8. Assist the RO Specialist to develop and design Refuge specific educational/interpretive materials (displays, brochures, posters, pamphlets, etc.) with information on the Arkansas/Red Rivers Ecosystem issues and the value of Lake Texoma by 2010.

9. Communicate with regional and state environmental educators and environmental educational organizations to become part of that network in Texas and combine resources where possible.

10. Provide Teacher Training on Refuge curricula.

11. Develop an outdoor classroom area for teachers to conduct activities, investigations, etc.

Objective 2: Encourage visitation by offering improved and/or expanded opportunities for the public to observe and photograph wildlife and engage in traditional activities such as fishing and hunting.

Rationale for Objective: The close proximity of the Refuge to the Dallas-Fort Worth metroplex and easy Refuge access on state and county maintained roads, are features that favor visitation to the Refuge which is currently at approximately 120,000 visitors. Refuges are places where people and wildlife meet. Several existing programs and facilities currently in place offer recreational opportunities for people of all abilities to enjoy a wildlife/wildlands experience, while remaining compatible with the primary purpose for which the Refuge was established. These can be upgraded and enhanced to further engage the Refuge visitor.

Strategies:

1. Install a concrete boat ramp on the east side of the Big Mineral arm of Lake Texoma (RONS #91013).

2. Improve the Big Mineral Day Use Area to enhance the recreational opportunities at this area.

3. In coordination with the TPWD, implement a feral hog hunt to provide additional hunting opportunities and to assist in reducing numbers of feral hogs; thereby, minimizing habitat destruction on the Refuge and on adjacent private lands.

4. Construct a one-half mile hiking trail at Dead Woman Pond. The addition of this hiking trail would enhance the area and increase public recreation activities at the Refuge.

5. Implement construction and maintenance of wildlife observation opportunities detailed in the Visitor Services Plan by 2010.

6. Install wildlife observation/photography blinds along auto loop and hiking trails.

7. Install or repair directional signs for auto tour, nature trail, and Refuge visitor information. Post regulation signs for closed areas and Refuge boundary signs where appropriate by 2007.

8. Repair vehicle counters and install additional counters where appropriate to improve baseline data on visitor use by 2007.

9. Review, evaluate, and adjust the existing hunt plan to improve hunting opportunities on the Refuge based upon known wildlife population levels and habitat relationships. Hunt season dates and bag limits will be adjusted as needed to achieve balanced wildlife population levels within carrying capacities, regardless of impacts to user opportunities.

10. Pursue opportunities to partner with TPWD and other organizations to provide additional wildlife-oriented recreational activities, such as Young Waterfowlers programs or additional youth hunting opportunities.

11. Hire a Maintenance Worker to complete short-term objectives of the Visitor Services Plan and maintain in good condition visitor public use facilities (trails, roads, viewing areas, parking lots, and restrooms) by 2008.

12. Pursue partnerships with organizations such as Texoma Council of Governments (TCOG), local Chambers of Commerce, and other community civic groups to help develop special Refuge events to foster wildlife observation at the Refuge, and assist with eco-tourism and other public use efforts.

Objective 3: Continue and expand outreach efforts to match anticipated increases in public interaction to develop a broader base of public support for the Refuge through community presentations, school programs, community-based habitat restoration projects, and representation at public events such as fairs, festivals, and career days.

Rationale for Objective: Outreach programs are instrumental in expanding the Refuge constituency in north-central Texas. The Refuge has the potential for a wide range of outreach opportunities with staff, funding, and the establishment of a volunteer program. The development of a support group (or "Friends" group) composed of community members would provide the Refuge with a direct connection to the voice of the community, their suggestions, and support. Volunteers and a community support group would provide a long-term, consistent outreach effort in the community, encouraging public awareness of the Refuge, and stewardship of our natural resources.

Strategies:

1. Update the Visitor Services Plan by 2008.

2. Work with RO staff specialists to formalize a national agreement between the Service and the Federal Highway Administration to provide signs on Interstate Highways for wildlife refuges like Hagerman that are open to the public.

3. Maintain and repair Refuge entrance signs and replace all current signs to meet Service standards by 2006.

4. Prioritize intermediate and long-term objectives of the Visitor Services Plan and work with the RO to secure funding to implement it.

5. Hire an ORP to establish an environmental education program, provide outreach programs in the community along with the updating of the Visitor Services Plan, and serve as the volunteer coordinator (RONS #91009).

6. Expand Refuge relations with schools and universities through outreach programs, volunteer programs, and workshops using the services of the new ORP (RONS #91009).

7. Expand outreach activities by participating in the Texas Expo, Red River Valley Birding and Nature Festival, county fairs, Refuge Week activities, etc.

8. The ORP and Refuge Manager will work to establish a "Friends" support group by 2010 in order to become an integral part of the communities of Sherman and Denison; develop a Refuge constituency to include all of Grayson, Cooke, Fannin, and Montague Counties; and assist with the implementation of Refuge outreach objectives.

9. Use the ORP position to create and develop one outreach product (program, poster, brochure, newsletter, local newspaper column, or art contest) interpreting the resources of the area to generate interest in the Refuge over the next five years.

NOCONA UNIT PROTECTION


(Photo by Rick Cantu)

Goal 5: Identify existing fish and wildlife resources and provide management and protection for the Nocona Unit. Preserve the natural diversity of the prairies and riparian habitats of the Nocona Unit for the benefit of fish and wildlife species and the visiting public.

Objective 1: Collect baseline data on species presence and abundance for all Refuge flora and fauna. Develop Refuge inventory and monitoring plan, and Refuge habitat management plan, as well as databases to house all collected data.

Rationale for Objective: There is little supporting data to measure the existing natural diversity, quality of the habitat components, and associated wildlife populations of the Nocona Unit. Baseline data is necessary to determine the existing natural diversity and document natural fluctuations in wildlife populations as opposed to those in response to habitat manipulation. Habitat inventories, monitoring, and management plans are integral components of the biological program providing valuable long-term information on dynamic habitats and animal communities. A systematic approach to obtaining resource information and decision making based on this information are integral components to the future planning efforts for this unit.

Strategies:

1. Develop a thorough database of the flora and fauna of wetland, grassland, riparian, and woodland communities including species diversity, distribution, and population levels through baseline surveys and GIS mapping by 2007.

2. Develop habitat monitoring programs in all habitats, particularly in grassland areas; document results of management actions and evaluate in terms of habitat objectives; identify factors that limit the Refuge's ability to meet objectives; and amend habitat management plans when monitoring and evaluation data support adjustments.

Objective 2: Protect and enhance natural habitats of the Nocona Unit using a combination of appropriate management practices available to the Refuge to facilitate use by resident native and migratory wildlife, as determined from wildlife inventories.

Rationale for Objective: Much of the Nocona Unit had been grazed. Active management is needed to help restore natural processes and habitat. Other wildlife objectives such as waterfowl and neotropical bird use, may not be achieved without more intensive management of specific areas.

Strategies:

1. Reconstruct the main road through the unit, in order to facilitate habitat maintenance, protection, and enhancement as well as the gathering of baseline wildlife and habitat data (RONS #93005).

2. Repair existing and install additional fencing necessary for proper land management. Fencing will also protect waterfowl management areas from other land management or recreational use areas (RONS #99102).

3. Procure a minimum amount of farm/transport equipment to begin specific farming and moist soil management activities for migratory waterfowl (RONS #93006).

4. Hire a Biological Technician to begin Nocona Unit management and law enforcement activities (RONS #00001).

5. Hire a Maintenance Worker to begin maintenance activities on the Nocona Unit.

Objective 3: Reach a rural constituency in north-central Texas with a conservation message, and develop a broader base of public support for the Refuge System through interpretation, recreation, and direct involvement of the public in environmental issues.

Rationale for Objective: There has been a small but strong interest in recreational pursuits in the area of the Nocona Unit. Interest will grow as awareness of the Refuge increases. Interpreting the Refuge and its resources is an important opportunity that must be seized so that the environmental message can reach a broader segment of the public. The Service also has an opportunity to accommodate a limited amount of consumptive recreation, with adequate support from partners.

Strategies:

1. Develop a walking trail through various habitats east of East Belknap Creek, provide parking for five cars, and develop interpretive panels for the trail to encourage appreciation for riparian and grassland importance of resident and migratory wildlife.

2. Explore and assess the opportunities to partner with TPWD and others to provide a limited hunting program on this unit (deer, turkey, dove, and quail) during part of the year.

3. Provide opportunities for volunteers to help in the data collection and management of the Nocona Unit.

ADMINISTRATIVE, BUDGETARY AND STAFF RESOURCES

(USFWS photo)

Goal 6: Obtain program support to provide the necessary staffing, facilities, equipment, and operational funds to accomplish the goals of the Refuge and fulfill the mission of the Refuge System.

Objective 1: Provide the personnel effort needed to accomplish the goals of this plan through the addition of specific staff specialists and programs that encourage community volunteers.

Rationale for Objective: Base funding continues to be a problem for the Refuge. Approximately 90 percent of the base funding is used to cover salaries. Operation and Maintenance (O&M) funding for the Refuge is so limited that current operations consume all funding. Implementation of any of the strategies will require additional O&M funding as well as proposed staffing increases.

Strategies:

1. Utilize internal mechanisms such as RONS to justify and acquire the additional funding and personnel to accomplish the Refuge goals by 2015. The full staffing level to accomplish this includes the following proposed positions: Refer to plan implementation for current and proposed staff positions.

Outdoor Recreation Planner	GS-09/11	PFT
Oil and Gas Specialist	GS-09/11	PFT
Biologist	GS-09/11	PFT
Biological Technician	GS-07/09	PFT
Law Enforcement Officer	GS-07/09	PFT
Maintenance Worker	WG-06	PFT
Summer Temporary Help	WG-05	TPT

2. Pursue agreements with other interested agencies and organizations to provide the needed personnel (interns, volunteers, and co-op students) and funds to accomplish the Refuge goals.

3. By 2010, work with the community to pursue an avenue to receive private funding through grants, donations, and partnerships with businesses, corporations, and institutions to subsidize environmental education programs, habitat restoration projects, or other community-based efforts benefitting wildlife habitats on the Refuge.

Objective 2: Provide a safe, efficient, and productive work environment for Refuge employees and a safe infrastructure for staff and visitors. The Service will develop a Health and Safety Plan addressing the needs of visitors to the Refuge.

Rationale for Objective: Providing the basic, safe infrastructure for all Refuge employees and visitors is essential for Refuge activities. For example, the Visitor Center building was built on geologically active ground. The foundation has shifted causing potentially unsafe conditions and needs to be repaired or replaced.

Strategies:

1. Utilize the Refuge Maintenance Management System (MMS) to upgrade and maintain safe infrastructure and/or facilities for Refuge employees and visitors.

2. Use RONS and MMS to upgrade computers, office equipment, field equipment, and vehicles as needed in order to provide an efficient and productive support system for Refuge staff.

CHAPTER 6: PLAN IMPLEMENTATION

Refuge objectives are intended to be accomplished over the next 15 years. Many of the management activities for the Refuge will require the development of step-down management plans. Implementation of new management activities will be phased in over time as described.

Implementation of these objectives 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 and funding needs, partnership opportunities, step-down management plans and a monitoring and evaluation plan.

Resource Projects

Listed below are summaries of major resource project needs addressing the goals and objectives of this plan. Each project summary includes planning links to this CCP. 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.

Project 1. Habitat Inventory and Management

Develop complete vegetation maps delineating major habitat types on the Refuge. Inventory plant species associated with each habitat. Implement improvements to 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, species, and areas targeted for restoration activities. (Planning Links: Goal 1, Objectives 1, 2, 3, 4, 7, 8, 9, and 10; Goal 2, Objectives 1 and 2; Goal 6, Objectives 1, 2, and 3; Goal 7, Objective 1)

Project 2. Population Management

Develop a wildlife and monitoring 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 monitoring plan and baseline biological data are essential for making informed management decisions affecting the Refuge resources. Update refuge GIS when changes and/or new information becomes available. (Planning Links: Goal 1, Objectives 1, 4, 5, 6, 7 and 9; Goal 6, Objectives 1 and 2; Goal 7, Objective 1)

Project 3. Archaeological Survey

Complete a comprehensive archaeological survey of the Refuge to obtain baseline information for the protection of existing cultural resources. This project is essential to meet cultural resource mandates. (Planning Links: Goal 3, Objectives 1 and 2; Goal 6, Objective 1; Goal 7, Objectives 1 and 2)

Project 4. Visitor Services Developments

Complete tasks outlined in the Visitor Services Plan which includes directional signs, entrance signs, visitor interpretive displays, exhibits at the visitor contact station, environmental education and outreach materials, outdoor interpretive kiosk, outdoor classroom curriculum guide and field equipment, boundary posting, parking pull outs, expanded hiking trail, hiking trail brochure, etc. (Planning Links: Goal 4, Objectives 1and 2; Goal 5, Objectives 1, 2 and 3; Goal 6, Objective 3; Goal 7, Objective 1)

Project 5. Initiate Management of the Nocona Unit

Provide management and protection for the Nocona Unit. This project is essential to preserve the natural diversity of the prairies and riparian habitats, and enhance wildlife habitat for the benefit of the public. (Planning Links: Goal 2, Objectives 5, 6, and 8; Goal 2, Objectives 1and 2; Goal 4, Objectives 1and 2; Goal 6, Objectives 1, 2,and 3; Goal 7, Objective 1)

Current and Proposed Funding and Personnel

Current Staff

The Refuge has a current staff of six permanent FTEs which has remained the same since 1997, although the staffing plan provides for six and one-half FTEs.

Refuge Manager	GS-13	PFT
Refuge Operations Specialist	GS-12	PFT
Administrative Assistant	GS-07	PFT
Invasive Species Biologist	GS-12	PFT
Engineering Equipment Operator	WG-11	PFT
Maintenance Worker	WG-08	PFT

Approximate current annual staff costs. $245,000

Proposed Staff

To accomplish the goals and objectives of this plan, the following increase in staff would be required:

Outdoor Recreation Planner	GS-09/11	PFT	1.0 FTE
Oil and Gas Specialist	GS-09/11	PFT	1.0 FTE
Biologist	GS-09/11	PFT	1.0 FTE
Biological Technician	GS-07/09	PFT	1.0 FTE
Law Enforcement Officer	GS-07/09	PFT	1.0 FTE
Maintenance Worker	WG-06	PFT	1.0 FTE
Summer Temporary Help	WG-05	TPT	.5 FTE

Approximate annual cost of proposed staff . . . . . $139,500 (125.5K without temporary help)
Start up costs for new professional positions ($75K each) . .$150,000 (first year only)

Current base funding and other funds

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 RONS and MMS funds. the Refuge funding totaled between $316,000 to $1,026,000 from 2000 to 2004. The following table is a general breakdown of the annual operation budget of the Refuge:

REFUGE BUDGET HISTORY
BY FISCAL YEAR
(in thousands)

ACCT		2004	2003	2002	2001	2000
1261	Station Base	350	316.8	406.3	288.1	260.5
	Volunteers	3	---	---	4	---
	RONS	---	---	---	139	---
	Watchable Wildlife	---	3	---	---	---
	Invasive Species	117	133.2	---	---	---
	Sub-Total	**470**	**453**	**406.3**	**431.1**	**260.5**
1262	Deferred Maintenance	482	160.9	---	---	18.4
	Annual Maintenance	48	102	39	39	37.5
	Heavy Equipment	---	85.3	---	---	---
	Rental	6	7.5	---	---	---
	SAMMS	20	---	---	---	---
	Sub-Total	**556**	**397.7**	**39**	**74**	**55.9**
	Total	**1,026**	**850.7**	**445.3**	**505.1**	**316.4**

*description of funding categories:

1261 funds include annual fixed costs: salaries, utilities, gasoline, diesel, equipment repair, mandatory training/travel.

1262 MMS funds include vehicle replacement and backlog maintenance of Refuge facilities and infrastructure.

Partnership Opportunities

There are many opportunities to partner with state and federal governmental agencies, NGOs, 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/outreach efforts. In the past, the Refuge has partnered with Southeastern Oklahoma State University, Austin College, and Grayson County College. Opportunities exist to expand coordination with Texas A&M University, University of North Texas, and others within the commuting area.

- Strengthening existing partnerships with TPWD would provide the following 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 Sherman, Texas will enhance efforts to implement riparian restoration projects on private lands along the Red River and Big Mineral Creek drainage areas, and other habitat restoration efforts on private lands.

- Establishing relationships with private landowners and conservation organizations will promote dialogue on options for land protection and 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, Wetland Habitat Alliance of Texas, Quail Unlimited, National Wild Turkey Federation, National Audubon Society, and the Heard Museum. 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 COE 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 all users.

Step-Down Management Planning

Step-down management plans are an important component of Refuge management. These detailed plans serve as guiding documents for the day-to-day operation of the Refuge. Step-down management plans differ from CCPs in that they provide more detail relative to Refuge management programs. These plans will describe the specific strategies and implementation schedules the Refuge will follow, "stepping down" from general goals and objectives. They may be addressed in detail during preparation of the CCP, or prepared following completion of the CCP. The preparation of new step-down management plans or substantial changes to existing plans typically require further NEPA compliance and an opportunity for public review.

The Refuge System Manual, Part 4, Chapter 3, lists over 25 specific management plans that are generally required on every Refuge. Some plans require annual revision, others are on a 5 to 10 year revision schedule.

The following is a list of step-down management plans that include mandatory plans, programmatic plans, and special use plans. The preparation and execution of these plans is dependent on funding and the availability of staff or technical support.

Completed Plans and Other Documents

The following plans and documents have been completed between 1984 through 1996, are subject to review, and require revising and updating:

Station Safety Plan - Describes actions and improvements necessary to make station facilities and operations comply with federal occupational health and safety standards and other applicable regulations. Should include Continuity of Operations Plan and Hazard Communication Plan when rewritten.

Marsh and Water Management Plan - Describes annual water management strategies including quantities of water delivered, place of use and timing, and habitat objectives. This plan has been replaced with the Habitat Management Plan (HMP). These activities will be updated and become part of the HMP.

Fire Management Plan - Details suppression strategies and determines the best use of fire in managing and enhancing the Refuge habitats. Provides specific strategies, conditions, and parameters for the use of fire to accomplish habitat objectives for targeted grassland and wetland areas.

Waterfowl Disease Contingency Plan - This plan describes strategies to be implemented during migratory bird disease outbreaks.

Law Enforcement Plan - Describes the staff, equipment available, and management techniques for law enforcement. Should include a Crowd Control Plan when rewritten.

Hunting Plan - Addresses specific aspects of the Refuge hunt program defining species to be hunted, season structure, hunting methods, and applicable Refuge specific hunting regulations.

Cropland Management Plan - Describes specific objectives of farming practices to produce sufficient food requirements for the Refuge's migratory birds. This plan has been replaced with the HMP. These activities will be updated and become part of the HMP.

Grassland Management Plan - Describes conditions, objectives, and management practices for Refuge grasslands. This plan has been replaced with the HMP. These activities will be updated and become part of the HMP.

Haying Plan - Describes procedures for awarding haying privileges. The basic plan calls for allowing hay to be harvested in exchange for fertilizer, mowing, and waterway renovation work. The objective is prairie restoration by precluding brush invasion. This plan has been replaced with the HMP. These activities will be updated and become part of the HMP.

Animal Control Plan - Provides for control of certain noxious animals which impact management efforts.

Quarters Plan - Outlines the purpose for and occupancy of the Refuge quarters.

Compatibility Determination for Public Hunting - Determined limited dove, quail, rabbit, and squirrel hunting with shotgun only, and an archery only white-tailed deer hunt on Hagerman NWR is compatible with the purpose and objectives of which the Refuge was established. The dove hunt is held in September. The quail hunt is held in February through the end of the state season. Rabbits and squirrels may also be taken during these hunts. The small game hunts utilize a self-permitting system, and no fees are charged. All state bag limits are in effect on the Refuge. The bow hunt is held in the fall, over three weekends. Permits are issued by drawing to allocate the resources available among interested parties. Up to three deer, but only one buck, may be taken. About 3700 acres are open to hunting. Completed in 1994.

Compatibility Determination for Outdoor Recreation - Bicycling, non-motorized boating, hiking, walking, horseback riding, wildlife photography, wildlife observation, picnicking, and limited group camping on the Refuge is compatible with the purpose and objectives for which the Refuge was established. Completed in 1994.

Compatibility Determination for Grazing - Determined that grazing by cattle owned by private individuals under a Special Use Permit is compatible with the purpose and objectives for which the Refuge was established as an effective habitat management tool designed to benefit wildlife objectives. Permits are issued on an annual basis to the highest bidder for each lease area. Pastures to be grazed within each unit, number of animal units allowable, and season of use are determined in accordance with the Grassland Management Plan. Completed in 1994.

Compatibility Determination for Powerboats - Determined that the use of powerboats (unrestricted size and motor) and air boats on the Refuge portion of Lake Texoma is compatible with the purpose and objectives for which the Refuge was established. Boats may enter Refuge waters only during the months of April through September. Completed in 1994.

Compatibility Determination for Natural Resource Collection (Food Gathering) - Determined that food gathering is compatible with the purpose and objectives for which the Refuge was established. These activities include the collection of pecans, dewberries, and mushrooms. Pecan gathering was at one time so popular that a limit of one gallon per day was imposed. Completed in 1994.

Compatibility Determination for Fishing - Determined that recreational fishing on Refuge waters is compatible with the purpose and objectives for which the Refuge was established. Fishing is permitted on Hagerman NWR, in accordance with state regulations, all year long. Most of the fishing occurs in the Lake Texoma portion of the Refuge. Fishing in ponds not connected to Lake Texoma is prohibited October through March, to avoid conflicts with wintering waterfowl. Completed in 1994.

Compatibility Determination for Cooperative Agricultural Programs - Determined that cooperative farming is compatible with the purpose and objectives for which the Refuge was established. Cooperative farming on the Refuge consists of mostly small grain and feed grain production in exchange for planting wheat for wildlife food, which may or may not be harvested. Some planting of Sudan or similar hay crops is done. Haying has been suggested as a grassland management tool. Mowing or shredding is an accepted and effective tool in brush suppression. Agricultural chemicals (pesticides) are used sparingly in the cooperative farming program, under close scrutiny of the Service. Completed in 1994.

Farming Programs Environmental Assessment - The purpose of this document is to assess the agricultural program as a means of providing food for wildlife, particularly migratory birds, in support of the Refuge objectives. (NEPA Compliance: Environmental Assessment and Finding of No Significant Impact, September, 1994).

Grassland Management Environmental Assessment - The purpose of this document is to evaluate the strategies for managing Refuge grasslands to the benefit of the widest possible diversity of native endemic life forms. (NEPA Compliance: Environmental Assessment and Finding of No Significant Impact, September, 1994).

Plans and Documents to be Developed in the Future

The following plans and documents will be developed and subjected to review and periodic updates:

Visitor Services and Interpretive Plans - Addresses specific interpretive, educational, and wildlife related public recreation issues and needs.

Wildlife Inventory and Monitoring Plan - Describes specific wildlife inventory activities and techniques for monitoring wildlife populations including census/survey methods, data analysis, and reporting requirements.

Habitat Management Plan - Describes the most appropriate management strategies for habitat protection, enhancement and restoration, emphasizes specific habitats and areas for management activities, and provides monitoring methods and evaluation criteria. To include all habitat types, including grassland, wetland, and cropland areas.

Cultural Resource Management Plan - Identifies areas with significant sites and provides methods for the management of these resources. The Cultural Resource Management (CRM) Plan also identifies areas with high potential of significant resources and provides the manager with information to make better decisions regarding development or management activities. A comprehensive cultural resource inventory is a prerequisite to the development of the CRM Plan as land management activities including public access could impact unidentified or unevaluated resources.

Integrated Pest Management Plan - Identifies pests which threaten or impede achievement of Refuge objectives; includes, invasives or desired weed and woody vegetation, exotic animals and insects, and crop pests and diseases. Describes biological, mechanical, and chemical methods for each pest which will have the least impact on desired natural resources and the environment while achieving effective control.

Sign Plan - This plan provides a record of all signs installed throughout the Refuge and guidelines for sign replacement.

Employee Development and Training Plan - Describes Refuge employee training needs.

Oil and Gas Management Plan - This plan provides a history of oil and gas activities on the Refuge, and annotates standard operating procedures for most issues that arise. Such issues will include oil and brine spill contingency protocols for wildlife.

Fishery Management Plan - Describes facilities, resources, and management practices of Refuge fisheries directed primarily toward recreational fishing in Refuge ponds. It does not address management of Lake Texoma.

Fishing Plan - This plan details the provisions for recreational public fishing opportunities, including fishing derbies available on the Refuge.

Refuge Program Monitoring and Evaluation

Where possible, the CCP identifies and incorporates monitoring and evaluation activities as strategies under the objectives developed for the Refuge. Each Refuge program has specific guidelines described in the appropriate step-down plan. Step-down plans include approaches and methods for monitoring management activities and specific criteria to evaluate the outcomes of the activities. As new information becomes available through baseline data, research, or outcomes of management projects, the existing Refuge programs would be adjusted. Step-down plans including the monitoring and evaluation sections would require periodic review, program evaluation, and adjustment as necessary.

Monitoring and Evaluation of the CCP

The National Wildlife Refuge System Improvement Act of 1997 requires that the Service monitor fish, wildlife and plants on refuges in order 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. All 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.

For this plan to be a useful working document for present and future Refuge managers, documentation and accountability must be a priority. The most effective implementation of the CCP would require periodic review, evaluation, and the addition of information as necessary to keep the document as current as the Refuge programs that evolve.

Where possible, the CCP will identify and incorporate 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.

Intra-Service Section 7

Intra-Service Section 7 Consultation was initiated with the Ecological Services Field Office in Arlington, Texas and was completed prior to final approval of this CCP.

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GLOSSARY

Alternative	A set of objectives and strategies needed to achieve refuge goals and the desired future condition.
Appropriate Use	A recreational use that is: 1) a Priority public use, or is necessary for the safe and effective conduct of the same; or 2) supports the Refuge System mission, purposes, goals or objectives of the Refuge; or 3) otherwise determined by the Refuge Manager, through proper documentation and concurred by the Regional Supervisor, to be appropriate.
Biota	Flora and fauna of the region.
Biotic Community	An assemblage of interrelated plants and animals that together inhabit a defined location.
Compatible Use	A wildlife-dependent recreational use, or any other use on a refuge that will not interfere with or detract from the fulfillment of the mission of the Service or the purpose(s) of the refuge.
Comprehensive Conservation Plan (CCP)	A document that describes the desired future conditions of the refuge, and specifies management actions to achieve refuge goals and the mission of the National Wildlife Refuge System.
Ecological Integrity	The variety of life forms and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.
Ecosystem	A dynamic interrelated complex of plant and animal communities and their associated nonliving environment.
Ecosystem Approach	A strategy or plan to protect and restore the natural function, structure, and species composition of an ecosystem, recognizing that all components are interrelated.
Ecosystem Management	Management of an ecosystem that includes all ecological, social, and economic components which make up the whole of the system.
Eco-Region	Ecological region as determined by the Service, defined by geographic similarities.
Endangered Species	Any species of pant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register.

Environmental Assessment	A systematic analysis to determine if proposed actions would result in a significant effect on the quality of the environment.
Exotic	A plant or animal species not native to the area and introduced intentionally or unintentionally.
Goals	Descriptive statements of desired future conditions.
Habitat	The environment in which a plant or animal naturally occurs, its "living place".
Issue	Any unsettled matter that requires a management decision. For example public uses, habitat protection needs, conflicts or controversies that are the focus of the planning effort.
National Wildlife Refuge	A designated area of land or water or an interest in land or water within the Refuge System, including national wildlife refuges, wildlife management areas, waterfowl production areas, and other areas under Service jurisdiction for the protection and conservation of fish and wildlife, and plant resources. A complete listing of all units of the refuge system may be found in the current "Annual Report of Lands Under Control of the U.S. Fish and Wildlife Service".
National Wildlife Refuge System	Various categories of areas (land and water) that are administered by the Secretary of the Interior and the U.S. Fish and Wildlife Service for the protection and conservation of fish and wildlife, and plant resources including species that are threatened with extinction; including national wildlife refuges, wildlife management areas, and waterfowl production areas.
NEPA	Requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.
No Action Alternative	An alternative under which existing management would be continued.
Nonpriority Public Use	A recreational use of the Refuge System that is not one of the priority wildlife-dependent uses, but may be allowed if it is appropriate and compatible.
Objectives	A concise statement of what will be achieved, how much will be achieved, when and where it will be achieved and who is responsible for the work. Objectives are derived from goals and provide the basis for determining management strategies, monitoring refuge accomplishments, and evaluating the success of the strategies. Objectives should be attainable and time specific and should be stated qualitatively to the extent possible. If objectives cannot be stated quantitatively, they

	may be stated qualitatively; Actions to be accomplished to achieve a desired and measurable outcome.
Opportunities	Potential solutions to issues.
Preferred Alternative	The Service's desired alternative identified in the Draft Comprehensive Conservation Plan.
Priority Public Use	Compatible wildlife-dependent recreational uses (hunting, fishing wildlife observation, photography, environmental education, and interpretation) are the priority general public uses of the system and shall receive priority consideration in refuge planning and management.
Proposed Action	The main action, to prepare and implement the CCP.
Public Involvement	The process by which interested and affected individuals, organizations, agencies, and governmental entities participate in the planning and decision making process.
Purpose of the Refuge	The purposes specified in or derived from the law, proclamation executive order, agreement, public land order, donating document, or administrative memorandum establishing authorizing or expanding a refuge, refuge unit or refuge sub-unit.
Research Natural Areas (RNA)	A land management category used by federal agencies to designate lands permanently reserved for research and educational purposes.
Riparian	Of or relating to land lying immediately adjacent to a water body and having specific characteristics of that transitional area, such as riparian vegetation. A stream bank is an example of a riparian habitat.
Scoping	A process for determining the scope of issues to be addresses by a comprehensive conservation plan and for identifying the significant issues. Involved in the process are federal, state, and local agencies, private organizations and individuals.
Species	A biological classification that identifies a specific plant or animal having unique distinguishable characteristics and that can breed and/or reproduce its own kind.
Strategies	A general approach or specific action, tool, or technique used to achieve refuge objectives.
Threatened Species	Those plant or animal species likely to become endangered throughout all or a significant portion of their range within the foreseeable future. A plant or animal identified and defined in accordance with the 1973 Endangered species Act and published in the Federal Register.

