DRAFT COMPREHENSIVE CONSERVATION PLAN
AND ENVIRONMENTAL ASSESSMENT

CLARKS RIVER NATIONAL WILDLIFE REFUGE

MARSHALL, MCCRACKEN, AND GRAVES COUNTIES, KENTUCKY

U.S. Department of the Interior
Fish and Wildlife Service

Southeast Region
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I. Background

This Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) was prepared to guide management actions and direction for Clarks River National Wildlife Refuge (NWR) in Marshall, McCracken, and Graves Counties, Kentucky (Figure 1). Fish and wildlife conservation will receive first priority in refuge management; wildlife-dependent recreation will be allowed and encouraged as long as it is compatible with, and does not detract from, the mission of the refuge or the purposes for which it was established.

A planning team developed a range of alternatives that best met the goals and objectives of the refuge and that could be implemented within the 15-year planning period. This Draft CCP/EA describes the proposed plan developed by the Fish and Wildlife Service (Service), as well as other alternatives considered and their effects on the environment. The Draft CCP/EA will be made available to state and federal government agencies, conservation partners, and the general public for review and comment. Comments from each entity will be considered in the development of the Final CCP.

PURPOSE AND NEED FOR THE PLAN

The purpose of the plan is to develop a proposed action that best achieves the refuge purpose; attains the vision and goals developed for the refuge; contributes to the mission of the National Wildlife Refuge System (Refuge System); addresses key problems, issues and relevant mandates; and is consistent with sound principles of fish and wildlife management.

Specifically, the plan is needed to:

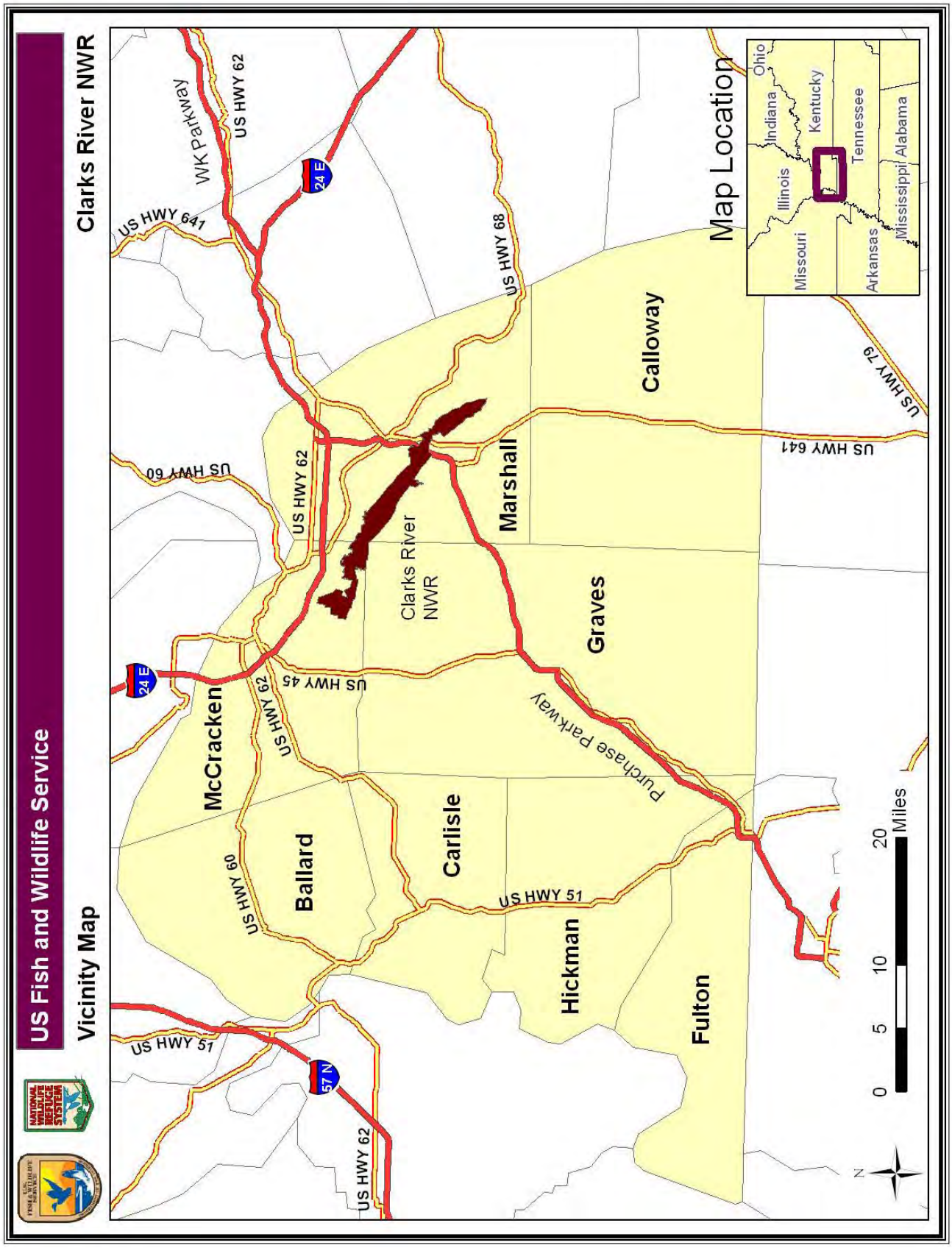
- Provide a clear statement of refuge management direction;
- Provide refuge neighbors, visitors, and government officials with an understanding of Service management actions on and around the refuge;
- Ensure that Service management actions, including land protection and recreation/education programs, are consistent with the mandates of the Refuge System; and
- Provide a basis for the development of budget requests for operations, maintenance, and capital improvement needs.

FISH AND WILDLIFE SERVICE

The Service traces its roots to 1871 and the establishment of the Commission of Fisheries involved with research and fish culture. The once independent commission was renamed the Bureau of Fisheries and placed under the Department of Commerce and Labor in 1903.

The Service also traces its roots to 1886 and the establishment of a Division of Economic Ornithology and Mammalogy in the Department of Agriculture. Research on the relationship of birds and animals to agriculture shifted to delineation of the range of plants and animals so the name was changed to the Division of the Biological Survey in 1896.

Figure 1. Location of Clarks River NWR acquisition boundary



The Department of Commerce, Bureau of Fisheries, was combined with the Department of Agriculture, Bureau of Biological Survey, on June 30, 1940, and transferred to the Department of the Interior as the Fish and Wildlife Service. The name was changed to the Bureau of Sport Fisheries and Wildlife in 1956 and finally to the Fish and Wildlife Service in 1974.

The Fish and Wildlife Service, working with others, is responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people through Federal programs relating to migratory birds, endangered species, interjurisdictional fish and marine mammals, and inland sport fisheries (142 DM 1.1).

As part of its mission, the Service manages more than 551 national wildlife refuges covering over 150 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands set aside specifically for fish and wildlife. The majority of these lands, 77 million acres, is in Alaska. The remaining acres are spread across the other 49 states and several United States territories. In addition to refuges, the Service manages thousands of small wetlands, 70 national fish hatcheries, 65 fishery resource offices, and 86 ecological services field stations. The Service enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

NATIONAL WILDLIFE REFUGE SYSTEM

The mission of the National Wildlife Refuge System, as defined by the National Wildlife Refuge System Improvement Act of 1997 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."

The National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) established, for the first time, a clear legislative mission of wildlife conservation for the Refuge System. Actions were initiated in 1997 to comply with the direction of this new legislation, including an effort to complete comprehensive conservation plans for all refuges. These plans, which are completed with full public involvement, help guide the future management of refuges by establishing natural resources and recreation/education programs. Consistent with the Improvement Act, approved plans will serve as the guidelines for refuge management for 15 years. The Improvement Act states that each refuge shall be managed to:

- Fulfill the mission of the Refuge System;
- Fulfill the individual purposes of each refuge;
- Consider the needs of wildlife first;
- Fulfill requirements of comprehensive conservation plans that are prepared for each unit of the Refuge System;
- Maintain the biological integrity, diversity, and environmental health of the Refuge System; and

- Recognize that wildlife-dependent recreation activities including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are legitimate and priority public uses and allow refuge managers authority to determine compatible public uses.

The following are just a few examples of the national network of conservation lands. Pelican Island NWR, the first refuge, was established in 1903 for the protection of colonial nesting birds in Florida, such as the snowy egret and the brown pelican. Western refuges were established for American bison (1906), elk (1912), prong-horned antelope (1931), and desert bighorn sheep (1936) after over-hunting, competition with cattle, and natural disasters decreased once-abundant herds. The drought conditions of the 1930s Dust Bowl severely depleted breeding populations of ducks and geese. Refuges established during the Great Depression focused on waterfowl production areas (i.e., protection of prairie wetlands in America's heartland). The emphasis on waterfowl continues today but also includes protection of wintering habitat in response to a dramatic loss of bottomland hardwoods. By 1973, the Service had begun to focus on establishing refuges for endangered species.

Over 40 million people visited national wildlife refuges in 2009, most to observe wildlife in their natural habitats (DOI 2009). National wildlife refuges connect visitors to their natural resource heritage and provide them with an opportunity to increase knowledge and appreciation of fish and wildlife ecology to help them understand their role in the environment. Wildlife-dependent recreation on refuges also generates economic benefits to local communities. According to the report, *Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*, and the *Economic Impact of the Department of the Interior's Programs and Activities Preliminary Report* (DOI 2009) over 40 million people visited national wildlife refuges in Fiscal Year 2009 and in 2006 generated almost $1.7 billion in total economic activity and creating almost 27,000 private sector jobs producing about $542.8 million in employment income (Carver and Caudill 2007). Additionally, recreational spending on refuges generated nearly $185.3 million in tax revenue at the local, county, state, and federal levels (Carver and Caudill 2007). As the number of visitors grows, significant economic benefits are realized by local communities. In 2006, nearly 71 million people, 16 years and older, fished, hunted, or observed wildlife, spending $45.7 billion and generating $122.6 billion (Leonard 2008).

Volunteers continue to be a major contributor to the success of the Refuge System. In 2005, approximately 38,000 refuge volunteers donated more than 1.4 million hours. The value of their service was more than $25 million.

The wildlife and habitat vision for national wildlife refuges stresses that wildlife comes first; that ecosystems, biodiversity, and wilderness are vital concepts in refuge management; that refuges must be healthy and growth must be strategic; and that the Refuge System must serve as a model for habitat management with broad participation from others.

All lands of the Refuge System will be managed in accordance with an approved comprehensive conservation plan that will guide management decisions and set forth strategies for achieving refuge unit purposes. The plan will be consistent with sound resource management principles, practices, and legal mandates, including Service compatibility standards and other Service policies, guidelines, and planning documents (602 FW 1.1).

LEGAL AND POLICY CONTEXT

Legal Mandates, Administrative and Policy Guidelines, and Other Special Considerations

Administration of national wildlife refuges is guided by the mission and goals of the Refuge System, congressional legislation, presidential executive orders, and international treaties. Policies for management options of refuges are further refined by administrative guidelines established by the Secretary of the Interior and by policy guidelines established by the Director of the Fish and Wildlife Service. Select legal summaries of treaties and laws relevant to administration of the Refuge System and management of the Clarks River NWR are provided in Appendix C.

Treaties, laws, administrative guidelines, and policy guidelines assist the refuge manager in making decisions pertaining to soil, water, air, flora, fauna, and other natural resources; historical and cultural resources; research and recreation on refuge lands; and provide a framework for cooperation between Clarks River NWR and other partners, such as the Kentucky Department of Fish and Wildlife Resources (KDFWR), Kentucky Department for Natural Resources, Land Between the Lakes-U.S. Forest Service, U.S. Army Corps of Engineers, private landowners, etc.

Lands within the Refuge System are closed to public use unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is one that, in the sound professional judgment 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. All programs and uses must be evaluated based on mandates set forth in the Improvement Act. Those mandates are to:

- Contribute to ecosystem goals, as well as refuge purposes and goals;
- Conserve, manage, and restore: fish, wildlife, and plant resources and their habitats;
- Monitor the trends of fish, wildlife, and plants;
- Manage and ensure appropriate visitor uses, as those uses benefit the conservation of fish and wildlife resources and contribute to the enjoyment of the public; and
- Ensure that visitor activities are compatible with refuge purposes.

The Improvement Act further identifies six priority wildlife-dependent recreational uses. These uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. As priority public uses of the Refuge System, these uses receive priority consideration over other public uses in planning and management.

Biological Integrity, Diversity, and Environmental Health Policy

The Improvement Act directs the Service to ensure that biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans. The policy is an additional directive for refuge managers to follow while achieving refuge purpose(s) and the Refuge System mission. It provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and associated ecosystems. When evaluating the appropriate management direction for refuges, refuge managers will use sound professional judgment to determine their refuge's contribution to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment incorporates field experience, knowledge of refuge resources, understanding of the refuge role within an ecosystem, applicable laws, and best available science, including consultation with others both inside and outside the Service.

NATIONAL AND INTERNATIONAL CONSERVATION PLANS AND INITIATIVES

Multiple partnerships have been developed among government and private entities to address the environmental problems affecting regions. There is a large amount of conservation and protection information that defines the role of the refuge at the local, national, international, and ecosystem levels. Conservation initiatives include broad-scale planning and cooperation between affected parties to address declining trends of natural, physical, social, and economic environments. The conservation guidance described below, along with issues, problems and trends, was reviewed and integrated where appropriate into this Draft CCP/EA.

This Draft CCP/EA supports, among others, the Partners in Flight Plan, the North American Waterfowl Management Plan, the Western Hemisphere Shorebird Reserve Network, and the National Wetlands Priority Conservation Plan.

North American Bird Conservation Initiative. Started in 1999, the North American Bird Conservation Initiative (NABCI) is a coalition of government agencies, private organizations, academic institutions, and private industry leaders in the United States, Canada, and Mexico working to ensure the long-term health of North America's native bird populations by fostering an integrated approach to bird conservation to benefit all birds in all habitats. The international and national bird initiatives include the North American Waterfowl Management Plan, Partners in Flight, Waterbird Conservation for the Americas, and the U.S. Shorebird Conservation Plan.

North American Waterfowl Management Plan. The North American Waterfowl Management Plan is an international action plan to conserve migratory birds throughout the continent. The plan's goal is to return waterfowl populations to their 1970s level by conserving wetland and upland habitats. Canada and the United States signed the Plan in 1986 in reaction to critically low numbers of waterfowl. Mexico joined in 1994 making it a truly continental effort. The plan is a partnership of federal, provincial/state and municipal governments, non-governmental organizations, private companies, and many individuals, all working towards achieving better wetland habitat for the benefit of migratory birds, other wetland-associated species, and people. Plan projects are international in scope, but implemented at regional levels. These projects contribute to the protection of habitat and wildlife species across the North American landscape.

Partners in Flight Bird Conservation Plan. Managed as part of the Partners in Flight Plan, the East Gulf Coastal Plain and Central Hardwoods physiographic area represents a scientifically based land bird conservation planning effort that ensures long-term maintenance of healthy populations of native land birds, primarily nongame land birds. Nongame land birds have been vastly under-represented in conservation efforts, and many are exhibiting significant declines in population. The plan is voluntary and nonregulatory, and focuses on relatively common species in areas where conservation actions can be most effective, as opposed to the frequent local emphasis on rare and peripheral populations.

U.S. Shorebird Conservation Plan. The U.S. Shorebird Conservation Plan is a partnership effort throughout the United States to ensure that stable and self-sustaining populations of shorebird species are restored and protected. The plan was developed by a wide range of agencies, organizations, and shorebird experts for separate regions of the country, and identifies conservation goals, critical habitat conservation needs, key research needs, and proposed education and outreach programs to increase awareness of shorebirds and the threats they face.

Northern American Waterbird Conservation Plan. This plan provides a framework for the conservation and management of 210 species of waterbirds in 29 nations. Threats to waterbird populations include destruction of inland and coastal wetlands, introduced predators and invasive species, pollutants, mortality from fisheries and industries, disturbances, and conflicts arising from abundant species. Particularly important habitats of the southeast region include pelagic areas, marshes, forested wetlands, and barrier and sea island complexes. Fifteen species of waterbirds are federally listed, including breeding populations of wood storks, Mississippi sandhill cranes, whooping cranes, interior least terns, and gulf coast populations of brown pelicans. A key objective of this plan is the standardization of data collection efforts to better recommend effective conservation measures.

RELATIONSHIP TO STATE WILDLIFE AGENCY

The Kentucky Comprehensive Wildlife Conservation Strategy (KCWCS) was developed in order to identify and conserve Kentucky's Species of Greatest Conservation Need and to comply with the requirements of the congressionally authorized State and Tribal Wildlife Grants (STWG) Program. The KCWCS represents a proactive plan for sustaining the diversity of species and habitats found in Kentucky. The KDFWR acted as the lead agency in this effort but many partners provided crucial input. The general public was also invited to participate and provide input.

II. Refuge Overview

INTRODUCTION

Clarks River NWR is located in western Kentucky, an area also known as the Jackson Purchase. The refuge averages 2 to 3 miles in width, extends about 20 miles from near Paducah, Kentucky, to just south of Benton, Kentucky, and is in Graves, Marshall and McCracken Counties. The refuge acquisition boundary includes approximately 40 river miles due to the meandering nature of the Clarks River.

Clarks River NWR was established in 1997. The acquisition boundary approved by Congress is approximately 19,605 acres, of which, 8,634 acres have been purchased (Figure 2). The lands are distributed among counties as follows; Graves County (56 acres), Marshall County (5,970 acres), and McCracken County (2,608 acres). Lands are purchased on a willing-seller basis only. The majority of the refuge, about two-thirds, is in Marshall County, with about one-third in McCracken County and a small fraction in the northeast corner of Graves County.

Approximately 74 percent of the land associated with the Clarks River NWR is forested, 23 percent is agricultural land, 3 percent is open water/swamp, and 1 percent native warm-season grasses. Disturbed lands (roads, utility corridors, etc.) comprise 4 percent of the refuge. Refuge lands are managed for all plants and animals that occur in the area of western Kentucky, with a primary emphasis on migratory songbirds and waterfowl, game species, and listed species. Refuge goals and objectives are achieved through forest management, cooperative farming, habitat restoration, water management, and prescribed fire.

CLARKS RIVER NWR HISTORY AND PURPOSE

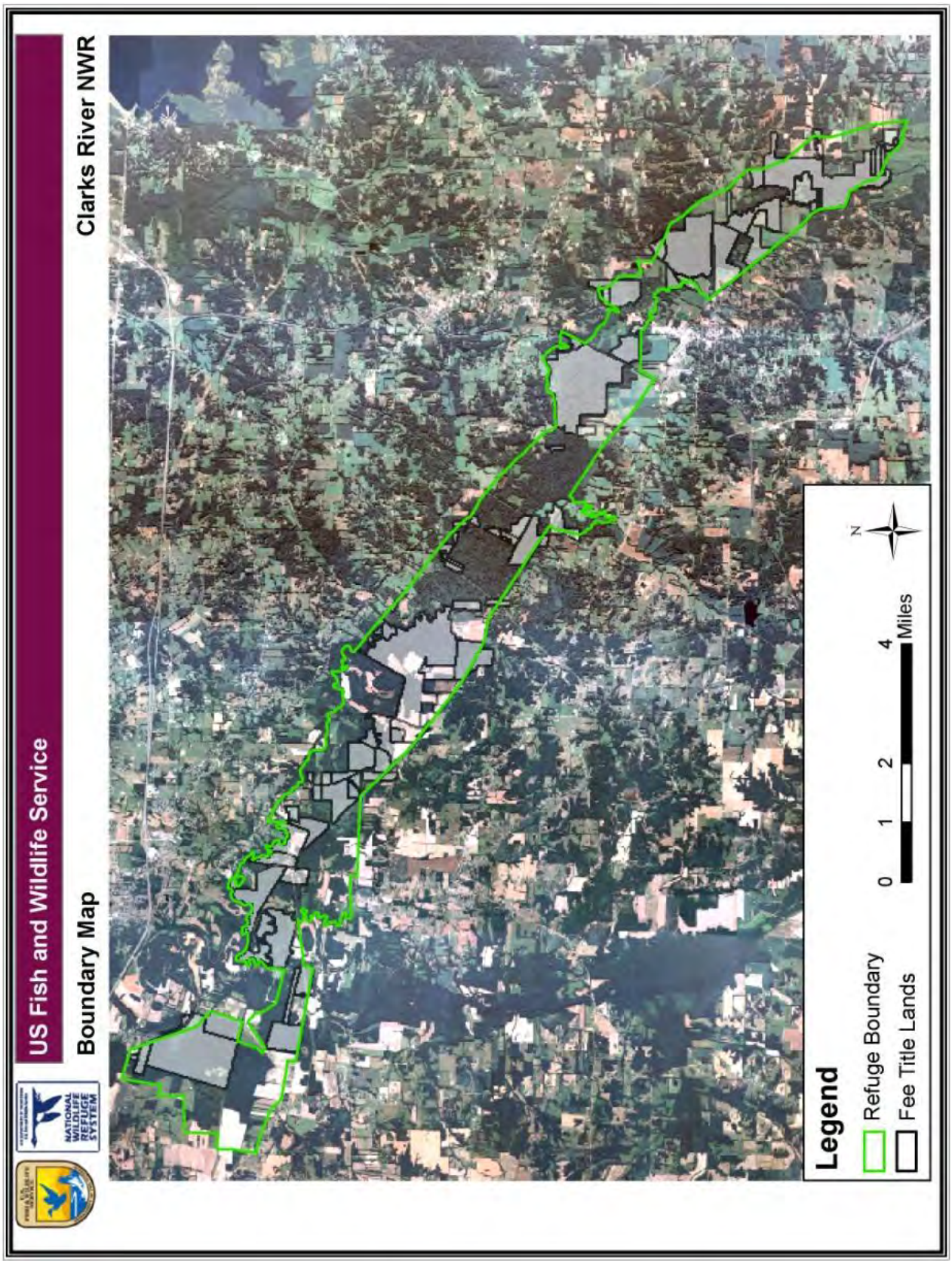
The Service, as part of its Bottomland Hardwood Preservation Program, evaluated the Clarks River as a candidate site for protection in 1975, because it was the only major river in western Kentucky that had not been dammed or dredged and because it was comprised of one of the largest remaining bottomland hardwood forests in the region. The final list of candidate sites published in 1978 excluded Clarks River because it lay outside the Mississippi Alluvial Valley primary focus area.