Vegetation	Plants in general, or the sum of total plant life in the area.
Vegetation Type	A category of land based on potential or existing dominant plant species of a particular area.
Watershed	The entire land area that collects and drains water into a stream or stream system
Wetland	Areas such as lakes, marshes, and streams that are inundated by surface or ground water for a long enough period of time each year to support, under natural conditions, plants and animals that require saturated or seasonally saturated soils.
Wildlife-dependent Recreational Use	A use of a refuge that involves hunting, fishing, wildlife observation, and photography, or environmental education and interpretation, as identified in the NWRS Improvement Act of 1997. The same as "priority public use."
Wildlife Diversity	A measure of the number of wildlife species in an area and their relative abundance.

APPENDIX A - HAGERMAN NWR SPECIES LIST

BIRDS (Order follows the A.O.U. Check-list of North American Birds, 7th ed. 1998)

Loons	
Common Loon	*Gavia immer*
Grebes	
Pied-billed Grebe	*Podilymbus podiceps*
Horned Grebe	*Podiceps auritus*
Eared Grebe	*Podiceps nigricollis*
Pelicans	
American White Pelican	*Pelecanus erythrorhynchos*
Cormorants	
Double-crested Cormorant	*Phalacrocorax auritus*
Neotropic Cormorant	*Phalacrocorax brasilianus*
Anhinga (Darters)	
Anhinga	*Anhinga anhinga*
Bitterns and Herons	
American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Great Blue Heron	*Ardea herodias*
Great Egret	*Ardea alba*
Snowy Egret	*Egretta thula*
Little Blue Heron	*Egretta caerulea*
Tricolored Heron	*Egretta tricolor*
Cattle Egret	*Bubulcus ibis*
Green Heron	*Butorides virescens*
Black-crowned Night-Heron	*Nycticorax nycticorax*
Yellow-crowned Night-Heron	*Nyctanassa violaceus*
Ibises and Spoonbills	
White Ibis	*Eudocimus albus*
White-faced Ibis	*Plegadis chihi*
Roseate Spoonbill	*Ajaia ajaja*
Swans, Geese, and Ducks	
Greater White-fronted Goose	*Anser albifrons*
Snow Goose	*Chen caerulescens*
Ross' Goose	*Chen rossii*
Canada Goose	*Branta canadensis*
Tundra Swan	*Cygnus columbianus*
Wood Duck	*Aix sponsa*
Gadwall	*Anas strepera*
American Wigeon	*Anas americana*
American Black Duck	*Anas rubripes*
Mallard	*Anas platyrhynchos*

Blue-winged Teal	*Anas discors*
Cinnamon Teal	*Anas cyanoptera*
Northern Shoveler	*Anas clypeata*
Northern Pintail	*Anas acuta*
Green-winged Teal	*Anas crecca*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Ring-necked Duck	*Aythya collaris*
Lesser Scaup	*Aythya affinis*
Bufflehead	*Bucephala albeola*
Common Goldeneye	*Bucephala clangula*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Ruddy Duck	*Oxyura jamaicensis*

American Vultures

Black Vulture	*Coragyps atratus*
Turkey Vulture	*Cathartes aura*

Kites, Eagles, and Hawks

Osprey	*Pandion haliaetus*
Mississippi Kite	*Ictinia mississippiensis*
Bald Eagle	*Haliaeetus leucocephalus*
Northern Harrier	*Circus cyaneus*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Northern Goshawk	*Accipiter gentilis*
Red-shouldered Hawk	*Buteo lineatus*
Broad-winged Hawk	*Buteo platypterus*
Swainson's Hawk	*Buteo swainsoni*
Red-tailed Hawk	*Buteo jamaicensis*
Rough-legged Hawk	*Buteo lagopus*
Golden Eagle	*Aquila chrysaetos*

Falcons

American Kestrel	*Falco sparverius*
Merlin	*Falco columbarius*
Peregrine Falcon	*Falco peregrinus*

Pheasants and Quail

Wild Turkey	*Meleagris gallopavo*
Northern Bobwhite	*Colinus virginianus*

Rails, Gallinules, and Coots

King Rail	*Rallus elegans*
Virginia Rail	*Rallus limicola*
Sora	*Porzana carolina*
Purple Gallinule	*Porphyrula martinica*
Common Moorhen	*Gallinula chloropus*
American Coot	*Fulica americana*

Cranes

Sandhill Crane	*Grus canadensis*

Plovers

Black-bellied Plover	*Pluvialis squatarola*
American Golden-Plover	*Pluvialis dominica*
Snowy Plover	*Charadrius alexandrinus*
Semipalmated Plover	*Charadrius semipalmatus*
Piping Plover	*Charadrius melodus*
Killdeer	*Charadrius vociferus*

Stilts and Avocets

Black-necked Stilt	*Himantopus mexicanus*
American Avocet	*Recurvirostra americana*

Sandpipers and Phalaropes

Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*Tringa flavipes*
Solitary Sandpiper	*Tringa solitaria*
Willet	*Catoptrophorus semipalmatus*
Spotted Sandpiper	*Actitis macularia*
Upland Sandpiper	*Bartramia longicauda*
Long-billed Curlew	*Numenius americanus*
Hudsonian Godwit	*Limosa haemastica*
Marbled Godwit	*Limosa fedoa*
Ruddy Turnstone	*Arenaria interpres*
Red Knot	*Calidris canutus*
Sanderling	*Calidris alba*
Semipalmated Sandpiper	*Calidris pusilla*
Western Sandpiper	*Calidris mauri*
Least Sandpiper	*Calidris minutilla*
White-rumped Sandpiper	*Calidris fuscicollis*
Baird's Sandpiper	*Calidris bairdii*
Pectoral Sandpiper	*Calidris melanotos*
Dunlin	*Calidris alpina*
Stilt Sandpiper	*Calidris himantopus*
Buff-breasted Sandpiper	*Tryngites subruficollis*
Short-billed Dowitcher	*Limnodromus griseus*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Common Snipe	*Gallinago gallinago*
American Woodcock	*Scolopax minor*
Wilson's Phalarope	*Phalaropus tricolor*
Red-necked Phalarope	*Phalaropus lobatus*
Red Phalarope	*Phalaropus fulicaria*

Gulls and Terns

Laughing Gull	*Larus atricilla*
Franklin's Gull	*Larus pipixcan*
Bonaparte's Gull	*Larus philadelphia*
Ring-billed Gull	*Larus delawarensis*
Herring Gull	*Larus argentatus*
Caspian Tern	*Sterna caspia*

Forster's Tern	*Sterna forsteri*
Least Tern	*Sterna antillarum*
Black Tern	*Chlidonias niger*
Pigeons and Doves	
Rock Dove	*Columba livia*
Mourning Dove	*Zenaida macroura*
Cuckoos and Roadrunners	
Yellow-billed Cuckoo	*Coccyzus americanus*
Greater Roadrunner	*Geococcyx californianus*
Owls	
Eastern Screech-Owl	*Otus asio*
Great Horned Owl	*Bubo virginianus*
Barred Owl	*Strix varia*
Short-eared Owl	*Asio flammeus*
Goatsuckers	
Common Nighthawk	*Chordeiles minor*
Chuck-will's-widow	*Caprimulgus carolinensis*
Whip-poor-will	*Caprimulgus vociferus*
Swifts	
Chimney Swift	*Chaetura pelagica*
Hummingbirds	
Ruby-throated Hummingbird	*Archilochus colubris*
Kingfishers	
Belted Kingfisher	*Ceryle alcyon*
Woodpeckers	
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-bellied Woodpecker	*Melanerpes carolinus*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Ladder-backed Woodpecker	*Picoides scalaris*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Northern Flicker	*Colaptes auratus*
Pileated Woodpecker	*Dryocopus pileatus*
Tyrant Flycatchers	
Olive-sided Flycatcher	*Contopus cooperi*
Eastern Wood-Pewee	*Contopus virens*
Yellow-bellied Flycatcher	*Empidonax flaviventris*
Acadian Flycatcher	*Empidonax virescens*
Alder Flycatcher	*Empidonax alnorum*
Willow Flycatcher	*Empidonax traillii*
Least Flycatcher	*Empidonax minimus*
Eastern Phoebe	*Sayornis phoebe*
Great Crested Flycatcher	*Myiarchus crinitus*

Western Kingbird	*Tyrannus verticalis*
Eastern Kingbird	*Tyrannus tyrannus*
Scissor-tailed Flycatcher	*Tyrannus forficatus*

Shrikes

Loggerhead Shrike	*Lanius ludovicianus*

Vireos

White-eyed Vireo	*Vireo griscus*
Bell's Vireo	*Vireo bellii*
Yellow-throated Vireo	*Vireo flavifrons*
Blue-headed Vireo	*Vireo solitarius*
Warbling Vireo	*Vireo gilvus*
Philadelphia Vireo	*Vireo philadelphicus*
Red-eyed Vireo	*Vireo olivaceus*

Jays and Crows

Blue Jay	*Cyanocitta cristata*
American Crow	*Corvus brachyrhynchos*

Larks

Horned Lark	*Eremophila alpestris*

Swallows

Purple Martin	*Progne subis*
Tree Swallow	*Tachycineta bicolor*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Petrochelidon pyrrhonota*
Barn Swallow	*Hirundo rustic*

Chickadees and Titmice

Carolina Chickadee	*Poecile carolinensis*
Tufted Titmouse	*Baeolophus bicolor*

Bushtits

Bushtit	*Psaltriparus minimus*

Nuthatches

Red-breasted Nuthatch	*Sitta canadensis*
White-breasted Nuthatch	*Sitta carolinensis*

Creepers

Brown Creeper	*Certhia americana*

Wrens

Carolina Wren	*Thryothorus ludovicianus*
Bewick's Wren	*Thryomanes bewickii*
House Wren	*Troglodytes aedon*
Winter Wren	*Troglodytes troglodytes*
Sedge Wren	*Cistothorus platensis*
Marsh Wren	*Cistothorus palustris*

Kinglets and Gnatchtchers

Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned Kinglet	*Regulus calendula*
Blue-gray Gnatcatcher	*Polioptila caerulea*

Thrushes

Eastern Bluebird	*Sialia sialis*
Veery	*Catharus fuscescens*
Gray-cheeked Thrush	*Catharus minimus*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
Wood Thrush	*Hylocichla mustelina*
American Robin	*Turdus migratorius*

Thrashers

Gray Catbird	*Dumetella carolinensis*
Northern Mockingbird	*Mimus polyglottos*
Brown Thrasher	*Toxostoma rufum*

Starlings

European Starling	*Sturnus vulgaris*

Pipits

American (Water) Pipit	*Anthus rubescens*
Sprague's Pipit	*Anthus spragueii*

Waxwings

Cedar Waxwing	*Bombycilla cedrorum*

Wood Warblers

Tennessee Warbler	*Vermivora peregrina*
Orange-crowned Warbler	*Vermivora celata*
Nashville Warbler	*Vermivora ruficapilla*
Northern Parula	*Parula americana*
Yellow Warbler	*Dendroica petechia*
Chestnut-sided Warbler	*Dendroica pensylvanica*
Magnolia Warbler	*Dendroica magnolia*
Yellow-rumped Warbler	*Dendroica coronata*
Black-throated Green Warbler	*Dendroica virens*
Blackburnian Warbler	*Dendroica fusca*
Yellow-throated Warbler	*Dendroica dominica*
Palm Warbler	*Dendroica palmarum*
Bay-breasted Warbler	*Dendroica castanea*
Blackpoll Warbler	*Dendroica striata*
Cerulean Warbler	*Dendroica cerulea*
Black-and-white Warbler	*Mniotilta varia*
American Redstart	*Setophaga ruticilla*
Prothonotary Warbler	*Protonotaria citrea*
Ovenbird	*Seiurus aurocapillus*
Northern Waterthrush	*Seiurus noveboracensis*
Louisiana Waterthrush	*Seiurus motacilla*
Kentucky Warbler	*Oporornis formosus*

Mourning Warbler	*Oporornis philadelphia*
Common Yellowthroat	*Geothlypis trichas*
Hooded Warbler	*Wilsonia citrina*
Wilson's Warbler	*Wilsonia pusilla*
Canada Warbler	*Wilsonia canadensis*
Yellow-breasted Chat	*Icteria virens*

Tanagers

Summer Tanager	*Piranga rubra*

Sparrows

Eastern Towhee	*Pipilo erythrophthalmus*
American Tree Sparrow	*Spizella arborea*
Chipping Sparrow	Spizella passerina
Field Sparrow	*Spizella pusilla*
Vesper Sparrow	*Pooecetes gramineus*
Lark Sparrow	*Chondestes grammacus*
Savannah Sparrow	*Passerculus sandwichensis*
Grasshopper Sparrow	*Ammodramus savannarum*
Le Conte's Sparrow	*Ammodramus leconteii*
Fox Sparrow	*Passerelia iliaca*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
Swamp Sparrow	*Melospiza georgiana*
White-throated Sparrow	*Zonotrichia albicollis*
Harris' Sparrow	*Zonotrichia querula*
White-crowned Sparrow	*Zonotrichia leucophrys*
Dark-eyed Junco	*Junco hyemalis*
McCown's Longspur	*Calcarius mccownii*
Lapland Longspur	*Calcarius lapponicus*
Smith's Longspur	*Calcarius pictus*
Chestnut-collared Longspur	*Calcarius ornatus*

Cardinals and Grosbeaks

Northern Cardinal	*Cardinalis cardinalis*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Blue Grosbeak	*Guiraca caerulea*
Indigo Bunting	*Passerina cyanea*
Painted Bunting	*Passerina ciris*
Dickcissel	*Spiza americana*

Blackbirds and Orioles

Bobolink	*Dolichonyx oryzivorus*
Red-winged Blackbird	*Agelaius phoeniceus*
Eastern Meadowlark	*Sturnella magna*
Western Meadowlark	*Surnella neglecta*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
Rusty Blackbird	*Euphagus carolinus*
Brewer's Blackbird	*Euphagus cyanocephalus*
Common Grackle	*Quiscalus quiscula*
Great-tailed Grackle	*Quiscalus mexicanus*

Brown-headed Cowbird	*Molothrus ater*
Orchard Oriole	*Icterus spurius*
Northern Oriole	*Icterus galbula*

Finches

Purple Finch	*Carpodacus purpureus*
Pine Siskin	*Carduelis pinus*
American Goldfinch	*Carduelis tristis*

Old World Sparrows

House Sparrow	*Passer domesticus*

The following birds have been seen at Hagerman NWR but are either no longer present, are not normally found in the area, or do not normally stop on the Refuge during migration.

Red-necked Grebe
Western Grebe
Brown Pelican
Greater Scaup
White-winged Scoter
Northern Goshawk
Ferruginous Hawk
Prairie Falcon
Ring-necked Pheasant
Black Rail
Whooping Crane
Whimbrel
Mountain Plover
Glaucous Gull
Sabine's Gull
Common Tern
Black Skimmer
Inca Dove
Black-billed Cuckoo
Barn Owl
Snowy Owl
Burrowing Owl
Northern Saw-whet Owl
Black-chinned Hummingbird
Black Phoebe
Say's Phoebe
Vermilion Flycatcher
Mountain Bluebird
Sage Thrasher
Curve-billed Thrasher
Blue-winged Warbler
Black-throated Blue Warbler
Pine Warbler
Prairie Warbler
MacGillivry's Warbler
Black-headed Grosbeak
Evening Grosbeak
Lazuli Bunting
Green-tailed Towhee
Baird's Sparrow
Sharp-tailed Sparrow
Red Crossbill
House Finch

MAMMALS

* Hypothesized, but not confirmed by collected specimen.

DELPHIMORPHA	
Virginia Opossum	*Didelphis virginiana*
INSECTIVORA	
Least Shrew*	*Cryptotis parva*
Eastern Mole	*Scalopus aquaticus*
CHIROPTERA	
Myotis*	*Myotis* spp.
Eastern Red Bat	*Lasiurus borealis*
Evening Bat	*Nycticeius humeralis*
XENARTHRA	
Nine-banded Armadillo	*Dasypus novemcinctus*
LAGOMORPHA	
Black Tailed Jackrabbit	*Lepus californicus*
Swamp Rabbit	*Sylvilagus aquaticus*
Eastern Cottontail	*Sylvilagus floridanus*
RODENTIA	
Eastern Gray Squirrel*	*Sciurus carolinensis*
Eastern Fox Squirrel	*Sciurus niger*
Southern Flying Squirrel	*Glaucomys volans*
Plains Pocket Gopher	*Geomys busarius*
Hipsid Cotton Rat	*Sigmodon hispidus*
Eastern Woodrat	*Neotoma floridana*
Fulvous Harvest Mouse	*Reithrodontomys fulvescens*
Hispid Pocket Mouse	*Perognathus hispidus*
Deer Mouse	*Peromyscus maniculatus*
White-footed Mouse	*Peromyscus leucopus*
Cotton Mouse*	*Peromyscus gossypinus*
Thirteen-lined Ground Squirrel	*Spermophilus tridecemlineatus*
House Mouse	*Mus musculus*
Common Muskrat	*Odantra zibethicus*
Norway Rat	*Rattus norvegicus*
Nutria	*Myocastor coypus*
American Beaver	*Castor canidensis*
CARNIVORA	
Common Raccoon	*Procyon lotor*
Ringtail*	*Bassariscus astutus*
Coyote	*Canis latrans*
Striped Skunk	*Mephitis mephitis*
Eastern Spotted Skunk	*Spirogale putorius*
Bobcat	*Lynx rufus*
Cougar	*Felis concolor*
Gray Fox	*Urocyon cinereoargenteus*
Red Fox	*Vulpes vulpes*

River Otter	*Lutra canadensis*
Badger	*Taxidea taxus*
Long-tailed Weasel	*Mustela frenata*
Mink	*Mustela vison*

ARTIODACTYLA

White-tailed Deer	*Odocoileus virginianus*

AMPHIBIANS AND REPTILES

* Species suspected of occurring on the Refuge but not confirmed by collected specimen.

AMPHIBIANS

Salamanders

Lesser Siren*	*Siren intermedia*
Central Newt*	*Notophthalmus viridescens louisianensis*
Small-mouthed Salamander	*Ambystoma texanum*
Barred Tiger Salamander	*Ambystoma tigrinum mavortium*

Toads

Hurter's Toad	*Scaphiopus holbrooki hurteri*
East Texas Toad	*Bufo woodhousii velatus*
Rocky Mountain Toad	*Bufo woodhousii woodhousii*
Texas Toad	*Bufo speciosus*
Western Narrow-mouthed Toad	*Gastrophryne olivacea*

Frogs

Southern Cricket Frog	*Acris gryllus gryllus*
Blanchard's Cricket Frog	*Acris crepitans blanchardi*
Spotted Chorus Frog	*Pseudacris clarki*
Strecker's Chorus Frog	*Pseudacris streckeri streckeri*
Striped Chorus Frog*	*Pseudacris triseriata*
Cope's Gray Tree Frog*	*Hyla chrysoscelis*
Bullfrog	*Rana catesbeiana*
Leopard Frog	*Rana pipiens*
Rio Grande Leopard Frog*	*Rana berlandieri*
Green Frog*	*Rana clamitans*

Turtles

Mississippi Mud Turtle	*Kinosternon subrubrum hippocrepis*
Stinkpot (Common Musk Turtle)	*Sternotherus odoratus*
Common Snapping Turtle	*Chelydra serpentina serpentina*
Three-toed Box Turtle	*Terrapene carolina triunguis*
Ornate Box Turtle	*Terrapene ornata ornata*
Ouachita Map Turtle	*Graptemys pseudogeographica ouachitensis*
Red-eared Turtle (Slider)	*Pseudemys scripta elegans*
Western Chicken Turtle	*Dierochelys reticularia miaria*
Smooth Soft-shell	*Trionyx muticus*
Texas Spiny Soft-shell	*Trionyx spiniferus emoryi*

Lizards

Eastern Collared Lizard*	*Crotaphytus collaris collaris*
Northern Fence Lizard	*Sceloporus undulatus hyacinthinus*
Texas Spiny Lizard	*Sceloporus olivaceus*
Green Anole	*Anolis carolinensis*
Texas Horned Lizard (Horned Toad)	*Phrynosoma cornutum*
Texas Spotted Whiptail	*Cnemidophorus gularis*
Six-lined Racerunner	*Cnemidophorus sexlineatus*
Ground Skink	*Scincella lateralis*
Broad-headed Skink	*Eumeces laticeps*
Five-lined Skink	*Eumeces fasciatus*
Eastern Glass Lizard (Glass-snake)	*Ophisaurus ventralis*

Snakes

Texas Blind Snake	*Leptotyphlops dulcis dulcis*
Diamondbacked Water Snake	*Nerodia rhombifera rhombifera*
Broad-banded Water Snake	*Nerodia sipedon confluens*
Blotched Water Snake	*Nerodia erythrogaster transversa*
Texas Brown Snake	*Storeria dekayi texana*
Red-bellied Snake*	*Storeria occipitomaculata*
Checkered Garter Snake	*Thamnophis marcianus*
Western Ribbon Snake	*Thamnophis proximus proximus*
Texas Garter Snake*	*Thamnophis sirtalis annectens*
Central Lined Snake	*Tropidoclonion lineatum annectens*
Rough Earth Snake	*Haldea striatula*
Western Earth Snake	*Haldea valeriae elegans*
Eastern Hognose Snake	*Heterodon platyrhinos*
Prairie Ringneck Snake	*Diadophis punctatus arnyi*
Racer	*Coluber constrictor foxi or C.c. flaviventris*
Eastern Coachwhip	*Masticophis flagellum flagellum*
Rough Green Snake	*Opheodrys aestivus*
Smooth Green Snake	*Opheodrys vernalis*
Texas Rat Snake	*Elaphe obsoleta lindheimeri*
Great Plains Rat Snake	*Elaphe gutttata emoryi*
Bullsnake	*Pituophis melanoleucas sayi*
Prairie Kingsnake	*Lampropeltis calligaster calligaster*
Speckled Kingsnake	*Lampropeltis getulus holbrooki*
Broad-banded Copperhead	*Agkistrodon contortrix laticinctus*
Western Cottonmouth	*Agkistrodon piscivorus leucostoma*
Western Pygmy Rattlesnake	*Sistrurus miliarius streckeri*
Timber Rattlesnake	*Crotalus horridus atricaudatus*
Western Diamondback Rattlesnake	*Crotalus atrox*

FISH

Polyodontidae

Paddlefish	*Polyodon spathula*

Lepisosteidae

Alligator Gar	*Lepisosteus spatula*
Spotted Gar	*Lepisosteus oculatus*
Longnose Gar	*Lepisosteus osseus*
Shortnose Gar	*Lepisosteus platostomus*

Clupeidae	
Gizzard Shad	*Dorosoma cepedianum*
Threadfin Shad	*Dorosoma petense*
Hiodontidae	
Goldeye	*Hiodon alosoides*
Cyprinidae	
Grass Carp	*Ctenopharyngodon idella*
Carp (German or European)	*Cypinus carpio*
Goldfish	*Carassius auratus*
Golden Shiner	*Notemigonus crysoleucas*
Pugnose Minnow	*Opsopoeodus emiliae*
Silver Chub	*Hybopsis storeriana*
Emerald Shiner	*Notropis atherinoides*
Silverband Shiner	*Notropis shumardi*
Chub Shiner	*Notropis potteri*
Blacktail Shiner	*Notropis venustus*
Red Shiner (Redhorse Shiner)	*Notropis lutrensis*
Ghost Shiner	*Notropis buchanani*
Bullhead Minnow	*Pimphales vigilax*
Fathead Minnow	*Pimphales promelas*
Mississippi Silvery Minnow	*Hybognathus nuchalis*
Catostomidae	
River Carpsucker	*Carpiodes carpio*
Smallmouth Buffalo	*Ictiobus bubalus*
Bigmouth Buffalo	*Ictiobus cyprinellus*
Gray Redhorse	*Moxostoma congestum*
Golden Redhorse	*Moxostoma erythrurum*
Spotted Sucker	*Minytrema melanops*
Ictaluridae	
Channel Catfish	*Ictalurus punctatus*
Blue Catfish	*Ictalurus furcatus*
Black Bullhead	*Ictalurus melas*
Yellow Bullhead	*Ictalurus natalis*
Flathead Catfish	*Pylodictis olivaris*
Anguillidae	
American Eel	*Anguilla rostrata*
Cyprinodontidae	
Blackstripe Topminnow	*Fundulus notatus*
Poeciliidae	
Mosquitofish	*Gambusia affinis*
Mugilidae	
Striped Mullet	*Mugil cephalus*

Atherinidae	
Mississippi Silverside	*Menidia audens*
Inland Silverside	*Menidia beryllina*
Brook Silverside	*Labidesthes sicculus*
Moronidae	
White Bass	*Morone chrysops*
Striped Bass	*Morone saxatilis*
Hybrid White/striped Bass	*M. chrysops x saxatilis*
Centrarchidae	
Smallmouth Bass	*Micropterus dolomieui*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Warmouth	*Lepomis gulosus*
Green Sunfish	*Lepomis cyanellus*
Bantam Sunfish	*Lepomis symmetricus*
Redear Sunfish	*Lepomis microlophus*
Bluegill	*Lepomis macrochirus*
Orangespotted Sunfish	*Lepomis humilis*
Longear Sunfish	*Lepomis megalotis*
White Crappie	*Pomoxis annularis*
Black Crappie	*Pomoxis nigromaculatus*
Percidae	
Walleye	*Stizostedion vitreum*
Logperch	*Percina caprodes*
Slough Darter	*Etheostoma gracile*
Sciaenidae	
Freshwater Drum	*Aplodinotus grunniens*
Cichlidae	
Mozambique Tilapia	*Tilapia mossambica*

THREATENED AND ENDANGERED SPECIES LIST

Bald Eagle	*Haliaeetus leucocephalus*	T-PD
Whooping Crane	*Grus americanus*	E
Least Tern	*Sterna antillarum*	E
Piping Plover	*Charadrius melodus*	T
Brown Pelican	*Pelecanus occidentalis*	E

Species of concern found in the vicinity, but only rarely on the Refuge:

Mountain Plover	*Charadrius montanus*

Index

E	=	Endangered
PD	=	Proposed De-listed
T	=	Threatened
PT	=	Proposed Threatened

PLANTS - This list was revised December 31, 1999 by Refuge volunteer C. Heise. It was later modified in June 2000 by Research Management Consultants, Inc. Scientific names follow Shinners' Manual of the North Central Texas Flora; Mahler, 1988; and the USDA/NRCS National Plant Database.

Common names follow Shinners' Manual except when numbers follow in parentheses.

The other common names follow:

(1) Checklist of the Vascular Plants of Texas, Hatch et al., 1990
(2) The grasses of Texas, Gould, 1975
(3) Manual of the Vascular Plants of Texas, Correll & Johnston, 1970
(4) Flora of the Great Plains, McGregor et al., 1986
(5) USDA/ NRCS National Plant Database

* signifies the common name of the genus is given
** signifies the common name of the species is used for a variety

ACANTHACEAE	
False Mint	*Dicliptera brachiata*
Prairie Petunia*	*Ruellia humilis*
Wild Petunia*, Smooth Ruellia	*Ruellia strepens*
ACERACEAE	
Box-Elder, Ashleaf Maple (1)	*Acer negundo*
AGAVACEAE	
Arkansas Yucca	*Yucca arkansana*
ALISMATACEAE	
Burrhead, Upright Burrhead	*Echinodorus berteroi*
Duck-potato, Common Arrowhead (1)	*Sagittaria latifolia*
Delta Arrowhead (1)	*Sagittaria platyphylla*
AMARANTHACEAE	
Tumbleweed, Tumbleweed Amaranth (1)	*Amaranthus albus*
Nuttall's Water-hemp	*Amaranthus rudis*
Spiny Pigweed, Thorny Amaranth (1)	*Amaranthus spinosus*
Florida Snakecotton (1), Cotton-weed*	*Froelichia floridana*
Slender Snakecotton (1), Cotton-weed*	*Froelichia gracillis*
Lance-leaf Cotton Flower	*Gossypianthus lanuginosus var. tenuiflorus*
Bloodleaf, Rootstock Bloodleaf (1)	*Iresine rhizomatosa*
ANACARDIACEAE	
Poison Ivy, Poison Oak, Hiedra (1)	*Toxicodendron radicans*
Wing-Rib Sumac, Flameleaf Sumac (1)	*Rhus copallinum var. latifolia*
Smooth Sumac, Scarlet Sumac (1)	*Rhus glabra*
APIACEAE	
Prairie Bishop (1)	*Bifora americana*
Chervil*(Hairy-fruit)	*Chaerophyllum tainturieri var. dasycarpum*
Chervil*	*Chaerophyllum tainturieri var. tainturieri*

Hone-wort (1), Wild Chervil (1)	*Cryptotaenia canadensis*
Rattlesnake Weed, Southwestern Carrot (1)	*Daucus pusillus*
Hooker's Eryngo	*Eryngium hookeri*
Leavenworth's Eryngo (1)	*Eryngium leavenworthii*
Arkansas Dogshade, Tansy Dogshade (5)	*Limnosciadium pinnatum*
Prairie Parsley (1), Prairie Parsnip*	*Polytaenia nuttallii*
Thread-leaf Mock Bishop's Weed	*Ptilimnium capillaceum*
Queen Anne's Lace	*Ptilimnium costatum*
Nuttall Mock Bishop (1), Queen Anne's Lace*	*Ptilimnium nuttallii*
Canada Snakeroot (1)	*Sanicula canadensis*
Cluster Sanicle	*Sanicula odorata*
Forked Scaleseed	*Spermolepis divaricata*
Beggar's Lice	*Spermolepis echinata*
Spreading Scaleseed	*Spermolepis inermis*
Knotted Hedge Parsley (1), Hedge Parsley	*Torilis nodosa*
Hedge Parsley* (1)	*Torilis arvensis*
Whitenymph (5)	*Trepocarpus aethusae*
Golden Alexanders, Golden Zizia	*Zizia aurea*

APOCYNACEAE

Indian Hemp*	*Apocynum cannabinum var. pubescen*
Prairie Dogbane, Willow Dogbane (1)	*Apocynum sibiricum*

AQUIFOLIACEAE

Winterberry, Deciduous Holly, Possum-haw (1)	*Ilex decidua*

ARACEAE

Green Dragon-Dragonroot	*Arisaema dracontium*

ASCLEPIADACEAE

Green Flowered Milkweed, Antelopehorn	*Asclepias viridiflora*
Milkweed*, Blunt-leaf Milkweed	*Asclepias amplexicaulis*
Antelope-spiderhorn, Milkweed* (1)	*Asclepias asperula var. decumbens*
Butterfly-weed	*Asclepias tuberosa*
Whorled Milkweed	*Asclepias verticillata*
Green Milkweed, Antelopehorn (1)	*Asclepias viridis*
Two-flowered Milkvine	*Matelea biflora*
Milkvine* (1), Anglepod	*Matelea gonocarpos*

ASPLENIACEAE

Ebony Spleenwort	*Asplenium platyneuron*

ASTERACEAE

Fragrant Cudweed (1)	*Pseudognaphalium obtusifolium*
Common Yarrow	*Achillea millefolium*
Western Ragweed, Perennial Ragweed	*Ambrosia psilostachya*
Blood Ragweed, Giant Ragweed	*Ambrosia trifida var.texana*
Largeleaf Pussy-toes (1)	*Antennaria parlinii var. fallax*
Prairie Plantain, Grovestem,	*Arnoglossum plantagineum*

Indian Plantain (1)	
Texas Aster (1)	*Aster drummondii var. texanus*
Heath Aster (1)	*Aster ericoides*
Aromatic Aster (1)	*Aster oblongifolius*
Skydrop Aster (1), Late Purple Aster	*Aster patens*
Tall Aster (1), Willow-leafed Aster	*Aster praealtus*
Salt-marsh Aster, Blackweed	*Aster subulatus var. ligulatus*
Roosevelt Weed, New Deal Weed, Jara Dulce (1)	*Baccharis neglecta*
Beggar-ticks, Stick-tights, Devil's Beggar's Ticks	*Bidens frondosa*
Prairie Kuhnia (1), False Boneset*	*Brickellia eupatoriodides var. texana*
Basket-flower, American B.(1), Powderpuff (1)	*Centaurea americana*
Common Least Daisy	*Chaetopappa asteroides*
Mexican Devil-weed, Spiny Aster	*Chloracantha spinosa*
Soft Goldaster (1)	*Chrysopsis pilosa*
Iowa Thistle (1), Tall Thistle	*Cirsium altissimum*
Blackland Thistle	*Cirsium engelmanii*
Thistle*, Texas Southern Thistle	*Cirsium texanum*
Horsetain Conyza (1), Marshtail (1), Canada Fleabane, Canadian Horseweed	*Conyza canadensis var. canadensis*
Plains Coreopsis*(1), Tickseed* (1)	*Coreopsis tinctoria*
Showy Hawksbeard (1)	*Crepis pulchara*
Blackeyed Susan, Clasping Cone-flower	*Dracopis amplexicaulis*
Blacksamson (1),Cone-flower*, Purple C.* (1)	*Echinacea angustifolia*
Yerba de Tajo (1), Pipeplant	*Eclipta prostrata*
Leafy Elephantfoot (1)	*Elephantopus carolinianus*
Englemann's Daisy (1), Cut-leaved Daisy*	*Engelmannia pinnatifida*
Annual Fleabane(1), Daisy-fleabane	*Erigeron annuus*
Daisy-fleabane*, Philadelphia Fleabane	*Erigeron philadelphicus*
Daisy-fleabane*, Prairie Fleabane	*Erigeron strigosus*
Tall Euptorium(1), Boneset*, Thoroughwort*	*Eupatorium altissimum*
Mist Flower, Blueboneset (1)	*Eupatorium coelestinum*
White Snakeroot	*Eupatorium rugosum*
Late Eupatorium (1), Fall Boneset	*Eupatorium serotinum*
Rabbit's Tobacco, Big Head Evax	*Evax prolifera*
Rabbit's Tobacco, Many-stem Evax	*Evax verna*
Fire-wheels, Indian Blanket	*Gaillardia pulchella*
Prairie Gallardia*, Lance-leafed Blanket Flower (5)	*Gaillardia aestivalis*
Purple Cudweed (1)	*Gamochaeta purpurea*
Goldenweed (4), Saw-leaf Daisy	*Grindelia papposa*
Common Broomweed	*Gutierrezia dracunculoides*
Texas Broomweed	*Gutierrezia texana*
Bitterweed, Sneezeweed* (1)	*Helenium amarum*
Stiff-hair Sunflower	*Helianthus hirsutus*
Common Sunflower, Mirasol (1)	*Helianthus annuus*
Maximilian Sunflower, Michaelmas Daisy (1)	*Helianthus maximiliani*
Jerusalem Artichoke	*Helianthus tuberosus*
Camphor-weed, Goldaster* (1)	*Heterotheca latifolia*
Old Plainsman, Chalkhill (1), Woolly White	*Hymenopappus tenuifolius*
Narrowleaf Sumpweed** (1),Marshelder** (1)	*Iva angustifolia*

Marshelder, Seascost Sumpweed (1), Sharpbract	*Iva annua*
Weedy-dwarf Dandelion	*Krigia cespitosa*
Weedy-dwarf Dandelion	*Krigia cespitosa var. gracilis*
Tuber Dandelion, Potato-Dandelion	*Krigia dandelion*
Wild Lettuce	*Lactuca canadensis*
Florida Lettuce (1), Woodland Lettuce	*Lactuca floridana*
Lettuce*, Western Wild Lettuce	*Lactuca ludoviciana*
Prickly Lettuce	*Lactuca serriola*
Tall Gayfeather (1), Blazing Star*	*Liatris aspera*
Blazing Star*, Narrow-leafed Gayfeather	*Liatris mucronata*
Smooth Gayfeather	*Liatris squarrosa var. glabrata*
Yellow Texas Star (1), Star Daisy	*Lindheimera texana*
Ragwort*, Ovated-leaf, Golden Groundsel	*Packera obovatus*
Ragwort*, Squaw-weed*, Prairie Groundsel	*Packera plattensis*
Groundsel* (1), Ragwort* (1), Yellowtop	*Packera tampicana*
Canela, Purple Pluchea (1)	*Pluchea odorata*
Native Dandelion*-Carolina	*Pyrrhopappus carolinianus*
Manystem False Dandelion (1), Native Dandelion*	*Pyrrhopappus pauciflorus*
Prairie Coneflower, Mexican Hat	*Ratibida columnifera*
Cone-flower*, Brown-eyed Susan* (1)	*Rudbeckia hirta var. pulcherrima*
Roughstem Rosinweed (1), Wh. Compass Plant	*Silphium asperrimum (radula)*
Compass-plant-yellow	*Silphium laciniatum*
Common Goldenrod** (1)	*Solidago canadensis var. scabra*
Giant Goldenrod	*Solidago gigantea var. serotina*
Missouri Basin Goldenrod** (1)	*Solidago missouriensis var. faciculata*
Flat-top Goldenrod (1)	*Solidago nitida*
Stiff Goldenrod (1)	*Solidago rigida*
Elm-leaf Goldenrod	*Solidago ulmifolia var. microphylla*
Prickly Sow Thistle (1)	*Sonchus asper*
Common Sow Thistle	*Sonchus oleraceus*
Common Dandelion	*Taraxacum officinale*
Goat's Beard	*Tragopogon dubius*
Gravelweed Crown-beard (1)	*Verbesina helianthoides*
Frostweed, White Crown-beard (1)	*Verbesina virginica*
Ironweed* Baldwin's	*Vernonia baldwinii*
Cocklebur	*Xanthium strumarium var. canadense*

BIGNONIACEAE

Common Trumpet-creeper (1), Cow-itch Vine (1)	*Campsis radicans*

BORAGINACEAE

Corn Gromwell (5)	*Buglossoides arvensis*
Salt Heliotrope (1), Chinese-pulsey (1), Quailplar	*Heliotropium curassavicum*
India Heliotrope (1), Turnsole (1)	*Heliotropium indicum*
Pasture Heliotrope (1)	*Heliotropium tenellum*
Narrow-leafed Gromwell	*Lithospermum incisum*
Rough Gromwell	*Myosotis macrosperma*
Western Marbleseed	*Onosmodium bejariense var. occidentale*

BRASSICACEAE

Smallseed False Flax	*Camelina microcarpa*
Shepherd's Purse	*Capsella bursa-pastoris*
Sand Bittercress	*Cardamine parviflora var. arenicola*
Pinnata Tansy-mustard	*Descurainia pinnata var. pinnata*
Flixweed, Tansy-mustard	*Descurainia sophia*
Short-pod Draba, Whitlow-grass (1)	*Draba brachycarpa*
Wedged-leafed Draba, Whitlow Wort	*Draba cuneifolia*
Broadpod Draba	*Draba platycarpa*
Spreading Erysimum, Bushy Wallflower	*Erysimum repandum*
Southern Peppergrass	*Lepidium austrinum*
Virginia Pepperweed (1), Poorman's Pepper (1)	*Lepidium virginicum*
Wild Mustard*, Bladderpod (1)	*Lesquerella gracilis*
Birdseye Cress (5)	*Myagrum perfoliatum*
Yellow Watercress	*Rapistrum rugosum*
Bog Marshcress (1)	*Rorippa palustris ssp. fernaldiana*
Stalkless Yellowcress	*Rorippa sessiliflora*
Virginia Sibara, Virginia Winged Rockcress (5)	*Sibara virginica*
Field Mustard, Charlock	*Sinapis-arvensis var. kaber*
Field Pennycress	*Thlaspi arvense*

BUDDLEJACEAE

Juniper-leaf, Pollyprim	*Polypremum procumbens*

CACTACEAE

Texas Prickly Pear, Nopal Prickly Pear (1)	*Opuntia engelmannii var. lindheimeri*

CALLITRICHACEAE

Larger Waterwort	*Callitriche heterophylla*

CAMPANULACEAE

Cardinal Flower	*Lobelia cardinalis*
Prairie Venus' Looking Glass (5)	*Triodanis lamprosperma*
Slimpod Venus' Looking Glass	*Triodanis leptocarpa*
Hen-and-chickens, Clasping Venus Looking Glass	*Triodanis perfoliata*
Small Venus Looking Glass (1)	*Triodanis perfoliata var. biflora*

CAPPARIDACEAE

Clammyweed* (1)	*Polanisia dodecandra var. trachysperma*

CAPRIFOLIACEAE

Japanese Honeysuckle (Vine)	*Lonicera japonica*
Elderberry*	*Sambucus nigra var.canadensis*
Indian Currant, Coral Berry, Buckbrush (1)	*Symphoricarpos orbiculata*
Southern Black Haw, Downy Viburnum (1)	*Viburnum rufidulum*

CARYOPHYLLACEAE

Thyme-leaf Sandwort	*Arenaria serpyllifolia*
Short-stalk Chickweed	*Cerastium brachypodium*
Common Mouse-ear, Big Chickweed	*Cerastium fontanum var. vulgare*

Sticky Chickweed	*Cerastium glomeratum*
Trailing Pearlwort, Beach Pearlwort	*Sagina decumbens*
Sleepy Catchfly	*Silene antirrhina*
Common Chickweed, Starwort*	*Stellaria media*

CHENOPODIACEAE

Lamb's-quarters, Pigweed	*Chenopodium album*
Wormseed(1), Goosefoot Spanish Tea (1), Mexican Tea (5)	*Chenopodium ambrosioides*
Stanley's Goosefoot	*Chenopodium standleyanum*

CISTACEAE

Rosemary Sunrose (1)	*Helianthemum rosmarinifolium*
Hairy Pinweed (1)	*Lechea mucronata*
Narrow-leaf Pinweed (1)	*Lechea tenuifolia*

COMMELINACEAE

Common Dayflower (1)	*Commelina communis*
Dayflower* (1)	*Commelina erecta var. deamiana*
Ohio Spiderwort (1)	*Tradescantia ohiensis*

CONVOLVULACEAE

Possession-vine, Field Bindweed (1)	*Convolvulus arvensis*
Lovevine	*Convolvulus equitans*
Pony foot	*Dichondra carolinensis*
Pitted Morning Glory (1), Small Wh. Morning Glory	*Ipomoea lacunosa*

CORNACEAE

Roughleaf Dogwood (1)	*Cornus drummondii*

CRASSULACEAE

Yellow Stonecrop	*Sedum nuttallianum*

CUCURBITACEAE

Melonette, Drooping Melonette (1)	*Melothria pendula*

CUSCUTACEAE

Cusp Dodder (1), Cuspidate Dodder (1)	*Cuscuta cuspidata*
Showy Dodder (1), Pretty Dodder (1)	*Cuscuta indecora var. indecora*
Longsepal Dodder (1), Love-vine*	*Cuscuta indecora var. longisepala*

CYPERACEAE

Alkali Bulrush (1), Bayonet Grass (1), Prairie	*Bolboschoenus maritimus*
Hairy Sedge	*Bulbostylis capillaris*
Globose Caric Sedge	*Carex bulbostylis*
Carolina Caric Sedge	*Carex caroliniana*
Head-bearing Caric Sedge	*Carex cephalophora*
Cherokee Caric Sedge	*Carex cherokeensis*
Crowfoot Sedge (1)	*Carex crus-corvi*
Davis' Caric Sedge	*Carex davisii*
Frank's Sedge (1)	*Carex frankii*
Thin-scale Caric Sedge	*Carex hyalinolepis*

Mead's Caric Sedge	*Carex meadii*
Smooth-tooth Caric Sedge	*Carex microdonta*
Muhlenberg's Caric Sedge	*Carex muhlenbergii*
Kidney-shaped Caric Sedge	*Carex reniformis*
Reflexed-fruit Caric Sedge	*Carex retroflexa*
Four-angle Caric Sedge	*Carex tetrastachya*
Fox-tail Caric Sedge	*Carex vulpinoidea*
Taper-leaf Flatsedge	*Cyperus acuminatus*
Baldwin Flatsedge	*Cyperus croceus*
Globe Flatsedge	*Cyperus echinatus*
Redroot Flatsedge (1)	*Cyperus erythrorhizos*
Yellow Nut-grass	*Cyperus esculentus*
Slender Flatsedge	*Cyperus lupulinus*
Fragrant Flatsedge (1), Large-head Flatsedge (1)	*Cyperus odoratus*
Marsh Flatsedge (5)	*Cyperus pseudovegetus*
Oneflower, Flatsedge (1)	*Cyperus retroflexus*
Pine Barren Flatsedge (5)	*Cyperus retrorsus var. retrorsus*
Nut-grass, Cocograss (1), Purple Nutgrass (1)	*Cyperus rotundus*
Lean Flatsedge (5)	*Cyperus setigerus*
Sand Spikerush (5)	*Eleocharis montevidensis*
Blunt Spikerush	*Eleocharis obtusa var. detonsa*
Dwarf Spikerush	*Eleocharis parvula*
Largespike Spikerush (1)	*Eleocharis parvula var.macrostachya*
Fimbry* (1)	*Fimbristylis puberula*
Vahl Fimbry (1)	*Fimbristylis vahlii*
Harvey's Beak Rush, Harvey's Beak Sedge (5)	*Rhynchospora harveyi*
Giant Bulrush, Tule, California Bulrush (1)	*Schoenoplectus californicus*
Bulrush	*Scirpus pendulus*
Fringed Nut Rush	*Scleria ciliata*
Few-flower Nut Rush	*Scleria oligantha*

DRYOPTERIDACEAE

Common Woodsia, Blunt-lobed Woodsia	*Woodsia obtusa*

EBENACEAE

Common Persimmon	*Diospyros virginiana*

EQUISETACEAE

Common or Tall Scouring Rush	*Equisetum hyemale var. affine*

EUPHORBIACEAE

Slender One-seed Copperleaf (1), Three Seeded	*Acalypha monococca*
Hop Hornbeam Copperleaf (1)	*Acalypha ostryifolia*
Virgina Copperleaf (1)	*Acalypha virginica*
Spotted Euphorbia (1), Spotted Spurge (1)	*Chamaesyce maculata*
Prairie Spurge**	*Chamaesyce missurica var.missurica*
Prostrate Euphorbia (1)	*Chamaesyce prostrata*
Eyebane (1)	*Chamaesyce nutans*
Mat Euphorbia (1),	*Chamaesyce serpens*

Hierba de la Golondrina (1)	
Texas Bullnettle (1), Mala Mujer (1)	*Cnidoscolus texanus*
Woolly Croton, Hogwort	*Croton capitatus*
Tropic Croton (1)	*Croton glandulosus*
Prairie Tea, One-seed Croton (1)	*Croton monanthogynus*
Low Wild Mercury (1)	*Ditaxis humilis*
Snow-on-the-prairie	*Euphorbia bicolor*
Wild Poinsettia, Painted Euphorbia (1), Painted Spurge	*Euphorbia cyathophora*
Toothed Spurge (1)	*Euphorbia dentata*
Warty Euphorbia (1)	*Euphorbia spathulata*
Knotweed-leaf Flower	*Phyllanthus polygonoides*
Shortspike Noseburn (1)	*Tragia brevispica*

FABACEAE

Fern Acacia, Prairie Acacia	*Acacia angustissima var. hirta*
Indigobush Amorpha (1), False Indigo (1)	*Amorpha fruticosa*
Groundnut, American Potato Bean	*Apios americana*
Canada Milk Vetch	*Astragalus canadensis*
Ground-plum, Buffalo-plum	*Astragalus crassicarpus*
Small-flower Milk Vetch (5)	*Astragalus nuttallianus var. pleianthus*
Turkey-pea, Small-flower Milk Vetch	*Astragalus nuttallianus var. nuttallianus*
Wild Indigo* (1)	*Baptisia bracteata var.leucophaea*
Green Wild Indigo (1), Yellow Wild Indigo (5)	*Baptisia sphaerocarpa*
Eastern Redbud (1)	*Cercis canadensis var. canadensis*
Partridge Pea, Bee Flower, Prairie Senna (1)	*Chamaecrista fasciculata*
Spoon Flower, Atlantic Pigeon-wings	*Clitoria mariana*
White Prairie Clover (5)	*Dalea candida var. candida*
Round Head Prairie Clover (1)	*Dalea multiflora*
Prairie Clover, Purple Prairie Clover (1)	*Dalea purpurea*
Prairie Mimosa, Illinois Bundleflower (1)	*Desmanthus illinoensis*
Prairie Bundleflower (1)	*Desmanthus leptolobus*
Tickclover* (1), Few-flower Tick-clover	*Desmodium paniculatum*
Sessileleaf Tickclover (1)	*Desmodium sessilifolium*
Tweedy Tickclover (1)	*Desmodium tweedyi*
Velvetleaf Tickclover (1)	*Desmodium viridiflorum*
Downy Milk-pea	*Galactia volubilis*
Honey Locust, Common Honey Locust (1)	*Gleditsia triacanthos*
Bladder Pod, Bag Pod	*Glottidium vesicarium*
Japanese Bush Clover, Common Lespedeza, Japanese Clover (5)	*Kummerowia striata*
Low Pea-vine, Tiny Pea-vine (5)	*Lathyrus pusillus*
Rough Pea, Singletary Pea, Caley Pea, Pea Vine* (1)	*Lathyrus hirsutus*
Trailing Bush Clover, Lespedeza	*Lespedeza (hybrid) procumbens*
Sericea, Chinese Bush Clover (1)	*Lespedeza cuneata*
Trailing Bush Clover, Trailing Lespedeza (1)	*Lespedeza procumbens*
Creeping Lespedeza	*Lespedeza repens*
Tall Bush Clover, Stueve Lespedeza (1)	*Lespedeza stuevei*
Violet Lespedeza (1), Prairie Clover (1)	*Lespedeza violacea*
Slender Bush Clover, Slender Lespedeza (1)	*Lespedeza virginica*

Bird's-foot Trefoil, Birdsfoot Deer-vetch (1)	*Lotus corniculatus*
Pursh Deer-vetch (1)	*Lotus unifoliolatus*
Spotted Bur Clover, Medick	*Medicago arabica*
Black Medick, Hop-clover, Yellow Trefoil	*Medicago lupulina*
Small Bur Clover, Medick*	*Medicago minima*
Button Clover, Button Medick (1)	*Medicago orbicularis*
California Bur Clover, Bur Clover (1)	*Medicago polymorpha*
Alfalfa, Lucerne	*Medicago sativa*
White Sweet Clover, Hubam Clover	*Melilotus albus*
Yellow Sweet Clover, Yellow Melilot (1)	*Melilotus officinalis*
Catclaw Sensitive Briar (1), Sensitive Vine*	*Mimosa nuttallii*
Roemer Sensitive Briar (1)	*Mimosa roemeriana*
Yellow-puff, Yellow Neptunia (1)	*Neptunia lutea*
Tall-beard Scurfpea	*Pediomelum cuspidatum*
Edible Scurf-pea, Prairie Potato	*Pediomelum hypogaeum var. subulatum*
Honey Mesquite	*Prosopis glandulosa*
Wild Alfalfa, Scurvy pea, Slimleaf Scurfpea (1)	*Psoralidium tenuiflorum*
Broadleaf Snoutbean (1)	*Rhynchosia latifolia*
Wild Senna, Maryland Senna	*Senna marilandica*
Coffee Bean, Bequilla	*Sesbania herbacea (macrocarpa)*
Texas Sophora (1), Eve's Necklace (1)	*Sophora affinis*
Amberique Bean, Trailing Wildbean (1)	*Strophostyles helvula*
Slick Seed Wildbean (1)	*Strophostyles leiosperma*
Side-beak, Pencil-flower	*Stylosanthes biflora*
Goat's Rue, Virginia Tephrosia (1), Catgut (1)	*Tephrosia virginiana*
Rabbit-foot Clover, Oldfield Clover (1)	*Trifolium arvense*
Large-hop Clover, Low-hop Clover	*Trifolium campestre*
Least-hop Clover, Shamrock	*Trifolium dubium*
White Clover, Dutch Clover	*Trifolium repens*
Persian Clover, Reversed Clover	*Trifolium resupinatum*
Arrow-leaf Clover	*Trifolium vesiculosum*
Leavenworth Vetch (1)	*Vicia ludoviciana ssp. leavenworthii*
Small-flower Vetch, Pygmy Flower Vetch	*Vicia minutiflora*
Common Vetch	*Vicia sativa var. segetalis*
Winter Vetch, Woolly Pod Vetch (1)	*Vicia villosa ssp.varia*

FAGACEAE

Bur Oak, Mossy-cup Oak (1)	*Quercus macrocarpa*
Blackjack Oak (1)	*Quercus marilandica*
Shumard Oak (1), Shumard's Red Oak (1)	*Quercus shumardii*
Post Oak	*Quercus stellata*

GERANIACEAE

Calif. Filaree, Pin Clover, Stork's Bill*, Alfilaria	*Erodium cicutarium*
Crane's Bill, Carolina Geranium (1)	*Geranium carolinianum*

HYPERICACEAE

St. Andrews Cross, St. Peter's Wort	*Ascyrum hypericoides var. multicaule*
Drummond's St. John's Wort	*Hypericum drummondii*
Spotted St. John's Wort (1)	*Hypericum punctatum*

IRIDACEAE

Prairie Iris	*Nemastylis geminiflora*
Dotted Blue-eyed Grass	*Sisyrinchium pruinosum*

JUGLANDACEAE

Pecan	*Carya illinoensis*
Black Hickory, Buckley's Hickory (1)	*Carya texana*
Black Walnut	*Juglans nigra*

JUNCACEAE

White Root Rush	*Juncus brachycarpus*
Small Head Rush	*Juncus brachyphyllus*
Slim-pod Rush	*Juncus diffusissimus*
Common Rush (1)	*Juncus effusus ssp. solutus*
Inland Rush (1)	*Juncus interior*
Grass-leaf Rush, Needle Point Rush	*Juncus marginatus*
Jointed Rush, Stout Rush (5)	*Juncus nodatus*
Slender Rush, Poverty Rush	*Juncus tenuis*
Texas Rush (1)	*Juncus texanus*
Torrey's Rush (1)	*Juncus torreyi*
Round Head Rush	*Juncus validus*

CUPRESSACEAE

Eastern Red Cedar (1), Red Cedar (1), Red Savin	*Juniperus virginiana*

KRAMERIACEAE

Trailing Ratany, Krameria*	*Krameria lanceolata*

LAMIACEAE

Rough False Pennyroyal	*Hedeoma hispida*
Rock Hedeoma (1), Mock Pennyroyal* (1)	*Hedeoma reverchonii var. reverchonii*
Henbit, Dead-nettle	*Lamium amplexicaule*
Valdiviana, Pale Duckweed	*Lemna valdiviana*
Lemon Beebalm (1), Horse-mint*	*Monarda citriodora*
Wild Bergamot (1)	*Monarda fistulosa*
Western Beebalm (1)	*Monarda punctata var. occidentalis*
Common Selfheal** (1), Carpenter-weed	*Prunella vulgaris var. lanceolata*
Blue Sage** (1)	*Salvia azurea var. grandiflora*
Small Skullcap	*Scutellaria parvula*
Wright's Skull-Cap (1)	*Scutellaria wrightii*
Common Duckweed (1), Duckweed, Greater*	*Spirodela polyrrhiza*

LILIACEAE

Wild Onion*	*Allium canadense*
Prairie Onion*	*Allium drummondii*
Cobelleta Rainlily (1), Evening Rainlily (5)	*Cooperia drummondii*
Crow-poison, Yellow False Garlic (1)	*Nothoscordum bivalve*

LINACEAE

Tufted Flax	*Linum imbricatum*
Grooved Flax (1)	*Linum sulcatum*

LYTHRACEAE

Purple Ammannia (1), Tooth-cup (1)	*Ammannia coccinea*
Ear-leafed Ammannia	*Ammannia auriculata*
Lanceleaf Loosestrife (1)	*Lythrum alatum var. lanceolatum*
Rotala (1), Tooth-Cup (1)	*Rotala ramosior*