Serious discussion about the need for a national wildlife refuge in western Kentucky began in 1987. The proposed refuge would support the mission of the Refuge System, the goals and objectives of the North American Waterfowl Management Plan, and help the Commonwealth of Kentucky achieve its conservation goals.

Three potential sites were identified with assistance from KDFWR in 1989. Two additional sites were added in 1991, including the site located on the East Fork of the Clarks River first evaluated in 1975. Evaluation of all five sites by Service personnel indicated that the East Fork of the Clarks River was an appropriate location for a new national wildlife refuge.

Other important factors in the evaluation process included proximity to the confluence of the Cumberland, Tennessee, Ohio, and Mississippi Rivers in the Mississippi Flyway; strong public support, and the land's potential for diverse wildlife management. Proximity to three national wildlife refuges and four state wildlife management areas was also an important consideration.

Figure 2. Clarks River NWR



Refuge planning documents were sent to Washington, D.C. in 1992, but the proposal was rejected due to other agency priorities; however, continued strong support from the public, the KDFWR, conservation organizations, and elected officials kept the proposal alive. The plans were resubmitted in 1995 and approved on June 19, 1997. Clarks River NWR was established under the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b); 100 Stat. 3582-91) "... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. 742f (a) (4) and "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742f (b) (1) (Fish and Wildlife Act of 1956). For the first time since the establishment of Kentucky Woodlands NWR in 1938, and its disposal in 1969, the Commonwealth of Kentucky had a national wildlife refuge located entirely within its borders.

SPECIAL DESIGNATIONS

The refuge does not include any special designation sites such as research natural areas, wilderness areas, scenic rivers, etc.

LANDSCAPE CONSERVATION CONTEXT

LOWER TENNESSEE-CUMBERLAND ECOSYSTEM

In mid-1990, the Service took an ecosystem approach to conservation of natural resources and had adopted watersheds as the basic unit for ecosystem management. Clarks River NWR was considered to be in the Lower Tennessee-Cumberland Ecosystem (LTCE) Strategic Plan (U.S. Fish and Wildlife Service 1995). The LTCE was composed of two watersheds, the lower half of the Tennessee River and the entire drainage of the Cumberland River. The Tennessee River, the fifth largest river in the United States in terms of flow, begins at the confluence of the Holston and French Broad Rivers near Knoxville, Tennessee, and empties into the Ohio River some 650 miles downstream near Paducah, Kentucky. The river drains 41,000 square miles over 125 counties in seven States. The Lower Tennessee River encompasses that portion of the river valley located in northern Alabama and middle and west Tennessee.

GULF COASTAL PLAINS AND OZARKS LANDSCAPE CONSERVATION COOPERATIVE

To ensure that the Service is “putting science in the right places,” the Directorate determined in April 2009 that the agency needed a national, geographic framework for implementing landscape conservation. Just as migratory bird flyways have provided an effective spatial frame of reference to build capacity and partnerships for international, national, state, and local waterfowl conservation, this geographic framework will provide a continental platform upon which the Service can work with partners to connect site-specific efforts to larger biological goals and outcomes. In its meeting on August 4-6, 2009, the Directorate approved a map of the geographic framework developed by a team of Service and U.S. Geological Survey experts from across the country. The map defines Geographic Areas that provide a spatial frame of reference for building and targeting science capacity that will support the Service and partners in planning and designing conservation strategies at landscape scales. It also allows us to more precisely explain to partners, Congress, and the American public why, where, and how we target conservation resources and how our science-based efforts connect to a greater whole. Currently, Clarks River NWR falls into the Gulf Coastal Plains and Ozarks (GCPO) Landscape Conservation Cooperative (LCC) (Figure 3).

RELATED RESOURCES

The geographic area in which the refuge is located is sometimes referred to as the Jackson Purchase, because it was purchased from the Chickasaw Indians by President Andrew Jackson in 1818. The geologic area in which the refuge is located is sometimes referred to as the Mississippi Embayment, because western Kentucky was once inundated by the Gulf of Mexico.

The Clarks River watershed is the largest of the Mississippi Embayment watersheds and drains approximately 531 square miles (Parola et al*.* 2005). The East Fork of the Clarks River rises in Henry County, Tennessee, and flows north through Calloway, Marshall, and McCracken Counties in Kentucky. The West Fork of the Clarks River rises in Calloway County and flows north through Graves County to join the east fork in southeastern McCracken County. The Clarks River proper flows another 6 miles north before emptying into the lower Tennessee River near Paducah, Kentucky.

Different conservation priorities among the various agencies account for the dispersal of conservation lands across western Kentucky and northwestern Tennessee. Areas protected and managed by conservation entities within a 60-mile (1-hour) radius include (Figure 4):

1. Tennessee National Wildlife Refuge – 51,358 acres
2. Reelfoot Lake National Wildlife Refuge – 10,428 acres
3. Cross Creeks National Wildlife Refuge – 8,862 acres
4. Land Between the Lakes National Recreation Area -106,668 acres
5. Fort Campbell Military Reservation – 106,700 acres
6. Tennessee Valley Authority Lands – 9,037 acres
7. Kentucky Wildlife Management Areas (12 units) – 46,272 acres
8. Kentucky State Forests (1 unit) – 14,498 acres
9. Kentucky State Parks (5 units) – 7,028 acres
10. Kentucky State Natural Areas and Preserves (2 units) – 1,613 acres
11. Non-governmental Organization Lands (4 units) – 662 acres

The refuge works closely with the KDFWR and the Kentucky State Nature Preserves Commission on conservation issues, with non-government organizations such as Quail Unlimited on habitat management issues, and with regional land trusts such as the Southern Conservation Corporation and The Nature Conservancy. The refuge provides office space for a Service Ecological Services private lands biologist whose territory covers western Kentucky and western Tennessee.

The refuge is also a member of The Four Rivers Basin Team, an active and effective partnership comprised of private citizens, businesses, academic institutions, and county, state, and federal entities convened to address environmental priorities related to watershed protection, agriculture, and healthy communities in western Kentucky.

Figure 3. Gulf Coastal Plains and Ozark Landscape Conservation Cooperative and Clarks River NWR

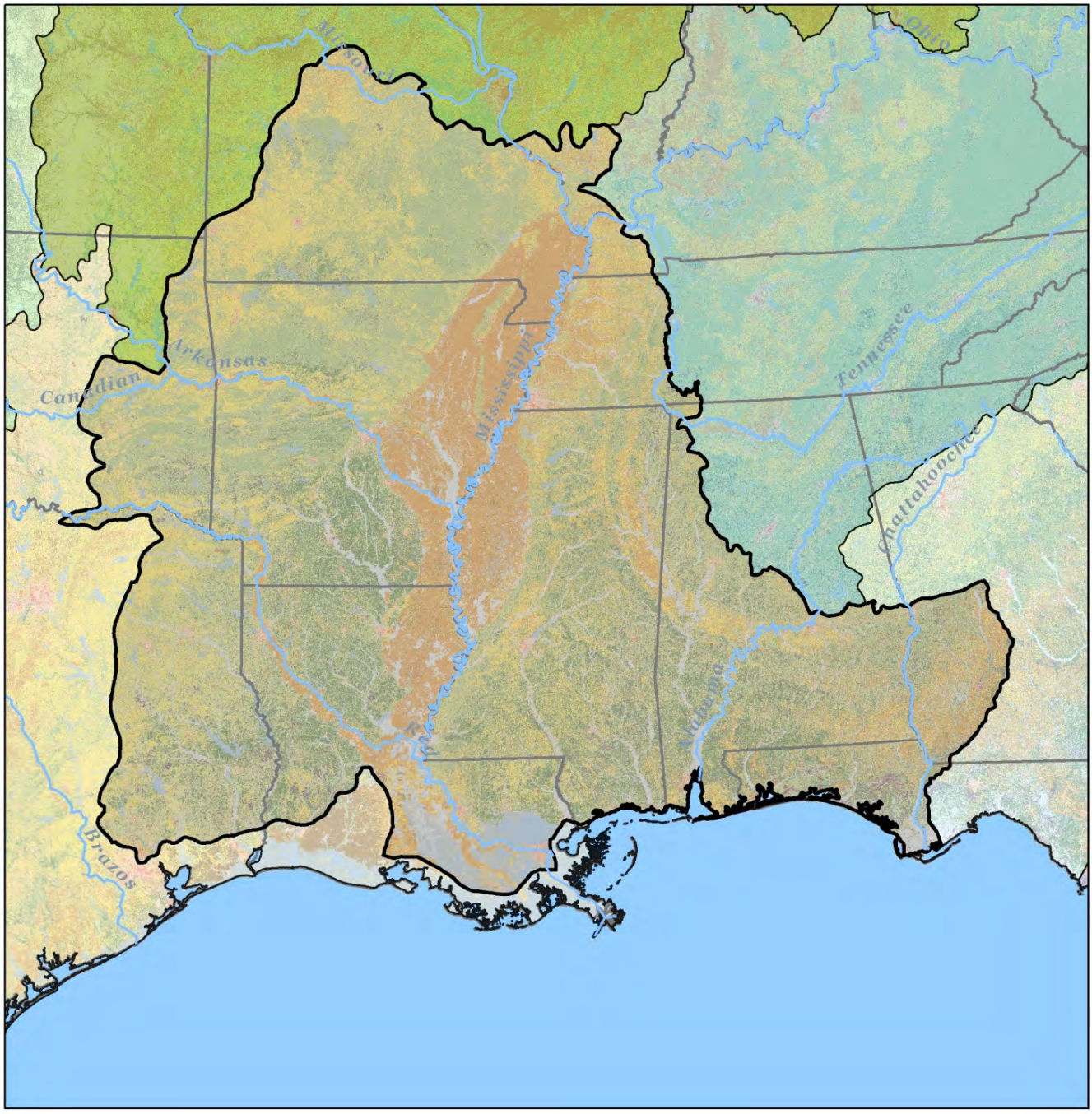
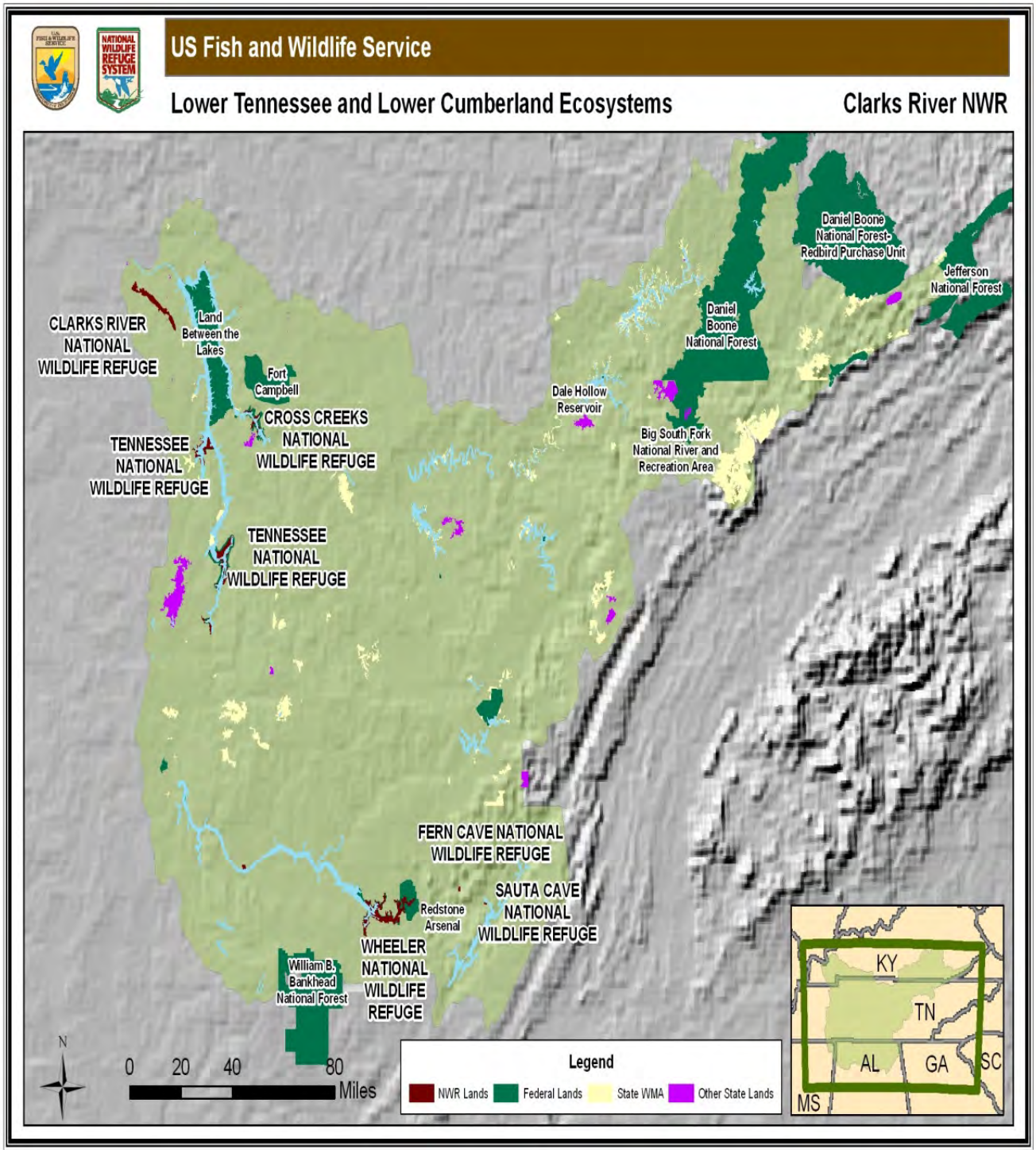


Figure 4. Clarks River NWR and areas protected and managed by conservation entities within the Lower Tennessee and Lower Cumberland Ecosystems



CONSERVATION PLANS AND REGIONAL INITIATIVES

Conservation priorities for national wildlife refuges in the Gulf Coastal Plains and Ozarks LCC focus on threatened and endangered species, trust species, and species of local concern. The goals and objectives in this Draft CCP/EA are stepped down from the following plans:

- North American Waterbird Conservation Plan
- United States Shorebird Conservation Plan
- Fisheries Vision for the Future
- Kentucky Wildlife Action Plan

NORTH AMERICAN WATERBIRD CONSERVATION PLAN

The North American Waterbird Conservation Plan was developed under a partnership called the Waterbird Conservation for the Americas, which is a group of individuals and organizations having interest and responsibility for the conservation of waterbirds and their habitats in the Americas. Clarks River NWR is located in the Southeast U.S. Regional Waterbird Conservation Planning Area. The refuge contributes to a key objective of this region, which is to standardize data collection efforts and analysis procedures to allow better tracking of regional movements and the association of these movements with environmental or land use changes.

UNITED STATES SHOREBIRD CONSERVATION PLAN

The United States Shorebird Conservation Plan is a partnership involving organizations throughout the United States committed to the conservation of shorebirds. Clarks River NWR is located within the Southeastern Coastal Plain Shorebird Conservation Region. On a regional scale, the refuge can help ensure that adequate quantity and quality of habitat are identified and maintained to support the different shorebirds that breed in, winter in, and migrate through the area.

FISHERIES VISION FOR THE FUTURE

In 2001, the Service worked with partners to refocus its Fisheries Program and develop a vision. This vision of the Service and its Fisheries Program is *"working with partners to restore and maintain fish and other aquatic resources at self-sustaining levels and to support Federal mitigation programs for the benefit of the American public."* To achieve the vision, the Fisheries program works with its partners to:

- Protect the health of aquatic habitats;
- Restore fish and other aquatic resources; and
- Provide opportunities to enjoy the benefits of healthy aquatic resources.

Together, the group developed a series of goals, objectives, and implementation actions to focus on key needs. Clarks River NWR can contribute to the program's recreational fishing goal to provide quality opportunities for responsible fishing and other related recreational enjoyment of aquatic resources on Service lands.

KENTUCKY WILDLIFE ACTION PLAN

Kentucky's wildlife action plan identifies priority conservation actions for both terrestrial and aquatic habitat guilds. Protecting habitat through acquisition, easements, or economic incentives with private landowners is an important strategy for wildlife and habitat, as is developing partnerships with other state and federal agencies and other conservation organizations in order to protect habitat. There is also a great need for long-term monitoring of at-risk species to detect population trends for species that currently lack long-term data sets. This is particularly true for aquatic species, reptiles, and amphibians. Clarks River NWR will significantly contribute to Kentucky's priority conservation actions.

ECOLOGICAL THREATS AND PROBLEMS

The primary refuge-related problems are linked to wetland loss, hydrologic alteration, land protection, and climate change.

WETLAND LOSS

Loss of wetlands due to land use modifications may be the primary cause of most problems within the Clarks River watershed. Wetlands store rainfall runoff (reducing effects of flooding), purify water, and provide valuable wildlife habitat. A wetland that has been drained or filled has lost its capacity to store and purify water. Without global climate change, the average annual rainfall in a watershed will remain consistent over time. As wetlands are lost, this puts greater pressure on the remaining wetlands to store and purify larger amounts of water, which leads to flooding and increased water pollution. Channelization exacerbates many problems such as downstream flooding, erosion, and reduction of water quality. Examples of channelized streams and rivers and the effects are prevalent in Kentucky and other states as are examples of floodplain protection and restoration.

Although precise figures are not available, it is evident that the Clarks River watershed has experienced a great deal of deforestation for agricultural and urban land uses. The rate at which water enters the watershed is influenced by the amount of land covered in vegetation. Land covered year-round in trees and grasses will absorb more rainfall than land covered only part of the year by crops, both vegetated and crop land absorb more water than land covered by pavement or buildings. A highly modified landscape will shed water at an increased volume and rate, thus causing problems downstream. There are a wide variety of solutions available for use in urban settings and with agricultural practices that are designed to capture and slow the release of rainfall runoff.

HYDOLOGICAL ALTERATION

The impact of roads on the flow of a river is often underestimated and easily overlooked. To reduce costs, federal, state, and local highway departments frequently resort to filling the floodplain for the roadbed rather than constructing lengthy bridges. The extent to which river flow is obstructed is in direct proportion to the length of the roadbed fill across the floodplain. Spanning the entire floodplain when new roads are constructed is detrimental. Due consideration should be given to removing roadbed fill and spanning the entire floodplain when old, unsafe bridges are replaced.

River obstructions such as dams, locks, and levees can dramatically alter the character of a river and its wetlands. The dams, locks and levees that facilitate commerce on major rivers, such as the Mississippi, Ohio, and Tennessee, result in higher than natural water levels in these systems. This in turn retards the rate at which water leaves tributary rivers; this is especially apparent when the major rivers are in flood stage. The water in tributaries then rises to higher levels and takes longer to runoff than is otherwise natural.

Understanding the natural functions of a river, its wetlands, and the various ways land use activities modify these functions, is vital to the ecological and economic health of our community. Proper land use that conforms two land types together with land conservation practices, such as the protection, enhancement, and restoration of natural wetlands, can reduce or eliminate the impacts of flooding, pollution, and loss of critical wildlife habitat.

STRATEGIC LAND PROTECTION

The Service has long been committed to the conservation of bottomland hardwood forests for the benefit of migratory birds. The acquisition of land from willing sellers within the boundary approved by Congress in 1997 is ongoing. Public access to refuge lands is limited. To address this problem, the Service proposes that the refuge be expanded to incorporate more road frontage. Using an existing public road rather than an arbitrary line will significantly improve access and provide greater opportunity for wildlife-dependent recreation, as well as facilitate management of wildlife and wildlife habitats.

In addition to promoting refuge access, a boundary expansion would benefit the protection and restoration of upland and bottomland hardwood wetland habitats within the Clarks River watershed. Upland buffers are critical to maintaining the integrity of an adjacent floodplain and the associated wildlife that depend upon it. Uplands adjacent to the floodplain in their natural state filter pollutants that enter these wetland systems and provide critical habitat to wetland wildlife species during flood events or to those that must overwinter at elevations not subject to fall and winter flood events.

The largest remaining contiguous bottomland hardwood habitats in the Clarks River watershed are along the East and West Forks of the Clarks River. Minimal protection activities have been directed towards the habitats of the West Fork. Both stretches of river contributed to overall makeup of the lower Clarks River watershed. Approximately 21 miles of the West Fork of the Clarks River below Highway 348 have been channelized. Land protection actions in this area provide excellent opportunities for river restoration and habitat protection. The existing refuge, combined with the proposed expansion area and state wildlife management area, would protect approximately 53,874 acres; approximately 18 percent of Kentucky's remaining wetlands.

The mission of the Service is to work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Consistent with that mission the Service proposes that the refuge expansion include lands along the West Fork of the Clarks River. This would connect Clarks River NWR with Kaler Bottoms Wildlife Management Area. In this area, the river flows from south to north and would provide a viable corridor for the movement of plants and animals.

CLIMATE CHANGE

Climate change and its relationship to existing problems of conserving fish and wildlife is the transformational conservation challenge of the 21st century. The Intergovernmental Panel on Climate Change (IPCC) reported that the warming of the world's climate system is unequivocal, based on documented increases in global average air and ocean temperatures, unprecedented melting of snow and ice, and rising average sea level (IPCC 2007). While the distribution and abundance of fish and wildlife naturally fluctuate due to a variety of environmental factors, climate change may drastically alter and accelerate the natural cycles that we are familiar with today. Some effects may include changes in precipitation, increased frequency and intensity of extreme weather events, rising sea levels, tidal fluctuations, and invasions of new exotic species. Consequently,

climate change is a challenge not only because of its direct effects, but also because of its potential to amplify the other stressors that have and will continue to be conservation issues.

The IPCC (2007) concluded that warming and sea level rise would continue for centuries even if greenhouse gas emissions are stabilized now. The Service is working to anticipate and address this challenge while protecting fish and wildlife habitats and maintaining biodiversity.

The effects of climate change and global warming will be changes in weather and rainfall patterns, decreases in snow and ice cover, rising sea levels, and stressed ecosystems. For the southeastern U.S., this could mean extreme precipitation events, greater likelihood of warmer, dryer summers and colder, wetter winters, and alterations of ecosystems and habitats due to changes in weather patterns. For Clarks River NWR, warmer conditions would favor increased densities of vegetation and wetter conditions would favor trees and vegetation that are better adapted to these conditions. If conditions become drier, the current range and density of forests would be reduced and replaced by grasslands; as a result, the probability of wildfires would increase. A recent study of the effects of climate change on eastern U.S. bird species concluded that 78 species of birds could decrease by at least 25 percent, where as many as 33 species could increase in abundance by at least 25 percent due to climate and habitat changes (Matthews et al. 2004). Global warming has the potential to increase storm intensity, negatively impact ecologically important plant species, alter the spread of invasive species, increase drought-induced fires, and further imperil already threatened and endangered species. Clarks River NWR will need to monitor for these changes on the refuge.

PHYSICAL RESOURCES

CLIMATE

The climate of the area may be characterized as temperate and humid with mild to moderately cold winters, hot summers, and abundant rainfall. Extreme weather variations occur from day-to-day, particularly during late fall through early spring, resulting from alternating intrusions of cold air masses from Canada and warm, moist air masses from the Gulf of Mexico. Average annual precipitation is approximately 49 inches and is fairly evenly distributed throughout the year. On average, August is the driest month, and April is the wettest month (Table 1).

The average growing season is 195-200 days (Humphrey et al. 1973), with March 23 as the average last date of killing frost in spring and November 12 as the average first killing frost in fall. A killing frost is defined as a temperature of 28 degrees Fahrenheit or below. The month of July tends to be the hottest month and January the coldest. Though precipitation is fairly well distributed throughout the year, extended dry periods throughout the growing season are not uncommon.

Table 1. National Weather Service rainfall data

Month	Mean (inches)	High (inches)	Low (inches)
January	3.81	14.13	.60
February	3.71	13.33	.94
March	4.50	14.91	.96
April	4.64	14.54	1.35
May	4.71	9.87	.71

Month	Mean (inches)	High (inches)	Low (inches)
June	4.14	9.52	.26
July	4.08	12.47	.52
August	3.08	7.60	.11
September	3.58	9.23	.12
October	3.28	10.55	.0
November	4.13	13.80	.56
December	4.44	11.53	.63

GEOLOGY AND TOPOGRAPHY

Clarks River NWR is located in the eastern portion of the Mississippi Embayment Region of western Kentucky, also known as the Jackson Purchase. The area is bounded by the Tennessee River on the east, the Ohio River on the north, the Mississippi River on the west, and the State of Tennessee on the south.

The geology of Graves, Marshall and McCracken Counties, where the refuge is located, is comprised of consolidated sedimentary rocks (sandstone and limestone) of Mississippian age, and unconsolidated sediments of Cretaceous, Tertiary, and Quaternary ages.

Mississippian era rocks were deposited 350 million years ago in the bottom of a warm, shallow sea. During the latter part of the Cretaceous, 130 million years ago, the Gulf of Mexico inundated much of the southern United States and covered all of the Jackson Purchase and some of the Mississippian Plateaus with sands, clays, and gravels. The Tertiary Period began 70 million years ago, with deposits of marine and fresh- to brackish-water sediments. Quaternary sediments have been deposited along the larger streams and rivers over the last million years (McGrain and Currens 1978).

Quaternary aged sediments characterize the refuge, which is located primarily in the floodplain of the Clarks River. Elevations on the refuge range from approximately 335 to 500 feet above mean sea level; however, the majority of refuge lands fall within 335 to 380 feet above mean sea level range. Local topography can vary from 50 to 150 feet between the Clarks River floodplain and adjacent uplands. Stream gradients are low, for example the East Fork of the Clarks River falls approximately 1 foot in elevation for every 2 river miles. Bottomland hardwood forests and forested swamps such as those found on the refuge are found in the floodplain valleys of major waterways.

SOILS

Most refuge lands fall within three soil associations as described by the Natural Resources Conservation Service, and the Kentucky Agricultural Experiment Station from surveys conducted in the mid-1960s (Agriculture (USDA electronic Field Office Technical Guide; *http://efotg.nrcs.usda.gov/treemenu* 2005). These soil types are Falaya Silt Loam (Fa), Collins Silt Loam (Co) and Waverly Silt Loam (Wa). Descriptions of these soil types are:

Falaya Series (0 to 2 percent slopes) consists of very deep somewhat poorly drained, moderately permeable soils that formed in silty alluvium from loess. They are found on level, to nearly level, wide flood plains. They are subject to flooding and are saturated with water at 1 to 2 feet during periods of high rainfall. Native vegetation is mixed hardwoods (United States Department of Agriculture (USDA) electronic Field Office Technical Guide; *http://efotg.nrcs.usda.gov/treemenu* 2005).

Waverly Series (0 to 2 percent slopes) consists of nearly level, very deep, poorly drained soils that have moderate permeability. They form in silty alluvium derived from loess. The water table is at or within 1 foot of the surface during the winter and spring months in normal years. These soils are subject to occasional or frequent flooding for brief-to-long duration after heavy rainfall. Native vegetation is bottomland hardwoods (Agriculture (USDA electronic Field Office Technical Guide; *http://efotg.nrcs.usda.gov/treemenu* 2005).

Collins Series (0 to 2 percent slopes) consist of very deep, moderately well drained, moderately permeable soils. These soils are saturated within a depth of 20 inches for more than 30 days in normal years. The soil is subject to flooding for brief to very long durations. Native vegetation is bottomland hardwoods (USDA Electronic Field Office Technical Guide; *http://efotg.nrcs.usda.gov/treemenu* 2005).

HYDROLOGY AND WATER QUALITY

Western Kentucky is associated with diverse aquatic systems. Major rivers that flow through the area make it one of the most unique areas in the United States. The Ohio River drains into the Mississippi River and has a watershed that spans 14 states, including all of the State of Kentucky except for a small portion of the Jackson Purchase in extreme western Kentucky, which drains directly into the Mississippi River.

Another major river that flows through the area is the Cumberland River. It is approximately 700 miles long and has a drainage basin of 18,500 square miles. The Cumberland River begins in Letcher County, Kentucky, near the Virginia border, flows through southeast Kentucky, and dips into Tennessee, before curving back into western Kentucky and joining the Ohio River at Smithland, Kentucky. Large reservoirs, or recreational lakes, have been created along the Cumberland River by a series of dams, including Lake Barkley in western Kentucky, Lake Cumberland in southern Kentucky, and Old Hickory Lake east of Nashville, Tennessee.

The Tennessee River is the largest tributary of the Ohio. It is formed on the east side of Knoxville, Tennessee, by the confluence of the Holston and French Broad Rivers. It flows southwest toward Chattanooga, Tennessee, loops south into northern Alabama, and then flows northward back into Tennessee and on to Kentucky, where it separates the Jackson Purchase from the rest of the state before joining the Ohio River at Paducah, Kentucky. The East and West Forks of the Clarks River are tributaries of the Tennessee River, which runs 650 miles (Kentucky 2010).

The Clarks River watershed is the largest of the Mississippi Embayment watersheds and drains approximately 531 square miles (Parola et al. 2005) (Figure 5). The East Fork of the Clarks River rises in Henry County, Tennessee, and flows north through Calloway, Marshall, and McCracken Counties in Kentucky. The West Fork of the Clarks River rises in Calloway County and flows north through Graves County, to join the east fork in southeastern McCracken County. The Clarks River proper flows another 6 miles north before emptying into the lower Tennessee River near Paducah, Kentucky. Twenty-one miles of the West Fork of the Clarks River have been channelized; however, a significant portion of bottomland habitat has persisted. The East Fork of the Clarks River is

unchannelized and considered unique as a result. Additionally, the Clarks River is the only major tributary to the Tennessee River that is located outside the U.S Army Corps of Engineers (USACE) Lock and Dam system.

AIR QUALITY

The Clean Air Act (CAA) of 1970 (as amended in 1990 and 1997), required the U.S. Environmental Protection Agency (EPA) to implement air quality standards to protect public health and welfare. National Ambient Air Quality Standards (NAAQS) were set for six pollutants commonly found throughout the United States: lead, ozone, nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter less than 10 and 2.5 microns in diameter (PM_{10} and $PM_{2.5}$).

The Technical Services Branch of the Kentucky Division for Air Quality (KDAQ) produces the Ambient Air Quality Annual Report. The 2011 report presented a summary of statistical results from monitoring outdoor concentrations of air pollutants in the Commonwealth during calendar year 2011. Generally, there has been a decline in ozone levels over the past 25 years based on 1-hour data.

There were no exceedances of the NO_2 standard in 2010, and there have been no recorded exceedances of the NAAQS since the inception of sampling in 1970. Statewide, ozone and NO_2 levels show a steady, downward trend, primarily due to the use of pollution control devices on motor vehicles, power plants, and industrial boilers (KDAQ 2011).

All Kentucky counties are currently in attainment of the standards for CO. Statewide and regional CO levels have declined substantially since 1980, primarily due to improved emission controls on motor vehicles (KDAQ 2007).

There were no exceedances of any of the SO_2 standards in 2007 (KDAQ 2007). There were ten exceedances of the 24-hour $PM_{2.5}$ standard and seven exceedances of the annual standard in 2010. A total of eight samplers exceeded the 3-year average, 24-hour (2005-2007) standard and zero samplers exceeded the 3-year average (2008-2010) annual standard.

Generally, statewide PM2.5 levels have declined from 2000-2010, with a slight increase in 2005 and 2007. There were no exceedances of the annual PM10 standard in 2010 (KDAQ 2011). All Kentucky counties are currently in attainment with the PM10 standard. Statewide and regional PM10 levels have shown declining trends. This downward trend is the result of controls on industrial sources for particulate matter (KDAQ 2011).

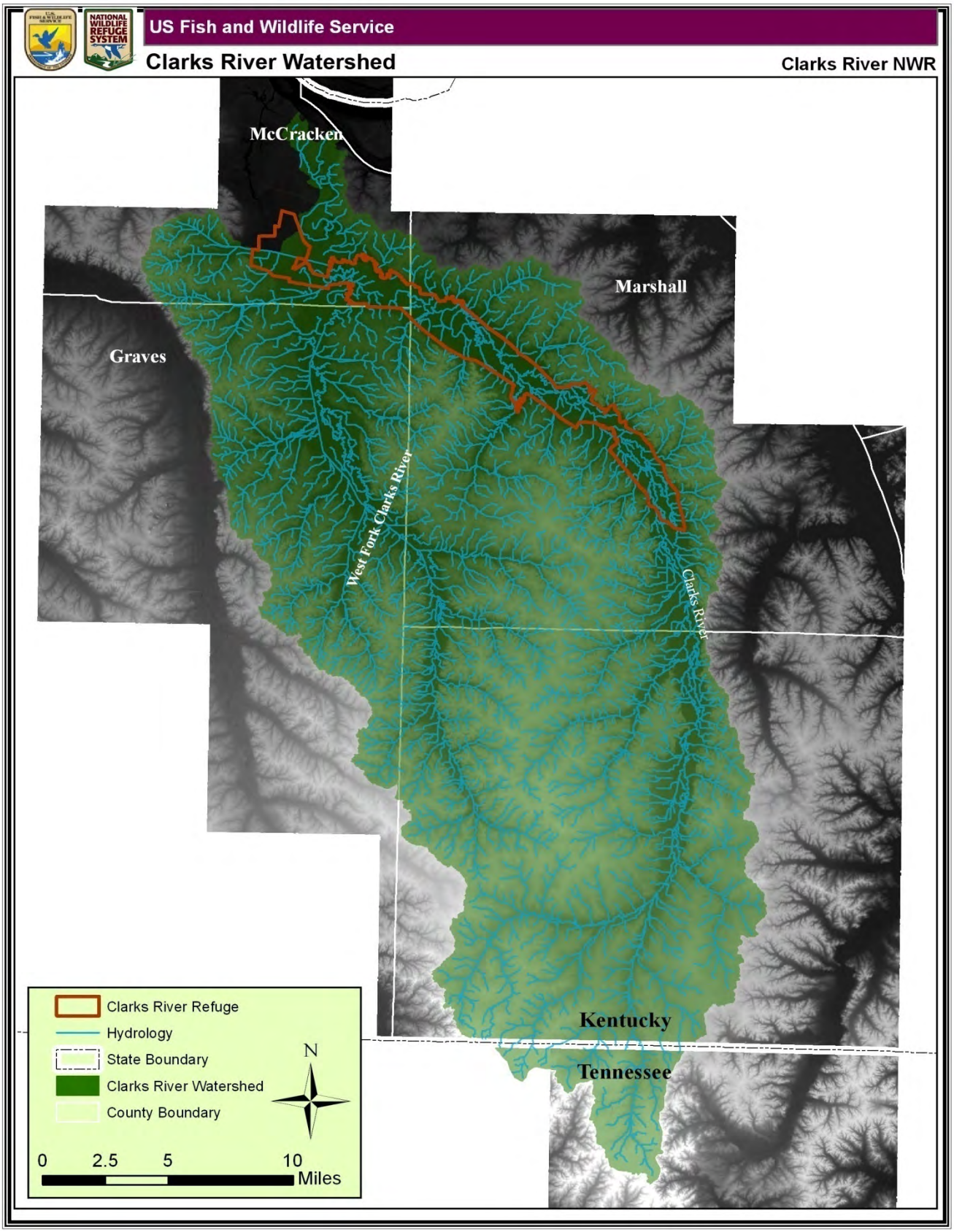
BIOLOGICAL RESOURCES

LANDCOVER CLASSES

The primary landcover classes within the Clarks River NWR acquisition boundary include open land (5,307 acres), forested (12,438 acres), and open water habitats (560 acres) (Figure 6). Within each of these habitat types, specific habitat conditions or vegetative communities exist (Figure 7). Open lands are comprised of marshes, abandoned fields, utility corridors, clearcuts, grass plantings, developed areas, and agricultural fields.

Forest habitat types include: xero-hydric flatwoods, wet flatwoods, bottomland hardwoods, bottomland hardwood swamps, reforested stands, plantations, riparian forests, sub-xeric acidic forests, and mesic acidic forests. Open water areas within the acquisition boundary consist of cypress swamps, open swamps, shrub swamps, rivers, and ponds.

Figure 5. Clarks River watershed



Natural Wetland Communities

Xero-hydric Flatwoods (1069 Acres)

This community type is associated with poorly drained soils containing a fragipan, a dense subsoil layer that is nearly impenetrable to water or roots, creating hydrologic conditions that alternate from very wet in the winter and spring to very dry in the summer and fall. These unusual hydrologic conditions form the foundation of a unique plant community that includes many species usually associated with dry upland sites, as well as species that are uniquely adapted to the changing hydrology. Fire and possibly grazing are thought to play an important role in this community by helping to maintain a somewhat open canopy, a weakly developed mid-story and grassy under-story (Anderson et al. 1999).

Figure 6. Landcover classes on lands within the Clarks River NWR acquisition boundary