MALVACEAE

Plains Winecup, Plains Poppy-mallow	*Callirhoe alcaeoides*
Purple Poppy Mallow, Buffalo Rose	*Callirhoe involucrata*
Scarlet Rose-mallow, Halberd-leaf Rose-mallow	*Hibiscus laevis*
Spreading Sida (1), Spreading Fanpetals (5)	*Sida abutifolia (Sida filicaulis)*

MELIACEAE

Chinaberry (1), Canelon (1)	*Melia azedarach*

MENISPERMACEAE

Carolina Snailseed (1), Coralberry (1)	*Cocculus carolinus*

MOLLUGINACEAE

Glinus (4), Spreading Sweetjuice (5)	*Glinus radiatus*
Carpet-weed, Green Carpet-weed (1)	*Mollugo verticillata*

MORACEAE

Bois D'Arc, Horse Apple, Osage Orange	*Maclura pomifera*
Red Mulberry	*Morus rubra*

NYCTAGINACEAE

Erect Spiderling (1), Pink or Purple	*Boerhavia erecta*
Four-o'lock*(1), White Four-o'clock	*Mirabilis albida*
Four-o'clock	*Mirabilis albida var. lata*
Linear-leaf Four-o'clock	*Mirabilis linearis*
Wild Four-O'Clock, Heartleaf Four-o' clock	*Mirabilis nyctaginea*

NYMPHAEACEAE

Yellow Nelumbus (1), Lotus*, Yellow Lotus	*Nelumbo lutea*

OLEACEAE

White Ash	*Fraxinus americana*
Green Ash, Red Ash	*Fraxinus pennsylvanica var. integerrima*

ONAGRACEAE

Halfshrub Sundrops (1), Beach Primrose	*Calylophus berlandieri ssp. pinifolius*
Plains Paura, Plains Beeblossom (5)	*Gaura brachycarpa*
Kearny Gaura, Tall Gaura, Longflower Beeblossom (5)	*Gaura longiflora*
Velvet-leaf Gaura, Small-flowering Gaura	*Gaura parviflora*
Wild Honeysuckle, Roadside Gaura, Kisses (5)	*Gaura suffulta*
Seedbox, Rattle-box, Bushy Seedbox	*Ludwigia alternifolia*
Torrey Seedbox (1), Creeping Seedbox (1)	*Ludwigia glandulosa*
Water Primrose, Smooth Water Primrose (1)	*Ludwigia peploides*

Cut-leaf Evening Primrose, Downy Primrose	*Oenothera laciniata*
Thread-leaf Sundrops	*Oenothera linifolia*
Four-point Evening Primrose (1)	*Oenothera rhombipetala*
Showy Primrose, Buttercup, Pink Ladies	*Oenothera speciosa*

OPHIOGLOSSACEAE

Engelmann's Adder's Tongue	*Ophioglossum engelmannii*

ORCHIDACEAE

Greenlip Ladies' Tresses, Slender Ladies	*Spiranthes lacera var. gracilis*
Spring or Upland Ladies' Tresses	*Spiranthes Vernalis*

OXALIDACEAE

Sheep-showers, Dillens Oxalis (1)	*Oxalis stricta (dillenii)*

PASSIFLORACEAE

Maypop, Maypop Passion Flower	*Passiflora incarnata*
Yellow Passion Flower	*Passiflora lutea*

PEDALIACEAE

Common Devil's Claw (1)	*Proboscidea louisianica*

PHYTOLACCACEAE

Pokeweed, Pokeberry	*Phytolacca americana*
Pidgeon Berry, Bloodberry (1), Pougeplant	*Rivina humilis*

PLANTAGINACEAE

Buckhorn, Bottlebrush Plantain	*Plantago aristata*
Slender Plantain	*Plantago elongata*
Tallow-weed, Red-seed Plantain	*Plantago rhodosperma*
Pale-seed Plantain, Hoary Plantain (1)	*Plantago virginica*
Wright's Plantain	*Plantago wrightiana*

POACEAE

Jointed Goat Grass	*Aegilops cylindrica*
Tickle Grass, Elliott's Bent Grass	*Agrostis elliottiana*
Winter Bent Grass, Flyway Grass	*Agrostis hiemalis*
Annual Hair Grass	*Aira caryophyllea var. capillaris*
Carolina Foxtail	*Alopecurus carolinianus*
Big Bluestem, Turkey's Foot	*Andropogon gerardii*
Splitbeard Bluestem, Silvery Beardgrass (1)	*Andropogon ternarius*
Broomsedge Bluestem (1)	*Andropogon virginicus*
Churchmouse Threeawn, Povertygrass	*Aristida dichotoma*
Kearney Threeawn, Plains Threeawn (1)	*Aristida longespica var. geniculata*
Old field Threeawn, Prairie Threeawn	*Aristida oligantha*
Arrowfeather Threeawn (1), Broomsedge (1)	*Aristida purpurascens*
Wild Oats	*Avena fatua*
King Ranch Bluestem	*Bothriochloa ischaemum var. songarica*
Silver Bluestem, Longspike, Silver Bluestem	*Bothriochloa laguroides ssp. torreyana*
Sideoats Grama	*Bouteloua curtipendula*
Blue Grama	*Bouteloua gracilis*
Texas Grama, Mesquite Grass (1)	*Bouteloua rigidiseta*

Rescue Grass	*Bromus catharticus (unioloides)*
Japanese Brome, Spreading Brome (1)	*Bromus japonicus*
Hairy Woodland Brome (5)	*Bromus pubescens*
Rye Brome	*Bromus secalinus*
Cheat Grass, Downy Chess, Downy Brome	*Bromus tectorum*
Buffalo Grass	*Buchloe dactyloides*
Sandbur, Brassbur	*Cenchrus incertus*
Oats, Broadleaf Woodoats (1)	*Chasmanthium latifolium*
Windmill Grass, Tumble Windmillgrass (1)	*Chloris verticillata*
Carolina Joint-tail	*Coelorachis cylindrica*
Bermuda Grass (1)	*Cynodon dactylon*
Poverty-oats, Poverty-oat Grass	*Danthonia spicata*
Southern Crabgrass	*Digitaria ciliaris*
Fall-witchgrass, Diffuse Crabgrass (1)	*Digitaria cognata*
Slender Crabgrass (1), Slender Fingergrass	*Digitaria filiformis*
Hairy Crabgrass, Large Crabgrass	*Digitaria sanguinalis*
Jungle Rice	*Echinochloa colonum*
Barnyard Grass, Cockspur* (1)	*Echinochloa crus-galli*
Cockspur* (1), Barnyard Grass* (1)	*Echinochloa crus-pavonis var. muricata*
Cockspur* (1), Barnyard Grass* (1)	*Echinochloa muricata var. muricata*
Cockspur* (1), Barnyard Grass* (1)	*Echinochloa walteri*
Goose Grass, Yard (1), Zacate Guacima (1)	*Eleusine indica*
Canada Rye* (1)	*Elymus canadensis var. brachystachys*
Wild Rye* (1), Nodding Wild Rye	*Elymus canadensis var. villosus*
Virginia Wild Rye (1)	*Elymus virginicus*
Virginia Wild Rye	*Elymus virginicus var. glabriflorus*
Mediterranean Lovegrass	*Eragrostis barrelieri*
Stink-grass	*Eragrostis cilianensis*
Gummy Lovegrass, Shortstalked	*Eragrostis curtipedicellata*
Weeping Lovegrass	*Eragrostis curvula*
Teal Lovegrass, Smooth Creeping Lovegrass	*Eragrostis hypnoides*
Plains Lovegrass (1)	*Eragrostis intermedia*
Red Lovegrass	*Eragrostis secundiflora ssp. oxylepis*
Tumble Lovegrass	*Eragrostis sessilispica*
Purple Lovegrass	*Eragrostis spectabilis*
Prairie Cupgrass	*Eriochloa contracta*
Texas Cupgrass, Silky Cupgrass (1)	*Eriochloa sericea*
Tall Fescue, Alta Fescue	*Festuca arundinacea*
Nodding Fescue	*Festuca subverticillata*
Little Barley, Mouse Barley	*Hordeum pusillum*
June Grass, Prairie June Grass	*Koeleria macrantha*
Rice Cutgrass	*Leersia oryzoides*
Bearded Spangletop, Salt Spangletop (Sprangletop)	*Leptochloa fascicularis*
Red Spangletop (Sprangletop)	*Leptochloa mucronata*
Ozark Grass	*Limnodea arkansana*
Perennial Ryegrass (1), Italian Ryegrass (1)	*Lolium perenne var. mutiflorum*
Darnel Rye Grass, Poison Darnel	*Lolium temulentum*
Rock Muhly, Rock Dropseed (1)	*Muhlenbergia sobolifera*
Wintergrass Speargrass, Texas Wintergrass (1)	*Nassella leucotricha*
Woolly Rosette Grass	*Panicum acuminatum*

Beaked Panicum	*Panicum anceps*
Witchgrass	*Panicum capillare*
Starved Gosette Grass	*Panicum depauperatum*
Fall Panicum (1), Spreading Witchgrass (1)	*Panicum dichotomiflorum*
Hall's Panic, Halls Panicum	*Panicum hallii*
Gaping Panic	*Panicum hians*
Lindheimer's Panic or Rosette Grass	*Panicum lindheimeri*
Slim-leaf Rosette Panic Grass	*Panicum linearifolium*
Soft-leaf Rosette Grass	*Panicum malacophyllum*
Vine-mesquite (1)	*Panicum obtusum*
Scribner's Rosette Grass (1)	*Panicum oligosanthes var. scribnerianum*
Ravenel's Rosette Grass (5)	*Panicum ravenelii*
Redtop Panic	*Panicum rigidulum*
Round-seed Rosette Grass	*Panicum sphaerocarpon*
Switchgrass	*Panicum virgatum*
Egyptian Paspalium	*Paspalidium geminatum*
Pitchfork Paspalum (1)	*Paspalum bifidum*
Knot Grass, Joint Grass	*Paspalum distichum*
Dallis Grass	*Paspalum dilatatum*
Florida Paspalum (1)	*Paspalum floridanum var. glabratum*
Smoothseed Paspalum (1)	*Paspalum pubiflorum var. glabrum*
Thin Paspalum** (1)	*Paspalum setaceum*
Canary Grass	*Phalaris angusta*
Wild & Carolina Canary Grass	*Phalaris caroliniana*
Annual Blue Grass, Low Spear Grass	*Poa annua*
Texas Blue Grass	*Poa arachnifera*
Sylvan Blue Grass	*Poa sylvestris*
Tumble Grass, Crabgrass	*Schedonnardus paniculatus*
Little Bluestem	*Schizachyrium scoparium*
Rye	*Secale cereale*
Knotroot Bristlegrass	*Setaria parviflora*
Yellow Bristlegrass	*Setaria pumila*
Green Bristlegrass	*Setaria viridis*
Indian Grass, Yellow Indiangrass (1)	*Sorghastrum nutans*
Johnson Grass	*Sorghum halepense*
Prairie Wedge Scale	*Sphenopholis obtusata*
Whorled Dropseed	*Sporobolus pyramidatus*
Tall Dropseed, Longleaved Rushgrass (1)	*Sporobolus compositus*
Sand Dropseed	*Sporobolus cryptandrus*
Southern & Poverty Dropseed (1)	*Sporobolus vaginiflorus*
White Tridens, Whitetop	*Tridens albescens*
Pink Tridens	*Tridens congestus*
Purple-top, Redtop (1)	*Tridens flavus*
Longspike Tridens	*Tridens strictus*
Purple Sandgrass	*Triplasis purpurea*
Eastern Gamma Grass	*Tripsacum dactyloides*
Bread Wheat, Wheat	*Triticum aestivum*
Broadleaf Signalgrass	*Urochloa platyphylla*
Common Sixweek Grass	*Vulpia octoflora*

POLEMONIACEAE

Drummond's Phlox	*Phlox drummondii*
Prairie Phlox	*Phlox pilosa*

POLYGALACEAE

Pink Milkwort (1)	*Polygala incarnata*
Whorled Milkwort	*Polygala verticillata*

POLYGONACEAE

Smartweed*, Dotted Smartweed (1)	*Polygonum punctatum*
Water Smartweed*	*Polygonum amphibium var. emersum*
Prostrate Knotweed (1)	*Polygonum aviculare*
Black Bindweed, Climbing Buckwheat	*Polygonum convolvulus*
Swamp Smartweed (1)	*Polygonum hydropiperoides*
Curltop Smartweed (1)	*Polygonum lapathifolium*
Smartweed, Pennsylvania Smartweed (1)	*Polygonum pensylvanica*
Bushy Knotweed (1)	*Polygonum ramosissimum*
Thicket Knotweed (1)	*Polygonum scandens var. cristatum*
Smartweed* (1)	*Polygonum setaceum*
Jump Seed (1)	*Polygonum virginianum*
Pale Dock, Peachleaf Dock (1)	*Rumex altissimus*
Curly Dock, Curlyleaf Dock (1)	*Rumex crispus*
Heartwing Sorrel (1)	*Rumex hastatulus*
Fiddle Dock	*Rumex pulcher*

PONTEDERIACEAE

Blue Mud-plantain	*Heteranthera limosa*

PORTULACACEAE

Virginia Spring Beauty	*Claytonia virginica*
Common Purslane, Verdolaga	*Portulaca oleracea*
Prairie Flameflower, Dwarf	*Talinum parviflorum*

POTAMOGETONACEAE

Longleaf Pondweed (10)	*Potamogeton nodosus*

PRIMULACEAE

Scarlet Pimpernel (1), Weathergrass	*Anagallis arvensis*
Western Rock-jasmine	*Androsace occidentalis*

PTERIDACEAE

Purple Cliff-brake, Blue Fern	*Pellaea atropurpurea*

RANUNCULACEAE

Ten-petal Anemone	*Anemone berlandieri*
Leather Flower, Bluebell, Pitcher Clematis (1)	*Clematis pitcheri*
Rocket Larkspur	*Consolida ajacis*
Prairie Larkspur	*Delphinium carolinianum ssp. virescens*
Tiny Mousetail (1)	*Myosurus minimus*
Little Leaf Buttercup	*Ranunculus abortivus*

Bristly Buttercup, Marsh Buttercup	*Ranunculus hispidus var. nitidus*
Weak Buttercup	*Ranunculus pusillus*
Celery-leaf Buttercup (1), Cursed Crowfoot (1)	*Ranunculus sceleratus*

RHAMNACEAE

Rattan-vine & Alabama Supplejack (1)	*Berchemia scandens*
Indian Cherry, Yellow Wood, Carolina Buckthorn	*Frangula caroliniana*

ROSACEAE

Cockspur Hawthorn, Bush's Hawthorn	*Crataegus crus-galli*
Little Hip Hawthorn, Pasture Haw	*Crataegus spathulata*
White Avens (1)	*Geum canadense var. camporum*
Chickasaw Plum	*Prunus angustifolia*
Sand Plum, Oklahoma Plum (1)	*Prunus gracilis*
Wild Plum, Mexican Plum (1)	*Prunus mexicana*
Thicket Plum	*Prunus rivularis*
White Prairie Rose, Leafy Rose (1)	*Rosa foliolosa*
Prairie Rose (1), Climbing Rose (1)	*Rosa setigera var. tomentosa*
Dewberry* (1)	*Rubus aboriginum*
Oklahoma Blackberry (5)	*Rubus oklahomus*
Southern Dewberry, Zarzamora	*Rubus trivialis*
Prairie Burnet	*Sanguisorba annua*

RUBIACEAE

Common Buttonbush (1), Honeyballs (1)	*Cephalanthus occidentalis*
Poor-joe, Button-weed	*Diodia teres*
Virginia & Large Buttonweed (1)	*Diodia virginiana*
Cleavers, Catchweed Bedstraw, Goosegrass (1)	*Galium aparine*
Cleavers, Catchweed Bedstraw	*Galium circaezans*
Hairy Bedstraw	*Galium pilosum*
Dyed Bedstraw, Stiff Marsh Bedstraw	*Galium tinctorium*
Southwest Bedstraw	*Galium virgatum*
Star Violet, Prairie Bluets (1)	*Houstonia nigricans*
Tiny Bluet, Southern Bluets	*Houstonia pusilla*

RUTACEAE

Prickly-ash, Hercules Club, Toothache Tree	*Zanthoxylum clava-herculis*

SALICACEAE

Plains Cottonwood (1), Texas Cottonwood	*Populus deltoides var. occidentalis*
Black Willow (1), Goodding Willow (1)	*Salix nigra var. lindheimeri*

SAPINDACEAE

Common Balloon-vine, Farolitos (1)	*Cardiospermum halicacabum*
Western Soap Berry (1)	*Sapindus saponaria var. drummondii*

SAPOTACEAE

Coma** (1), Chittimwood*	*Sideroxylon lanuginosum ssp. oblongifolium*

SCROPHULARIACEAE

Prairie Agalinis, Gerardia* (1)	*Agalinis heterophylla*
Citron & Lipped Indian Paintbrush (1)	*Castilleja purpurea var. citrina*
Lindheimer & Prairie Indian Paintbrush (1)	*Castilleja purpurea var. lindheimeri*
Violet Collinsia	*Collinsia violacea*
Narrowleaf Conobea* (1)	*Leucospora multifida*
Common Toad Flax	*Linaria vulgaris*
Clasping False Pimpernel (1)	*Lindernia dubia var. anagallidea*
Wild Foxglove, Cobaea Penstemon	*Penstemon cobaea*
Beardtongue	*Penstemon laxiflorus*
Common Speedwell	*Veronica arvensis*
Purslane Speedwell, Neckweed	*Veronica peregrina*
Gray Field Speedwell	*Veronica polita*

SMILACACEAE

Saw Greenbriar (1), Chinabrier (1), Bullbrier (1)	*Smilax bona-nox*
Chinaroot (1), Helifetter (1), Bristle Greenbriar	*Smilax tamnoides*

SOLANACEAE

Box Thorn, Matrimony-vine	*Lycium barbarum*
Cutleaf & Purple-vein Ground Cherry (1)	*Physalis angulata*
Beach Ground Cherry (1)	*Physalis cinerascens var. cinerascens*
Clammy Ground Cherry	*Physalis heterophylla*
Common Ground Cherry** (1)	*Physalis longifolia var. sonorae*
Downy & Low Hair Ground Cherry (1)	*Physalis pubescens*
Dwarf ground cherry (5), Prairie Ground Cherry	*Physalis pumila*
Thicket Ground Cherry (1)	*Physalis turbinata*
Virginia Ground Cherry** (1)	*Physalis virginiana*
Horse Nettle, Western Horse Nettle (1)	*Solanum dimidiatum*
Silverleaf Nightshade (1)	*Solanum elaeagnifolium*
Nightshade* (1)	*Solanum ptychanthum (americanum)*
Buffalo Bur (1)	*Solanum rostratum*
Horse Nettle, Carolina Horse Nettle (1)	*Solanum carolinense*

TYPHACEAE

Narrowleaf Cattail (1)	*Typha domingensis*
Common Cattail	*Typha latifolia*

ULMACEAE

Sugarberry*, Sugar Hackberry** (1)	*Celtis laevigata var. laevigata*
Winged Elm, Cork Elm	*Ulmus alata*
White Elm, American Elm	*Ulmus americana*
Cedar Elm (1)	*Ulmus crassifolia*
Slippery Elm, Red Elm (1)	*Ulmus rubra*

URTICACEAE

Button Hemp, Bog Hemp	*Boehmeria cylindrica var. cylindrica*
Pennsylvania Pellitory	*Parietaria pensylvanica var. pensylvanica*
Stinging Nettle, Ortiguilla	*Urtica chamaedryoides*

VALERIANACEAE

Beaked Cornsalad (1)	*Valerianella radiata*

VERBENACEAE

White Vervain	*Verbena urticifolia*
American Beautyberry (1), French Mulberry (1)	*Callicarpa americana*
Rose Vervain	*Glandularia bipinnatifida*
Pink Vervain, Wild Verbena	*Glandularia pumila*
Lanceleaf Frog-fruit (1)	*Lippia lanceolata*
Sawtooth (1), Frog-fruit*	*Lippia nodiflora*
Bigbract Vervain (1)	*Verbena bracteata*
Gray Vervain	*Verbena canadensis*
Slender Verbena (1), Blue Verbena (1)	*Verbena halei*
Coarse Vervain (1)	*Verbena xutha*

VIOLACEAE

Field Pansy, Johnny Jump-up	*Viola bicolor*
Missouri Violet	*Viola missouriensis*
Early Blue Violet (5)	*Viola palmata*
Yellow Violet (Smooth)	*Viola pubescens var. eriocarpon*

VISCACEAE

Injerto (1), Christmas Mistletoe	*Phoradendron tomentosum*

VITACEAE

Pepper Vine	*Ampelopsis arborea*
Heartleaf Ampelopsis (1)	*Ampelopsis cordata*
Mustang Grape	*Vitis mustangensis*
Cow-itch, Ivy Treebine, Marinevine (1)	*Cissus incisa*
Virginia Creeper, Redtwig Creeper (1)	*Parthenocissus quinquefolia*
Pigeon Grape	*Vitis aestivalis*
Summer, Gray Bark Grape, Sweet Grape	*Vitis cinerea*
Fox Grape	*Vitis vulpina*

ZYGOPHYLLACEAE

Warty Caltrop (1)	*Kallstroemia parviflora*
Goat-head, Puncture Vine (1)	*Tribulus terrestris*

APPENDIX B - REFUGE OPERATING NEEDS SYSTEM

Refuge Operating Needs

21580 Hagerman NWR

SR:	1	One-Time:	$65	21009 Expand Environmental Education and Outreach Program
DR:	63	RecurBase:	$69	Provide an Environmental Education and Outreach specialist to provide in-school and on-refuge educational programs. Based on past volunteer work, over 6,000 youths per year could be reached with the conservation message. Interpretive media can be improved and expanded, and
RR:	69	Tot. 1st Yr:	$134	weekend visitors will be better served. A "Friends" group will be established, and on-refuge programs will be increased. Based on the latest Fish and Wildlife Service data available, the additional visitors to this area attracted by the visitor center would contribute $38,269 annually to the
FTEs	1.0			local economy. Hagerman Refuge is within 100 miles of over 2 million people.

☐ : Approved Minimum Staff
☐ : Approved Critical Mission
☐ : Approved New/Expand Station
☐ : Facility Improve. Bundle

21580 Hagerman NWR

SR:	1	One-Time:	$65	01002 Protect Resources and Public on Hagerman NWR
DR:	999	RecurBase:	$71	Provide Law Enforcement personnel to ensure that Refuge resources are adequately protected. Hagerman NWR is located within 100 miles of two million people and visitations to the Refuge are estimated to exceed 150,000. Examples of Refuge public use activities include fishing on
RR:	42	Tot. 1st Yr:	$136	Lake Texoma, boating, hunting, hiking, wildlife photography, and birding. Threatened and endangered species such as the bald eagle and interior
FTEs	1.0			least tern utilize the same habitats used by the large number of visitors. A law enforcement presence would guarantee that these species could take advantage of the ideal habitat provided by Hagerman NWR while still providing ample public use opportunities for Refuge visitors.

☐ : Approved Minimum Staff
☐ : Approved Critical Mission
☐ : Approved New/Expand Station
☐ : Facility Improve. Bundle

21580 Hagerman NWR

SR:	01	One-Time:	$20	03005 Invasive Species Management Through Partnerships:Restoring the Refuge Neighborhood
DR:	999	RecurBase:		Establish and foster partnerships for the management of invasive species at Hagerman NWR, other FWS field stations in Texas and Oklahoma, and on neighbors and other cooperator's sites. Invasive species infestations will be scouted out, identified, mapped, and controlled with the
RR:	999	Tot. 1st Yr:	$20	assistance of volunteers, friends groups, other agencies, and cooperating individuals and organizations using integrated pest management principles based on sound weed science and other scientific knowledge and principles.
FTEs				The initial project funding will be used to facilitate

☐ : Approved Minimum Staff
☐ : Approved Critical Mission
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☐ : Facility Improve. Bundle

management capabilities in the field with the acquisition of equipment and supplies to provide the means for effective control actions on invasives.

An integral part of the project work will be the restoration of disturbed, altered and fragmented sites and the application of sound land management principles, with restoration of quality fish and wildlife habitat the ultimate project goal.

Refuge Operating Needs System - Project list - Updated 2/2/2005 page 1

Refuge Operating Needs

21580 Hagerman NWR

SR:	2	One-Time:	$65
DR:	42	RecurBase:	$69
RR:	106	Tot. 1st Yr:	$134
FTEs	1.0		

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

00001 Provide Managment Staff for the Nocona Unit

Provide full-time management staff for the The 822-acre Nocona Unit transferred to the Service in 1995. No active management has been undertaken, pending completion of a Comprehensive Conservation Plan. This position will facilitate management of the refuge as proposed in the Plan, now in draft. Grassland management will be a major responsibility. The position will also provide habitat monitoring and wildlife population data for more effective management. Law enforcement authority will be required to provide resource protection and to allow public use activities on the refuge for the first time. Farming and seasonal wetland management will also be responsibilities of this position.

21580 Hagerman NWR

SR:	2	One-Time:	$101
DR:	999	RecurBase:	$52
RR:	725	Tot. 1st Yr:	$153
FTEs	1.0		

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

02002 Restore Native Grassland Habitat

Restore substantial portions of native tall grass prairie through the control of invading eastern red cedar and other woody vegetation and the re-seeding of native prairie plant species, especially little bluestem, Indian grass, side-oats gramma, and other species, depending on the site soil type. The restored prairie will be maintained by an active prescribed burning program featuring a burning cycle of every 3 to 5 years. The region of north Texas and southern Oklahoma was predominately tall grass prairei, but has been drastically transformed into a brush community in the absence of fire in recent decades. The woody vegetation established in these brushy sites, which now dominate the landscape, are not susceptible to fire due to the lack of underlying fuels, requiring a mechanical control approach along with selective use of herbicides before prairie vegetation can be reestablished. Failure to implement an effective control strategy against the encroachment of woody vegetation will mean the rapid loss of all grassland habitats and the degradtion of the woodland community into a cedar thicket, severely reducing biodiversity in conflict with refuge purposes and objectives.

21580 Hagerman NWR

SR:	3	One-Time:	$33
DR:	70	RecurBase:	$26
RR:	158	Tot. 1st Yr:	$59
FTEs	0.5		

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

97008 Enhance Facility Maintenance Program

Provide a seasonal maintenance position to address the additional work load presented by an aggressive fire management program, seasonal wetland management, and new initiatives in grazing/haying. This position will help the refuge give more immediate attention to grounds, building, and facility maintenance to avoid backlogging necessary action. Incumbent will mow lawns and maintain roadsides and dikes so that other staff can run range transects, take aquatic samples, and fix water control structures and erosion problems.

Refuge Operating Needs

21580 Hagerman NWR

SR:	3	One-Time:	$65
DR:	999	RecurBase:	$82
RR:	109	Tot. 1st Yr:	$147
FTEs	1.0		

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

01001 Begin essential wildlife and habitat surveys to monitor results of implemented management decisions.

Develop and implement surveys and censuses to improve knowledge of species located on Hagerman NWR. Management techniques used by Hagerman NWR include: Prescribed burning, farming, haying, grazing, water management, and moist soil management. The threatened bald eagle winters on the Refuge and the endangered interior least tern has recently been discovered nesting on the Refuge. A biologist is needed to monitor all flora and fauna and existing management techniques to ensure that Hagerman NWR continues to meet the needs of resident and migratory wildlife.

21580 Hagerman NWR

SR:	4	One-Time:	$34
DR:	34	RecurBase:	$4
RR:	67	Tot. 1st Yr:	$38
FTEs			

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

98001 Enhance grassland management

Purchase tree shearing equipment and a all-terrain vehicle to improve fence line maintenance, fire prevention, and brush encroachment in pastures scheduled for the haying program. This equipment will improve grassland management for the benefit of prairie-dependant songbirds by providing management options such as prescribed fire, grazing, and haying. Invasive brush is one of the most serious management problems on the refuge. Haying is very effective means of controlling invasive brush species.

21580 Hagerman NWR

SR:	5	One-Time:	$68
DR:	63	RecurBase:	$9
RR:	137	Tot. 1st Yr:	$77
FTEs			

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

91004 Initiate Rotational Grazing Program

Refuge grasslands have declined in quality due to the absence of grazing and fire. A high intensity, short duration grazing system will provide a way to improve native grasslands on the refuge. Water development will be required in some paddocks. Power fencing will be used. Also, monitoring of this project over a 5-year period will document changes in plant communities and wildlife response by prairie dependant birds. Prairie/grassland communities will benefit and serve as a demonstration area to local ranchers. A major partner in this effort will be the Noble Foundation, in Ardmore, OK, which has cutting-edge research and technology to promote steadily improving quality of native prairie ecosystems.