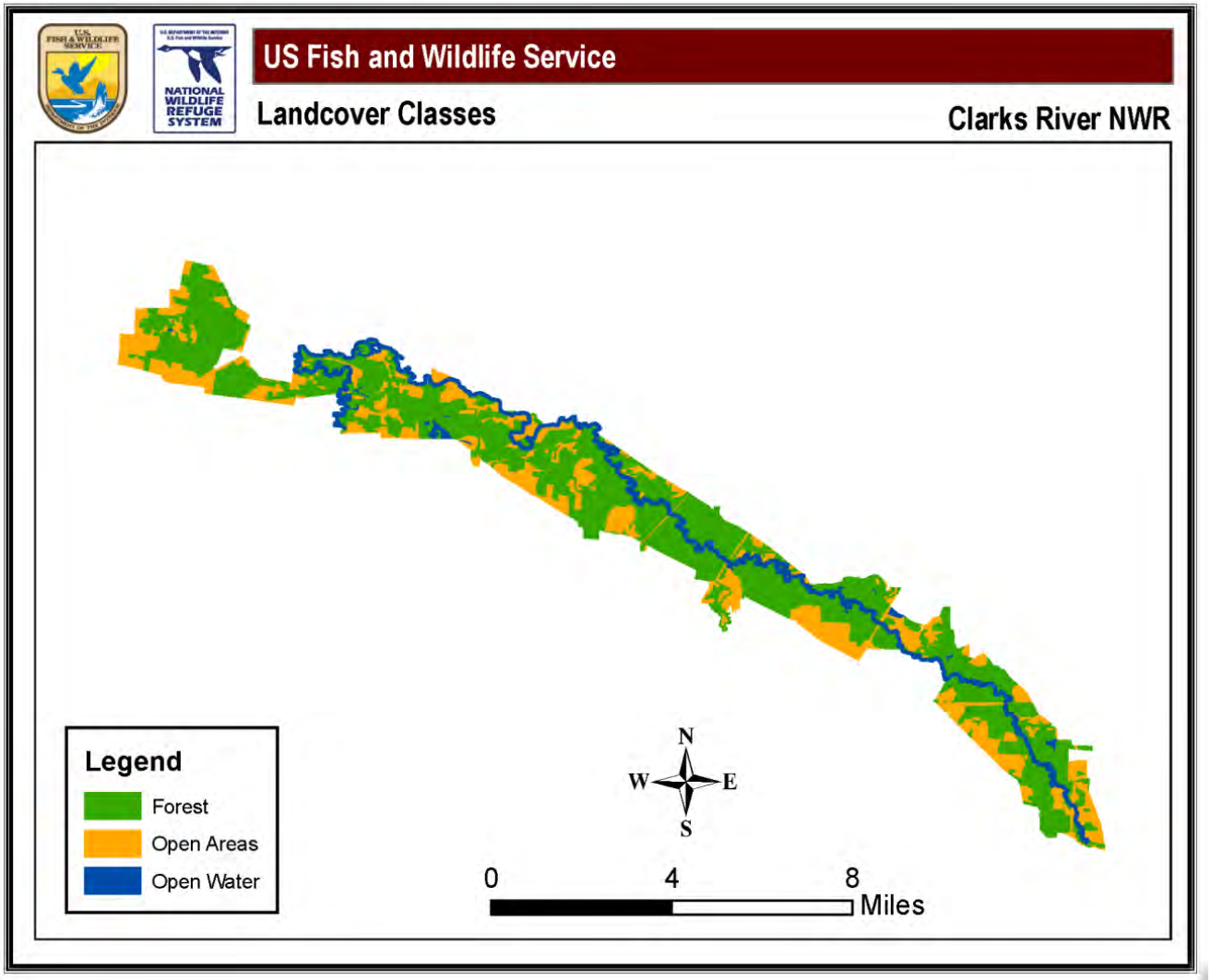
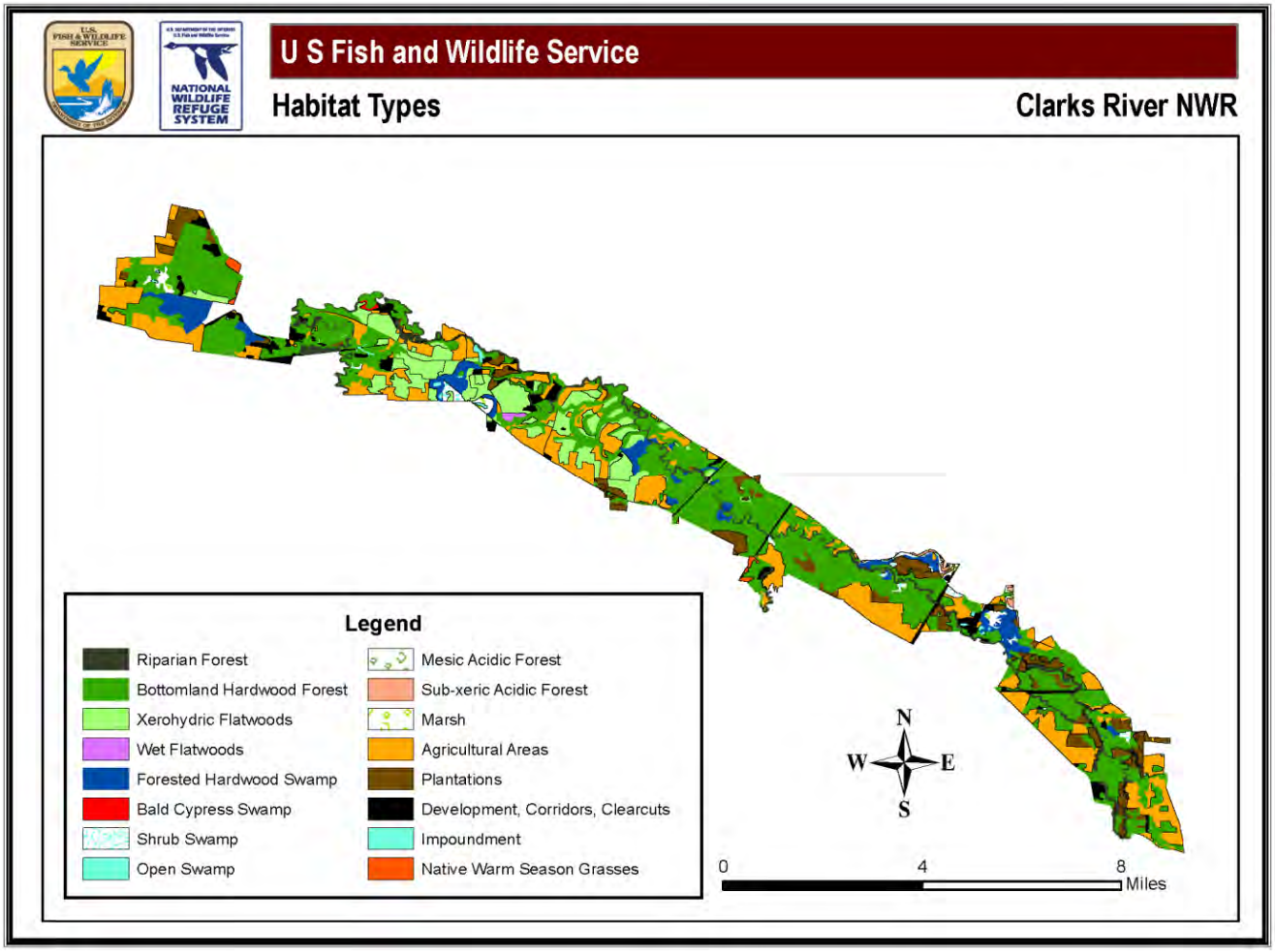


Figure 7. Specific habitat types on lands within the Clarks River NWR acquisition boundary



The most common canopy species is post oak (*Quercus stellata*), which often occurs in almost pure stands. Other common canopy species are willow oak (*Q. phellos*), swamp white oak (*Q. bicolor*), southern red oak (*Q. falcata*), and shagbark hickory. The mid-story in high-quality stands is weakly developed, but in the absence of fire can become very dense. Common species include sugarberry, persimmon (*Diospyros virginiana*), and winged elm (*Ulmus alata*).

High-quality stands characteristically have a diverse herbaceous understory including fascicled false foxglove (*Agalinis fasciculata*), Elliott's bluestem (*Andropogon gyrans*), cream wild indigo (*Baptisia bracteata* var. *leucophaea*), river wood oats, sweet woodreed, poverty oatgrass (*Danthonia spicata*), flowering spurge (*Euphorbia corollata*), common flat-topped goldenrod (*Euthamia graminifolia*), woodland sunflower (*Helianthus divaricatus*), small-headed sunflower (*H. microcephalus*), ashy sunflower (*H. mollis*), Canadian bluet (*Houstonia canadensis*), dense blazing-star (*Liatris spicata*), narrowleaf mountainmint (*Pycnanthemum tenuifolium*), smooth phlox (*Phlox glaberrima*), foxglove beardtongue (*Penstemon digitalis*), little bluestem (*Schizachyrium scoparium*), and gray goldenrod (*Solidago nemoralis*).

This community type is represented in several tracts near Elva in the center of the refuge where it is associated with an ancient lake bed. Most flatwoods have been converted to agricultural fields. The remaining stands are fairly young and the hydrology has been altered, but even so, the refuge contains some of the most extensive tracts of flatwoods remaining in Kentucky, and a few stands are fairly pristine and have a high diversity of native plants. Unfortunately, most have developed a dense mid-story, which has lead to a decrease in herbaceous diversity. However, with proper management, the refuge has the potential of becoming the most important location for xero-hydric flatwoods in Kentucky.

Wet Flatwoods (31 Acres)

This community type is similar to xero-hydric flatwoods, but with longer periods of flooding between dry periods. Post oak and willow oak are characteristic canopy species, but co-dominants include trees adapted to wetter conditions, such as pin oak, swamp white oak, and occasionally overcup oak (*Q. lyrata*) and cherrybark oak (*Q. pagoda*) in wet pockets, and Shumard oak (*Q. shumardii*) in better drained sites. The mid-story tends to be very open and the herbaceous under-story sparse and of low diversity with much bare ground due to longer periods of standing water (ponding). Only a few small remnants of this community type have been located on the refuge.

Bottomland Hardwood Forest (8211 Acres)

This community is associated with seasonally flooded but well-drained rich soils along floodplains of medium and large rivers. The trees are fast growing and the canopy is usually closed. The mid-story is well-developed and dense in places with shrubs being common and the herbaceous under-story lush and diverse. Common tree species in intact stands include pin oak (*Quercus palustris*), overcup oak, American elm (*Ulmus americana*), shagbark hickory (*Carya ovata*), cherrybark oak, swamp chestnut oak (*Q. michauxii*), water hickory (*C. aquatica*), silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), American beech (*Fagus grandifolia*), green ash (*Fraxinus pennsylvanica*), and sweetgum (*Liquidambar styraciflua*).

Small trees and shrubs include pawpaw (*Asimina triloba*), American hornbeam (*Carpinus caroliniana*), sugarberry (*Celtis laevigata*), possumhaw (*Ilex decidua*), and Northern spicebush (*Lindera benzoin*). Giant cane (*Arundinaria gigantea*) is also common. Vines are often plentiful, including grape (*Vitis* spp.) and greenbrier (*Smilax* spp.), as well as American hogpeanut (*Amphicarpaea bracteata*), crossvine (*Bignonia capreolata*), trumpet creeper (*Campsis radicans*), and poison ivy (*Toxicodendron radicans*), which tends to form extensive monocultures in the bottoms.

The under-story is often dominated by nettles, especially false nettle (*Boehmeria cylindrica*) and wood nettle (*Laportea canadensis*), or by a mixture of herbs and grasses, especially river wood oats (*Chasmanthium latifolium*) and sweet woodreed (*Cinna arundinacea*). Other common herbs are winter bentgrass (*Agrostis hyemalis*), tickseed sunflowers (*Bidens* spp.), dodder (*Cuscuta* spp.), Virginia wildrye (*Elymus virginicus*), fowl mannagrass (*Glyceria striata*), catchfly grass (*Leersia lenticularis*), Virginia cut grass (*L. virginica*), clearweed (*Pilea pumila*), Jacob's ladder (*Polemonium reptans*), swamp rose (*Rosa palustris*), mad-dog skullcap (*Scutellaria lateriflora*), Virginia spiderwort (*Tradescantia virginiana*), and various species of violet (*Viola* spp.).

Intact stands of this community type are extremely rare in Kentucky and on the refuge. Most stands of bottomland hardwood forests are highly degraded and have lost their oak component due to past clearing and/or timber harvest. This is especially apparent in the majority of bottomland hardwood stands in the Dogtown Unit, or southern third of the refuge.

Forested Hardwood Swamp (824 Acres)

This community type occurs on floodplains of rivers and large streams. Soils are deep, poorly drained, wet for significant periods of time throughout the year; usually becoming drained by late summer. This community is subject to frequent flooding or prolonged standing water. Ponding from beaver activity may result in significant variation in vegetation structure due to tree mortality. The canopy is often partially open because the water depth limits tree establishment.

Trees tend to be concentrated on hummocks surrounded by deeper water. Common canopy species are silver maple, river birch, pin oak, American sycamore, green ash, black willow, water hickory, water tupelo, and bald cypress. Smaller trees and shrubs include American hornbeam, buttonbush, and possumhaw.

The herbaceous under-story includes various sedges such as hop sedge (*Carex lupulina*), shallow sedge (*C. lurida*), and Gray's sedge (*C. grayi*). Other characteristic species include taperleaf water-horehound (*Lycopus rubellus*), ditch stonecrop (*Penthorum sedoides*), mad-dog skullcap, bur-reeds (*Sparganium* spp.), sensitive fern (*Onoclea sensibilis*), marsh fleabane (*Pluchea camphorata*), jumpseed (*Polygonum virginianum*), and greater marsh St. Johnswort (*Triadenum walteri*).

Bald Cypress Swamp (18 Acres)

This community type occurs in permanently or semi-permanently ponded or inundated depressions, oxbow ponds, backwater sloughs, and other very wet sites of stream and river floodplains. Soils are deep and very poorly drained. Parent material is alluvium. Surface water is present for extended periods of time. These sites can become dry in late summer or during droughts. Tree canopy is tall, and variably open, depending upon water depth. Under-story is absent or poorly developed, consisting of scattered hydrophytic shrubs. Herbaceous vegetation is sparse, consisting of scattered emergents, free-floating aquatics, or epiphytic plants. While bald cypress is usually the most common species, other characteristic species include buttonbush, Virginia willow (*Itea virginica*), pumpkin ash, water tupelo, swamp rose, duckweeds (*Lemna* spp.), black willow, and greater marsh St. Johnswort.

Most of the cypress has been removed from the refuge, and/or hydrologic conditions have been altered to make habitat unsuitable for this community type. Cypress dominated sites on the refuge are small and do not exhibit the characteristics of typical cypress swamps. Areas where cypress swamp probably occurred include Blizzard Pond, which now has only a few remnant trees and has been mapped as open swamp and marsh. Water locust (*Gleditsia aquatica*), another species characteristic of cypress swamps, and a state species of special concern, has not been reported from the refuge, but is likely to occur here.

Riparian Forest (878 Acres)

This community occurs as narrow bands along the banks of medium and larger rivers on a natural levee or the level floodplain. Soils are deep, moderately well-drained to poorly drained, and seasonally or intermittently flooded. The parent material is alluvium. This community, although subject to frequent flooding, is generally higher and better drained than the adjacent floodplain forest or swamp. This community is also subject to the greatest intensity of river floods and receives the most natural disturbance and greatest deposition of sediment, usually sands, gravels, or other coarse sediment. Tree canopy is tall with a variable cover depending upon variation in water levels. The under-story is poorly developed to fairly well-developed, usually consisting of scattered shrubs and small trees. Ground cover is sparse most of the year with late season herbs dominating. Common and characteristic woody plants include silver maple, American sycamore (*Platanus occidentalis*),

sugarberry, river birch (*Betula nigra*), Eastern cottonwood (*Populus deltoides*), sweetgum, green ash, and others. Under-story species include boxelder (*A. negundo*), pawpaw, and Northern spicebush. In some places where the natural levee is low or absent, wet soil species such as black willow (*Salix nigra*); bald cypress (*Taxodium distichum*); water tupelo (*Nyssa aquatica*), which is uncommon on the refuge; planertree (*Planera aquatica*); water hickory; pumpkin ash (*F. profunda*); buttonbush (*Cephalanthus occidentalis*); possumhaw; and others occur.

Open Swamp (42 Acres)

Open swamps are open water sections usually associated with bottomland hardwood swamps or bald cypress swamps. These areas are usually flooded permanently or for much of the year. Scattered trees include silver maple, green ash, water tupelo, black willow, and bald cypress. Floating species include *(Potamogeton spp*.), water smartweeds and duckweeds. The margins are rimmed with zones of shrub swamp and marsh such as buttonbush.

Marsh (73 Acres)

Marshes are often a component of open swamps, forming on deep soils along the shallow water margins that go dry during the summer. They can form and disappear quickly in response to changes in hydrology (i.e., beaver activity). Marshes are dominated by herbaceous and graminoid wetland vegetation. Composition is variable due to water depth and duration of flooding. Scattered shrubs are sometimes present. The most common species in refuge marshes are dotted smartweed (*P. punctatum*), which tends to form extensive carpets, rufous bulrush (*Scirpus pendulus*), soft rush (*Juncus effusus*), and rough flatsedge (*Cyperus refractus*). Other common species include Virginia buttonweed (*Diodia virginiana*), hollow-stemmed joe-pye weed (*Eupatorium fistulosum*), bushy St. Johnswort (*Hypericum densiflorum*), Virginia cut grass, catchfly grass, seedbox (*Ludwigia alternifolia*), marsh fleabane, and wrinkle-leaved goldenrod (*S. rugosa*).

Two rare species, one-flowered false fiddleleaf (*Hydrolea uniflora*), a state species of special concern and heartleaf pondweed (*Potamogeton pulcher*), state-listed as threatened, have been identified on the refuge. They are currently known only from Blizzard Pond in McCracken County but might occur in other locations.

Shrub Swamp (255 Acres)

This community type occurs in inundated depressions, oxbow ponds, and backwater sloughs in stream and river floodplains. Soils are deep and very poorly drained. Surface water is present for extended periods of time, sometimes becoming dry in late summer and during droughts. Tree canopy is absent or poorly developed. Shrubs occur in scattered clumps or dense thickets. Herbaceous vegetation is sparse or absent. Common or characteristic plants include buttonbush, which is usually the dominant species. Less common are swamp dogwood (*Cornus foemina*), Virginia willow, rosemallows (*Hibiscus* spp.), black willow, and common cattail (*Typha latifolia*).

Natural Upland Communities

The only stands of upland forest within Clarks River NWR boundaries occur on slopes near Benton. These small stands are all young and disturbed. They include a mixture of early and late successional species.

Sub-xeric Acidic Forest (40 Acres)

Common canopy species are red maple, sugar maple, pignut hickory (*C. glabra*), persimmon, Eastern redcedar (*Juniperus virginiana*), tuliptree, black cherry (*Prunus serotina*), black locust (*Robinia pseudoacacia*), sassafras, sweetgum, blackgum (*N. sylvatica*), white oak, chestnut oak (*Q. prinus*), post oak, black oak and winged elm.

Smaller trees and shrubs found in the mid-story of this community include downy serviceberry (*Amelanchier arborea*), flowering dogwood, hophornbeam (*Ostrya virginiana*), and farkleberry (*Vaccinium arboreum*). Crossvine and greenbrier are common.

Mesic Acidic Forest (84 Acres)

Small tracts of cut over, young forest are located on lower slopes east and west of Highway 641. Common canopy species include red maple, sugar maple (*Acer saribarum*), sweet birch (*B. lenta*), shagbark hickory, mockernut hickory (*C. tomentosa*), black walnut (*Juglans nigra*), white ash (*F. americana*), tuliptree (*Liriodendron tulipifera*), sweetgum, white oak (*Q. alba*), northern red oak (*Q. rubra*), black oak (*Q. velutina*), and sassafras (*Sassafras albidum*).

Smaller trees and shrubs found in the mid-story of this community include pawpaw, flowering dogwood (*Cornus florida*), American hornbeam, common winterberry (*I. verticillata*), Northern spicebush, and American holly (*I. opaca*).

Anthropogenic Land-cover Types

Agricultural Area (4,545 Acres)

This includes tracts of open lands that are currently utilized for row crop and/or other agricultural uses.

Plantations (1,301 Acres)

These tracts represent forest stands that have been commercially row planted.

Warm Season Grass Plantings (83 Acres)

Areas planted in native warm season grassland species, primarily Indian Grass *(Sorghastrum nutans)* and big-bluestem (*Andropogon gerardii).*

Developed Areas (731 Acres)

This includes houses and other developments associated with clearing and altering the landscape for uses other than agriculture, utility corridors, and forest clearcuts.

Threatened and Endangered Species

Clarks River NWR is located within the historic ranges of the American burying beetle (*Nicrophorus americanus*), the Indiana bat (*Myotis sodalis*), and the gray bat (*Myotis grisescens*). All of these species are listed by the Service as endangered. Detailed information on each species can be found in their respective recovery plans. A brief discussion of each species follows.

The American burying beetle was once found throughout much of eastern North America and its historic range appears to have coincided with that of eastern deciduous forest. It has not been observed in Kentucky since 1974, when it was collected from Land Between the Lakes National Recreation Area in nearby Trigg County. The adults are nocturnal and generally most active from April through September.

Burying beetle surveys were conducted by refuge staff in the summer of 2010. Numerous species of carrion beetles were captured and identified; however, the American burying beetle was not observed.

The Indiana bat is generally found in and near roost caves from mid-August through mid-May. Female Indiana bats emerge from hibernation in the roost caves during April and May and disperse to distant forests with suitable maternal colony sites characterized by mature live trees with loose, shaggy bark and dead trees with loose, sloughing bark. The females and dependent young may be found roosting and foraging in the vicinity of the maternal colony from May through July. Indiana bats forage primarily in wetland and upland forests but may also forage over or along the edge of open lands. Indiana bat maternal colonies have been documented in counties surrounding the refuge. Surveys for maternal colonies of the Indiana bat have been conducted on refuge lands but to date, none have been found.

The gray bat dwells in caves throughout the year and uses different caves for winter hibernation and summer maternal colonies. The gray bat is most likely to be encountered at the caves and when it forages near the caves. It is less likely to be encountered when it migrates between the summer and winter caves. The caves favored by the gray bat are closely associated with limestone karst in the southeastern United States. There are no caves located on or adjacent to the refuge. The likelihood of encountering a foraging or migrating gray bat is considered low.

Bat surveys were conducted by Service personnel from the refuge, the Frankfort Ecological Services office, as well as volunteer crews from KDFWR and local contractors in 2008 and 2009. During the survey period, no Indiana or Gray bats were captured.

Avian Species

The American Ornithological Union lists over 800 species of birds likely to be found in the continental United States (AOU 2009). According to the Kentucky Ornithological Society, approximately 364 species may be found in certain habitats at a certain time of the year (KOS 2009). Birds that might inhabit or use the mountainous region of eastern Kentucky will differ from those that use the low-lying swamps, grasslands, or rolling hills of the western part of Kentucky. The refuge, located in the Jackson Purchase, lists over 240 birds as likely to be found. Most popular field guides, which can be acquired from any local bookstore, are useful in helping to identify the birds that can be found in this area. More detail on refuge birds is provided below.

Migratory Song Birds

Clarks River NWR straddles the Central Hardwoods and East Gulf Coastal Plain Bird Conservation Regions and serves as breeding, wintering, and migratory habitat for over 240 species of migratory birds. This includes 37 percent of the Birds of Conservation Concern found in the southeast region (USFWS 2008), 40 percent of the wetland-associated landbird Species of Continental Importance monitored by Partners in Flight (Rich et al. 2004), and 69 percent of the birds designated by Kentucky as Species of Greatest Conservation Need (KCWCS 2010).