Refuge Operating Needs

21580 Hagerman NWR

SR:	5	One-Time:	$154
DR:		RecurBase:	$18
RR:	226	Tot. 1st Yr:	$172
FTEs			

☐ : Approved Minimum Staff
☐ : Approved Critical Mission
☐ : Approved New/Expand Station
☐ : Facility Improve. Bundle

91006 Meadow Pond water supply

Develop water supply to Meadow Pond and obtain necessary permits and water right to divert water from Big Mineral Creek to provide dependable water supply to manage impoundment more effectively. Easy to drain; hard to fill back at present, and very little upstream watershed. Besides enhancing waterfowl use, there is a growing great blue heron rookery on this pond. The only sighting of whooping cranes on Hagerman Refuge was at Meadow Pond. Other bird use is also significant. A water quality study is needed to ensure water is worth having (City of Whitesboro sewage treatment facility has made this a perennial stream). ARLES will be a cooperator in the water quality determination.

21580 Hagerman NWR

SR:	5	One-Time:	$146
DR:	999	RecurBase:	$224
RR:	999	Tot. 1st Yr:	$370
FTEs	3.0		

☐ : Approved Minimum Staff
☐ : Approved Critical Mission
☐ : Approved New/Expand Station
☐ : Facility Improve. Bundle

03002A Establish Invasive Species Strike Team for Red River Ecosystem

Establish the first half of a 6-person Strike Team for the control of invasive species on refuges in Oklahoma and North Texas. To start up the Strike Team this project will create 3 positions, lead by a Biologist and including 1 Lead Technician (identified as a Resource Specialist to fit into the RONS system), and 1 Tractor Operator. The Team will locate, inventory, map, control and monitor infestations and also restore the quality of native habitats. Empahasizing early detection and rapid response, the Strike Team will provide the much-needed ability to address the threat of invasive species on refuges in the region. Target species will include Johnsongrass, kudzu, field bindweed, Chinese bush clover, musk thistle, Chinese tallow, red-horned poppy, giant salvinia, hydrilla, water hyacinth and other new species that appear in the ecosystem.

21580 Hagerman NWR

SR:	6	One-Time:	$53
DR:	13	RecurBase:	$69
RR:	8	Tot. 1st Yr:	$122
FTEs			

☐ : Approved Minimum Staff
☐ : Approved Critical Mission
☐ : Approved New/Expand Station
☐ : Facility Improve. Bundle

00004 Control Invasive Weeds on Arkansas-Red River Ecosystem Refuges

Provide a weed control specialist to contribute to regional efforts to control infestations of invasive weeds on refuges in the Arkansas/Red Rivers ecosystem located in Region 2. Invasive weeds are causing serious wildlife habitat deterioration. Once established, they are extremely difficult and costly to control or eradicate. Many of these invasive species are just beginning to spread into Oklahoma and northeastern Texas. By catching these new infestations early, there is a possibility they can be eradicated. Experience elsewhere indicates that failure to control them early will result in significantly increased costs of control over the long term. This project is linked to two others that provide the staff for a weed control "swat" team to assist refuge managers in identifying threats and eradicating new infestations promptly. It provides the training, equipment, and supplies to implement the team.

Refuge Operating Needs

21580 Hagerman NWR

SR:	006	One-Time:	$85
DR:	999	RecurBase:	$150
RR:	999	Tot. 1st Yr:	$235
FTEs	3.0		

☐ : Approved Minimum Staff
☐ : Approved Critical Mission
☐ : Approved New/Expand Station
☐ : Facility Improve. Bundle

03002B Expand Invasive Species Strike Team for Red River Ecosystem

Enhance the capability of the Invasive Species Strike Team for the Red River Ecosystem by expanding the staff size from 3 to the full complement of 6 personnel. This project will add much-needed field capability with the addition of a Crew Leader (Biologist) and two field staff; a Tractor Operator and a Biotech (identified as a "Resource Specialist" to fit into the RONS system). Enlarging the to Strike Team with these 3 additional field staff will more than double the capability of the Team to locate, map, and treat infestations and restore altered native refuge upland and wetland habitats that have become infested with non-native invasive species.

This "part B" RONS project links to the prerequisite project 03002A for the control of Johnsongrass, kudzu, field bindweed, Chinese bush clover, musk thistle, Chinese tallow, red-horned poppy, giant salvinia, hydrilla, water hyacynth and other invasive species that occur in Oklahoma and North Texas.

21580 Hagerman NWR

SR:	7	One-Time:	$24
DR:	208	RecurBase:	$2
RR:	269	Tot. 1st Yr:	$26
FTEs			

☐ : Approved Minimum Staff
☐ : Approved Critical Mission
☐ : Approved New/Expand Station
☐ : Facility Improve. Bundle

91013 Develop boat access at Goode Day Use Area

Develop boat access (concrete boat ramp) on the east side of Big Mineral Arm of Lake Texoma, possibly near Goode Day Use Area. An old oil well site provides a good location where the grade and a road are already established. Additional gravel for the road and parking area is needed. No current trailer-launch facilities exist on the east side. The public has identified the need for a trailer boat launching facility in this area. The Corps of Engineers is curtailing visitor services on Lake Texoma, which increases demand on the refuge. Fishing use will be enhanced and increased by the addition of this facility. Based on the latest data available, the additional visitors this boat access would attract are expected to contribute $18,340 annually to the local economy.

21580 Hagerman NWR

SR:	9	One-Time:	$33
DR:		RecurBase:	$5
RR:	315	Tot. 1st Yr:	$38
FTEs			

☐ : Approved Minimum Staff
☐ : Approved Critical Mission
☐ : Approved New/Expand Station
☐ : Facility Improve. Bundle

97006 Construct pole shed

A new pole shed is needed to protect refuge equipment. Most farm implements, and many pieces of equipment, are currently exposed to year-round adverse weather conditions. A covered storage shed is needed to prolong the useful life of tools and equipment. The tools and equipment are used for farming for wildlife and in our grassland management program (burning, fencing, etc.).

Refuge Operating Needs

21580 Hagerman NWR

SR:	9	One-Time:	$85
DR:	999	RecurBase:	$86
RR:	999	Tot. 1st Yr:	$171
FTEs	1.0		

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

03003A Research Biological Controls Methods for Invasive Species in Region 2

Develop a science-based research program for the control of invasive species utilizing biological control agents and IPM techniqies. Numerous invasive species have become established on refuges throughout the southwest region (Arizona, New Mexico, Texas and Oklahoma) of the FWS and few have viable, proven biological control agents that provide sound control alternatives in pursing an Intergated Pests Management (IPM) approach. This project provides funding for applicable research efforts including development of new biocontrol alternatives and monitoring of field trials, with the focus on refuge needs throughout the region. Biologist will develop and foster cooperative partnerships with academia, other Federal and state agencies, ARS, NGO's and other stakeholders. This project is "part A" of two linked projects, the other "part B" project cross-referenced under activity 3h "Invasive Plant Management". Target species include salt cedar, field bindweed, giant salvinia and kudzu.

21580 Hagerman NWR

SR:	10	One-Time:	$99
DR:		RecurBase:	$11
RR:	341	Tot. 1st Yr:	$110
FTEs			

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

93004 Improved farming practices

The refuge is responsible within the Arkansas-Red Rivers Ecosystem for providing food and resting areas for migrating and wintering ducks and geese (over one half million use-days annually). Current refuge farming operations have been limited by the lack of equipment and supplies. Equipment needs are: (1) Purchase grain cart to facilitate harvest/grain delivery and planting operations; (2) Purchase no-till drill for direct seeding into existing stubble without plowing crop residue under (no-till is a land management practice encouraged by State and Federal Agricultural support agencies); (3) Purchase rotary hoe for more effective cultivation of row crops (row cultivator pulls down the stalks).

21580 Hagerman NWR

SR:	10	One-Time:	$40
DR:	999	RecurBase:	$7
RR:	999	Tot. 1st Yr:	$47
FTEs			

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

03001 Develop volunteer opportunities

Increase volunteer opportunities by developing six trailer pads with full RV hookups. Volunteers have become essential to refuge operations contributing to various programs by conducting tours, coordinating environmental education programs, improving access for anglers and bird watchers, and assisting with habitat management and wildlife surveys. Communtiy involvement through the volunteer program has resulted in pride and commitment to the refuge. The additional visitors attracted to this area is expected to contribute more than $50,000 annually to the local economy.

Refuge Operating Needs

21580 Hagerman NWR

SR:	10	One-Time:	$75
DR:	999	RecurBase:	$72
RR:	999	Tot. 1st Yr:	$147
FTEs	1.0		

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

03003B Expand Invasive Species Biological Control Research in R2

Further develop research capabilities for the use of biological control agents in the integrated pest management of Invasive Species on refuges in Arizona, New Mexico, Oklahoma, and Texas. This "part B" project increases the capabilities for field operations, especially monitoring of release sites, by adding a 7/9/11 Biologist to assist the Lead Biologist and perform activities in the field.

Target species include salt cedar, kudzu, field bindweed, johnsongrass, and giant salvinia. Invasive species are a major cause of decline of native species, leading to T&E status. Providing sound science-based IPM alternatives, including biological controls, needed to manage threats to native species.

Project links to "part A" project 03003A cross-referenced under activity 1b for studies and investigations.

21580 Hagerman NWR

SR:	11	One-Time:	$58
DR:	999	RecurBase:	
RR:	999	Tot. 1st Yr:	$58
FTEs			

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

030004 Informational kiosks at refuge entrances

Improve and enhance visitor understanding, facilitate interpretation and recreation programs, improve outreach, and better inform the public about the refuge, fish and wildlife resources, and the Service by constructing interpretive kiosks at the five refuge entrances. Hagerman NWR is located an hour from the Dallas/Fort Worth Metroplex with over 1.5 million people which could provide a huge economic benefit to the local communities. Interpretive and informational kiosks are an excellent opportunity to share educational information, the Service mission and goals, as well as, migratory birds, wildlife conservation, and wildlife management techniques and activities.

21580 Hagerman NWR

SR:	12	One-Time:	$108
DR:	220	RecurBase:	$9
RR:	422	Tot. 1st Yr:	$117
FTEs			

☐: Approved Minimum Staff
☐: Approved Critical Mission
☐: Approved New/Expand Station
☐: Facility Improve. Bundle

91003 Improve Muleshoe and Steedman marshes

Muleshoe and Steedman Marshes are extremely important migration and wintering areas for shorebirds, ducks, and other migratory birds. Current use of these marshes is limited by their depth. The marsh bottoms of Muleshoe and Steedman Marshes need to be recontoured to provide better flooding and manipulation capabilities. Siltation outside the dikes currently impedes drainage, which creates deep water habitats within the marshes. This project will restore usefulness to the marshes. The plan is to use suction dredged material pumped into the existing impoundments to make them shallower and more manageable. They will be easier to drain and less prone to flooding by the lake.

Refuge Operating Needs

21580 Hagerman NWR

SR:	13	One-Time:	$61	93006	Initiate farming on Nocona Unit
DR:		RecurBase:	$5	Purchase vehicle and trailer to haul farm/construction equipment between Hagerman and the Nocona Unit. Provide seed and soil amendments to initiate farming at the Nocona Unit. Waterfowl food plots will be established to provide critical high quality foods for winter migrants. Prospects for cooperative farming is low. Very little farming is done in immediate vicinity of the refuge. Consequently, off-site feeding opportunities are limited. The area has great potential for waterfowl and shorebirds, and it is within the flight path of whooping cranes.		
RR:	439	Tot. 1st Yr:	$66		
FTEs					

☐ : Approved Minimum Staff
☐ : Approved Critical Mission
☐ : Approved New/Expand Station
☐ : Facility Improve. Bundle

APPENDIX C- MAINTENANCE MANAGEMENT SYSTEM

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
Hagerman Deferred Maintenance
Region 2

08/02/02

STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	2	TX	21580 - 04008	Replace worn cement block maintenance shop building	200	

Replace worn cement block maintenance shop building. The building was constructed in 1982 and is made from concrete blocks which have deteriorated and are in need of replacement. The building is used to store vehicles and equipment used in every day operations of the Refuge. The building also houses the office areas of maintenance personnel.

Hagerman NWR	004	TX	21580 - 00006	Replace old office roof	27	

Replace roof on old office, repair eaves, rafter tails, soffits and fascia. This building houses the bunkhouse for volunteers, audiovisual classroom for bird watching and hunter safety classes, welding shop, and incidental storage. Also serves as fire cache storage. This building is critical to many refuge programs.

Hagerman NWR	005	TX	21580 - 00005	Replace roof on warehouse	27	

Replace roof on warehouse and repair soffits and fascia. The roof leaks and if not repaired, will result in structural damage. The building is used for vehicle and equipment storage, and serves as seed locker and sign shop. It is needed in support of farming, moist soil management, and law enforcement programs.

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STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	009	TX	21580 - 98008	Renovate parking and driveway at visitor center/office	53	

Rehabilitate cracked and worn driveway and parking area at office and visitor center. This would alleviate visitors injuring themselves from tripping in the cracks in the pavement. Restripe parking spaces, including handicapped space. Over 12,000 visitors annually stop at the visitor center to get information and look at the interpretive displays. Parking area must accommodate buses of school children touring the refuge and will contain disabled parking spaces. The visitor center is instrumental in explaining the refuge regulations and programs for resource protection and emphasizes the message of staying on designated roads and trails for the protection of sensitive species wildlife habitat and preventing cultural resource damage.

Hagerman NWR	010	TX	21580 - 98007	Rehabilitate driveways and parking areas in shop/maintenance	85	

Repair 20,000 square feet of cracked and worn asphalt maintenance shop parking area, including driveways, service area, and parking area between old buildings. Cracked asphalt is unable to safely support lifting devices for equipment and does not effectively manage storm water runoff, potentially causing water quality problems. The maintenance area supports all refuge programs, especially the public use program and the waterfowl management program. Area also serves the audiovisual classroom and check station for deer bow hunting season.

Hagerman NWR	017	TX	21580 - 94001	Repair low water crossing on Big Mineral Creek	132	

Repair low water crossing on Big Mineral Creek. Repair and stabilize erosion problem at abutments by elevating downstream wing walls. Repair torn baskets and mattresses and cap with grout to protect wire. This structure provides critical access to entire west side of the refuge, including Brooks Marsh which hosts up to 25,000 ducks in the winter. Law enforcement, grazing, and fire management capabilities will be enhanced.

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STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	18	TX	21580 - 04009	Rehabilitate Refuge Ponds	150	

Rehabilitate Refuge Ponds. There are 28 ponds located throughout the Refuge which are in need of repair in order to be of maximum benefit to area wildlife. Some of the ponds are silted in while others are in need of dike work. Visitors to the Refuge would benefit by increased wildlife viewing opportunities.

Hagerman NWR	19	TX	21580 - 04011	Rehabilitate terrace and level farming fields	150	

Rehabilitate terrace and level farming fields. The farm fields are a very important part of the Refuge's mission in providing a feeding area and refuge for wintering waterfowl and area wildlife. Farm fields must be in good condition and functioning properly in order to reach their maximum yields for waterfowl and area wildlife. Visitors will benefit by increased waterfowl and wildlife viewing.

Hagerman NWR	020	TX	21580 - 90008	Crossings on LMU A	26	

Replace culverts with gabion structures at 3 locations. Current access is severely hampered. Enhanced access will support grassland management (grazing and fire management) and law enforcement activities for protection of wildlife resources.

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STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	021	TX	21580 - 90007	Replace culverts with TX crossings in LMU C north of Big Mineral	27	

Replace existing culverts with gabion structures on three draws on the far west boundary. The west side road provides critical access for managing water on Brooks Marsh, which feeds up to 25,000 ducks annually. Boundary road also affords fire protection and access for law enforcement.

Hagerman NWR	022	TX	21580 - 90009	Replace crossings at Beaver Cr., Hazel's, Elba, and RRX	161	

Replace existing culvert type creek crossings with gabion structures. Access around refuge boundary is essential for law enforcement and fire protection, as well as a variety of management programs. The crossings are located in the bow hunt area, supporting 10,000 recreation hours annually.

Hagerman NWR	29	TX	21580 - 04018	Replace Worn Gator Pump	18	

Replace worn Gator Pump. The pump is used to move water from one unit to another in order to meet our moist soil and water management objectives. The pump is worn and a replacement is needed. Visitors would benefit from increased waterfowl and wildlife viewing opportunities.

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STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	030	TX	21580 - 01012	Replenish rock on Meadow Pond Road	116	

Rehabilitate Meadow Pond Road. This road serves all of land management in unit C, supporting grassland and wetland management, law enforcement, and wildlife-dependent recreation over 1,700 acres. Marshes in this unit have peak populations of 5,000 ducks annually. About 500 hunters annually are also served. Current gravel surface is breaking down and needs a cap of fresh crushed rock to prevent losing it to erosion.

Hagerman NWR	031	TX	21580 - 93015	Repair pond spillway and drop pipe	27	

Repair pond by rebuilding the spillway, replacing the drop pipe, and repairing the dam. Current spillway has washed out and destroyed the road on the dam connecting the north and south portions of this management unit, the access point for critical fire and enforcement. The pond expands wood duck nesting and brood habitat, and provides stock watering for this management unit.

Hagerman NWR	32	TX	21580 - 04021	Replace Deteriorated Air Conditioning/Heating System in	20	

Replace Deteriorated Air Conditioning/Heating System in Maintenance Shop Building. The system has deteriorated to the point that it should be replaced. The maintenance shop building houses vehicles, equipment, and the maintenance employees.

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STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	037	TX	21580 - 02003	Replace Refuge Directional and Informational Signs	37	

Replace Refuge directional and informational signs. Refuge directional and informational signs are used by the public to arrive at the Refuge without becoming lost. The informational signs located throughout the Refuge are worn and in need of replacement. These signs help Hagerman Refuge educate the public in regards to the different types of wildlife found on the Refuge and the different types of management techniques we use to help migratory and resident wildlife. Replacement of the worn directional and informational signs will help to educate the public about our mission, goals, and objectives.

Hagerman NWR	038	TX	21580 - 02005	Replace Crow Hill Observation Tower	52	

Replace Crow Hill public observation tower. The Crow Hill observation tower is located along the Crow Hill trail and is constructed of metal steps with a handrail. The tower is worn and should be replaced with a new tower which allows access to persons with disabilities. The Crow Hill trail and tower allows the public an improved view of Refuge plants and animals, including Refuge fields, moist-soil units, and Lake Texoma. This beautiful view should be afforded to all visitors so that they can develop a better understanding of the need to restore, conserve, and protect wildlife.

Hagerman NWR	040	TX	21580 - 02006	Replace Sandy Point Observation Tower	52	

Replace Sandy Point public observation tower. The Sandy Point observation tower is located near the oil pad "A" road and is constructed of metal steps with a handrail. The tower is not accessible at this time and should be replaced with a new tower which allows access to persons with disabilities. The Sandy Point tower allows the public an improved view of Refuge plants and animals, including moist-soil units, and Lake Texoma. This beautiful view should be afforded to all visitors so that they can develop a better understanding of the need to restore, conserve, and protect wildlife.

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Region 2

08/02/02

STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	999	TX	21580 - 04013	Replace two deteriorated boat ramps	75	

Replace two deteriorated boat ramps. The concrete boat ramps have become unsafe due to the erosion of base material under the ramp. The ramp has been packed with gravel but a more thorough job of packing and then replacing the ramp surface and installing floating docks should greatly improve lake access by area boaters. The ramps are also used by staff to monitor trotlines and buoy markers.

Hagerman NWR	999	TX	21580 - 02009	Replace North Boundary Fence	29	

Replace five miles of North boundary fencing. The boundary fence around Hagerman Refuge is worn and in many areas broken. These areas allow activities such as trespass grazing to occur. Repair of the boundary fence will prevent activities from occurring, as well as signifying to everyone that they are entering a National Wildlife Refuge. Additional benefits of repairing the boundary fence includes improved plant and animal communities. This will benefit grassland nesting birds which are in decline due to habitat loss. Wildlife Photography and wildlife viewing opportunities will also improve as plant communities improve.

Hagerman NWR	999	TX	21580 - 02030	Rehab the Auto Tour Road (Gravel and Signs)	104	

Replace auto tour route signs. The auto tour route is located along Lake Texoma and includes a portion of the Central Service Road, "O" and "P" pad roads, and Silliman road. The Hagerman Refuge hosts approximately 165,000 visitors annually and the majority of these visitors travel along the tour route. The signs along the route have become worn and faded. Replacing the informational signs will help to educate the public about area plants, wildlife, and management techniques used by the Refuge to aid in restoring and conserving wildlife.

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Region 2

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STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	999	TX	21580 - 02010	Rehab Moist Soil Unit Water Line	31	

Rehabilitate the moist soil management unit water line. An underground water line connects goose pen pond to moist soil unit eight. This line has developed leaks and is no longer achieving its intended purpose. Replacement of the line would facilitate moist soil management thereby increasing the waterfowl and shorebird populations. This would also provide the secondary benefits of increasing wildlife viewing opportunities and increasing visitor satisfaction while touring the Refuge.

Hagerman NWR	999	TX	21580 - 02011	Rehab water control structures and flap gates.	37	

Rehabilitate water control structures and flap gates. The channels on the concrete stop log structures located in Muleshoe Marsh, Steedman Marsh, and Mineral Marsh have chipped and cracked which prevents a good seal from forming when attempting to manipulate water levels. This severely limits our moist soil management abilities. These units also contain flap gates which were designed to keep water out of the moist soil units when Lake Texoma floods. These flap gates have become misaligned due to spring flooding and must be realigned before they will function properly. Rehabilitating the water control structures and the flap gates will facilitate moist soil and water management capabilities thereby increasing waterfowl and area wildlife populations. A secondary benefit includes increased wildlife viewing opportunities and increased visitor satisfaction while touring the refuge.

Hagerman NWR	999	TX	21580 - 02012	Rehab Moist Soil Units	75	

Rehabilitate the dikes in Muleshoe Marsh and Steedman Marsh. They have eroded and need to be raised in order to improve water level manipulation. The elevation at the upper end of these units also needs to be reshaped and lowered to derive the maximum benefits from water manipulation. Rehabilitating the dikes and lowering the elevation in these units will greatly improve moist soil and water management capabilities thereby increasing waterfowl populations, wildlife viewing opportunities, and visitor satisfaction.

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STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	999	TX	21580 - 02032	Replace five Miles of South Boundary Fence	52	

Replace five miles of South boundary fence. The boundary fence around Hagerman Refuge is worn and in many areas broken. These areas allow activities such as trespass grazing to occur. When trespass grazing occurs the animal and plant communities suffer. Repair of the boundary fence will prevent these activities from occurring, as well as signifying to everyone that they are entering a National Wildlife Refuge. Additional benefits of repairing the boundary fence includes improved plant and animal communities. This will benefit grassland nesting birds which are in decline due to habitat loss. Wildlife Photography and wildlife viewing opportunities will also improve as plant communities improve.

Hagerman NWR	999	TX	21580 - 02033	Replace Five Miles of West Boundary Fence	52	

Replace five miles of West boundary fence. The boundary fence around Hagerman Refuge is worn and in many areas broken. These areas allow activities such as trespass grazing to occur. When trespass grazing occurs the animal and plant communities suffer the consequences. Repair of the boundary fence will prevent these activities from occurring, as well as signifying to everyone that they are entering a National Wildlife Refuge. Additional benefits of repairing the boundary fence includes improved plant and animal communities. This will benefit grassland nesting birds which are in decline due to habitat loss. Wildlife Photography and wildlife viewing opportunities will also improve as plant communities improve.

Hagerman NWR	999	TX	21580 - 02043	Replace Screwgates on Moist Soil Units	84	

Replace screwgate structures with stop log structures. Several of the screwgates on the Refuge are worn and leaking. Replacement of these structures would increase waterfowl populations, water level manipulation, and moist soil capabilities. Visitors would also experience greater opportunities for wildlife photography and wildlife viewing.

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Region 2

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STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	999	TX	21580 - 02015	Replace Grassland Management Program Fences	26	

Replace grassland management program fences. Grassland management interior fences are located throughout Land Management Units A,B,C, and D. The grassland management interior fences, which are made up of wooden or metal posts and barbed wire, are worn and broken. These areas allow activities such as trespass grazing to occur. Repair of the interior fence will prevent illegal activities from occurring, as well as, informing visitors that they are entering grazing units within Hagerman Refuge. The benefits of repairing the grassland management program interior fences include improved plant and animal communities. Wildlife Photography and wildlife viewing opportunities will also improve as plant communities improve.

Hagerman NWR	999	TX	21580 - 02008	Replace Refuge Boundary Signs	28	

Replace Refuge boundary signs. Refuge boundary signs have not been replaced and many are no longer legible. This would reduce criminal activities like poaching, trespass grazing, and other illegal activities. This would also allow visitors to know they had reached an area which allows and encourages hiking, wildlife viewing and photography.

Hagerman NWR	999	TX	21580 - 02014	Rehab the Big Mineral Day Use Area	26	

Rehabilitate the Big Mineral Day Use Area. The Big Mineral Day Use area is located adjacent to Big Mineral Creek which floods on occasion. The parking lot needs gravel to allow for the 165,000 visitors each year. Rehabilitating the parking lot will result in increased visitor satisfaction by providing fishing, wildlife photography, and wildlife viewing opportunities.

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08/02/02

STATION	StaRank	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Date Complete
Hagerman NWR	999	TX	21580 - 02029	Rehab the Harris Creek Day Use Area	26	

Rehabilitate the Harris Creek Day Use Area. The Hagerman Refuge hosts approximately 165,000 visitors every year. The Harris Creek is in need of an entrance sign and the benches along the trail which were erected in 1986 have become weathered and unusable. The trail is also in need of informational and directional signs. Establishment of entrance and informational signs would help to educate the public about area plants, wildlife, and the management techniques used by the Refuge to aid in restoring and conserving wildlife.

Hagerman NWR	999	TX	21580 - 02031	Replace five Miles of South Boundary Fence	52	

Replace five miles of South boundary fence. The boundary fence around Hagerman Refuge is worn and in many areas broken. These areas allow activities such as trespass grazing to occur. When trespass grazing occurs the animal and plant communities suffer the consequences. Repair of the boundary fence will prevent these activities from occurring, as well as signifying to everyone that they are entering a National Wildlife Refuge. Additional benefits of repairing the boundary fence includes improved plant and animal communities This will benefit grassland nesting birds which are in decline due to habitat loss. Wildlife Photography and wildlife viewing opportunities will also improve as plant communities improve.

Total Cost	**2,057**

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
SMALL EQUIPMENT

Region 2 2/2/2005

STARANK	PlanYear	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Running Backlog
Hagerman NWR		TX	21580 04020M	Replace Inadequate, Non-Compliant Wash	75	75
3		Replace inadequate non-compliant wash station for vehicles and equipment. The new facility must meet state and EPA regulations for waste management and promote Region 2 Policy for HACCP principles.				
Hagerman NWR		TX	21580 03004M	Replace office copy machine	8	83
007		Replace the office copy machine. The copier no longer meets the office's copier needs. The copy machine is currently used by Refuge staff in completing various assignments ranging from fencing projects, water management, conducting prescribed fires, law enforcement activities, and farming.				
Hagerman NWR		TX	21580 99002M	Replace Grain drill	14	97
016		Replace International grain drill with no-till type drill in support of conservation farming program and prairie restoration. As no-till and low-till farming methods increase, equipment must be upgraded to meet changing mandates. Providing green browse (winter wheat) for the up to 10,000 geese that winter here is a critical management practice.				

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
SMALL EQUIPMENT

Region 2 2/2/2005

STARANK	PlanYear	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Running Backlog
Hagerman NWR		TX	21580 00002M	Replace IHC 480 disk harrow	17	114
026	2005eqSM	Replace worn-out disk. Maintenance costs are rising on this old piece of equipment. Farming for wildlife food crops requires a reliable and resilient land preparation tool. Winter wheat and feed grains sustain a wintering population goal of up to 10,000 geese.				
Hagerman NWR		TX	21580 00003M	Replace Krause plow	16	130
027	2005eqSM	Replace Krause plow that is unreliable and requires major repairs. Plow needed for primary land preparation in farming for wildlife. Winter wheat and feed grain production provide feed for populations of up to 10,000 geese of four species in the winter and other wildlife as well. Viewing opportunities to as many as 300 people per day during winter months are provided.				
Hagerman NWR		TX	21580 04019M	Replace 2002 Ford F-250	35	165
33		Replace 2002 Ford F-250. The truck has 11,280 miles and is the primary law enforcement vehicle on the station. Replacement of the truck would improve the Law Enforcement Officer's ability to perform law enforcement work on the Refuge. Visitors would benefit by feeling safer when touring the Refuge by seeing a Law Enforcement Officer on patrol.				

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
SMALL EQUIPMENT

Region 2 2/2/2005

STARANK	PlanYear	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Running Backlog
Hagerman NWR		TX	21580 02020M	Replace 1996 Dodge 4x2 Pickup	33	198
999				Replace the 1996 Dodge 4X2 Pickup. The 1996 Dodge pickup has approximately 35,000 miles and is showing signs of wear. The vehicle is currently being used as a Law Enforcement vehicle but is limited by not having 4-wheel drive capabilities. The vehicle is also used for moist-soil management and water level manipulation. Replacing the 1996 Dodge would improve the ability to access areas within the Refuge that are not accessible by 4X2 vehicles. Moist soil and water level capabilities would also greatly improve.		
Hagerman NWR		TX	21580 02046M	Replace 1986 Case Row Planter	10	208
999				Replace 1986 Case row planter. The Case planter has 750 hours and is showing signs of wear. The planter is used in the farming program. The Refuge plants a variety of crops including soybeans, corn, and wheat, to ensure that the nutritional requirements of wintering waterfowl are met. Benefits include a larger portion of waterfowl surviving thru the winter. Visitors also enjoy the increased benefits of viewing large numbers of wintering waterfowl during the fall, winter, and early spring.		
Hagerman NWR		TX	21580 02047M	Replace 1986 Case IH Field Row Cultivator	10	218
999				Replace 1986 Case field row cultivator. The Case cultivator has 1000 hours and is showing signs of wear. The cultivator is used in the farming program. The Refuge plants a variety of crops including soybeans, corn, and wheat, to ensure that the nutritional requirements of wintering waterfowl are met. Benefits include a larger portion of waterfowl surviving thru the winter. Visitors also enjoy the increased benefits of viewing large numbers of wintering waterfowl during the fall, winter, and early spring.		

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
SMALL EQUIPMENT

Region 2 2/2/2005

STARANK	PlanYear	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Running Backlog
Hagerman NWR		TX	21580 04001M	Replace 1999 Econoline Ford Van	35	253
999		Replace 1999 Econoline Ford Van. The van has 20,706 miles and is used to conduct biological surveys. The van is also used to transport up to 15 volunteers at one time. Replacement of the van would improve the ability for a large number of volunteers to accomplish Refuge objectives resulting in a substantial savings to the station.				
Hagerman NWR		TX	21580 04002M	Replace worn 15 foot bat wing mower	16	269
999		Replace worn 15 foot bat wing mower. The mower is currently used for mowing roadsides and the day use areas. The mower is also used to mow small saplings that are invading the native grass areas. Visitors to the refuge would benefit by the increased opportunities for wildlife photography and wildlife viewing.				
Hagerman NWR		TX	21580 04003M	Replace worn Honda Four Trax 300 All-Terrain	8	277
999		Replace worn Honda Four Trax 300 All-Terrain Vehicle. The ATV is used for all aspects of management which occur on the Refuge including the biological, farming, and hunting programs. The ATV is also used in reseeding native grass areas, seeding millet in moist soil units and monitoring water control structures and the Refuge boundary. The ATV is also used in law enforcement activities. It is an important and integral piece of equipment used to accomplish a variety of tasks on the Refuge.				

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
SMALL EQUIPMENT

Region 2 2/2/2005

STARANK	PlanYear	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Running Backlog
Hagerman NWR		TX	21580 04004M	Replace worn Boston Whaler motor	15	292
999		Replace worn Boston Whaler motor. The motor used on the Boston Whaler is currently an 110 evenrude outboard motor which is worn and in need of replacement. The boat is used to monitor buoy markers along the Refuge boundary and lake Texoma. It is also used to monitor trotlines within Refuge waters. The boat is also used to monitor fishermen during Law Enforcement water patrols.				
Hagerman NWR		TX	21580 04005M	Replace 2001 Dodge V10 Truck	35	327
999		Replace 2001 Dodge V10 Truck. The truck has 4x4 capabilities and has 38,450 miles. The truck is assigned to the Refuge invasive species biologist and is used when the biologist travels to stations in Oklahoma and north Texas. Replacement of the truck would improve the biologist's ability to continue the battle against invasive species with the Region.				
Hagerman NWR		TX	21580 04006M	Replace 2001 Dodge Flatbed Truck	35	362
999		Replace 2001 dodge Flatbed Truck. The truck is used as a maintenance truck with 4x4 capabilities and has 15,973 miles. The truck is used for all management projects which occur on the Refuge ranging from farming, water and moist soil management and fencing projects.				

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
SMALL EQUIPMENT

Region 2 2/2/2005

STARANK PlanYear	STATE	OrgCode-Project	PROJTITLE	Cost ($000)	Running Backlog
Hagerman NWR	TX	21580 04007M	Replace 2001 Polaris 500 4x4 All-Terrain Vehicle	8	370
999	Replace 2001 Polaris 500 4x4 All-Terrain Vehicle. The ATV is used in the battle against invasive species by the Invasive Species Biologist. The ATV is also used when the biologist travels to stations in Oklahoma and north Texas.				
Hagerman NWR	TX	21580 04010M	Replace worn Panther Air Boat	15	385
999	Replace worn Panther Air Boat. The 14 foot air boat is used for seeding millet along the lake shore and for monitoring trotlines on the Lake. It is also occasionally used for law enforcement patrol on the Lake.				
Hagerman NWR	TX	21580 04012M	Replace 255 Tractor/Mower	30	415
999	Replace the 255 Tractor/Mower. The 255 is used to mow around the Refuge headquarters and adjacent buildings. It is used for "lighter" mowing needs rather than the heavier roadside grasses. The 255 is also used to maintain the day use areas where only a smaller mower is needed or can be used.				
				Total Cost	415

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
Heavy Equipment

2/2/2005

STARANK	Unit Name	State	Congress District	Project Title/Description	Cost ($000)	Date Complete
013	Hagerman NWR 21580 · 99003	TX	0	Replace Case IHC 2294 with 195 DBHP tractor with all-wheel drive, duels, and front weights. (Case IHC 8930 or equal) Farm tractor is critical to meeting waterfowl needs, especially goose management goals of feeding up to 10,000 geese in peak periods.	125	
015	Hagerman NWR 21580 · 01003	TX	0	Replace Ford 6600 tractor to support farming for goose management, fire management program (mowing fire guards and fire lanes), and to a lesser extent for grounds and roadside maintenance (public use program). Green browse is critical to goose management. Fire is critical to the health of our Tall Grass Prairie. Visiting public numbers about 175,000 per year and is expected to increase substantially in 5-10 years.	94	
025	Hagerman NWR 21580 · 00001	TX	0	Replace 40 hp farm tractor that is old and requires continuous major maintenance to the engine and transmission. Repair costs exceed replacement cost of the equipment. Tractor is used to perform light agricultural operations in support of goose management. Current objectives call for holding up to 10,000 geese (Canada, white-fronts, and snows) on refuge lands through midwinter.	94	
999	Hagerman NWR 21580 · 02017	TX	0	Replace the John Deere 310D backhoe/loader. The 310D backhoe/loader has approximately 1738 hours and is showing signs of wear. The backhoe/loader is used for a variety of functions including moist soil management and water level manipulation. Waterfowl population will benefit greatly by having an operational backhoe to repair dikes, clean ditches, remove and add fill material when needed. Visitors also benefit by having increased opportunities for viewing and photographing wildlife.	94	
999	Hagerman NWR 21580 · 02021	TX	0	Replace 1991 Ford LT 9000 4X6 Dump Truck. The dump truck currently has 5,804 miles and is showing signs of wear. The hitch on the truck is in need of repair and currently cannot safely transport equipment. The dump truck is used to repair dikes and crossings. It is also used to maintain moist soil units in working condition. Replacement of this truck would greatly enhance moist soil management capabilities. This would also increase waterfowl populations and enhance visitor satisfaction when visiting Hagerman Refuge.	52	

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
Heavy Equipment

2/2/2005

STARANK	Unit Name	State	Congress District	Project Title/Description	Cost ($000)	Date Complete
999	Hagerman NWR 21580 · 02023	TX	0	Replace 1988 Caterpillar Motor Grader. The motor grader currently has 3910 hours and is showing signs of wear. The motor grader is used to grade the roads and reduce the size of the potholes in the gravel roads. The grader is also used to improve the ditches along the road which allows for improved access by visitors traveling thru the Hagerman Refuge. Replacement of the motor grader would allow for improved access thru the Refuge and allow for an increase in opportunities for wildlife photography and wildlife viewing by the public.	100	
999	Hagerman NWR 21580 · 02028	TX	0	Replace 1984 Ford 7610 farm tractor. The Ford 7610 farm tractor currently has 2059 hours and is showing signs of wear. The farm tractor is used in the farming program. The Refuge plants a variety of crops including soybeans, corn, and wheat, to ensure that the nutritional requirements of wintering waterfowl are met. The tractor is also used for mowing the fire lanes along the Refuge boundary and in the Prescribed fire program. Invasive species are also mowed with this tractor. Benefits include a larger portion of waterfowl surviving thru the winter, improved grassland communities and a reduction in invasive species populations. Visitors also enjoy the increased benefits of viewing large numbers of wintering waterfowl during the fall, winter, and early spring.	94	
				Total Cost	**653**	

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
ROADS

2/2/2005

STARANK	Unit Name	State	Congress District	Project Title/Description	Cost ($000)	Date Complete
008	Hagerman NWR 21580 · 98003	TX	0	Construction. Repave .9 mile and upgrade .5 miles to asphalt. Road provides primary access to Visitor Center, Office, and public use facilities. Three-quarters of all visitors (175,000 per year) use this route.	271	
011	Hagerman NWR 21580 · 98004	TX	0	Construction. Replenish gravel on Central Service Road (AKA Wildlife Drive),. The Central Service Road is the main access facility in support of 165,000 visits per year. Fishermen, bird watchers, and sightseers are served by the CSR.	470	
012	Hagerman NWR 21580 · 01009	TX	0	Construction. Replace existing Central Service Road railroad bridge that is one lane and a safety concern. Corrosion has compromised structural integrity. The road serves 100,000 visitors annually and is the focus of the Auto Tour Route. ~~Bridge and road are vital to refuge operations, especially farming, marsh management, law enforcement, and public use programs.~~	326	
014	Hagerman NWR 21580 · 01010	TX	0	Construction. Replace 75-year old single-lane railroad bridge with 2-lane concrete bridge. Old bridge shows serious structural deterioration and the approaches are subject to caving and sloughing. [How many visitors use this bridge each year?] ~~Loss of the bridge would hamper public access and impede resource protection and management on nearly half the refuge. Public safety is an issue.~~	110	
23	Hagerman NWR 21580 · 04015	TX	0	Replace Meyers Branch Low Water Crossing with Bridge. The low water crossing is located north of the Refuge office and was originally constructed in 1959. The low water crossing should be replaced to improve access thru the Refuge during times of heavy rain when the route becomes impassable due to run off. Visitors would benefit by being able to travel thru most of Refuge during times of heavy rain.	250	
28	Hagerman NWR 21580 · 04016	TX	0	Replace Low Water Crossing with Bridge. The low water crossing should be replaced to improve access thru the Refuge during times of heavy rain when the route becomes impassable due to run off. Visitors would benefit by being able to travel thru most of the Refuge during times of heavy rain.	200	
999	Hagerman NWR 21580 · 04017	TX	0	Rehabilitate and elevate road from Shell Low Water Crossing to L pad road. The road between the low water crossing and L pad road needs to be elevated in order to allow vehicles a safe passage during periods of heavy rainfall. Visitors would benefit by being able to travel most of the Refuge during times of heavy rain.	850	

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
ROADS

2/2/2005

STARANK	Unit Name	State	Congress District	Project Title/Description	Cost ($000)	Date Complete
999	Hagerman NWR 21580 - 02048	TX	0	Preliminary engineering. Provide planning and design of public use roads and parking lots. This project will include site visits surveying needs and site assessment and upon completion will identify design, specifications, and a cost estimate for the proposed road and parking lots.	209	
999	Hagerman NWR 21580 - 02013	TX	0	Construction and rehabilitation of 2 refuge roads. Regrade and regravel. Route 101,102 parking lot 903	261	
999	Hagerman NWR 21580 - 02037	TX	0	Construction. Construct and rebuild Crow Hill , Steedman and Muleshoe roads. Work will consist of regrading and regraveling 1.6 miles of road Route 105-107 parking lots 911-913	418	
999	Hagerman NWR 21580 - 02016	TX	0	Construction. This project will be used to regrade and regravel Shotgun Alley, Sandy Road and 6 parking lots (Rte 103,104, 906-910).	800	
				Total Cost	**4,165**	

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
Small Construction

2/2/2005

STARANK	Unit Name	State	Congress District	Project Title/Description	Cost ($000)	Date Complete
024	Hagerman NWR 21580 - 01005	TX	0	Expand inadequate capacity of visitor area. Hunter education and bird watching classes are held several times per year, but capacity is limited. Currently serves about 350 users per year. Expanded facility will include restrooms, which are currently lacking. Upgraded capability would facilitate use up to 1,000 or more people. Reel-to-reel , slide projectors, and a TV/VCR will be replaced by a video projector.	77	
999	Hagerman NWR 21580 - 02036	TX	0	Rehabilitate Goose Pen Pond Well. Goose Pen Pond is a wetland which contains a water control structure but is dependent on runoff. Rehabilitating a nearby well will provide a reliable source of water during the hot and dry summer months. Rehabilitating this well may also supply moist soil unit eight with water. The benefits will be an increase in waterfowl populations, increased moist soil management capabilities and increased wildlife viewing opportunities for visitors.	26	
999	Hagerman NWR 21580 - 02045	TX	0	Construct a fuel island cover. The fuel dispensing tanks are in need of a cover to provide shelter when fueling under wet or dry conditions. Benefits include improved morale by personnel so they can better focus on additional Refuge projects.	21	
999	Hagerman NWR 21580 - 95001	TX	0	Construct diversion structure to provide water by gravity flow to service MSU-8 on Martin Branch. A water right exists to pursue this project. When flooded, this impoundment can feed 3,000 ducks for an extended period of time in a location on the Auto Tour Route offering excellent viewing opportunities. This impoundment was built in cooperation with Ducks Unlimited, who has an ongoing interest in its success. Develop a moist soil unit within Railroad Pond on the lower end of RF-3. A good seed bank exists and produces abundantly each year, but it often does not flood back so waterfowl can use it. The area has potential for several thousand additional ducks. Additional water rights may be required.	108	
999	Hagerman NWR 21580 - 91005	TX	0	Improve access to Crow Hill interpretive trail by stabilizing creek crossing and by regraveling road and parking area, which is the new terminus for the auto tour route. High quality display is needed to explain the importance of grasslands to songbirds as well as resident wildlife. The trail traverses a Savannah habitat type that has all but disappeared from Texas. Located between the urban centers of Oklahoma City and Dallas on Lake Texoma, the refuge has a tremendous opportunity to help meet the growing demand for nature based tourism. Based on the latest Fish and Wildlife Service data available, the additional visitors these trail improvements would attract are expected to contribute $15,308 annually to the local economy.	60	

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
Small Construction

2/2/2005

STARANK	Unit Name	State	Congress District	Project Title/Description	Cost ($000)	Date Complete
999	Hagerman NWR 21580 · 99101	TX	0	Construct dams, spillways, and water control devices on two draws on the Nocona Unit to create moist soil units and green-tree areas for waterfowl. This project will greatly enhance the quality of the area for a variety of wildlife species, including shorebirds, marsh birds, and prairie nesting nongame birds. Abundant artesian water is available in the area.	55	
999	Hagerman NWR 21580 · 99102	TX	0	Grazing is a natural and necessary part of the ecology of prairie grassland habitats. This project proposes to build 20 miles of internal fencing to more effectively manage grazing to restore and maintain quality of grasslands and to control invasive species. We will use power fencing and a short duration grazing system to maximize habitat response to move native grasslands toward climax, increase plant vigor and density, and provide more micro-habitats for grassland fauna, especially nongame and upland game birds. NRCS and the Noble Foundation are planning partners in this endeavor. The project will become a demonstration area in a region experiencing economic hardship and range deterioration.	55	
				Total Cost	**402**	

U.S. FISH & WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM
Large Construction

2/2/2005

STARANK	Unit Name	State	Congress District	Project Title/Description	Cost ($000)	Date Complete
039	Hagerman NWR 21580 - R2 B	TX	0	Replace/rehabilitate a number of bridges located at Hagerman NWR. These unsafe bridges are used both by Refuge staff and by the general public. Bridges proposed for replacement are deteriorated and worn to the point it is not economically feasible to rehabilitate. **Funds for Phase I planning and design were appropriated in FY 2001.**	1,800	
001	Hagerman NWR 21580 - 01001 A	TX	0	Remove the existing administrative office building and replace an existing office building with a building of similar square footage (approximately 3,000 sq. ft.) that is code compliant, energy efficient, and in conformance with Americans With Disability Act standards.	160	
6	Hagerman NWR 21580 - 04014	TX	0	Replace deteriorated Refuge Residence and Garage. The residence was constructed in 1951 and is in need of replacement. The garage was constructed in 1982 and is a detached one car masonry garage. The garage is very small and hardly allows for the driver to exit the vehicle.	200	
				Total Cost	**2,160**	

APPENDIX D- COMPATIBILITY DETERMINATIONS

COMPATIBILITY DETERMINATION

USE: Outdoor Recreation

STATION NAME: Hagerman NWR

DATE ESTABLISHED: Feb. 9, 1946

ESTABLISHING AND ACQUISITION AUTHORITIES: Public Land Order 314, under the authority vested in the President, and pursuant to Executive Order No. 9337 dated April 24, 1943.

PURPOSES FOR WHICH THE REFUGE WAS ESTABLISHED: "...for refuge and breeding ground purposes for migratory birds and other wildlife...reservation as a wildlife refuge...shall not interfere with any existing or future uses...in the operation and maintenance of the Denison Dam and Reservoir Project."

MANAGEMENT GOALS AND OBJECTIVES: Goals of the National Wildlife Refuge System, given in Attachment 1, provide the framework for the objectives at Hagerman N.W.R. Refuge objectives are as follows;

1) To provide resting an feeding habitat for migrating and wintering waterfowl, and other birds and endangered species.

2) To provide the public with opportunities to understand refuge management operations and the ecosystems represented on the refuge.

3) To offer quality viewing and appreciation of wildlife and the environment.

4) To make renewable refuge resources available for harvest through managed recreational programs.

OTHER APPLICABLE LAWS, REGULATIONS AND POLICIES:

1. Antiquities Act of 1906 (34 Stat. 225).
2. Migratory Bird Treaty Act of 1918 (U.S.C. 703-711; 40 Stat. 755).
3. Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222).
4. Migratory Bird Hunting Stamp Act or 1934 (16 U.S.C. 718-178h; 48 Stat.451).
5. Criminal Code Provisions of 1940 (18 U.S.C. 41).
6. Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250).
7. Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686).
8. Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat. 1119).
9. Refuge Recreation Act of 1962 (16 U.S.C. 760k-760k-4; 76 Stat.653).
10. Land and Water Conservation Fund Act of 1965.
11. National Historical Preservation Act of 1966 (16 U.S.C. 470, et seq.; 80 Stat. 927).
12. National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927).
13. The National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq.; 83 Stat. 852).
14. Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989).
15. Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.; 87 Stat. 884).
16. National Wildlife Refuge Regulations (50 CFR Subchapter C; 43 CFR 3101.3-3).
17. Emergency Wetlands Resources Act of 1986 (S.B. 740).

18. North American Wetlands Conservation Act of 1990.
19. Food Security Act (Farm Bill) of 1990 as amended (H.R. 2100)
20. The Property Clause of the U. S. Constitution (Art.IV 3, Clause 2).
21. The Commerce Clause of the U. S. Constitution (Art. I, Section 8).

DESCRIPTION OF USE:

Several classes of wildlife/wildlands recreation are covered in this document. Each will be listed and described in a separate paragraph below.

1) Bicycling-permitted on established roadways only. No off-road bicycling is permitted, although there is a high demand for it in this area. No motorized bikes are permitted off graveled roads.

2) Boating (non-motorized)-refers to john boats, canoes, kayaks, and the occasional sailboat. All boats are prohibited from October 1 to March 31. Access is limited by launching restrictions, so that all refuge waters are not accessible by boat. Otherwise, the activity is unrestricted.

3)Camping (group-only)-permitted at one location at the north end of the Pad Road, at an abandoned oil well site. Primitive camping only--no facilities, including water, are furnished. Use amounts to only one or two times per year.

4)Hiking-this is walking long distances for exercise and scenic enjoyment. No trails are set aside and maintained exclusively for this purpose, but a couple of routes have been identified, mostly on existing roads and trails.

5) Horseback riding-is permitted on graveled roads only, NOT cross-country. As such, it could be classed along with vehicular transit through the refuge. Use is extremely limited.

6) Walking-similar to hiking, but is much more leisurely, and often invovles more serious nature study. Most of this activity is done on existing field roads and fire guards, and trails maintained for interpretation.

7) Wildlife photography-conducted at all levels of proficiency, from Instamatics through the windshield to expensive set-ups with blinds and telescopic lenses.
8) Picnicking-tables are provided at three locations, and is invariably associated with other wildlife-oriented activities, such as fishing, bird watching, nature study, or sightseeing. Some stations are referring to this as lunching areas.

9) Wildlife observation-refers mostly to bird watching, but deer watching, turkey watching, and even turtle watching are increasing in popularity. This activity may be on foot, by car, or any other conveyance. It could even be extended to flower watching.

With the exception of the maintenance areas, none of the refuge is closed to public access. In actuality, most of the foregoing activities take place on or near existing gravel roads, field roads, or trails set aside for the activity. Very few adventurous souls trek off cross-country. This cluster of activities in nominally non-consumptive.

ANTICIPATED BIOLOGICAL IMPACTS OF THE USE:

Despite the basically non-consumptive nature of the activities under consideration, authorities have opined that no human intrusion into the outdoors is truly non-consumptive, and that some impacts to the environment will be realized.

Some species are extremely sensitive to disturbance by human presence, such as nesting bald eagles. Many cases of altered behavior have been attributed to visitor use. Critical habitats and threatened/endangered species certainly must be protected from negative impacts connected with visitor use. This situation has not, however, been the experience at Hagerman Refuge. The low intensity of use has not produced a wildlife disturbance quotient of any concern as yet.

Impacts are also incurred by the habitat. Studies have shown that impacts begin almost immediately and peak out rapidly, so that even low levels of use can produce measurable impacts on the environment, such as soil compaction, erosion, and trampling. These impacts can be ameliorated by zoning or confining on-the-ground activities to designated areas, thereby lessening the general impact to the whole. This is the actual experience here at Hagerman Refuge. Most of the direct public contact with the environment comes at sites set aside for the purpose, obviating the need for the public to pioneer new territory for their activities. As observed before, most of the public use here occurs on or adjacent to an existing road, or a trail set aside for the purpose.

NEPA Compliance:

Categorical Exclusion ✓ 516 DM 1.4.B.5, C.2

Environmental Assessment EAM
Environmental Impact Statement ____

FONSI ____

Determination: (Check one)
This use is ✓ is not ____ compatible.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Regulations are in place to ensure that impacts to the refuge environment are kept to a minimum. Off-road vehicle use is prohibited, and vehicles are restricted to graveled roads only. Boat launching policy zones boat launching to designated areas provided, to concentrate impacts at a few locations rather than allow bank vegetation to be trampled at many locations.

Horse hooves can do tremendous damage to sod, and lead to serious erosion problems. For this reason, horse use is restricted to existing roads. Bicycles can be hard on the soil as well. They, too, are restricted to existing roadways.

Boating and wildlife observation have been demonstrated to flush birds on occasion. Experience shows that for the most part, this disturbance is of a temporary nature, and that the birds often circle around and return to the same area after the disturbance is past. Persistent harassment is prosecuted under 50 CFR 27.51.

Camping by youth groups is confined to a previously disturbed area, i.e., a former oil well location. Use of this site is minimal, averaging less than two weekends per year. By concentrating picnicking at three sites on the refuge, the remainder of the refuge is protected from undue impacts associated with this activity.

JUSTIFICATION:

While it is recognized that any intrusion by humans into the natural environment carries with it the potential for harm, the responsibility of managers is to assess impacts, and limit or manage visitor use to lessen or avoid negative impacts. A constant and continuing evaluation of public use is carried out to ensure the continued compatibility of those activities currently permitted. Enjoyment by and education of the public to wildlife values and environmental concerns is a stated objective of the refuge and the Service. Non-consumptive wildlife-oriented recreation is entirely proper, indeed necessary, for us to carry out the mission of the Service.

PROJECT LEADER: _____ Ref. Mgr. 8/12/94
(Signature/Title/Date)

REVIEWED BY: Gary Burke Asst Mgr OCTX 9/13/94
(Signature/Title/Date)

_____ RD/RAW 9/19/94
(Signature/Title/Date)

COMPATIBILITY DETERMINATION

USE: Powerboats

STATION NAME: Hagerman NWR

DATE ESTABLISHED: Feb. 9, 1946

ESTABLISHING AND ACQUISITION AUTHORITIES: Public Land Order 314, under the authority vested in the President, and pursuant to Executive Order No. 9337 dated April 24, 1943.

PURPOSES FOR WHICH THE REFUGE WAS ESTABLISHED: "...for refuge and breeding ground purposes for migratory birds and other wildlife...reservation as a wildlife refuge...shall not interfere with any existing or future uses...in the operation and maintenance of the Denison Dam and Reservoir Project."

MANAGEMENT GOALS AND OBJECTIVES: Goals of the National Wildlife Refuge System, given in Attachment 1, provide the framework for the objectives at Hagerman N.W.R. Refuge objectives are as follows;

1) To provide resting an feeding habitat for migrating and wintering waterfowl, and other birds and endangered species.

2) To provide the public with opportunities to understand refuge management operations and the ecosystems represented on the refuge.

3) To offer quality viewing and appreciation of wildlife and the environment.

4) To make renewable refuge resources available for harvest through managed recreational programs.

OTHER APPLICABLE LAWS, REGULATIONS AND POLICIES:

1. Antiquities Act of 1906 (34 Stat. 225).
2. Migratory Bird Treaty Act of 1918 (U.S.C. 703-711; 40 Stat. 755).
3. Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222).
4. Migratory Bird Hunting Stamp Act or 1934 (16 U.S.C. 718-178h; 48 Stat.451).
5. Criminal Code Provisions of 1940 (18 U.S.C. 41).
6. Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250).
7. Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686).
8. Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat. 1119).
9. Refuge Recreation Act of 1962 (16 U.S.C. 760k-760k-4; 76 Stat.653).
10. Land and Water Conservation Fund Act of 1965.
11. National Historical Preservation Act of 1966 (16 U.S.C. 470, et seq.; 80 Stat. 927).
12. National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927).
13. The National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq.; 83 Stat. 852).
14. Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989).
15. Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.; 87 Stat. 884).
16. National Wildlife Refuge Regulations (50 CFR Subchapter C; 43 CFR 3101.3-3).
17. Emergency Wetlands Resources Act of 1986 (S.B. 740).
18. North American Wetlands Conservation Act of 1990.

19. Food Security Act (Farm Bill) of 1990 as amended (H.R. 2100)
20. The Property Clause of the U. S. Constitution (Art.IV 3, Clause 2).
21. The Commerce Clause of the U. S. Constitution (Art. I, Section 8).

DESCRIPTION OF USE: Use of powerboats and airboats

The use of powerboats and airboats is permitted on the refuge portion of Lake Texoma, and is currently unrestricted in size of boat and motor. Airboats are seen infrequently--perhaps only two or three times during a five-year period. Boats are, however, restricted by season of use, and may enter refuge waters only during the months of April through September.

Since the refuge is closed to waterskiing, the size of boats is effectively confined to bass boats of varying horsepower. Fishing, and occasionally, sightseeing, are the main draw, in the absence of skiing as an activity. Large cabin cruisers are sometimes seen making an excursion onto the refuge, and sailboats are seen on rare occasions. Jetskis, SeaDoo's, and other personal watercraft are addressed elsewhere.

ANTICIPATED BIOLOGICAL IMPACTS OF THE USE:

NEPA Compliance:

Categorical Exclusion_____ 516 DM 1.4.B.5, C.2

Environmental Assessment EAM Pre-Nepa
Environmental Impact Statement_____

FONSI _____

Determination: ✓ (Check one)
This use is ✓ is not _____ compatible.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

1. Continue closure of refuge to boating October through March.
2. Continue restriction on waterskiing.
3. Monitor use by airboats and jet boats.

JUSTIFICATION:

Boats and boating are an obvious disturbance to waterfowl and other water-associated birds. For that reason, the Public Use Regulations for Hagerman National Wildlife Refuge provide for closing the refuge to all boats from October 1 through March 31, which covers the bulk of the waterfowl presence in this part of Texas. Conflicts during the summer boating season are limited by the absence of waterskiing as an activity.