The published refuge bird list includes over 240 species including four wrens, six vireos, seven thrushes, seven woodpeckers, ten flycatchers, 15 sparrows, and 35 warblers. The Kentucky warbler (*Oporomis formosus*) is the unofficial refuge mascot and symbol used by the Friends of Clarks River National Wildlife Refuge on promotional materials, and is a common capture during refuge MAPS and other songbird banding activities. (See Appendix I for summary list of species captured during banding operations)

Waterfowl

The refuge is located in the North American Waterfowl Management Plan, Lower Mississippi Valley Joint Venture area and provides breeding and wintering habitat for 18 species of waterfowl, including some whose population levels are below long-term averages or management goals (NAWMP 1986).

Resident and migrating wood ducks (*Aix sponsa*) are probably the most common species using the refuge. Other species commonly observed include gadwall (*Anas strepera*), American wigeon (*Anas americana*), northern pintail (*Anas acuta*), northern shoveler (*Anas clypeata*), green-winged teal (*Anas crecca*), mallard (*Anas platyrynchos*), and blue-winged teal (*Anas discors*). Hooded merganser (*Lophodytes cucullatus*), American black duck (*Anas rubripes*), bufflehead (*Bucephala albeola*), redhead (*Aythya americana*), canvasback (*Aythya balisineria*), Canada goose (*Branta canadensis*), and snow goose (*Chen caerulescens*) occur occasionally but in small numbers.

The refuge's role in meeting the objectives of the North American Waterfowl Management Plan is to provide suitable habitats to support the foraging, loafing, roosting, molting, and other needs of 5,000 ducks by the year 2022 and 10,000 ducks by 2020. Much of these needs will be met through the natural overflow flooding of the protected bottomland forest. The remainder will be provided through management of constructed impoundments, moist-soil management, and the cooperative farming program.

Wading Birds

Wading birds are long-legged and feed by wading in shallow water in the refuge's natural and managed wetlands. Common wading bird species that use the refuge throughout the year or during migration include: great blue heron (*Ardea herodius*), little blue heron (*Egretta caerulea*), green heron (*Butorides virescens*), black-crowned night heron (*Nycticorax nycticorax*), yellow-crowned night heron (*Nyctanassa violacea*), great egret (*Ardea alba*), and snowy egret (*Egretta thula*). There are several small heron rookeries on the refuge.

Sandhill cranes (*Grus canadensis*) are somewhat uncommon in western Kentucky, but in recent years have been observed much more frequently in the area around the refuge.

In addition, on November 24, 2008, the whooping crane (*Grus americana*) made an appearance near the refuge when the Operation Migration ultra-light aircraft and 14 cranes landed in Marshall County. The location was kept secret to protect the privacy of the cooperating landowner and for the sake of the birds. This was stop number 12 on the annual flight between Wisconsin, where the cranes were raised, and Florida, where they will spend the winter. The Wisconsin-to-Florida migration route was changed in 2008 to a more westerly and southerly route to avoid having to cross the southern Appalachians (Operation Migration 2009). With any luck, the whooping crane will become a regular refuge visitor during the spring and fall migrations.

Marsh Birds

Marsh birds are small birds that swim freely in open water. The pied-billed grebe (*Podilymbus podiceps*) is common on the refuge during the fall through spring. The American coot (*Fulica Americana*) is common on the refuge during the fall through spring, but rare during the summer. The coot is a favorite food item of the American bald eagle (*Haliaeetus leucocephalus*), which follows it during migration.

Shorebirds, Gulls, Terns, and Allied Species

Shorebirds are small-bodied with long legs, no webbing on the toes, and short to long bills. Shorebird use on the refuge is limited, but occurs along the river and within saturated agricultural fields for short periods when proper water conditions coincide with the annual spring and fall migration. Species such as yellowlegs (*Tringa* sp.) and Wilson's snipe (*Gallinago* wilsonii) may be found as individuals or in small flocks. Several different species of small sandpipers occur here but sightings are rare. Sightings of the American woodcock (*Scolopax minor*) are uncommon. Killdeer (*Charadrius vociferous*) are very common and present throughout the year.

The refuge is committed to providing additional habitat and has created shorebird management areas at the Environmental Education and Recreation Area and at Mallard Point and Redhead Impoundments. More pronounced shorebird management and habitat improvements are anticipated in the upcoming years.

Raptors

Turkey vultures (*Cathartes aura*), red-tailed hawks (*Buteo jamaicensis*), red-shouldered hawks (*Buteo lineatus*), barred owls (*Strix varia*), and the American kestrel (*Falco sparverius*) are common on the refuge. These species, along with the Mississippi kite (*Ictinia mississippiensis*), screech owl (*Otus asio*), great horned owl (*Bubo virginianus*), and Cooper's hawk (*Accipiter cooperii*) nest on the refuge or in the local area. Other raptors found on the refuge over winter or during the spring and fall migrations include the black vulture (*Coragyps atratus*), Northern harrier (*Circus cyaneus*), broad-winged hawk (*Buteo platypterus*), and sharp-shinned hawk (*Accipiter striatus*).

Reintroduction efforts by the states of Tennessee and Indiana have produced a surplus of American bald eagles that are beginning to colonize suitable habitats in western Kentucky along the Mississippi and Ohio Rivers west and north of the refuge.

The dams and reservoirs that define Land Between the Lakes National Recreation Area, approximately 5 to 10 miles east of the refuge, attract wintering eagles and provide foraging habitat. Each year state and federal conservation agencies host an eagle watch at the end of January.

The eagle nest closest to the refuge (MRS-02a) is located 1 mile east of our boundary in Marshall County. All eagle nests are monitored each year by KDFWR to determine reproductive success rates.

The American bald eagle was removed from the list of threatened and endangered species on August 8, 2007, after critical recovery goals had been met. It may be found in the vicinity of the refuge throughout the year and sightings on the refuge are on the rise.

Mammals

Prior to the settlement of western Kentucky, large mammals, such as bison (*Bison bison*), elk (*Cervus canadensis*), black bear (*Ursus americanus*), gray wolf (*Canis lupus*), red wolf (*Canis niger*), and mountain lion (*Puma concolor*), were present in the area. Between 1850 and the early 1900s, these species were extirpated from the state. Today, with the assistance and support of conservation agencies and groups, the black bear and elk are making a comeback in eastern Kentucky. However, it is highly unlikely that any of the above-listed species will establish sustainable populations on refuge lands. The life requirements of these species include vast amounts of habitat that cannot be met within the existing or proposed refuge acquisition boundary.

During settlement times, the population of white-tailed deer (*Odocoileus virginianus*), beaver (*Castor canadensis*), and other furbearers were greatly reduced by over-harvesting. White-tailed deer and beaver in particular had been extirpated from many states by the early 1900s. Conservation of these animals was achieved through land protection, stocking programs, natural increases, and game laws regulating the circumstances and timing of their harvest. These popular species have increased in number and are now abundant. Harvest is permitted and is in accordance with state and federal laws.

Today, the game mammals found on the refuge are typical of small or fragmented bottomland hardwood forests, upland forests, agricultural lands, moist soils, and native warm-season grasses. These are species that have life requirements that can be minimally achieved with the habitats available and include eastern gray squirrel (*Sciurus carolinensis*), eastern fox squirrel (*Sciurus niger*), swamp rabbit (*Sylvilagus aquaticus*), eastern cottontail rabbit (*Sylvilagus floridanus*), and white-tailed deer. Furbearers present here include opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*), red fox (*Vulpes fulva*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), river otter (*Lutra canadensis*), mink *(Mustela vison),* and beaver. Populations of these species appear to be stable or increasing within the habitats on the refuge.

Nongame mammals that have been documented on the refuge include southern short-tailed shrew (*Blarina brevicauda*), woodchuck (*Marmota monax*), striped skunk (*Mephitis mephitis*), prairie vole (*Microtus ochrogaster*), woodland vole (*Microtus pinetorum*), house mouse (*Mus musculus*), golden mouse (*Ochrotomys nuttalli*), marsh rice rat (*Oryzomys palustris*), cotton mouse (*Peromyscus gossypinus*), white-footed mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus maniculatus*), eastern harvest mouse (*Reithrodontomys humulis*), and meadow jumping mouse (*Zapus hudsonius*). Population trends of these species on the refuge are currently undetermined, but are expected to be consistent with regional trends.

Bats are also prevalent throughout the refuge. Through combined efforts with KDFWR, the Service's Ecological Services Field Office in Kentucky, and various volunteers, refuge staff have identified at least six different species. These include the silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), southeastern myotis (*Myotis austroriparius*), northern myotis (Myotis septentrionalis), evening bat (*Nycticeius humeralis*), and eastern pipistrelle (*Pipistrellus subflavus*). Again, population trends within the refuge are undetermined. However, due to the recent discovery

and spread of white-nose syndrome in the United States, bat populations are being monitored more carefully on the refuge and throughout the country.

Amphibians and Reptiles

A checklist generated by noted KDFWR herpetologist John MacGregor indicates that approximately 84 species of reptiles and amphibians may be found in western Kentucky. The refuge provides habitat for at least 10 species of salamander, 10 species of frogs and toads, 4 species of lizards, 19 species of snakes, and 9 species of turtles. So far, staff have confirmed the presence of over 50 reptiles and amphibian species. See Appendix I for a list of species recorded to date.

Two notable sightings by refuge staff include that of the northern redbelly snake (*Storeria occipitomaculata occipitomaculata*), a species considered "unlikely" to be found in the vicinity of the refuge and the four-toed salamander (*Hemidactylium scutatum*), a species considered "highly unlikely" to be found in the area. The four-toed salamander sighting constituted the westernmost record for Kentucky and only the second record of this species in the Jackson Purchase since it was first recorded in Calloway County in 1970.

Malformed Amphibian Surveys

Amphibians are on the decline worldwide due to habitat destruction, disease, and pollution. Amphibians are particularly susceptible to environmental contaminants because they have very porous skin and spend much of their life in and around water where pollutants tend to concentrate (Boyle and Grow 2008). Biologists have recently noted a sharp increase in the rate of amphibian malformations raising concern about the health of their environment.

Amphibian deformities from mutation or trauma are to be expected and generally occur at rates of 2 percent or less of the population. When biologists in Wisconsin found amphibian populations with malformation rates ranging between 30 and 50 percent in 1993, this led to concerns about local water quality. Since then other studies have documented higher than normal malformation rates in 56 native species across 48 states (Guderyahn 2006).

Biologists in the northeast and mid-west began surveying Refuge System lands for malformed amphibians in 1997, and the survey went nationwide in 2000. Early results indicate that UV-B irradiation, parasites, and chemicals are each responsible for different types of malformations (Guderyahn 2006). Additional studies are being conducted to better understand the malformation phenomena and its implications for maintaining healthy amphibian populations.

Clarks River NWR received funding for, and conducted, its first malformed amphibian survey in 2007 and 2008. The malformation rates of the species sampled from select areas on the refuge were found to be within the norm expected, about 3 percent. Staff will continue to monitor malformation rates in refuge amphibian populations in future years.

Aquatic Species

Refuge waters along the Clarks River provide nursery, spawning, foraging, and overall critical habitat for a wide variety of fish, mussels, aquatic invertebrates, and a host of other water-dependent species. A refuge-specific fish survey was conducted in 2000 and 2002 in conjunction with an environmental contaminants investigation. A total of 54 species was identified, primarily darters, madtoms, and minnows. The stock of two fishes, the river darter (*Percina shumardi*) and redhorse

(*Moxostoma spp.*) is considered depleted. However, individuals of both species were collected in the river on the refuge during the initial fish surveys. See Appendix I for a complete list.

Mainstream Commercial Divers, Inc., of Murray, Kentucky, using grant monies obtained by the Service, surveyed 6 miles of the Clarks River for mussels in 2005. A total of 24 species was collected. Two of them, the pocketbook (*Lampsilis ovata*) and purple lilliput (*Toxolasma lividus*) are state listed as endangered. No federal listed threatened or endangered mussels were found (Lewis 2006). See Appendix I for a complete list of the freshwater mussels that were found.

The refuge encompasses about 40 river miles along the East Fork of the Clarks River, of which only 15 percent has been surveyed. Long-term plans should include more surveys to better document the diversity, distribution, and abundance of this imperiled fauna and to determine habitat suitability for supplementation of existing native mussel populations.

Humans have long harvested freshwater mussels for their meat, pearls, and shells. Native American archaeological sites are sometimes marked by shell middens, or piles of shells left near the banks of a waterway of productive mussel beds. Smaller middens may be found where river otters feed. In some areas of America, freshwater mussels provided capital for rural economies in the 1800s (pearls) and early 1900s (buttons) until over-harvesting curtailed the markets (Strayer et al. 2004). Pearls and buttons from wild mussels were later supplemented by farm-raised or synthetic substitutes. Some commercial markets for wild mussels still exist, especially overseas. These markets have had severe negative impacts on U.S. mussel populations, especially in the Mississippi River and its tributaries.

Freshwater mussels are indicators of good water quality; that is clean water in the proper amount at the proper time. Land use changes that alter rainfall runoff patterns, pollution, and habitat destruction associated with the channelization or damming of rivers will have negative effects on mussels. Native mussels are also impacted by the introduction of exotic species such as the Asian clam (*Corbicula fluminea*) or zebra mussel (*Dreissena polymorpha*), both of which compete for space and resources in the ecosystem (Strayer et al. 2004).

Over-harvesting, habitat destruction, pollution, and exotic species have caused mussel populations to decline. In North America, 13 percent of the freshwater mussel species have gone extinct, 40 percent are imperiled, 17 percent are vulnerable, and 30 percent are considered secure. The rapid nature of their declines and the degree to which they are imperiled has stimulated research to understand the ecology and management of freshwater mussels (Strayer et al. 2004).

Noxious Invasive Species

Noxious invasive species, primarily plants but also some animals, have long been recognized as harmful to man and this is reflected in the passage of federal laws such as the Federal Pest Plant Act of 1957, the Federal Noxious Weed Act of 1974, and the Non-indigenous Aquatic Nuisance Act of 1990. President Clinton signed Executive Order 13112 in 1999 directing all appropriate federal agencies combine resources to prevent the introduction of invasive species and to minimize their impacts on human health, the environment, and the economy.

Concern about the impacts of invasive species is reflected in state laws as well and the Commonwealth of Kentucky is no exception. The laws are too numerous to discuss here but generally speaking the Kentucky Department of Agriculture and each of the state agencies that own and manage land (parks, forests, and highways) are actively involved in the eradication of invasive species and in preventing the introduction or spread of these species.

Two invasive animals found on the refuge include the Asian clam, an exotic freshwater mussel that competes for resources against native mussels, and the European starling (*Sturnus vulgaris*) an aggressive, abundant blackbird that competes with native songbirds for nesting cavities. The starling is also considered a crop pest, a nuisance at urban roosts, and may transmit diseases to swine when raiding feeding stations (Johnson and Glahn 2009).

A national network of non-profit Exotic Pest Plant Councils maintains lists of noxious-invasive species. The blueprint for the councils originated with a task force formed to eradicate the highly invasive melalueca (*Melaleuca quinquenervia*) in southern Florida. The cooperative effort was quite successful and led to the formation of the Florida Exotic Pest Plant Council in 1984. Other states quickly followed suit and later organized regional chapters and a national association. The Kentucky EPPC was established in 2000 and is one of 650 members of the Southeast Exotic Pest Plant Council (Bowen 2007).

Invasive plants monitored by the Kentucky EPPC are classified in one of three categories depending on the level of threat posed: severe, significant, or lesser. Plants considered a severe threat are highly invasive, can displace native plants, and could become widespread in the state. Those considered a significant threat are generally confined to disturbed areas but they may spread into natural areas. Those considered a lesser threat are confined to disturbed areas and do not easily invade natural areas (SE-EPPC 2009).

Refuge staff have identified 23 different species on the Kentucky EPPC watch list in each of the three threat categories, severe (8), significant (5), and lesser (8). For most of the species the populations appear to be small and limited in distribution. The exceptions are Reed Canary grass (*Phalaris arundinace*a) and Japanese grass (*Microstegium viminuem*). Seed from this species are distributed many ways including by floodwater, and as a result they are found throughout the refuge. See Appendix I for a complete list of known noxious invasive plants.

The refuge also contracted with Austin Peay State University for a vegetation survey that was conducted in 2009-2010. One purpose of the survey was to document the presence, abundance, and distribution of invasive plants on the refuge. This information will be used to develop a management program to control or eradicate invasive plants.

The Service encourages the use of native plants for landscaping and gardening. If there are any questions on the use and availability of native plants for these purposes, the refuge should be contacted or the local agricultural extension agent could be contacted.

Cultural Resources

Kentucky has a rich and varied archaeological heritage, with archaeological sites being located in every county of the Commonwealth. To date, archaeologists have recorded more than 19,000 archaeological sites in Kentucky. Prehistoric sites include seasonal camps, villages, burial mounds, and earthworks. Native Americans occupied some of these sites more than 12,000 years ago, while they occupied others less than 300 years ago.

Paleo-Indian (12,000 to 8,000 B.C.) groups are thought to have arrived in Kentucky at the end of the last ice age at least 14,000 years ago. At that time, the climate in Kentucky was much colder and wetter. They are thought to have come into the area on the trail of large game such as mammoth, mastodon, or bison. These animals not only provided meat, but skins for shelter and clothing. During this time period, people lived in small groups and moved frequently. They often carried their belongings in skin bags and built temporary shelters for protection against the elements (Lewis 1996).

By the Archaic (8,000 to 1,000 B.C.) period the climate had become more like it is today. Climatic changes led to the extinction of large animals, such as the mastodon and giant bison. With the extinction of these animals, archaic hunters turned their attention to smaller game such as deer, turkey, and rabbit. They also collected wild plants for food and medicine and began to grow small gardens. Archaic groups made baskets for collecting, transporting, and storing their food.

During the Archaic period, people tended to live in one place for longer periods of time than they had during the Paleo-Indian period. However, they continued to have a mobile lifestyle, never staying in one place for more than a few months. Their camps were located in areas where they could exploit a variety of resources. Smaller seasonal camps also were located in rock shelters.

By 1,000 B.C., some Archaic peoples had begun to experiment with growing their own food. They let squash and small-seeded plants like goosefoot grow on the trash heaps near their base camps. Before long, Archaic women were planting seeds in areas cleared especially for that purpose.

The Woodland (1,000 B.C. to 1,000 A.D.) period is marked by the introduction of pottery. Pottery could be used for cooking and could be made watertight. Surplus food could be sealed into the pottery to protect it from pests. The use of baskets, gourds, and other containers continued. During the Woodland period, more time was devoted to gardening and cultivated plants became an important component of the diet. Plants, such as squash, sunflower, goosefoot, and maygrass, were grown. Woodland peoples also hunted a variety of animals. They built bigger houses and lived in larger communities.

By the Late Prehistoric (1,000 to 1,750 A.D.) period, village life revolved around the planting, growing, and harvesting of corn and beans. These plants supplied the Mississippian people of western Kentucky with as much as 60 percent of their diet. During the Late Prehistoric period people began to construct rectangular houses. They also began to live in large year-round settlements, many of which were stockade. As many as 2,000 people may have lived in some of the large towns. These communities were ruled by hereditary chiefs, who lived on large platform mounds near the center of the community.

The arrival of Europeans on America's eastern shores brought this story to a close. Long before the first explorers and traders arrived, items of European manufacture filtered through the trade networks. Diseases, many previously unknown to the native residents, also outraced the Europeans' arrival in Kentucky. These diseases often wiped out entire villages, and native population levels rapidly decreased. By the mid 1700s, only a handful of native settlements survived in Kentucky. By the early 19th century, the Native Americans had all but disappeared from Kentucky. Their tradition lives on in descendants who were exiled to other states when the area was settled by Euro-Americans and those who continue to live in Kentucky today. Their heritage survives in Kentucky's rich archaeological record.

SOCIOECONOMIC ENVIRONMENT

Clarks River NWR is located in the Jackson Purchase Region of western Kentucky in Graves, McCracken, and Marshall Counties. General social, political, and economic information for each county is provided below (*http://www.epodunk.com/cgi-bin/genInfo.php*). Refuge information is also provided.

GRAVES COUNTY
Graves County was formed in 1824 and has a land area of 556 square miles. The population has grown from 2,504 in 1830 (4.5 people per square mile) to 37,719 in 2009 (68 people per square mile). The population is up 1.9 percent from April 1, 2000. The county seat is Mayfield, with a population of 10,349. The per capita income is $16,834, and the median household income is $36,771. The population is 87.9 percent Caucasian, 4.6 percent African American, 5.8 percent

Hispanic, 0.3 percent Native American, 0.4 percent Asian (USCB 2010). Farmland comprises 78 percent of the county and the average farm size is 162 acres (USDA 2007). Graves County produced a total of $200.9 million in agricultural products and ranked 3rd out of 120 counties statewide in 2004 (KDA 2005).

MCCRACKEN COUNTY

McCracken County was formed in 1825 and has a land area of 251 square miles. The population has grown from 1,297 in 1830 (2.4 people per-square-mile) to 65,880 in 2009 (262 people per-square-mile). The population is up 0.6 percent from April 1, 2000. The county seat is Paducah, with a population of 26,307. The per capita income is $19,533, and the median household income is $41,586. The population is 85.3 percent Caucasian, 11 percent African American, 1.6 percent Hispanic, 0.7 percent Asian, and 0.3 percent Native American (USCB 2010). Farmland comprises 44 percent of the county and the average farm size is 156 acres (USDA 2007). McCracken County produced a total of $21.1 million in agricultural products and ranked 59th out of 120 counties statewide in 2004 (KDA 2005).

MARSHALL COUNTY

Marshall County was formed in 1842 and has a land area of 305 square miles. The population has grown from 5,269 in 1830 (15.5 people per-square-mile) to 31,200 in 2009 (102 per-square-mile). The population is up 3.6 percent from April 1, 2000. The county seat is Benton, population 4,197. The per capita income is $18,069, and the median household income is $43,776. The population is 96.7 percent Caucasian, 1.2 percent Hispanic, 0.2 percent Native American, 0.8 percent African American, and 0.3 percent Asian (USCB 2010). Farmland comprises 45 percent of the county and the average farm size is 113 acres (USDA 2007). Marshall County produced a total of $37 million in agricultural products and ranked 36th out of 120 counties statewide in 2004 (KDA 2005).

CLARKS RIVER NWR

The refuge headquarters is located on U.S. Highway 641, which traverses the refuge from north to south along with the Julian M. Carroll (Purchase) Parkway. State Roads 58, 131, 408, 450, and four paved county roads also traverse the refuge. Access to the refuge boundary is fair but internal access is poor. Existing woods roads provide only limited access and are impassable when wet since they are located in the floodplain.

Four power lines are owned and maintained by the Tennessee Valley Authority, Western Kentucky Rural Electric Cooperative, and the Big Rivers Electric Corporation and one pipeline across the refuge is owned and maintained by Texas Gas. An abandoned railroad right-of-way forms a large part of the refuge's southern boundary. Patchwork ownership and obsolete or missing bridges hinder access along the railroad grade (Figure 4).

The refuge cooperative farming program involved four farmers and approximately 700 acres in 2009. These numbers have fluctuated over time with eight being the highest number of cooperative farmers since refuge establishment and approximately 850 acres as the maximum amount of agricultural land. Attrition of farmers has resulted from retirement or declinations by farmers to continue participation in the cooperative farming program.

Over the past few years, approximately 250 acres of farmland has been reforested, converted to grasslands and grassland buffers, or lost to levee construction. Through the refuge's cooperative farming program, the farmers harvest 75 percent of the crop and the refuge receives 25 percent of the crop. Commercial crop types consist of corn, soybeans, and milo. Refuge shares are taken in corn, millet, milo, and sometimes sunflowers or winter wheat. Farming on the refuge is conducted through a special use

permit, which has conditions that must be met by the cooperator. Examples of conditions that are typically a part of the agreement include: pre-approved chemicals, buffer strips, soil testing, crop and GMO (genetically modified organism)/non-GMO rotation, location of crops, crop type, etc.

The cooperative farming program is designed to provide food and habitat for waterfowl and other wildlife or maintain open status of land until adjacent lands are acquired and full unit management capabilities are available. When agricultural lands are purchased, the existing tenant has first right of refusal should the refuge manager determine the lands acquired will become a part of the cooperative farming program. Should the tenant elect to continue farm operations on the property, all conditions stipulated in the special use permit must be abided by while conducting authorized agricultural activities. If the current tenant declines, farmers already participating in the refuge's cooperative farming program are selected as the operators based on their existing area of operation and the location of the newly acquired cropland. In the absence of existing refuge cooperative farmers, a transparent process for securing cooperators as dictated by Service policy would result. Farm operations may also be conducted by refuge staff should adequate resources be available. All crops planted would remain unharvested in the absence of cooperative farmers and the cooperative refuge farming program.

The Refuge Revenue Sharing Act of June 15, 1935 (16 U.S.C. 715s), Section 401 (49 Stat. 383), provides payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges. The revenues are deposited in a special Treasury account and net receipts distributed to counties as provided by the law and it various amendments. In 2009, the payment-in-lieu-of-taxes to Graves, McCracken, and Marshall Counties were $115, $7,564, and $14,784, respectively.

REFUGE ADMINISTRATION AND MANAGEMENT

LAND PROTECTION AND CONSERVATION

Clarks River NWR is a relatively new station and has an active land acquisition program. Refuge access and management is challenging because of a patchwork of ownership; depending on the location of the acquisition, challenges may be reduced or amplified. As refuge ownership is consolidated overtime, many of the issues associated with a patchwork ownership will be eliminated. Currently, one of the most challenging issues is associated with the abandoned railroad right-of-way, which forms part of the refuge boundary. Use of the railroad right-of-way as the refuge acquisition line has created unforeseen issues in efficient acquisition of this critical asset and its access attributes. Despite the challenges at hand, progress has been made to improve the situation. Approval of the proposed acquisition boundary expansion will alleviate some of the issues encountered in acquiring the right-of-way in its entirety.

Acquisition Status

The refuge acquisition boundary approved by Congress in 1997 includes approximately 19,605 acres. Lands are purchased on a willing-seller basis only. The refuge currently consists of approximately 8,634 acres distributed as follows: Graves County (56 acres), Marshall County (5,970 acres), and McCracken County (2,608 acres). Senator Mitch McConnell has been a strong advocate of the refuge and has managed to secure the Land and Water Conservation Funds necessary to move the project forward. Future land purchases will be made primarily with Land and Water Conservation Funds as appropriated.

Railroad Right-of-Way/Rails to Trails

An abandoned railroad right-of-way runs along the refuge's southern boundary. The right-of-way has a lengthy history that includes original ownership by the Nashville, Chattanooga, and St. Louis Railway (chartered in Tennessee in 1845), a merger with the Louisville and Nashville Railroad in 1957, and a merger with the CSX Corporation in 1980. The right-of-way was abandoned by CSX Transportation, Inc., in 1995.

Kentucky law prohibits ownership of the right-of-way by the railroad company. The landowner, depending on whether it passes through the property or along the boundary, may own the right-of-way in whole or in part. The refuge is interested in using the right-of-way for public and management access. The refuge is also trying to ascertain ownership and has worked with the Service's Division of Realty to determine a fair market value for railroad right-of-way as a stand-alone land unit. Some of the first stand-alone offers on right-of-way were made in 2010, which made significant progress in the attempts to improve refuge access.

Wetland Mitigation

A 100-acre mitigation project has been developed adjacent to refuge lands (just outside the current refuge acquisition boundary) to offset wetland and stream impacts associated with federal and state highway projects; primarily the Highway 68/80 expansion in Calloway, Graves, and Marshall Counties. Southern Conservation Corporation, a non-profit land trust, implemented all phases of the project. The tract was purchased in 2006. Approximately 50 acres of wetlands were reforested and 7,200 feet of stream channel were restored in 2007. The remainder of the tract was planted in native warm-season grasses in the spring of 2008. The tract is now in a monitoring phase.

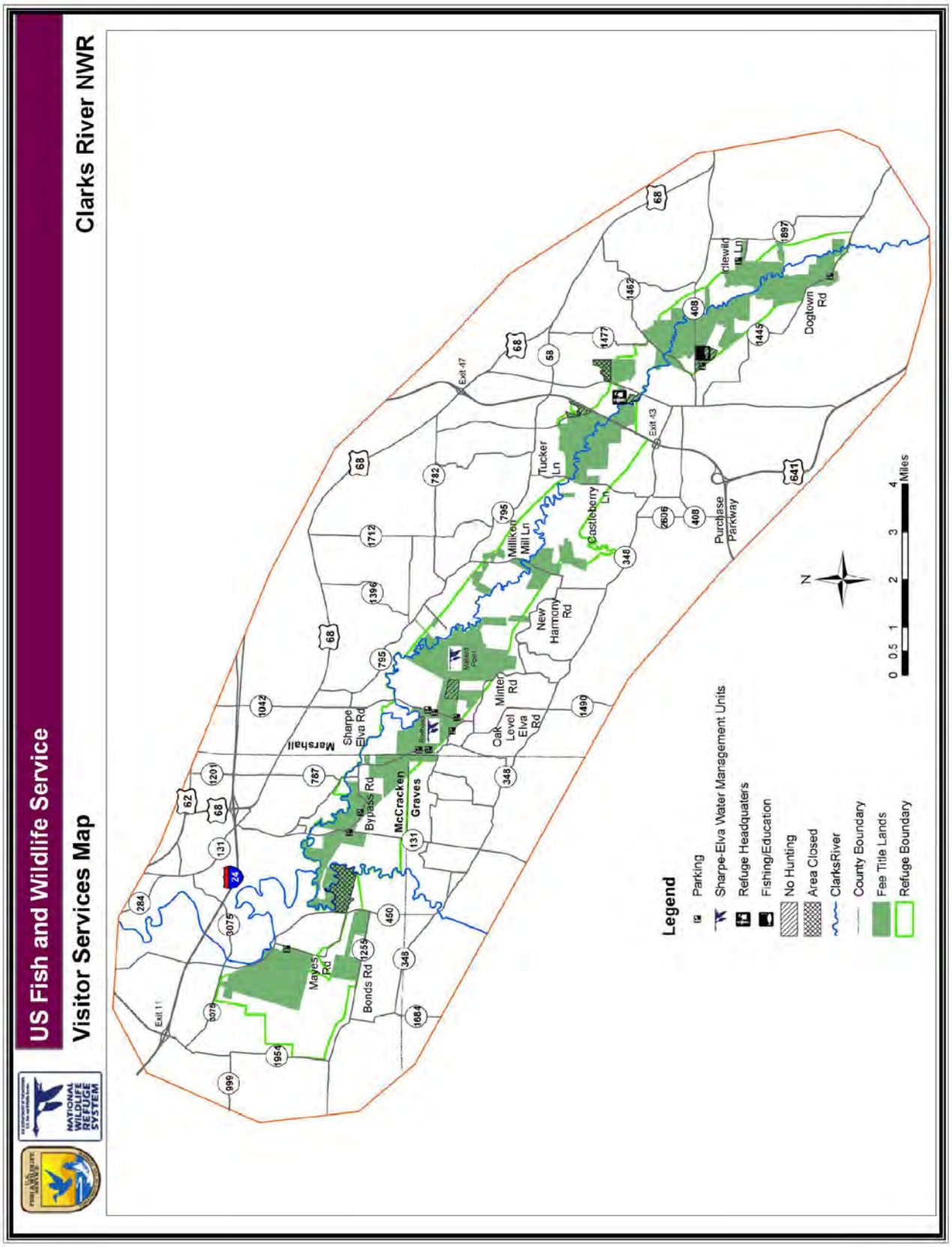
A second mitigation project was developed by USACE to offset the loss of seven acres of forested wetlands associated with the Tennessee Valley Authority's Kentucky Lock Addition. This tract is partially within the refuge's existing acquisition boundary. Low levees were constructed to hinder water runoff on the 25-acre mitigation parcel. Approximately 14 acres were reforested with native bottomland hardwood trees in 2003. Additional trees were planted in 2008, to replace those that did not survive the 5-year monitoring phase. The site has otherwise been successfully transformed and is now being used by numerous wetland-dependent animals.

Mitigation parcels are typically monitored for 5 years to assure that project goals have been achieved. At that time, the lands may be turned over to a federal, state, or local government natural resource agency or to a non-profit conservation organization for management in the public trust. Both of these parcels will likely be added to the Clarks River NWR in the future.

VISITOR SERVICES

Clarks River NWR has a relatively high public use considering the age of the refuge, total acreage, lack of designated public use facilities, and dedicated staff resources to facilitate use. Although the refuge has only been present in the area a few years, efforts have been successful in providing public use and environmental education opportunities for members of the public who have an interest. Public use opportunities include hiking, wildlife observation, wildlife photography, hunting, and fishing (Figure 8).

Figure 8. Visitor services on Clarks River NWR



Wildlife observation and hunting are the most popular activities, and are commonly engaged in during the spring and fall. The seasonal use of the refuge is beneficial to local businesses, as it creates an influx of customers from outside the immediate area. The staff estimates that 40,000 use-days by members of the public occur annually on the refuge. This is a significant number considering the previously mentioned limitations. The activities of anglers, hunters, and wildlife observers also contribute to the national and state economy.

Visitor Orientation

Refuge information, maps, and hunting and fishing regulations are distributed at refuge headquarters on Highway 641 north of Benton and at a parking lot kiosk located at the Environmental Education and Recreation Area on Highway 408 east of Benton. Hunting and fishing regulations are also distributed in local sporting goods stores in the 3-county area. Hunting regulations and maps are mailed to individuals from out-of-town when requested by phone or e-mail. Clarks River NWR is open year-round for permitted activities.

Hunting

Clarks River NWR draws many hunters from neighboring states and from throughout the southeast and northeast. Hunting is the most popular recreational activity on the refuge at this time and opportunities are numerous. The refuge hunting seasons run concurrent with statewide hunting seasons, with only minor exceptions. Deer, turkey, waterfowl, rabbit, and squirrel seasons are the most popular. The refuge utilizes the KDFWR tele-check system to obtain harvest data for white-tailed deer and eastern wild turkey.

All hunts are open to the general public, with the exception of the Mallard Point and Redhead Waterfowl Impoundments (~60 acres), which are managed on a quota system. Approximately 450 acres that are designated for environmental education, research, or are located adjacent to residential or commercial developments, are also closed to hunting.

Fishing

Fishing opportunities exist on accessible reaches of the Clarks River and in the waters of small ponds located on purchased lands such as those found on Sharpe-Elva Road. The fishery associated with available waters is poor, with limited potential for enhancement. However, a 5-acre, universal access fishing pond at the Environmental Education and Recreation Area completed and stocked with fish in 2006 has proven to be very popular with local anglers, especially youth. The pond is managed with assistance from the KDFWR.

Wildlife Observation

Observations are commonly conducted from refuge roadways and unimproved access routes (i.e. abandoned railroad right-of-way and farm roads). The typical users are hunters, birders, family groups, and tourists, all hoping to catch a glimpse of wildlife suitable to their personal interest. Use of the refuge for wildlife observation is second to hunting as a wildlife-dependent activity.

Approximately 2.5 miles of paved, graveled, and dirt trails have been laid out at the Environmental Education and Recreation Area (EERA) to provide additional opportunities for wildlife observation. The well-marked trails are designed to showcase refuge management and habitat restoration techniques. The EERA also features an observation platform, gazebo, restroom facility, environmental education shelter, five interpretive wayside exhibits, warm-season grass plots,

reforestation plots, managed impoundments, cropland management, and wading bird pools. Other improvements will be incorporated as deemed appropriate.

The refuge also has tentative plans to establish a second EERA on the northern part of the refuge when the appropriate lands are purchased. This could possibly link the abandoned railroad right-of-way on the north end of the refuge with a system of trails to be developed along the city of Paducah water front and a McCracken County park. For these plans to become a reality, the refuge must obtain railroad right-of-way ownership, a suitable site must be acquired, refuge funding for EERA development must be secured, and city funding of the connecting off-refuge trails will have to be appropriated.

Wildlife Photography

Only a small number of people engage in this wildlife-dependent activity on the refuge. However, the staff and volunteers have had great success photographing wildlife as part of their jobs and during their spare time. Consequently, a few sites are under consideration for development in order to promote wildlife photography. Photographs provided by staff and volunteers are used in refuge brochures, annual narratives, exhibits, and public presentations.

Environmental Education

The demand for environmental education has increased tremendously over the past several years. This trend is expected to continue as local schools, youth groups, churches, and organizations become more aware of the opportunities that exist on the refuge. In previous years, approximately 800 students were accommodated through on-refuge field activities, and an additional 300 students in classroom activities. Demands upon the refuge for environmental education have overwhelmed existing staff resources, but is deemed as one of the refuge's highest priorities. Contributions from temporary staff and volunteers make the refuge's environmental education work currently being conducted possible.

Each year, since 2004, the refuge has hosted a Connect to Nature program for students from Wingo Elementary School in Wingo, Kentucky (Graves County), North and South Marshall Middle School in Benton, Kentucky (Marshall County), and Concord Elementary in Paducah, Kentucky (McCracken County). The program began as a pilot project and partnership with the Western Kentucky University, Regional Science Resource Center, and was funded by a Nature of Learning Grant from the National Fish and Wildlife Foundation, and other contributions provided by the Service, the National Wildlife Refuge Association, Friends of Clarks River National Wildlife Refuge, and the Keystone Science Foundation. The pilot program was deemed a huge success. Since that time, the Friends of Clarks River National Wildlife Refuge has assumed full responsibility for the program. More than 1,000 students have been through this formal program, which begins in the classroom and concludes with hands-on activities in the field and land stewardship projects.

One objective of the Connect to Nature Program is to inform local teachers about value of the resources at the refuge and its potential for educational opportunities. This goal is accomplished by providing informational meetings for teachers, held before and after the program. A second objective is to connect students and teachers to the environment. Activities include a bird banding demonstration, a water sampling exercise, exciting outdoor activities, and an aquatic invertebrate survey. All activities are designed to be hands-on, to promote a connection to the outdoors and increase environmental awareness and stewardship of the land.

The morning portion of the program provides students with an opportunity to learn about the importance of wetland forest habitat to migratory birds just returning from a long winter in South America. The staff and volunteers demonstrate how to capture, identify, and band birds, and explain the importance in the collection of such data. After a picnic, students take water samples to check pH, use dip nets to find out what animals live in the Clarks River, and discuss how this data can help scientists determine the quality of the water. All activities are hands-on and emphasize conservation issues as well as human impacts to the environment.

Environmental Interpretation

Wayside exhibits that interpret bottomland hardwood forests, grasslands, and native warm-season grasses, the plight of migratory birds, the common water birds found on the refuge, and the status of wetlands in America and Kentucky have been placed at various points along the trails at the EERA. Three panel kiosks with interpretive panels have also been erected at the EERA and headquarters location. Future exhibits are planned for other areas of the refuge.

Other Uses

Uses on the refuge that may be considered non-wildlife dependent uses are minimal. Horseback riding and hiking are two uses that could be considered non-wildlife dependent, depending on the user's intentions. Horseback riding is permitted but only on graveled trails or roads maintained by the refuge, such as Dunn Road in the Benton Unit. Walking or hiking is observed on a frequent basis at the EERA along the area's graveled and paved trails. All non-wildlife dependent uses are subject to a compatibility determination.

PERSONNEL, OPERATIONS AND MAINTENANCE

Because of its success and critically important mission, the Refuge System has experienced significant growth over the past century—expanding from one 5-acre island in Florida to 551 units nationwide that encompass over 150 million acres—all dedicated to conserving wildlife resources for future generations. The Southeast Region of the Service currently manages 128 national wildlife refuges, encompassing nearly 4 million acres. This is 24 percent of the total number of refuges, making the Southeast Region the largest of the nine regions. The southeastern tefuges also host 30 percent of the total visitation nationally.

After several years of budget increases leading up to the centennial of the Refuge System in 2003, the budget experienced a down turn. The nationwide budget decline, and the ever-rising cost to conduct business, continues to limit the management capability of our national wildlife refuges, affecting their ability to achieve the purposes for which they were established. More than one third of the Southeast Region's national wildlife refuges have no full-time personnel assigned to them. One half of the Southeast Region's refuges have three or fewer full-time staff. More resources would enble the staff to operate the types of facilities that accommodate application of conservation measures and visitor services initiatives.

Staffing

Minimal core staff should include a refuge manager, a biologist, a skilled equipment operator, a law enforcement officer, and an administrative officer. Many refuge-specific factors then dictate the need for staff in addition to core staff, such as refuge purpose and agency goals/objectives, refuge location (i.e., urban or rural and remote with limited access), public use or visitation, major issues and threats, habitat restoration/improvement needs, endangered species recovery, environmental

education/interpretation demands, and facility upkeep and maintenance requirements (i.e., roads, culverts, and mowing).

The Clarks River NWR, after more than a decade, has achieved what could be considered minimum core staffing levels. However, growth of refuge programs has already created workloads exceeding core staff capabilities. This is not uncommon, as new refuges tend to experience rapid growth for many years after establishment as the land base grows, an infrastructure is developed, and as people learn what the refuge has to offer.