Fishing and sightseeing are done at relatively low speeds that reduce disturbance to wading birds. Shorebirds use areas that are so shallow that boats are effectively prevented from flushing birds feeding on the mudflats. Our observation is that birds that are flushed by casual activity usually circle around and come back in to the same location or very nearby.

Size restrictions are not seen as necessary at this time. If size of boats or motors become a problem in the future, the annual review of public use regulations can be used to address the need. This could become a problem if the use of jet boats or airboats increases manifestly. These classes of boats pose a real conflict with wildlife use due to the noise factor. Generally, refuge waters hold little appeal to these craft, and they have not been a problem in the past.

PROJECT LEADER: _____ Ref. Mgr. 8/8/94
(Signature/Title/Date)

REVIEWED BY: Gary Burke Assoc Mgr ecl TX 9/13/94
(Signature/Title/Date)

_____ 9/23/94
(Signature/Title/Date)

COMPATIBILITY DETERMINATION

USE: Hunting (all)

STATION NAME: Hagerman NWR

DATE ESTABLISHED: Feb. 9, 1946

ESTABLISHING AND ACQUISITION AUTHORITIES: Public Land Order 314, under the authority vested in the President, and pursuant to Executive Order No. 9337 dated April 24, 1943.

PURPOSES FOR WHICH THE REFUGE WAS ESTABLISHED: "...for refuge and breeding ground purposes for migratory birds and other wildlife...reservation as a wildlife refuge...shall not interfere with any existing or future uses...in the operation and maintenance of the Denison Dam and Reservoir Project."

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3) To offer quality viewing and appreciation of wildlife and the environment.

4) To make renewable refuge resources available for harvest through managed recreational programs.

OTHER APPLICABLE LAWS, REGULATIONS AND POLICIES:

1. Antiquities Act of 1906 (34 Stat. 225).
2. Migratory Bird Treaty Act of 1918 (U.S.C. 703-711; 40 Stat. 755).
3. Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222).
4. Migratory Bird Hunting Stamp Act or 1934 (16 U.S.C. 718-178h; 48 Stat.451).
5. Criminal Code Provisions of 1940 (18 U.S.C. 41).
6. Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250).
7. Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686).
8. Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat. 1119).
9. Refuge Recreation Act of 1962 (16 U.S.C. 760k-760k-4; 76 Stat.653).
10. Land and Water Conservation Fund Act of 1965.
11. National Historical Preservation Act of 1966 (16 U.S.C. 470, et seq.; 80 Stat. 927).
12. National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927).
13. The National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq.; 83 Stat. 852).
14. Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989).
15. Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.; 87 Stat. 884).
16. National Wildlife Refuge Regulations (50 CFR Subchapter C; 43 CFR 3101.3-3).
17. Emergency Wetlands Resources Act of 1986 (S.B. 740).

18. North American Wetlands Conservation Act of 1990.
19. Food Security Act (Farm Bill) of 1990 as amended (H.R. 2100)
20. The Property Clause of the U. S. Constitution (Art.IV 3, Clause 2).
21. The Commerce Clause of the U. S. Constitution (Art. I, Section 8).

DESCRIPTION OF USE:

The public hunting program at Hagerman National Wildlife Refuge consists of dove, quail, rabbit, and squirrel hunting with shotgun only, and an archery-only white-tailed deer hunt. The dove hunt is confined to the month of September, and the quail hunt is held in February, through the end of State season. Rabbits and squirrels may also be taken during these hunts. The small game hunts utilize a self-permitting system, and no fees are charged. All State bag limits are in effect.

The bow hunt is held in the fall, over three weekends, usually separated by a week. Due to the availability of framework, part of the hunt is held during the State's General Season, with method of take restricted to bow only. Permits are issued by drawing to allocate the resources available among the interested parties. Only one deer, either sex may be taken.

Only limited portions of the refuge are open for hunting. In all, only about 3,000 acres of the approximately 8,000 acres of upland are open for any kind of hunting. And it should be noted that the upland game hunts have a very low participation rate, which may be a reflection of the success rate. The bow hunt nearly always fills up the available slots.

ANTICIPATED BIOLOGICAL IMPACTS OF THE USE:

Archery hunting has a very poor track record with regard to wounding and recovery rate of deer struck. The concern for wounding rate was severe enough to drive some hunters to experiment with drugged arrows to improve retrieval chances. This technique is illegal in Texas, and is prohibited on Federal lands, due to a lack of FDA approval of the substance used for this purpose.

Deer populations are not materially affected by bow hunting, because of low success rates compared to gun hunts. This hunt is purely recreational, and not of management importance. The deer herd is surveyed annually by TPWD biologists, and the information is transmitted to this office.

Non-target species may be disturbed or subject to illegal taking. Since turkeys have been stocked on the refuge, hunting might be anticipated to disturb their use of the area. However, research indicates that turkeys accept a great deal of disturbance without affecting use of home territories. Danger to livestock on the refuge is reduced by the use of shotguns and bows.

Some have anticipated that September dove hunting may have a harmful effect on late-nesting birds. This has been shown not to be the case in Texas, despite information from other areas where the dove population seems to be non-migratory in nature.

Hunting has relatively little effect on small game species for several reasons. Generally, these species are somewhat cyclic in population numbers, responding

quickly and substantially to habitat conditions. While hunting has been considered compensatory along with natural mortality, there are some situations where hunting mortality may actually be additive. If habitat in sufficient quantity and quality is available, small game species will generally fair well even in the face of hunting pressure. Individuals will immigrate to compensate for hunting losses if habitat is adequate, provided adjacent habitat has populations to export.

NEPA Compliance:

Categorical Exclusion_____ N/A

Environmental Assessment ✓____
Environmental Impact Statement____

FONSI ✓____

Determination: (Check one)
This use is ✓____ is not _____ compatible.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Normal crippling loss connected with archery is considered unacceptable for aesthetic reasons (rather than biological), and has led the refuge to institute the requirement for training and proof of proficiency in using a bow. The International Bowhunter Education Program (IBEP) is a course which teaches, among other things, tracking skills and proper arrow placement--both factors in losing deer. The course also ~~teaches~~ stresses waiting for the deer to go down before tracking or pursuing the deer. (Startling wounded deer is a major factor in losing them.) A proficiency test is required, in order to assure a minimum skill level with a bow. With these provisions, we have been able to hold the crippling loss at Hagerman Refuge to less than 50%. Nationally the figure runs closer to 100%; that is, as many lost as found.

The archery hunt is conducted on a permit basis in order to restrict the number of participants to what the available habitat will hold. Each segment will be limited to 65 hunters.

All hunting on the refuge is zoned in time and space to avoid conflicts with waterfowl. Dove hunting is held in September only, to protect ducks that may use Meadow and Dever Ponds. Quail hunting is conducted during the goose use season, but is held on the Goode Unit where geese are seldom found. None of the hunts usurp exclusive use for extended periods of time, which would impact other classes of uses, such as wildlife observation and photography.

Rifles are not permitted for any hunt, to reduce hazards to non-target speies, and to ensure the safety of the using public as well as surrounding neighbors.

JUSTIFICATION:

Hunting is a legitimate traditional form of wildlife-oriented recreation, and is supported by refuge and NWRS objectives. Hunting programs should be conducted in such a way as to minimize conflicts with other user groups and disturbance to non-target species. The program is subject to annual review in order to ensure that compatibility with refuge purposes has not been compromised.

PROJECT LEADER: _____ Ref. Mgr. 8/10/94
(Signature/Title/Date)

REVIEWED BY: Gary Burke Assoc Mgr OC/TX 9/13/94
(Signature/Title/Date)

_____ 9/12/94
(Signature/Title/Date)

COMPATIBILITY DETERMINATION

USE: Fishing (recreational)

STATION NAME: Hagerman NWR

DATE ESTABLISHED: Feb. 9, 1946

ESTABLISHING AND ACQUISITION AUTHORITIES: Public Land Order 314, under the authority vested in the President, and pursuant to Executive Order No. 9337 dated April 24, 1943.

PURPOSES FOR WHICH THE REFUGE WAS ESTABLISHED: "...for refuge and breeding ground purposes for migratory birds and other wildlife...reservation as a wildlife refuge...shall not interfere with any existing or future uses...in the operation and maintenance of the Denison Dam and Reservoir Project."

MANAGEMENT GOALS AND OBJECTIVES: Goals of the National Wildlife Refuge System, given in Attachment 1, provide the framework for the objectives at Hagerman N.W.R. Refuge objectives are as follows;

1) To provide resting an feeding habitat for migrating and wintering waterfowl, and other birds and endangered species.

2) To provide the public with opportunities to understand refuge management operations and the ecosystems represented on the refuge.

3) To offer quality viewing and appreciation of wildlife and the environment.

4) To make renewable refuge resources available for harvest through managed recreational programs.

OTHER APPLICABLE LAWS, REGULATIONS AND POLICIES:

1. Antiquities Act of 1906 (34 Stat. 225).
2. Migratory Bird Treaty Act of 1918 (U.S.C. 703-711; 40 Stat. 755).
3. Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222).
4. Migratory Bird Hunting Stamp Act or 1934 (16 U.S.C. 718-178h; 48 Stat.451).
5. Criminal Code Provisions of 1940 (18 U.S.C. 41).
6. Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250).
7. Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686).
8. Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat. 1119).
9. Refuge Recreation Act of 1962 (16 U.S.C. 760k-760k-4; 76 Stat.653).
10. Land and Water Conservation Fund Act of 1965.
11. National Historical Preservation Act of 1966 (16 U.S.C. 470, et seq.; 80 Stat. 927).
12. National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927).
13. The National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq.; 83 Stat. 852).
14. Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989).
15. Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.; 87 Stat. 884).
16. National Wildlife Refuge Regulations (50 CFR Subchapter C; 43 CFR 3101.3-3).
17. Emergency Wetlands Resources Act of 1986 (S.B. 740).

18. North American Wetlands Conservation Act of 1990.
19. Food Security Act (Farm Bill) of 1990 as amended (H.R. 2100)
20. The Property Clause of the U. S. Constitution (Art.IV 3, Clause 2).
21. The Commerce Clause of the U. S. Constitution (Art. I, Section 8).

DESCRIPTION OF USE:

Recreational fishing is permitted on Hagerman National Wildlife Refuge, in accordance with State regulations, year around. Most of this fishing occurs in the lake portion of refuge waters. Fishing in the ponds and tanks not connected to Lake Texoma is restricted during the waterfowl season (October through March).
Fishery management is not carried out directly by refuge staff. Assistance is available from both State and Federal sources, and is of top quality. Refuge waters are not generally managed intensively, except for a couple of ponds. One is a catch-and-release bass pond. The other is managed for the annual Kids' Fishing Derby.

A considerable amount of the fishing pressure comes in the form of trotline fishing. Second in importance is bank fishing, with boat fishing with rod and reel a close third. Catfish and striped bass are the most sought-after species, followed closely by crappie and other Centrarchids. Bow fishing is of little importance at this time, but is gaining in popularity. Only rough fish may be taken by bow, according to State regulations.

Aside from the annual Kids' Fishing Derby, no fishing tournaments are sponsored or hosted by the refuge. Fishing tournaments held on Lake Texoma will often spill over onto the refuge portion of the lake, but are not a significant part of the refuge program.

ANTICIPATED BIOLOGICAL IMPACTS OF THE USE:

Fishing, in and of itself, has virtually no impact on the primary trust resources of the refuge. Basically, only the fish resource is affected by removal. Effects of removal have been shown to benefit size class and age distribution in the literature. Over-harvest can, of course have serious negative impacts on the fish population. Harvest limits are set by the State based on various surveys conducted by TPWD Fisheries Biologists stationed on the lake. Striped bass are especially subject to adjusted size and bag limits.

More impacts accrue to the boating associated with fishing, than directly by the act of fishing itself. Fishing is by nature a rather placid pursuit. Fishermen on the bank can affect bird use in the immediate vicinity of their activities, but public use has not reached the intensity that alternative feeding and resting areas for birds flushed are not available.

Waterfowl use on the lake is affected more by major fluctuations in water levels than by fishing, per se. Changing water levels prevent emergent vegetation zones and moist soil food development. Management for moist soil habitat by refuge staff enhances not only waterfowl use, but fishery resources as well.

Trotlines on the lake have been a source of waterbird mortality in the past due to the exposure of hooks when lake levels have receded and left the lines

dangling out of the water. Pelicans, great blue herons, occasional double-crested cormorants, and rarely a great egret have been the most prevalent victims of untended trotlines. These lines are often not marked, so the responsible party cannot be notified or prosecuted.

The annual Kids' Fishing Derby has a serious impact on fish populations in Picnic Pond, where the event is traditionally held. This pond is heavily fished throughout the season, and requires restocking on an annual basis. The derby participants are encouraged to use catch-and-release methods during the event, keeping only the largest fish for weigh-in.

NEPA Compliance:

Categorical Exclusion ____ **516 DM 1.4.C.2**

Environmental Assessment EAM (Pre-Nepa)
Environmental Impact Statement ____

FONSI _____

Determination: ✓ **(Check one)**
This use is ✓ **is not** _____ **compatible.**

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

The following rules, policies and regulations are in place to ensure the continued compatibility of the recreational fishing program at Hagerman Refuge.

1) Fishing is not permitted in refuge waters not connected to Lake Texoma from October through March, in order to avoid disturbance to wintering waterfowl.

2) Likewise, boating is prohibited during the waterfowl season (October through March), to avoid probable conflicts.

3) Trotlines may not be tied to any stationary object. Only floating lines are permitted--strung between anchored jugs that will rise and fall with the fluctuating water levels.

JUSTIFICATION:

Fishing is a legitimate and traditional form of wildlife-oriented recreation that is compatible with refuge purposes, as modified by the provisions stated above. Restricting the use of boats during the bulk of the waterfowl presence in the area will avoid conflicts in the winter season. Floating trotlines will reduce the hazard to protected species. Zoning fishing to the lake only during the waterfowl season will make ponds and tanks available for waterfowl use.

PROJECT LEADER: _____ 8/9/94
(Signature/Title/Date)

REVIEWED BY: _____
(Signature/Title/Date)

_____ 9/12/94
(Signature/Title/Date)

COMPATIBILITY DETERMINATION

USE: Natural Resource Collection

STATION NAME: Hagerman NWR

DATE ESTABLISHED: Feb. 9, 1946

ESTABLISHING AND ACQUISITION AUTHORITIES: Public Land Order 314, under the authority vested in the President, and pursuant to Executive Order No. 9337 dated April 24, 1943.

PURPOSES FOR WHICH THE REFUGE WAS ESTABLISHED: "...for refuge and breeding ground purposes for migratory birds and other wildlife...reservation as a wildlife refuge...shall not interfere with any existing or future uses...in the operation and maintenance of the Denison Dam and Reservoir Project."

MANAGEMENT GOALS AND OBJECTIVES: Goals of the National Wildlife Refuge System, given in Attachment 1, provide the framework for the objectives at Hagerman N.W.R. Refuge objectives are as follows;

1) To provide resting an feeding habitat for migrating and wintering waterfowl, and other birds and endangered species.

2) To provide the public with opportunities to understand refuge management operations and the ecosystems represented on the refuge.

3) To offer quality viewing and appreciation of wildlife and the environment.

4) To make renewable refuge resources available for harvest through managed recreational programs.

OTHER APPLICABLE LAWS, REGULATIONS AND POLICIES:

1. Antiquities Act of 1906 (34 Stat. 225).
2. Migratory Bird Treaty Act of 1918 (U.S.C. 703-711; 40 Stat. 755).
3. Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222).
4. Migratory Bird Hunting Stamp Act or 1934 (16 U.S.C. 718-178h; 48 Stat.451).
5. Criminal Code Provisions of 1940 (18 U.S.C. 41).
6. Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250).
7. Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686).
8. Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat. 1119).
9. Refuge Recreation Act of 1962 (16 U.S.C. 760k-760k-4; 76 Stat.653).
10. Land and Water Conservation Fund Act of 1965.
11. National Historical Preservation Act of 1966 (16 U.S.C. 470, et seq.; 80 Stat. 927).
12. National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927).
13. The National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq.; 83 Stat. 852).
14. Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989).
15. Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.; 87 Stat. 884).
16. National Wildlife Refuge Regulations (50 CFR Subchapter C; 43 CFR 3101.3-3).
17. Emergency Wetlands Resources Act of 1986 (S.B. 740).
18. North American Wetlands Conservation Act of 1990.

19. Food Security Act (Farm Bill) of 1990 as amended (H.R. 2100)
20. The Property Clause of the U. S. Constitution (Art.IV 3, Clause 2).
21. The Commerce Clause of the U. S. Constitution (Art. I, Section 8).

DESCRIPTION OF USE:

Several activities are grouped together under this heading. The most prominent of these is pecan gathering. Incidental use by people picking dewberries (Rubus spp.) and mushrooms is also addressed. A few people are issued a day-use permit to cut a redcedar (Juniperus virginiana) for a Christmas tree.

Pecan gathering was at one time so popular that a limit of one gallon per day was imposed. Some were even gathering and selling commercially. This use has fallen off considerably in recent years and amounts to less than 500 activity hours per year. Other consumptive uses are negligible.

ANTICIPATED BIOLOGICAL IMPACTS OF THE USE:

A certain amount of wildlife food is removed from the environment by public harvest of natural products. The level of this removal is so slight at this time that it is judged to be inconsequential. Most of the gathering is done in areas of easy public access, i.e., along roadsides and in park areas. Seldom do people venture very far afield to gather pecans. Berry-picking is done mostly on roadsides and railroad rights-of-way. This represents a very small percentage of the total production on the refuge.

NEPA Compliance:

Categorical Exclusion_____

Environmental Assessment _____
Environmental Impact Statement_____
Pre-Act Activity_✓___

FONSI _____

Determination: ✓ (Check one)
This use is _____ is not _____ compatible.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Current refuge regulations limit harvest of pecans to one gallon per day per person. This provision curtails the commercialization of the activity. All consumptive uses of the refuge are reviewed on a regular basis to ensure their continued compatibility

JUSTIFICATION:

The gathering of natural food resources by the public is a legitimate wildlife-oriented activity on the refuge. Impacts of the reduction in food available to wildlife is insignificant.

PROJECT LEADER: _____ Ref. Mgr. 8/11/94
(Signature/Title/Date)

REVIEWED BY: Gary Burke Assoc Mgr OC/TX 9/13/94
(Signature/Title/Date)

_____ 9/9/94
(Signature/Title/Date)

COMPATIBILITY DETERMINATION

USE: Cooperative Agricultural Programs

STATION NAME: Hagerman NWR

DATE ESTABLISHED: Feb. 9, 1946

ESTABLISHING AND ACQUISITION AUTHORITIES: Public Land Order 314, under the authority vested in the President, and pursuant to Executive Order No. 9337 dated April 24, 1943.

PURPOSES FOR WHICH THE REFUGE WAS ESTABLISHED: "...for refuge and breeding ground purposes for migratory birds and other wildlife...reservation as a wildlife refuge...shall not interfere with any existing or future uses...in the operation and maintenance of the Denison Dam and Reservoir Project."

MANAGEMENT GOALS AND OBJECTIVES: Goals of the National Wildlife Refuge System, given in Attachment 1, provide the framework for the objectives at Hagerman N.W.R. Refuge objectives are as follows;

1) To provide resting an feeding habitat for migrating and wintering waterfowl, and other birds and endangered species.

2) To provide the public with opportunities to understand refuge management operations and the ecosystems represented on the refuge.

3) To offer quality viewing and appreciation of wildlife and the environment.

4) To make renewable refuge resources available for harvest through managed recreational programs.

OTHER APPLICABLE LAWS, REGULATIONS AND POLICIES:

1. Antiquities Act of 1906 (34 Stat. 225).
2. Migratory Bird Treaty Act of 1918 (U.S.C. 703-711; 40 Stat. 755).
3. Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222).
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6. Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250).
7. Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686).
8. Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat. 1119).
9. Refuge Recreation Act of 1962 (16 U.S.C. 760k-760k-4; 76 Stat.653).
10. Land and Water Conservation Fund Act of 1965.
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12. National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927).
13. The National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq.; 83 Stat. 852).
14. Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989).
15. Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.; 87 Stat. 884).
16. National Wildlife Refuge Regulations (50 CFR Subchapter C; 43 CFR 3101.3-3).
17. Emergency Wetlands Resources Act of 1986 (S.B. 740).

18. North American Wetlands Conservation Act of 1990.
19. Food Security Act (Farm Bill) of 1990 as amended (H.R. 2100)
20. The Property Clause of the U. S. Constitution (Art.IV 3, Clause 2).
21. The Commerce Clause of the U. S. Constitution (Art. I, Section 8).

DESCRIPTION OF USE:

Included in this document are cooperative farming, including the use of agricultural chemicals, and haying. Cooperative farming is carried out on 308 of the 639 acres currently under tillage on the refuge. Cooperative haying is not currently being done, but is planned for the future, so a determination of compatibility is appropriate at this time.

The cooperative farming program is described in detail in the Cropland Management Plan, on file in the Regional Office and in the Refuge Office. Broadly, cooperative farming on Hagerman Refuge consists mostly of small grain and feed grain production in exchange for planting small grains, mostly wheat, for wildlife food, which may or may not be harvested. Some planting of Sudan or similar hay crops also is done. Rotations to mung beans or other warm season legumes is being worked into the program.

Haying has been suggested as a grassland management tool. Mowing or shredding is an accepted and effective tool in brush suppression. However, due to the labor intensive nature of this management technique, it had not been considered heretofore. A cooperative haying program would accomplish the same objective at little or no cost to the refuge, similar to the cooperative farming program.

Agricultural chemicals--pesticides--are used sparingly in the cooperative farming program, under close scrutiny of refuge staff. All pesticide use must be approved before application, and materials must be the least detrimental to the environment and safe to use around wildlife. Low input sustainable agriculture (LISA) is the goal for both the refuge and our cooperators. Crops grown are selected for their low need for pesticides. Grain sorghum, corn, wheat and oats are the primary crops grown.

ANTICIPATED BIOLOGICAL IMPACTS OF THE USE:

Conversion of wildlands to agricultural uses is the single most important reason for the decline in wildlife numbers in the United States over its short history. Clean farming, especially, has had serious negative impacts on wildlife populations. Cropland provides very little in the way of nesting habitat, and those birds nesting there are lost during tillage or harvest. However, croplands provide valuable feeding and foraging areas, once harvest is complete. The reason for farming at all here is in support of the waterfowl maintenance objective. Geese feed extensively and exclusively on small grains planted for the purpose. Feed grains and legumes supplement the small grains, particularly during cold weather when energy requirements are higher.

Despite using the principles of LISA, there are times when pesticides must be used--that is, when economic thresholds have been reached. When that time comes, only approved chemicals can be used. Pesticides have a long track record of being extremely detrimental to wildlife. Direct mortality is only a small part of the overall impact of pesticides. Biomagnification, ground water

contamination, and teratogenicity have also been linked to pesticide use. Improper, indiscriminate, and excessive pesticide use exacerbates the problem. Pesticides effects on vertebrates and epigeal organisms are observable, but less well understood are the effects on soil biota. Soil organisms can be affected by herbicides as well as insecticides. Fungicides and acaricides are not commonly used in the farming program.

Haying, mowing and shredding can also be destructive of ground-nesting birds, their nests, eggs and fledglings. Rodent populations can be altered by removal of vegetation in a grassland. On the other hand, removal of standing crop and overstory can make food more available. Haying/mowing can actually improve species composition and nesting success the year following treatment. So for this, as with so many habitat management techniques, there are pitfalls to be avoided along the way to realizing very positive results in support of management objectives.

NEPA Compliance:

Categorical Exclusion_____ N/A

Environmental Assessment ✓

Environmental Impact Statement_____

FONSI ✓

Determination: (Check one)
This use is ✓ is not _____ compatible.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Crops requiring extensive pesticide use (such as cotton) are not permitted to be grown in the cooperative farming program, by policy. No pesticides are applied until economic thresholds have been reached. All pesticides used by the cooperators must be pre-approved. The test of approval includes method of application (ground equipment being preferred), vertebrate LD50 (as a measure of safety to wildlife), and persistence in the environment.

Haying should be done late in the season to avoid possible harm to ground-nesting birds. Haying operations could begin in August, but should be concluded by mid-September to allow for sufficient herbaceous regrowth to protect the soil over the winter. An area should not be hayed any more often than three year intervals, and not more than 5 years should elapse between haying. Hayed areas should be scattered, rather than contiguous, to meet objectives.

JUSTIFICATION:

Cooperative farming has long been employed on national wildlife refuges as a means of meeting objectives, especially waterfowl objectives, at minimum cost to the Government. Similarly, a cooperative haying program will help the refuge achieve grassland management objectives at minimum cost, compared to having to

mow/shred pastures force account.

The use of pesticides by cooperative farmers is necessary to ensure profitability. If the farmer cannot make a crop, his economic viability is compromised, and he won't be able to stay in business, at least not here.

The advantage to having the cooperative farming program is that the food resources are more widely scattered around the refuge with the increase in availability to more wildlife. The literature supports the importance of a mixture of habitats in close proximity. The dispersion of croplands around the refuge seems to be nearly ideal. Cropped areas are close to grassland habitat, as well as forested bottomlands, promoting maximum use by a variety of wildlife. While croplands provide little or no nesting habitat, these areas are favored feeding areas after harvest. Fallowed fields also provide habitat in the form of cover.

Both farming and haying have been shown to benefit raptors by exposure of prey. In fact, gulls, egrets and a variety of other birds often follow the plow or the cutting bar. Proper timing of haying will avoid damage to nesting birds, while allowing an important management tool to be added to the array of those already in place. The fact of the matter is, some of the most beautiful, most vibrant, most species-rich examples of the remaining natural Blackland Prairie habitat in this part of Texas are hay meadows. In support of Service objectives for biodiversity, a diversity of management is necessary. Farming and haying are important tools to achieve the diversity of habitats and wildlife.

PROJECT LEADER: _____ Ref. Mgr. 8/16/94
(Signature/Title/Date)

REVIEWED BY: Gary Burke Assoc Mgr OFTX 9/13/94
(Signature/Title/Date)

_____ 9/12/94
(Signature/Title/Date)

COMPATIBILITY DETERMINATION

USE: Grazing

STATION NAME: Hagerman NWR

DATE ESTABLISHED: Feb. 9, 1946

ESTABLISHING AND ACQUISITION AUTHORITIES: Public Land Order 314, under the authority vested in the President, and pursuant to Executive Order No. 9337 dated April 24, 1943.

PURPOSES FOR WHICH THE REFUGE WAS ESTABLISHED: "...for refuge and breeding ground purposes for migratory birds and other wildlife...reservation as a wildlife refuge...shall not interfere with any existing or future uses...in the operation and maintenance of the Denison Dam and Reservoir Project."

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OTHER APPLICABLE LAWS, REGULATIONS AND POLICIES:

1. Antiquities Act of 1906 (34 Stat. 225).
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5. Criminal Code Provisions of 1940 (18 U.S.C. 41).
6. Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250).
7. Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686).
8. Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat. 1119).
9. Refuge Recreation Act of 1962 (16 U.S.C. 760k-760k-4; 76 Stat.653).
10. Land and Water Conservation Fund Act of 1965.
11. National Historical Preservation Act of 1966 (16 U.S.C. 470, et seq.; 80 Stat. 927).
12. National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927).
13. The National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq.; 83 Stat. 852).
14. Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989).
15. Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.; 87 Stat. 884).
16. National Wildlife Refuge Regulations (50 CFR Subchapter C; 43 CFR 3101.3-3).
17. Emergency Wetlands Resources Act of 1986 (S.B. 740).
18. North American Wetlands Conservation Act of 1990.

19. Food Security Act (Farm Bill) of 1990 as amended (H.R. 2100)
20. The Property Clause of the U. S. Constitution (Art.IV 3, Clause 2).
21. The Commerce Clause of the U. S. Constitution (Art. I, Section 8).

DESCRIPTION OF USE: Grazing of cattle by fee permit
Cattle are grazed on Hagerman National Wildlife Refuge by private individuals under a Special Use Permit (Form 3-1383). Permits are issued on an annual basis to the highest bidder for each lease area. Pastures to be grazed within each unit, number of animal units allowable, and season of use are determined in accordance with the Grassland Management Plan on file in the refuge office.

ANTICIPATED BIOLOGICAL IMPACTS OF THE USE:
The Tall Grass Prairie, of which Hagerman Refuge is a part, developed under a regime of grazing by large ungulates, namely, bison. Therefore, grazing is a natural part of the ecology of this area. The environmental processes that characterize prairie ecology are necessary to ensure the health of the ecosystem.
At Hagerman Refuge, cattle are used to replace the long-departed bison.

A literature review turned up a good deal of conflicting information about impact of cattle grazing. The obvious point of consistency throughout the literature revolved around the damage caused by improper grazing. Another consistent conclusion was that what benefits one species may work against another, and that a variety of habitats and seral levels were desireable to meet the requirements of a wide variety of species.