The refuge currently has five full-time permanent employees (Table 2). The refuge also utilizes numerous volunteers and an average of three to five part-time temporary employees. Additional full-time staff is required to ensure permanence and progression of refuge programs, and to ensure the Clarks River NWR wholly contributes to the Service mission and as a conservation unit of the Refuge System. In 2008, a national workforce planning exercise was conducted to estimate full-time staff required to administer each refuge nationwide at optimal levels. The model developed used information submitted in the Refuge Annual Performance Plan. Numbers predicted were then evaluated for "fatal errors" and adjustments made within each region under nationally agreed-upon criteria. Regional adjustments were made to the Clarks River NWR prediction outcome. When compared to similar-sized refuges of similar complexity, the prediction results were inconsistent with refuge needs, because the Clarks River NWR is a relatively new refuge with acreage, use, and program activities increasing steadily. After adjustments, a full-time staff of ten permanent employees was recommended for operation and maintenance of Clarks River NWR.

Table 2. Permanent full-time staff at Clarks River NWR

2010 Funded Positions	Status
Refuge Manager	Full-time Permanent
Assistant Refuge Manager	Full-time Permanent
Office Assistant	Full-time Permanent
Law Enforcement Officer	Full-time Permanent
Engineering Equipment Operator	Full-time Permanent
Seasonal Interns (3)	Part-time/ Temporary

Funding

Clarks River NWR had a budget of approximately $916,192 in 2009 (Table 3). The funding covered employee salaries and benefits, operational expenses, special projects, biological studies, and visitor outreach. Annual funding outside of special projects or one-time funding for 2009 was $537,892. Details are provided below.

Table 3. Clarks River NWR 2009 budget allocations

	Description	FTE*	Amount
1122*	Fish and Wildlife Biologist (term)	0.5	$43,400
1261	Refuge Operations – Administration	2.0	$224,800
1262	Refuge Operations – Maintenance	1.0	$124,200
1262*	Equipment and Vehicle Replacement	0.0	$26,600
1262*	Equipment Rental	0.0	$10,000
1263	Refuge Operations – Public Use	0.5	$38,100
1264	Refuge Operations – Law Enforcement	1.0	$147,300
1265*	Conservation Planning	0.5	$59,500
1664	ISP Reimbursement	0.0	$1,320
2821*	Facility Enhancement	0.0	$180,100
2986*	Storm Repair	0.0	$47,600
4144*	AARA	0.0	$6,100
4524	Federal Junior Duck Stamp Contest	0.0	$595
6860*	Revenue Sharing Forestry	0.0	$5,000
8610	Quarters	0.0	$1,577
Total Refuge Operating Budget 2009		5.5	$916,192

**Special projects or one time funding; not considered as annual allocation for Clarks River NWR*

Facilities

The headquarters for Clarks River NWR is located in Benton, Kentucky. The building was constructed in 2002 and serves as the primary point of contact for most refuge visitors. A new maintenance shop was constructed in 2007 to replace the old shop, a horse barn, acquired with a tract of land located on Highway 408 east of Benton. The shop is adequate to meet current refuge needs and will likely remain so for many years to come. A four room bunkhouse was also constructed in 2008. This facility has tremendously facilitated the refuge's ability to recruit temporary help and foster research partnerships. The refuge currently maintains about 1.25 miles of gravel road at Mallard Point and several small parking lots scattered across the refuge. Additional parking lots are needed on certain public roads to provide visitor access and enhance enjoyment of the refuge. The public roads are narrow, shoulders are often non-existent, and the terrain does not permit visitors the latitude to simply pull off of the road safely out of the way of traffic. Future plans include construction of a full-scale visitor's center adjacent to the Purchase Parkway overlooking the Benton Bottoms, a part of the Clarks River floodplain.

Today, the showcase of the refuge is the EERA on Highway 408 east of Benton. The EERA features a 5-acre, universal access fishing pond completed and stocked in 2006, approximately 2.5 miles of marked pavement, graveled and dirt trails, an outdoor gazebo, a wildlife observation platform, an environmental education shelter, and a public restroom facility. The EERA is

comprised of demonstrative native-warm season grass plots, moist-soils units, wading bird pool, a bottomland hardwood restoration site, and a small field, all of which are managed to attract wildlife and to show visitors how the refuge is managed and how private lands may, in turn, be managed. Development of the EERA is an ongoing process and improvements will be made as time and funding permit.

Refuge Revenue Sharing

The Refuge Revenue Sharing Act of 1935 (16 U.S.C. 715s; 49 Stat. 383) established a procedure for making payments to counties with revenues derived from the sale of products on refuge lands located in the county. The Act has been amended over the years to include all Service-owned lands and a broader definition of refuge products. Counties where the Service has purchased land are currently paid 75 cents per acre; three-fourths of one percent of the appraised value of the land; or 25 percent of the net receipts of revenue produced from the land, whichever is greater. If the receipts generated on a refuge do not meet the entitlement amount, Congress may approve appropriation of the funds necessary to bridge the shortfall.

The three counties in which the refuge is located are enrolled in the Automated Clearing House Payment System and revenue sharing funds are disbursed to them electronically. The program was implemented in 2006. The revenue sharing payments by county for the past 3 years are shown below in Table 44.

Table 4. Refuge Revenue Sharing payments in Graves, Marshall, and McCracken Counties, Kentucky

Fiscal Year	Graves	Marshall	McCracken	Totals
2009	$115	$14,784	$7,564	$22,103
2008	$122	$15,733	$6,813	$22,668
2007	$157	$20,191	$7,726	$28,074

Coordination/Cooperative Programs

The refuge staff coordinates and cooperates extensively with state agencies, tribes, landowners, the public, conservation groups, and local agencies and organizations. Clarks River NWR is a component of several important regional or ecosystem planning and management efforts, and works with all levels of government and non-governmental organizations and private citizens to accomplish goals and objectives specific to those efforts.

III. Plan Development

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

The planning team identified a number of issues, concerns, and opportunities related to fish and wildlife protection, habitat restoration, recreation, and management of threatened and endangered species. Additionally, the planning team considered federal and state mandates, as well as applicable local ordinances, regulations, and plans. The team also directed the process of obtaining public input through public scoping meetings and personal comments. All public and advisory team comments were considered; however, some issues important to the public fall outside the scope of the decisions to be made within this planning process. The team has considered all issues that arose through this planning process, and has developed a plan that attempts to balance the competing opinions regarding important issues. The team identified those issues that, in the team's best professional judgment, are most significant to the refuge. A summary of the significant issues for Clarks River NWR follows.

FISH AND WILDLIFE POPULATION MANAGEMENT

Baseline Data: The absence of baseline data is an issue of concern. Consequences of active or inactive management are minimally understood. Past refuge research/studies/surveys consist of a fish survey (2000 and 2002), mussel survey (2005), alligator snapping turtle survey (2004), amphibian survey (2002), malformed amphibian surveys (2007-2008), migratory songbird production and survival (MAPS) data (2003-present), cerulean warbler surveys (2005-2006), waterfowl surveys, bat surveys (2006-2009), vegetation surveys (ongoing), forest inventory (2010), and a contaminant survey (2000-2005). Copies of reports generated from these activities were available during the biological review.

Active waterfowl management and shorebird management potential on the refuge are limited by lands in current ownership, non-contiguous ownership, access, and staff resources. The management of waterfowl and shorebirds on the Clarks River NWR is a priority refuge objective. Recommendations and actions that achieve refuge/regional/national goals associated with management of these species on the refuge are priority, but must be balanced with other refuge purposes.

Threatened and Endangered Species: Clarks River NWR is located within the historic ranges of the Indiana bat (*Myotis sodalis*), the gray bat (*Myotis grisescens*), and the American burying beetle (*Nicrophorus americanus*), all listed by the Service as endangered. Transient species include the whooping crane (*Grus americana*), which is listed as endangered as part of a Non-essential Experimental Population, and the American bald eagle (*Haliaeetus leucocephalus*), which was delisted in 2007, but is still protected under the provisions of the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.

Refuge habitats may incur some summer use by Indiana bats. Although surveys have been conducted, no data exist to make this determination. Fifteen Indiana bat maternity boxes have been erected on private properties adjacent to the refuge. Monitoring for use of these boxes, and additional mist net surveys, will aid in making determinations pertaining to use of refuge habitats by Indiana bats.

No other threatened and endangered species are known to occur on the refuge; however, refuge-specific survey data are minimal. A carrion beetle survey was conducted in the summer of 2010. This survey was intended to confirm the presence/absence of the American burying beetle (*Nicrophorus americanus*) and document other carrion beetle species found on the refuge. Other priority surveys are continuing to be identified to ensure appropriate management actions are included in long-term planning efforts.

Biological Review Comments:

- Need baseline data on fish and wildlife populations
- Nuisance beaver management.
- Migratory bird management – migratory songbirds, waterfowl, minimal shorebird habitat.
- Resident species management – deer, turkey, and other game species.
- Indiana bat use on the refuge
- Aquatic species – darters, fish, and mussels

Public Comments:

- Need baseline data on fish and wildlife populations
- Too many deer
- Depredation issues on crops and residential fruit, shrubs, etc., from too many deer
- Coyote populations seem to be increasing
- Fox populations seem to be increasing and pose a danger to people; fox using ground hog tunnels in barns
- Refuge has brought a large influx of wildlife
- There needs to be an effort on adjacent lands to control wildlife populations – cooperation between hunters and landowners

HABITAT MANAGEMENT

Forest Management: The majority of refuge habitat consists of bottomland hardwood forests. Minimal data have been available on existing stands, with the exception of the mono-culture pine, sycamore, sweetgum, and alder plantations purchased from Westvaco. A forest inventory of the refuge was conducted in April 2010. Results of the inventory will be available for consideration in 2011. Once the information is received, participating foresters and biologists will be further consulted on management recommendations. A forest treatment approach to address remnant Westvaco plantations will be the refuge's highest priority; additional forest habitat management recommendations that most appropriately achieve the goals and objectives of the refuge and that support regional and national plans will be implemented. Recommendations will need to address forest plantations, mixed hardwood stands, and use of fire and reforestation. Considerations associated with the endangered Indiana bat must also be incorporated into forest improvement recommendations.

Cropland Management: Approximately 8 percent (700 acres) of refuge habitat is in the form of agricultural crops. Farming is conducted on a sharecrop basis, with the refuge receiving one-quarter of the crop grown. The refuge's share is left standing in the field. Crops planted consist of corn, soybeans, and on occasion milo, Japanese millet, sunflowers, or wheat. A significant number of crop fields is subject to annual spring flooding, crop failure, and often require replanting. Issues associated with agricultural fields subject to annual spring flooding are reduced crop rotation and inability to produce wheat crops. Efforts are made to reduce cooperative farming acreage in these areas through reforestation.

Grassland Management: Less than one percent of current refuge lands is estimated to be appropriate for grassland management. Approximately 80 acres have been converted from fescue or agricultural land to native warm-season grass fields since the refuge was established. Management consideration given prior to establishment of these habitats includes soil types, flood risks, fragmentation, and proximity to similar habitat types.

Flooding is a significant concern among local communities and landowners in the surrounding region. These concerns are most pronounced within the agricultural community, city of Benton, Kentucky, and community of Sharpe-Elva. Although flood events within the Clarks River floodplain are anticipated, the severity and frequency are perceived to have increased over time. Fault for increased flooding has been placed on community development in the upper watershed of the Clarks River, loss of floodplain functions resulting from agricultural activities, and on the USACE unwillingness to consider channelization projects and/or the USACE dam system on the big rivers to which the waters of Clarks River drain. It is also believed that local perception may form that the refuge's presence also contributes to local flooding issues through refuge management practices and regulation of floodplain activities on refuge lands.

Biological Review Comments:

- Farming – pesticide use, farmer restrictions, cooperative farming, where and how much to farm (700 acres currently), loss of area agricultural lands
- Need to develop moist-soil and active water management areas – develop wetland infrastructure and management capabilities
- Forest management – forest inventory, plantations (pine, hardwood), fire, and reforestation
- Invasive species concerns – mostly terrestrial, reed canary grass, Japanese grass, etc.
- Management – fire, burning native warm-season grass, forests
- Work within Service resources to improve forest conditions (timber harvesting, fire, reforestation)

Public Comments:

- Control and introduce flooding to some of the hardwood bottoms for migratory waterfowl to create a unique and beneficial resource
- Install flood control structures to allow seasonal flooding of hardwood bottoms
- Does not like the fact that all the farm fields are grown up into weeds; believes fields should be leased back to farmers to raise corn for wildlife

RESOURCE PROTECTION

The refuge and its programs have grown rapidly since the refuge was established. This growth can be attributed to congressional, state, and community support that has, and continues to exist, for the Clarks River NWR. Management activities are followed closely by refuge supporters to ensure that growth and positive direction are sustained. Because the refuge is the only representative land base of the Service located solely within Kentucky, interaction with supporters (governmental and non-governmental) has been facilitated and led to close working relationships. These relationships have been, and will continue to be, important in maintaining the principles on which the refuge was established. Awareness of the refuge's presence is constantly increasing. The recognition of such may be attributed to the environmental education program, which has been given high marks from those who have assisted or observed, and from those with children that have actively participated. The success of the environmental education program is remarkable and has resulted in numerous requests by teachers from Murray to Paducah and surrounding communities. The growth in this program contributes significantly to the refuge's resource protection efforts.

Lack of refuge access is a critical issue partially attributed to the original delineation of the refuge's acquisition boundary. The acquisition boundary runs parallel to two major roadways on the outer boundaries of the Clarks River floodplain. The distance from the roadway varies, but is such, that the use of these public rights-of-way does not accommodate refuge access. Minimal other improved access opportunities exist. The lack of refuge access has proved a barrier to refuge management. Issues associated with access pose problems with effectively collecting biological data, management of refuge programs, public use of the refuge, regulation of approved access, and providing universal accessibility to refuge users. Access and other issues unforeseen during the delineation of the original acquisition boundary and refuge establishment are readily apparent to those charged with the administration and management of the Clarks River NWR today. In an effort to address the issue of access, the refuge has submitted a preliminary project proposal to expand the current refuge boundary. The proposal has a three-fold purpose or objective: (1) Improve public and management access, (2) establish upland buffers critical to floodplain health and over-wintering wetland wildlife, and (3) enhance the lower floodplain of the Clarks River and protect/restore bottomland hardwood habitat

The refuge has an active land acquisition program. The number of landowners within the acquisition boundary that own large tracts of land are limited. Most tracts that have been purchased have been 200 acres or less, with the exception of the Westvaco tracts. The refuge typically has three to ten acquisition projects at various stages of the acquisition process at any given time. Approximately 50-75 percent of these projects lead to successful acquisitions. Time-lines associated with the acquisition process negatively impact the refuge's land acquisition program and often cause undue landowner frustration. The majority of the refuge is located within the floodplain of the Clarks River and is not conducive to residential or commercial development; despite this, lands immediately adjacent to the refuge continue to experience rapid residential development. Urban sprawl is not limited to the region of refuge establishment, but is a common threat being experienced throughout the Central Hardwoods BCR (Fitzgerald et al. 2003). It is anticipated that this growth will continue, eventually leaving the protected habitat of the refuge as an isolated island.

The upland habitat immediately adjacent to the floodplain provides a temporary safe-haven during severe flood events for wildlife, as well as overwintering and breeding habitat, required by many wetland-dependent species. Land use associated with uplands immediately adjacent to floodplains also impacts the viability of these lowland wetland complexes. Run-off of exposed lands can deposit sedimentation, residential sewage, and household contaminants in the wetlands, which can alter plant communities. Many contaminants can more readily enter the floodplain area following heavy rains where sufficient buffers to the wetlands do not exist, especially if dwellings exist in close proximity and/or excessive nutrification from agricultural activities (i.e., row crop, cattle, hog) occurs. Uplands adjacent to wetlands serve many functions, which are critical to the overall function and health of the associated wetland. It is believed that changes to the existing refuge acquisition boundary and proactive private land conservation initiatives on adjacent upland areas, where potential problems may exist, have the best potential to reduce future impacts associated with urban sprawl or other unforeseen land use on the purposes for which Clarks River NWR was established.

Biological Review Comments:

- Global warming concerns
- Garbage dumping – (household and construction debris)
- Mineral rights
- Perception of flooding associated with Clarks River- clogged with debris and see more flooding than we should; perception of promoting flooding; public perceives dredging as possible solution

- Sedimentation and water quality – Murray State University studying upper watershed above refuge
- Restoration of floodplain will need velocity reduction – storage areas are mostly on private lands
- Private lands protection and partnerships – increase funding and backing for this program; work with partners to get some water storage and upland buffers
    - Hydrological studies and assessments needed
    - Need to explain and educate about floodplain restoration
    - Delineation of acquisition boundary address through expansion
    - Access address through expansion
    - Acquiring land
    - Boundary line establishment
    - In-holdings – key tracts identified in biological review
    - Management capabilities
    - Infrastructure
    - Protection of additional bottomland and aquatic habitat of significance

Public Comments:

- Adjacent landowners are being negatively impacted by water drainage issues
- It is difficult to drain land and farm
- Solution to drainage problem – Clarks River should be straightened from Dog Town Road to Paducah and cleaned out
- Fencing to prevent free ranging of respondents' cattle
- Trespassing on lands adjacent to refuge, destroying crops, and tearing up roads
- Drainage system on Clarks River is less than desired for agricultural operations
- Water drainage in Marshall County is not good
- Prevent dumping/pollution in the area that would harm wildlife
- Concerned with poaching - prevention
- Concerned with illegal dumping and river pollution

VISITOR SERVICES

One of the most critical issues facing the refuge is the growth and demand associated with ongoing refuge programs, especially hunting and environmental education. Participation in refuge programs and demand for new programs by the public have rapidly exceeded staff capabilities. Demands on resources are not anticipated to subside in the immediate future, nor are expectations of the refuge's perceived obligations. The potential to positively impact conservation and achieve the goals of the refuge is believed best accomplished through the refuge's environmental education program. Over 1,000 students each year experience the refuge through the environmental education program. This number could be easily increased should the necessary resources become available. More than 40 schools are located within 20 miles of the refuge boundary. Only a handful of these schools has had the opportunity for formal interaction. Refuge staff, volunteers, and temporary hires place requests for conservation education, as one of their highest priorities.

Access to refuge lands limits some potential user groups from enjoying the refuge. The lack of roads and trails is a product of the extremely wet nature of refuge lands and delineation of the original approved acquisition boundary. Improved access is another high priority of management.

Hunting opportunities are numerous and increase with each new purchase of land and improvement of water management capabilities. Current seasons follow KDFWR season structures with only minor modifications. Demand has not exceeded the current available opportunity level, but will continue to be monitored. Should excessive use lead to reduced hunting quality, crowding or over-harvest, additional quota hunting will be implemented.

Fishing opportunities are limited on the refuge. This is partially a result of poor access but also a result of changes that have occurred in the river over the past few decades. Some of the older generations speak of the excellent fishing opportunities that used to exist in the Clarks River. They describe deep pools of water that for the most part no longer exist. The desire to recover this lost fishery is evident; however, it may be very difficult to achieve. A fishing pond was developed off of Highway 408 that is easily accessed and used extensively by youth anglers. Several small ponds have been acquired with tracts of land purchased by the refuge over the past few years. These ponds are scattered around the refuge, but offer limited fishing opportunities because of their size.

Competing interests is a factor of management concern. Members of the public, community leaders, and local conservation groups encourage the management of refuge lands that promotes activities most suited to their interests/missions. Members of the general public see the refuge as a place to recreate, wildlife-dependent or otherwise. The most common issues resulting from non-wildlife-dependent recreation are associated with all-terrain vehicle use and horseback riding. Horseback riding is only allowed on improved refuge roads or sections of the abandoned railroad track owned by the refuge. All-terrain vehicles are not permitted on refuge lands unless users are mobility impaired. All-terrain vehicles are regulated by special use permit. Community leaders seek active management that promotes tourism and the local economy. A large number of people come to the area to participate in the refuge's hunting program each fall. Although the land-base associated with the refuge is limited, use by non-local hunters is substantial. The most popular hunting is for waterfowl and white-tailed deer. Private conservation groups compete for implementation of on-refuge management strategies that favor individual species or species groups (Quail Unlimited, Ducks Unlimited, National Wild Turkey Federation, Raccoon Hunting Associations, Kentucky Ornithological Society). Management activities on the refuge are followed closely by many of the groups that have chapters in the Jackson Purchase region.