The issue, then, is less a question of the impacts of grazing, since it is a natural constituent of the community dynamics, but rather a question of how the tool is utilized. The impacts of confining cattle with the use of fences to discrete parcels of land can destroy the integrity of the grassland community and the fauna it supports. Extensive research in many different grasslands has proven the case against poorly managed grazing.

Poor cattle management has been shown to have a negative impact on waterfowl nesting in the prairie pothole country. Less studied, but a growing concern, is the impact of over-grazing, or over-rest, on neotropical migrants and passerines in particular. Certainly, much more information and study is needed, but studies seem to indicate a need by passerines for a variety of habitats, tall residual cover for nesting, and shorter grasslands for foraging. In fact, a variety of seral stages and vegetation densities effects rodent populations, and their availability to raptors.

Over-rest may contribute to the forestation process, especially if fire is excluded as well. Over-rest may cause accumulations of duff that effectively prevent recruitment of new seedlings into the community, and make foraging by passerines virtually impossible. Lizards and gallinaceous birds are also affected by closed climax stands of native grasslands.

Grazing incorporates organic material, opens up feeding areas, and recycles nutrients from the standing crop of dead and live vegetation. Grazing, when properly managed for the habitat and soil type, provides a variety of conditions, suitable to a broad spectrum of species. This biodiversity is a primary goal of the Service and of Hagerman Refuge .

NEPA Compliance:

Categorical Exclusion___ 516 DM 1.4.C.2

Environmental Assessment EAM Pre-Nepa
Environmental Impact Statement____

FONSI _____

Determination: ✓ (Check one)
This use is ✓ is not _____ compatible.

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

Monitoring use of refuge grasslands by cattle is of surpassing importance in determining the proper level of grazing to ensure that no pasture incurs harm. Proper grazing should entail frequent movement of cattle to spread use more evenly and prevent spot overgrazing while leaving some plants totally ungrazed. Continuous grazing is no longer practiced on the refuge. The rest-rotation system currently in use addresses some, but by no means all, of the problems inherent in using cattle as a tool in grassland manipulation. Goals for the National Wildlife Refuge System are evolving, and management goals and objectives will continue to evolve with them. Monitoring programs will help assure meeting refuge objectives.

JUSTIFICATION:

Grazing is one of several effective and necessary tools in managing grassland habitats for the benefit of wildlife, both game and non-game. No single tool will replace the others; each has its place in helping to achieve System goals and Refuge objectives. Continued biological monitoring will ensure that the tool of grazing is being properly and effectively utilized, without damaging the resources entrusted to the Service's care.

PROJECT LEADER _____ Ref. Mgr. 8/3/94
(Signature/Title/Date)

REVIEWED BY: Gary Burke Assoc Mgr ARW 9/13/94
(Signature/Title/Date)

_____ ARW/Comm 9/12/94
(Signature/Title/Date)

APPENDIX E - KEY LEGISLATION AND SERVICE POLICIES

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): Prohibits discrimination in public accommodations and services.

Antiquities Act (1906): Authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Archaeological and Historic Preservation Act (1974): Directs the preservation of historic and archaeological data in Federal construction projects.

Archaeological Resources Protection Act (1979) as amended: Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to located archaeological resources.

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

Bald and Golden Eagle Protection Act (1940) as amended: Calls for the protection of these raptorial species on and off Federal lands.

Clean Air Act (1977) as amended: The primary objective of this Act is to establish Federal standard for various pollutants from both stationary and mobile sources and to provide for the regulation of polluting emissions via stat implementation plants. In addition, and of special interest for National Wildlife Refuges, some amendments are designed to prevent significant deterioration in certain areas which do not meet Federal standards ('non-attainment' areas). Federal facilities are required to comply with air quality standards to the same extent as non-governmental entities (42 U.S.C 7418). Part C of the 1997 amendments stipulates requirements to prevent significant deterioration of air quality and, in particular, to preserve air quality in national parks, national wilderness areas, national monuments, and national seashores (42 U.S.C. 7470).

Clean Water Act (1977): Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

Emergency Wetlands Resources Act (1986): The purpose of the Act is "To promote the conservation of migratory waterfowl and to offset or prevent the serious loss of wetlands by the acquisition of wetlands and other essential habitat, and for other purposes."

Endangered Species Act (1973): Requires all Federal agencies to carry out programs for the conservation of endangered and threatened species.

Executive Order 11593, Protection and Enhancement of Cultural Environment (1971): If proposed development activities will affect archaeological or historical sites, the Service will consult with Federal and State Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.

Executive Order 11988 (1977): Floodplain Management. Each Federal agency shall provide leadership and take action to reduce the risk of flood loss and minimize the impact of flood loss and

minimize the impact of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Executive Order 11990 Protection of Wetlands: The proposal will help conserve the natural and beneficial values of the wetland habitat. The Service will undertake no activity that would be detrimental to the continuance of the vital wetlands.

Executive Order 12996 Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the System.

Executive Order 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.

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.

Fish and Wildlife Act (1956): Established a comprehensive national fish and wildlife policy and broadened the authority for acquisition and development of refuges.

Fish and Wildlife Coordination Act (1958): Allows the Fish and Wildlife Service to enter into agreements with private landowners for wildlife management purposes.

Land and Water Conservation Fund Act (1965): Uses the receipts from the sale of surplus Federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities.

Migratory Bird Treaty Act (1918): Designates the protection of migratory birds as a Federal responsibility. This Act enables the setting of seasons, and other regulations including the closing of areas, Federal or non-Federal, to the hunting of migratory birds.

Migratory Bird Conservation Act (1929): Establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Migratory Bird Conservation Commission.

Migratory Bird Hunting and Conservation Stamp Act (1934): Authorized the opening of part of a refuge to waterfowl hunting.

National Environmental Policy Act (1969): Requires the disclosure of the environmental impacts of any major Federal action significantly affecting the quality of the human environment.

National Historic Preservation Act (1966) as amended: Establishes as policy that the Federal Government is to provide leadership in the preservation of the nation's prehistoric and historic resources.

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 to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the

Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation and photography, or environmental education and interpretation); establishes a formal process for determining compatibility; established the responsibilities of the Secretary of Interior for managing and protecting the System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

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

Refuge Recreation Act (1962): Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient funds are available to manage the uses.

Refuge Revenue Sharing Act (1935) as amended (16 U.S.C. 715s): Provides for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges. Public Law 88-523 (1964) revised this Act and required that all revenues received from refuge products, such as animals, timber and minerals, or from leases or other privileges, be deposited in a special Treasury account and net receipts distributed to counties for public schools and roads. 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, 24 percent of the net receipts and basic payments under Public Law 94-565 (31 U.S.C. 1601 - 1607, 90 Stat. 2662), payment in lieu of taxes on public lands. The current and proposed management of this refuge under this Plan is in compliance with this Act.

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.

Secretarial Order 3127 (602 DM 2) Contaminants and Hazardous Waste Determination: No contaminants or hazardous wastes are known to exist on the refuge and none will be created.

Volunteer and Community Partnership Enhancement Act (1998): The purposes of this Act are to encourage the use of volunteers to assist in the management of refuges within the Refuge System; to facilitate partnerships between the Refuge System and non-Federal entities to promote public awareness of the resources of the Refuge System and public participation in the conservation of the resources and; to encourage donations and other contributions.

Wilderness Act of 1964 (Public Law 88-577 [16 U.S.C. 1131-1116]): Defines wilderness as follows: "A Wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped 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 imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5000 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 historical value."

Comments Received to the Hagerman National Wildlife Refuge Draft Comprehensive Conservation Plan and Service Response

On October 13, 2005, the U.S. Fish and Wildlife Service placed a notice in the Federal Register informing readers that the Draft Hagerman National Wildlife Refuge Comprehensive Conservation Plan (CCP) and Draft Environmental Assessment (EA) were available for public review. On November 8, 2005, a similar notice was mailed to numerous individuals and institutions on the Hagerman CCP/EA mailing list. The notice provided instructions for requesting a copy of the document in print or CD-ROM format, by telephone, letter or e-mail and announced that the Service would accept comments on the Draft CCP/EA until November 28, 2005.

The Service held an Open House at the Refuge Visitor Center on November 17, 2005 to present the Draft CCP/EA and receive comments on the document. A summary of comments received along with the Service's response, follows:

Issue #1: *Hunting - Hunting was the issue most frequently addressed in comments on the draft CCP. General hunting comments include advocates in favor of hunting on the Refuge and individuals that are opposed to hunting in any form. Some comments requested that the Refuge discontinue its recreational deer hunt until a detailed survey of the deer population was conducted. Comments were also received stating that too many young bucks were being harvested and not enough does. Numerous written and verbals comments requested that a separate feral hog hunt be implemented on the Refuge.*

Response: The hunting of resident species, such as deer, rabbits and squirrels, falls within the responsibility of state fish and wildlife agencies, which also monitor and manage populations to ensure healthy ecosystems, sustainable populations, and a certain level of hunter success. The Refuge works in partnership with the TPWD and relies on their knowledge and expertise to determine the appropriateness of hunting seasons. State wildlife agencies have an excellent record of sound, professional wildlife management, and this is true of the TPWD as well.

The Refuge allows archery deer hunting with only specific areas open for hunting activities. Rifle hunting for deer is not allowed in Grayson County. Archery deer hunting occurs during November and December and is divided into four hunt segments (total of 12 days). During the first three segments, three deer can be taken (one buck and two antlerless). The fourth segment, antlerless only, two does may be taken. The Refuge's hunting program as described in the CCP, is consistent with the State's hunting regulations. The CCP addresses the need to review and evaluate the existing Hunt Management Plan and if necessary, hunt dates and bag limits will be adjusted as needed in coordination with the TPWD.

Hunters are allowed to take feral hogs during the deer hunt. The Refuge recognizes that a more aggressive approach is necessary in order to reduce feral hog numbers and minimize habitat destruction both on the Refuge and on adjacent private lands. The Refuge in coordination with the TPWD will explore the possibility of implementing a separate hunt for feral hogs.

Issue #2: *Fishery Management - A written comment was received opposing the stocking of Refuge ponds with recreational game fish.*

Response: Fishing is one of the priority wildlife dependent uses for national wildlife refuges, where compatible. As such, the Refuge has determined that fishing is compatible with the purpose of the Refuge and is permitted in accordance with State regulations. Second to wildlife observation and photography, fishing is the most popular public use activity. The majority of fishing activities occur in Lake Texoma. Fishing in ponds not connected to Lake Texoma is restricted during the waterfowl

season (October through March) to protect waterfowl using the ponds during the winter months. Refuge ponds are not generally managed intensively, except for two ponds. One is a catch-and-release bass pond; the other is managed for the annual Kids' Fishing Derby. In partnership with the TPWD, this is an educational fishing program conducted during the first week in June.

Issue #3: *Grazing - A written comment was received requesting that the CCP more thoroughly evaluate the feasibility of restoring grazed areas with native ungulates to achieve wildlife and habitat objectives.*

Response: The grazing program will be reviewed and updated as part of the Habitat Management Plan. Grazing is used as a management tool and was determined to be compatible with the purpose for which the Refuge was established. The grazing program serves to maintain and encourage native grasses and forbs necessary to meet the needs of nongame migratory birds. Over the last year, grazing activities have been greatly reduced because of problems in maintaining cattle fencelines near Lake Texoma due to fluctuating water levels. In addition, the Refuge is considering the use of prescribed fires to manage native grasslands. If implemented, the Refuge will monitor these prescribed burning activities to determine its feasibility and value in habitat management on the Refuge. Both grazing and prescribed fire will be evaluated to determine which of these tools or combination thereof best meet the goals and objectives of the Habitat Management Plan.

Issue #4: *Farming - A written comment was received requesting that the CCP more thoroughly evaluate the feasibility of restoring farmed areas because lands surrounding the Refuge already contain agricultural areas.*

Response: The farming program will be reviewed and updated as part of the Habitat Management Plan. The farming program is aimed at providing forage for wintering waterfowl and other wildlife species. The farming program enables the Refuge to determine the crops needed while providing protection to wintering waterfowl. In addition, the Refuge's farming program assists in reducing crop depredation by waterfowl on adjacent lands.

Issue #5: *Trapping - A written comment was received requesting that trapping activities not be allowed to continue on the Refuge.*

Response: Trapping on the Refuge is limited to nuisance beavers, raccoons, and skunks. This activity is conducted by Refuge personnel on a limited basis and in response to specific circumstances.

Issue #6: *Oil and Gas Management - A written comment was received requesting that the Refuge develop stronger standards for oil and gas management and permitting activities, and to quantify the impacts of oil and gas activities within the CCP.*

Response: The Refuge manages fish and wildlife species and their associated habitats on certain lands owned by the U.S. Army Corps of Engineers (COE) and does not have ownership of the mineral rights. Permits for oil and gas activities on the Refuge are issued by the COE. The Refuge reviews the permits before they are issued and is provided the opportunity to comment on any wildlife and habitat concerns. Refuge personnel have gone to great lengths to establish close, positive working relationships with both the COE and the oil companies resulting in their observance of Refuge rules and regulations to help protect fish and wildlife species and their habitats.

Detailed information regarding the impacts of oil and gas activities on the Refuge will be included within a step-down plan of the CCP. The need for the development of an Oil and Gas Management Plan has been identified within the document and should be completed by 2012.

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Johnny Beall, Refuge Manager
Telephone Number: 903-786-2826
Date: September 14, 2005

I. Region: Southwest

II. Service Activity (Program): Refuges: Hagerman NWR, Implementation of Comprehensive Conservation Plan (CCP).

III. Pertinent Species and Habitat:

D. Listed species and/or their critical habitat within the action area:

Grayson County
Least Tern (*Sterna antillarum*) - (E)
Bald Eagle (*Haliaeetus leucocephalus*) - (T)
Piping Plover (*Charadrius melodus*) - (T w/P/CH)
Brown Pelican (*Pelecanus occidentalis*) - (E)

Montague County
Whooping Crane (*Grus americana*) - (E W/CH)
Black-capped Vireo (*Vireo atricapillus*) - (E)
Least Tern (*Sterna antillarum*) - (E)
Bald Eagle (*Haliaeetus leucocephalus*) - (T)

E. Proposed species and/or proposed critical habitat within the action area:
n/a

F. Candidate species within the action area:
n/a

G. Include species/habitat occurrence on a map: See maps in CCP.

IV. Geographic area or station name and action:

Station: Hagerman National Wildlife Refuge, Sherman, Texas

Action: Issuance and implementation of the CCP for the Hagerman NWR.

V. Location (attach map):

A. Ecoregion Number and Name: Arkansas/Red Rivers Ecosystem

B. County and state: Grayson (Main Refuge) and Montague County (Nocona Unit), Texas

C. Section, township, and range (or latitude and longitude): 33.7 deg N. / 96.7 deg W.

D. Distance (miles) and direction to nearest town: About 15 miles west of Denison, TX.; Nocona Unit is approximately 8 miles southwest of Nocona, TX, about 70 miles west of Hagerman NWR

E. Species/habitat occurrence: Least Tern/bare ground lakeshore oil pad sites
Bald Eagle/Lake Texoma
Piping Plover/Lake Texoma shorelines and oil pad sites

VI. Description of proposed action (attach additional pages as needed):

Adopt and implement Comprehensive Conservation Plan (10-15 year management plan) for Hagerman NWR

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitat in items III A, B, and C (attach additional pages as needed):

The CCP will guide management decisions over the next 15 years and set forth strategies for achieving Refuge goals and objectives within that time frame. Specific management activities are designed to fulfill the Service's mission for the National Wildlife Refuge System as well as the original establishment purposes of Hagerman NWR. Specific goals from the ecosystem plan of the Arkansas/Red Rivers Ecosystem have also been incorporated where applicable.

The only federally-listed species which breed or seasonally utilize the Refuge's habitats are the bald eagle, least tern, and the occasional piping plover in migration. There is no designated critical habitat for any listed species on the Refuge. Specific activities of the CCP which may affect listed species (bald eagle and least tern) include habitat management (i.e., the creation of additional moist soil units, invasive species management, prescribed burning, and establishing or enhancing protected tern nesting sites). However, these activities are aimed at habitat protection and improvement (such as recreating natural prairie cycles) for use by these and other rare species and are thus beneficial effects over the long term. Invasive species management on Hagerman Refuge involves combinations of grazing, mechanical, and chemical to control brush encroachment of Eastern red cedar into native grasslands and controlling fire ants, European morning glory, Johnson grass, Chinese bush clover, and feral hogs. In addition, the CCP proposes increasing compatible public recreational and educational uses such as installing a new boat ramp and the construction of a new foot trail (at Dead Woman's Pond).

The least tern regularly nests on Hagerman within the Big Mineral Area along Lake Texoma's shorelines from about May to August. Up to 22 nests have been documented on the Refuge in a given year. They nest on the gravel oil company roads that jut out into Lake Texoma. Recreational uses such as boating and oil and gas operations are the only ongoing activities that may result in minor amounts of disturbance to least terns that nest on the oil pad areas. The bald eagle winters in small numbers (i.e., groups of up to 10) on the Refuge, arriving between October and November with a population peak around January. Eagles traditionally roost in the cottonwood trees along the shores of Lake Texoma and may winter on the Refuge as late as March. Piping plovers begin migrating from their breeding grounds around July to September. Those that winter

along the Texas Gulf Coast arrive by late July to November. By March to mid-April, the birds make their way back north. Piping plovers are occasionally noted within the Refuge's shoreline habitat during these migratory stopovers on their way to and from the Gulf Coast.

The Brown pelican is an accidental species to Lake Texoma. Brown pelicans inhabit coastal beaches and lagoons and rarely occur in freshwater habitats, particularly this far inland. More frequently, they are turning up in places they do not normally occur (i.e., reservoirs all over Texas, Oklahoma, New Mexico, and Arizona) (B. Howe, pers. comm.). It is thought to be an indication of overall population increases and post-breeding wandering (B. Howe, pers. comm.). Still a straggler inland, brown pelicans may irregularly occur on the Refuge.

There have been no verified records of whooping cranes on the Refuge, although the Nocona Unit has been identified as occurring within their narrow migration corridor.

The Black-capped Vireo is found in cedar-oak thickets in central and West Texas. This species' current breeding range includes portions of western Oklahoma, central Texas, and Coahuila, Mexico. There are no records of black-capped vireo on the Refuge. However, some potential habitat may exist along brushy draw areas to the south and western parts of the Refuge. Breeding records do exist in Montague County where the Nocona Unit is located.

B. Explanation of actions to be implemented to reduce adverse effects:

None of the activities proposed in the CCP are carried out within tern or eagle habitat during the tern nesting season or the bald eagle winter use season. To avoid impacts to sensitive species, public use activities such as boating, fishing, and hunting are allowed in pre-designated areas and seasons only.

Before the arrival of least terns, the Refuge begins monitoring the nesting areas. These sites are closed to oil and gas activities and to public access for three months (May through August), until the terns leave. Oil companies that service these oil pad sites are aware of, comply with, and plan for Refuge closure of these sites during the nesting season each year. To avoid impacting bald eagles and wintering waterfowl, boating on the Refuge is only allowed from April through September.

Under the CCP, the Refuge proposes to develop a thorough updated database of the flora and fauna of wetland, grassland, riparian, and woodland communities including species diversity, distribution, and population levels through baseline surveys. These updates should redouble the Refuge's sensitive species mandates to provide future management and protection if additional listed species are documented on the Refuge.

The Refuge will ensure federally listed species protection through compliance with section 7 of the Endangered Species Act by consulting with Ecological Services on any additional projects/actions which may affect threatened, endangered, or proposed species.

VIII. Effect determination and response requested: [* = optional]

A. Listed species/designated critical habitat:

Determination	Response Requested
No effect on species/critical habitat (species: Piping Plover, Whooping Crane, Black-capped Vireo)	___X___*Concurrence
May affect, is not likely to adversely affect species/critical habitat (species: Bald Eagle, Least Tern, Brown Pelican)	___X___Concurrence
May affect, is likely to adversely affect species/critical habitat (species: none)	_____Formal Consultation

B. Proposed species/proposed critical habitat:

Determination	Response Requested
No effect on proposed species/critical habitat (species:)	_____*Concurrence
Is not likely to jeopardize proposed species/ adversely modify proposed critical habitat (species: n/a)	_____ Concurrence
Is likely to jeopardize proposed species/ adversely modify proposed critical habitat (species: n/a)	_____ Conference

C. Candidate species:

Determination	Response Requested
No effect on candidate species (species: n/a)	_____*Concurrence
Is not likely to jeopardize candidate species (species: n/a)	_____ Concurrence
Is likely to jeopardize candidate species (species: n/a)	_____Conference

Johnny L. Beall 11/28/05

Signature Date

[Title/office of supervisor at originating office]

IX. Reviewing ESFO Evaluations:

A. Concurrence: ✓ Nonconcurrence: _____

B. Formal consultation required: _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

Don Cloud 11/30/05

Signature Date

[Title/office of reviewing official]

U.S. FISH AND WILDLIFE SERVICE
ENVIRONMENTAL ACTION STATEMENT

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) and other statutes, orders, and policies that protects fish and wildlife resources, I have established the following administrative record and have determined that the action of approval of the proposals reflected in the Hagerman National Wildlife Refuge Comprehensive Conservation Plan and in the proposed management framework alternative in the attached Environmental Assessment.

_____ is a categorical exclusion as provided by 516 DM 6 Appendix 1 section B(4). No further documentation will be made.

__X__ is found not to have significant environmental effects as determined by the attached Environmental Assessment and Finding of No Significant Impact.

_____ is found to have special environmental conditions as described in the attached Environmental Assessment. The attached Finding of No Significant Impact will not be final nor any actions taken pending a 30 day period for public review (40 CFR 1501.4(e) (2)).

_____ is found to have significant effects, and therefore a "Notice of Intent" will be published in the Federal Register to prepare an Environmental Impact Statement before the project is considered further.

_____ is denied because of environmental damage, Service policy, or mandate.

_____ is and emergency situation. Only those actions necessary to control the immediate impacts of the emergency will be taken. Other related actions remain subject to NEPA review.

Other supporting documents: Finding of No Significant Impact, Hagerman NWR Comprehensive Conservation Plan and Environmental Assessment.

ACTING _____ 5/9/06
Director/Regional Director Date

(1) _____ 4/25/06
Initiator/ Biologist/Natural Resource Planner Date

(2) Gary P. Montoya 5/2/06
Chief, NWR System, R2 Date

(3) _____ 5/3/06
NEPA Coordinator/Region 2 Date

Finding of No Significant Impact

Comprehensive Conservation Plan and Environmental Assessment for Hagerman National Wildlife Refuge

To: All Interested Governmental Agencies and Organizations

In the proposed agency action, as outlined in the Hagerman National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, the U.S. Fish and Wildlife Service establishes a set of management strategies to promote the conservation goals of the Hagerman National Wildlife Refuge (the Refuge) during a period of 15 years. The Refuge is strategically situated on the Red River between Texas and Oklahoma in Grayson County, Texas. The Refuge encompasses approximately 11,320 acres of land.

The Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) have been prepared as required by the National Wildlife Refuge System Improvement Act of 1997 and the National Environmental Policy Act of 1969 (NEPA) and its implementation regulations (40 CFR 1500 *et seq*.). The CCP establishes six goals for management of the Refuge to: 1) restore, enhance, and protect the natural diversity of the Refuge and the broader Arkansas/Red Rivers Ecosystem for the benefit of trust wildlife (waterfowl, nongame migratory birds, threatened and endangered species) and resident wildlife; 2) facilitate, maintain, and develop an adequate water supply for wetland management on existing Service lands; 3) identify, protect, and interpret the prehistoric and cultural resources on the Refuge for the benefit of present and future generations; 4) maintain or strengthen existing interagency and interjurisdictional relationships and establish new partnerships within the community for improving wildlife and habitat resources on the Refuge and within the Arkansas/Red Rivers Ecosystem; 5) identify existing fish and wildlife resources and provide management and protection for the Nocona Unit. Preserve the natural diversity of the prairies and riparian habitats of the Nocona Unit for the benefit of fish and wildlife species and the visiting public; and 6) obtain program support to provide the necessary staffing, facilities, equipment, and operational funds to accomplish the goals of the Refuge and fulfill the mission of the Refuge System.

The CCP outlines long-range management objectives to be met to achieve these goals. The strategies address management of habitats, wildlife, grasslands, waters, cultural resources, administration and public use within the Refuge. Each strategy includes a summary of existing conditions, identifies any ongoing data needs and recommends actions to achieve one or more of the six Refuge goals.

The EA evaluates three alternative scenarios for overall management of the Refuge, as proposed in the CCP. The effects of each alternative upon the physical, biological and human environment are examined, as well as each alternative's potential to achieve the goals of the CCP. Analysis of these alternatives is summarized below:

Alternative A: Refuge will maintain current management practices (No Action Alternative).

This alternative considers no change in current Refuge management practices, funding or staffing, and no adoption of a management plan. There would be no expansion of wildlife, habitat, or biological diversity activities. The public use program would remain at current levels and no new facilities, beyond those currently under construction, would be developed. Current base funding and staffing levels provide for the Refuge to focus on limited habitat management and maintenance projects. Public Use activities would remain and any improvement to the program would occur opportunistically. The Service would rely primarily on partnerships with local and State agencies,

organizations, universities, and volunteers to accomplish many or its resource protection and monitoring goals.

Alternative B: Proposed Action

Under this alternative, the Refuge would adopt and implement the actions making up the CCP. The objectives and strategies detailed in the CCP would provide for short and long-term conservation and enhancement of resources and values in the planning area. The management actions within this alternative reflect a need to continue and enhance the major strategies of resource management, resource protection, wildlife dependent recreation, environmental education and interpretation, dynamic partnering, Refuge administration and archaeological, cultural and historical resource protection. Compatible public use and education opportunities would be increased. Existing interagency relationships would be enhanced and new partnerships within the community would be established.

Alternative C: Custodial management approach.

This alternative would call for no active management strategies. Refuge management would consist of allowing access for limited purposes only. Management would be reduced to a custodial state.

Public Involvement:

In an ongoing effort to involve the local community and officials in the CCP process, the Service prepared and distributed a fact sheet which included the history of the Refuge, the goals and objectives, long range plans, recreational activities, habitat management, and public use activities in October 1999. The Notice of Intent and comment period notification was published in the Federal Register in November 1999. Two open houses were held to inform interested parties about the CCP process. The first open house was held on November 16, 1999 at the Refuge Headquarters located near Sherman, Texas. The second open house was held on November 18, 1999 at the Montague County Courthouse in Montague, Texas. The fact sheets, drafts, and other relevant information for public review have been available at the Refuge headquarters. These actions satisfied the scoping requirements under NEPA.

The Service received comments from open house participants that were considered during the development of the draft CCP. Comments received focused on issues related to wildlife management, recreational activities (fishing, hunting, hiking, wildlife observation, etc.), and environmental education and interpretation. The Texas Parks and Wildlife Department (TPWD) expressed interest in the development of the CCP and initial responses indicated a desire for a continued working partnership between the two agencies. During the development of the draft CCP, existing joint management activities were incorporated into the document.

In March 2005, the Service provided TPWD the opportunity to review and comment on the draft CCP prior to its release to the public. The TPWD provided written comments stating they were pleased with the preparation of the document and considered the Refuge to be a valuable asset in the accomplishment of state-wide conservation goals and that implementation of the document was in the best interest of the fish and wildlife resources of the state of Texas. The Refuge maintains a close working relationship with the TPWD and both agencies frequently work together for the benefit of the State's natural resources.

The draft CCP and EA were released to the public in September 2005. The Service published a formal notice in the Federal Register on October 13, 2005, requesting comments and advice from the public. During the same month, the Refuge Manager provided information about the CCP to

approximately 125 individuals who were in attendance at the Refuge's annual Friends and Volunteer Luncheon. Copies of the CCP were available and distributed to individuals. On November 8, 2005, the Service issued a news release from the Regional Office to various media outlets inviting the public to attend an open house at the Refuge Headquarters on November 17, 2005. The Service held the open house to seek public comment on the draft CCP. Comments received were considered, and to the degree possible, incorporated into the final document.

Summary:

Adoption and implementation of the proposed alternative, as described in the CCP and EA will formally establish a set of programmatic comprehensive goals, objectives and strategies for cooperative management of the Refuge with the Texas Parks and Wildlife Department.

Based on a review and evaluation of the information contained in the CCP and the EA, I have determined that the formal approval of Refuge management goals and objectives as described in the Proposed Alternative of the EA (Alternative B) is not deemed a major Federal action that would significantly affect the quality of the human environment within the meaning of Section 102(2) (c) of NEPA. Therefore, an Environmental Impact Statement is not required. However, it is the intent of the Service to revisit questions of significant environmental consequences in accordance with NEPA upon consideration of the implementation of site specific proposals called for and discussed in the final CCP.

ACTIN 5/9/06

Regional Director, Region 2 Date
U.S. Fish and Wildlife Service