Biological Review Comments:

- Friends group – improve growth and membership, very supportive
- Visitor and staff access
- Maximize usage opportunities
- ATV use only for mobility impaired
- Fishing access and opportunities limited – river blockage makes opportunities difficult
- Hunting – keep program
- Visitor center – congressional backing
- Total of 40-50 schools within 20 miles of refuge
- Huge demand for environmental education and interpretation programs
- Limited land base to manage wildlife from a population standpoint but excellent migratory bird habitat and great opportunities for environmental education and interpretation
- Access for hunting limited on refuge

Public Scoping Comments:

- Need environmental education opportunities for elementary, middle, and high school students
- Need full-time park ranger/environmental education staff or need to train more teachers
- Offer access for nature hiking and biking on the northern parts of the refuge

- Create bike and/or jogging trail along railroad bed; provide parking and signage for people
- Allow muzzleloader/modern firearm hunting though quota hunt/draw similar to Land Between the Lakes
- Move spring turkey hunts to a quota then open hunting similar to Land Between the Lakes
- Maintain, allow, and expand hunting (numerous comments)
- Further develop the property for public waterfowl hunting – park and use area as first come first served
- Maintain areas for wildlife photography
- Do not allow use of all-terrain vehicles or horseback riding, among others, without hunting and wildlife focus
- Continue to allow turkey hunting
- Add park ranger (law enforcement) and public use specialist
- Need more infomation displayed on appropriate uses
- Allow electronic calls for varmint hunting (coyotes and crows)
- Allow center fire rifle calibers for varmint hunting; to deny this is to discriminate against certain sections of the hunting public
- Do not create refuges, ever
- Set up area for target shooting
- Make fishing a substantial part of the plan
- Administer hunting and fishing programs in a scientific program in partnership with KDFWR
- Create two nice picnic areas and scenic hiking trail

REFUGE ADMINISTRATION

The Clarks River NWR is a newly established refuge viewed favorably by many members of the community, state/federal entities, and private conservation groups in the region. The level of acceptance achieved has been a result of the Service's efforts to fulfill promises and maintain its intentions as presented during public meetings held in the late 1990s. This has been critical in relationship building and in ameliorating the degree of distrust associated with past government actions in the region. Concerns and negativity associated with the refuge during the establishing period most often focused on subjects relative to land condemnation, loss of economically productive lands, the potential of increased flooding from refuge management/land protection activities, and the regulation of public use. Management of the refuge, thus far, has been sensitive to these issues, and will continue to be if the success achieved is to be maintained.

- Priority positions to add: park ranger (public use), biologist, biological technician, maintenance worker, park ranger (law enforcement).

Wilderness Review

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The Clarks River NWR is narrow and linear in shape, is bisected by several paved public roads and utility lines and therefore has no roadless area of 5,000 contiguous acres. There are no areas on the refuge that meet the eligibility criteria for a wilderness study. Therefore, the suitability of Clarks River NWR lands for wilderness designation is not further analyzed in this plan. The results of the wilderness review are included in Appendix H.

IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats considering the needs of all resources in decision-making. But first and foremost, fish and wildlife conservation assumes priority in refuge management. The Improvement Act requires the Service to maintain the ecological health, diversity, and integrity of refuges. Public uses are allowed if they are appropriate and compatible with wildlife and habitat conservation. Congress identified six priority wildlife-dependent public uses. Hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are therefore emphasized in this Draft CCP/EA.

Described below is the Draft CCP for managing the refuge over the next 15 years. This proposed management direction contains the goals, objectives, and strategies that will be used to achieve the vision of the refuge.

Three alternatives for managing the refuge were considered. Each alternative is described in the Alternatives section of the EA.

ALTERNATIVES FOR MANAGING CLARKS RIVER NWR

The three alternatives considered for managing Clarks River NWR are as follows:

A - No Action (Current Management)
B - Optimize Wildlife-dependent Public Use and Management
C - Maximize Wildlife-dependent Public Use

Each of these alternatives is described in the Alternatives section of the Environmental Assessment (Section B). The Service chose Alternative B as the proposed management direction.

Implementing the proposed alternative would result in management based on sound science for the conservation of a structurally sound and ecologically diverse bottomland hardwood habitat (along with managed wetlands and associated prairies) for migratory birds and resident wildlife. A focused effort would be put toward reducing invasive species threatening the biological integrity of the refuge. Baseline inventorying and monitoring of management actions would be completed to gain information on a variety of species from reptiles and amphibians to game animals, as well as species of concern. Several cooperative projects would be conducted with universities, KDFWR, and other agencies and individuals to provide biological information to be used in management decisions. When compatible, the wildlife-dependent recreational opportunities for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation would be provided and enhanced while achieving refuge purposes.

VISION FOR CLARKS RIVER NWR

The Clarks River National Wildlife Refuge will be managed to restore, enhance, and conserve bottomland hardwood forests and associated wetland and upland habitats within the East Gulf Coastal Plain and Central Hardwoods Ecoregions as part of the National Wildlife Refuge System. These habitats support a variety of migratory birds, species of special concern, and other associated wildlife and plants. This effort will be enhanced through partnerships and public support by

emphasizing habitat management, environmental education and interpretation, and opportunities for hunting, fishing, and wildlife observation and photography.

GOALS, OBJECTIVES, AND STRATEGIES FOR CLARKS RIVER NWR

The goals, objectives, and strategies presented for Clarks River NWR are the Service's response to the issues, concerns, and needs expressed by the planning team, the refuge staff and partners, and the public; each are presented in hierarchical format. Chapter V, Plan Implementation, identifies the projects associated with the various strategies.

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the Improvement Act, the mission of the Refuge System, and the purposes and vision of Clarks River NWR. With adequate resources as outlined in Chapter V, the Service would accomplish these goals, objectives, and strategies within the next 15 years.

FISH AND WILDLIFE POPULATION MANAGEMENT

Goal A. Fish and Wildlife Population Management. Protect, manage, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within the Clarks River NWR and surrounding Clarks River Watershed.

Objective A-1 Migratory Waterfowl - Provide adequate flooded hardwoods, moist-soil, and agriculture habitats to meet the foraging needs of 5,000 ducks for 110 days by 2012 and 10,000 ducks by 2020. Collect inventory data during key migration, wintering, and nesting periods in coordination with KDFWR mid-winter waterfowl aerial surveys.

Discussion: The refuge is located within major waterfowl routes of the Mississippi Flyway, and it is not uncommon for nearby state/federal management areas to harbor thousands of ducks and geese during migration (fall, winter, spring). Additionally, wood ducks and hooded mergansers are year-round residents, nesting and feeding within the forested wetlands and adjacent open lands. Specifically, refuge lands are part of the Tennessee Cumberland Ecosystem, the Central Hardwoods Conservation Region, and the Lower Mississippi River Joint Venture, each having goals associated with the conservation of North America waterfowl populations.

Waterfowl conservation is one of the primary purposes of the refuge and there is management potential for ducks and geese, but the degree of focus should be commensurate with system-wide needs/contributions. To meet the varying needs of waterfowl (foraging, sanctuary, pairing and mating, molting, and protective cover, roosting, and brood rearing), a complex of natural and managed habitats (moist-soil, agriculture, flooded wetlands, natural aquatics, shallow water, open areas for geese, etc.) is required. Some degree of solitude, where disturbance is minimal, is also a necessary component to ensure that several life-history requirements are met.

Strategies:

- Determine the feasibility of a multi-agency, multi-refuge cooperative aerial survey (inventory protocol) during key months (late-October through mid-February). Pool resources for monthly or twice monthly (fall/winter) aerial inventories (archive the data).
- Continue aerial mid-winter survey using the current Southeast Region Waterfowl Survey Protocol for Refuges.
- Hire biologist and/or biological technician to assist with surveys and data management.

- Design and implement a protocol for estimating wintering waterfowl use of flooded forests.
- Explore opportunities for land acquisition along the West Fork of the Clarks River which has significant potential for waterfowl management
- Develop inventorying and monitoring plan for waterfowl species utilizing refuge lands.

Objective A-2 Waterfowl Sanctuary - Maintain three sanctuary sites throughout the refuge.

Discussion: Waterfowl need sanctuary from hunting pressure. Winter is an important season in the life of waterfowl. It is a biological preparatory period during which many ducks and geese pair and perform other life functions [e.g., females of some species (e.g., mallard) undergo a pre-basic molt to acquire their breeding-season plumage] in readiness for reproduction. No hunting areas enable some species of waterfowl to prepare biologically for spring migration and reproduction.

Strategies:

- Enforce waterfowl hunting prohibitions in closed areas.
- Monitor the closed-to-hunting areas for disturbance during waterfowl wintering period.
- Evaluate closed areas from a conservation perspective for size, location, and access. The closed areas should comprise a contiguous block of at least 400-500 acres (larger if possible), depending on terrain and physical boundary features. No motorized entry and no gun hunting during the above stated periods (possible exception for the National Youth Hunt days for waterfowl).
- Expand sanctuary areas near/around the Sharpe-Elva management site through purchase of surrounding lands (to expand management regimes similar to that being implemented at the Mallard Point and Red-Head Waterfowl management units (limited gun hunting and motorized access).
- Utilize shallow impoundments located at the EERA off of Highway 408 as a waterfowl sanctuary area and focus efforts on the purchase of surrounding lands to increase size of the sanctuary area.
- Maintain, at a minimum, the current waterfowl hunting period of only one-half day throughout the refuge, or give consideration to only 3 days/week of one-half day waterfowl hunting (refuge-wide).
- Continue to focus on development of impoundments and protection/restoration of bottomland hardwood habitats through purchase or easements along the Clarks River on both the East and West Forks.

Objective A-3 Resident/Nesting Waterfowl - Increase wood duck nest/brood habitats and nest boxes by 50 percent and help achieve banding quotas to ensure adequate population monitoring.

Discussion: Wood ducks are cavity nesters, seeking cavities in trees within a mile of water. Brood survival is higher in situations where nests are close to suitable brood-rearing habitat. Due to conversion of forest lands to urbanization, agriculture or other commercial uses, and competition for nest sites from a host of other cavity nesting species, natural cavities are considered to limit reproduction. Nest boxes are commonly used to supplement natural cavities and increase local and regional production of wood ducks. Box programs are not an end to all nesting problems. They require time to clean and repair at least annually. Production can be increased by more frequent checks and cleaning of boxes, but this must be weighed with other time constraints.

A publication entitled, *Increasing Wood Duck Productivity: Guidelines for Management and Banding* on USFWS Refuge Lands (Bowers 2003), provides guidelines that should be used to guide the nest box program on refuge lands. It is critical that nest boxes be spread out so that they are at least 100 yards apart or cannot be seen from another box. The boxes must have a functional predator guard and be checked and repaired annually; otherwise, boxes are considered traps for the hen and her clutch. Conical predator guards should be placed on all of the boxes to more effectively keep rat snakes and raccoons from climbing into the boxes. Some reports indicate that if rat snakes learn there is a meal of eggs in the nest box, that it is very difficult to exclude them from the boxes, even boxes with predator guards. If boxes cannot be properly maintained, they should be boarded up until sufficient effort can be put toward operating an effective program. Cleaning the boxes after the initial peak of nesting (about mid-April) will significantly improve annual production if competition for nest sites increases. Continued monitoring of nest boxes is critical to success. If box usage and nest success does not improve, modifications to the current program should be considered.

Brood survival is always a consideration, especially if broods must travel long distances to suitable habitat. McGilvrey (1968) described preferred brood habitat as 30 to 50 percent shrubs, 40 to 70 percent herbaceous emergents, and 25 percent open water. Overhead cover within one to two feet of the water surface is vital for wood duck broods. Optimum habitat should have 75 percent cover and 25 percent open water, with a minimum of one-third cover to two-thirds' open water. Probable reasons for the limited nest box usage should be reviewed periodically and corrected through reasonable management actions.

In addition to hundreds of native wood ducks currently utilizing the refuge, many other hundreds and possibly thousands of wood ducks will migrate through and use the flooded forest, beaver ponds, and back water sloughs each fall and winter. Kentucky is one of the few states that has an early September wood duck hunting season. Therefore, banding of wood ducks to help monitor the flyway-wide status of this species is a requirement of the state. Typically, state and federal wildlife agencies work in conjunction to meet established banding quotas. The refuge should assist in this effort, once a suitable location has been identified and staffing resources are available.

Strategies:

- Sustain a program of well-maintained nest boxes. Place boxes with functional predator guards at distances difficult to see from one box to the next or at least 100 yards apart. Place boxes so that they are easy to access and near suitable brood rearing habitat. At a minimum, box checks should be conducted in January, just prior to nest initiation. Preferably, boxes will be checked in late April, soon after the first round of nest exodus by ducklings and again in August, just after the nesting season is complete.
- Evaluate nest use and nesting success in boxes and adjust the program accordingly. Add more boxes if over 50 percent of the existing boxes are used, but do not to exceed more nest boxes than refuge staff can properly maintain or than suitable brood habitat is available. If nest box usage does not expand, boxes should only be replaced to provide about two times the average number of boxes used during the previous two or three years (e.g., if 10 boxes are used on the average during the past two years, maintain a box program of 20 nest boxes). Keep good records, archive data (see 2003 Guidelines). Utilize trapping/banding to help achieve banding objectives—focus on July-September banding periods. Meet or exceed the pre-season wood duck banding quota.
- Favor/keep good brood rearing sites (do not destroy all beaver ponds—see 2003 Guidelines).

- Favor natural cavities when conducting forestry practices. Add this as an integral part of the Forest Habitat Management Plan.
- Work with state biologists to accomplish wood duck banding quotas for Kentucky.
- Develop inventorying and monitoring plan for wood ducks nesting on refuge lands. Hire biologist and/or biological technician to assist with banding, box program, and data management.

Objective A-4 Geese - Provide sufficient open-habitats and foraging sites to accommodate for migratory Canada geese (*Branta canadensis)* during migration and wintering periods.

Discussion: Canada geese (migrants and resident) occur on refuge open lands (wheat fields, harvested corn, and bean fields). The Southeast Region of the Service is actively managing habitats to achieve flyway objectives related to South James Bay Canada geese and Mississippi Valley Canada geese (two populations most likely to occur in the Clarks River area). Also, resident Canada geese (Giants) are increasing in Kentucky and in the Southeast; however, specific actions to increase these Giant populations on the refuge will not be a priority.

Strategies:

- Provide two to three strategically identified open areas 30 to 40 acres in size where grain crops and or green browse can be cultivated and made available for goose use.
- After waterfowl hunting seasons close, or where legally possible during the season, knock-down/bush hog corn in strategically identified fields.
- Develop inventorying and monitoring plan for geese found on refuge lands.

Objective A-5 Forest Breeding Birds - Monitor local bird populations and response to management actions by implementing a combination of the following: point counts distributed across all forest stand types and conditions (measure of relative abundance); Monitoring Avian Productivity and Survivorship (MAPS); BIRD plots; and additional fall banding through active partnerships with universities and conservation organizations.

Discussion: According to the Kentucky Ornithological Society, approximately 364 species may be found in the Commonwealth of Kentucky (KOS 2009). Clarks River NWR straddles the Central Hardwoods and East Gulf Coastal Plain Bird Conservation Regions and serves as breeding, wintering, and migrating habitat for over 240 species of migratory birds. This includes 37 percent of the Birds of Conservation Concern found in the Southeast Region (USFWS 2008), 40 percent of the wetland-associated landbird Species of Continental Importance monitored by Partners in Flight (Rich et al. 2004), and 69 percent of the birds designated by Kentucky as Species of Greatest Conservation Need (KCWCS 2010).

Floodplain and upland forest tract size in the Clarks River area is limited. Therefore, the refuge contribution to range-wide migratory bird objectives for Partners in Flight conservation plans place emphasis on increasing nest productivity of forest species that have moderate or low forest tract size requirements (such as Acadian flycatcher, wood thrush, and prothonotary warbler), providing food resources to birds in migration (numerous species), and nesting scrub/shrub and edge species (i.e. white-eyed vireo).

Strategies:

- Determine nest productivity for highest priority species in various habitat types.
- Analyze MAPS data compared to staff effort, determine cost and benefits of maintaining MAPS; consideration to focus equal effort on other protocols or expand MAPS to different habitats.
- Design and implement more intensive nest search and monitoring protocols (such as BBIRD) in each of the major habitats of the refuge (generally, BBIRD design calls for a grid of 40 acres or more in one habitat type, where an observer finds and monitors all bird nests each week throughout the breeding season).
- Determine local population status and trends in relation to specific management actions on the refuge.
- Conduct a series of point counts across major habitat types on the refuge to be conducted during passerine nesting season (May-June).
- Conduct a series of roadside counts, placed at random, that represent typical habitats surrounding the refuge, within a designated distance around the refuge.
- Conduct a series of transects or block area searches to be conducted during non-breeding seasons (for both migrating and wintering birds).
- Work with Joint Venture offices and partners to judge need for and feasibility of creating a 5,000-acre bottomland hardwood forest core area for meeting life requirements for neotropical birds. A coordinated meeting and/or correspondence with nongame bird personnel at state, regional office, and Joint Venture lands to judge appropriateness for core establishment.
- If the decision is to establish a core, then begin identification of minimum habitat requirements.
- Document existing conservation easements within 10-km area of the current refuge boundary.
- Focus conservation efforts on areas identified as appropriate and feasible and on partnerships for long-term conservation on private lands for conservation of additional upland habitat and bottomland habitat along the East and West Fork of the Clarks River. Develop an inventorying and monitoring plan for forest breeding bird species found on refuge lands.
- Hire biologist and/or biological technician to assist with surveys and data management.

Objective A-6 Grassland Birds - Implement grassland songbird and bobwhite quail surveys within improved habitats in coordination with partners.

Discussion: The Clarks River NWR provides important breeding and non-breeding habitat for over 240 bird species throughout the year. For bird conservation planning, the refuge lies at the northwestern extreme of the East Gulf Coastal Plain, an ecological region that extends from western Kentucky through western Tennessee to the Gulf Coast of Mississippi, Alabama, and the panhandle of Florida. However, vegetation communities, and thus bird habitats at the refuge have affinities to the southern coastal plain and Mississippi Alluvial Valley (e.g., bottomland hardwoods), as well as the central hardwoods (e.g., prairie, oak savanna). Because of the refuge's unique location and diverse habitat characteristics, it serves as a valuable habitat resource for many types of bird species including grassland birds.

Although the area of the Clarks River is considered as providing important bird habitats, limitations exist for grassland bird management within the existing refuge land acquisition boundary. The flood-prone conditions of lands in the current focus area are naturally suited to bottomland forest habitats.

A limited amount of this wetland forest referred to as *xero-hydric Flatwoods* exists (~1,940 acres), which exhibits upland oak-savanna characteristics and makes it potentially suitable for grassland bird management. The refuge has also proposed an upland buffer in its boundary expansion proposal, which would contribute significantly to grassland bird management opportunities on the refuge. Agencies such as KDFWR, USFS, TNC, and QU have also placed an emphasis on grassland management on lands they manage and on private lands in western Kentucky counties. These efforts are supported by the Service's private lands program and Clarks River NWR's on-refuge grassland restoration projects.

Strategies:

- Develop projects in cooperation with KDFWR and local universities to meet grassland bird habitat objectives
- Obtain funding for graduate research projects that facilitate on-refuge grassland bird management.
- Develop and manipulate open lands on the refuge for native warm-season grasses where proper maintenance can be conducted; document and monitor the vegetation and bird response to improve future management decisions.
- Determine local grassland habitat population objectives (through participation in regional bird conservation planning), and apportion sustainable habitat acreage for refuge lands and for adjacent private lands.
- Apply adaptive resource management concepts to experiment locally with timing and frequency of disturbance, as well as vegetation and bird response.
- Utilize nest searches to determine nest productivity of high-priority grasslands species (grasshopper sparrow, Henslow's sparrow) and adjust grassland habitat acreage as needed to meet these objectives.
- Expand acquisition area to incorporate areas more conducive to grassland habitat establishment/enhancement where maintenance of habitats can more easily be accommodated.
- Develop inventorying and monitoring plan for grassland bird species found on refuge lands. Hire biologist and/or biological technician to assist with surveys and data management.

Objective A-7 Scrub/shrub birds - Implement breeding bird surveys in scrub/shrub habitats.

Discussion: Several species associated with early successional forests are often described as scrub/shrub species. American woodcock, prairie warbler, and LeConte's sparrows are among the higher priority scrub/shrub species found on the refuge and dependent upon these habitats. The refuge has a relatively small amount of scrub/shrub habitat, although the amount of acreage will increase in the future with purchase of additional lands and through the refuge's reforestation program. The increases may be short-term as succession of these habitats move beyond the scrub/shrub stage. Maintenance of these habitats will be required if this habitat is determined to be a high priority. Decisions on the priority level of developing and maintaining scrub/shrub habitat and total desired acreage will be made in cooperation with KDFWR and other conservation partners.

Strategies:

- Link status of scrub/shrub species with existing scrub/hrub habitats. All forest edges should be feathered by cutting into the existing woods to maximize potential use by scrub/shrub species and with nearby patches of un-mowed grass, such as along roadsides and utility rights-of-way from mid-April to mid-August (as is practicable).
- Working with partners, consider establishing roadside point counts along forest and field edges across the refuge to track habitat use by all priority scrub/shrub species.
- Cooperate with partners and a university to develop a research project conducted by a graduate student to evaluate timber management approaches on scrub/shrub bird species.
- Enhance and sustain existing opportunities for permanent scrub/shrub habitats on the refuge, once desired acreages have been determined.
- Hire biologist and/or biological technician to assist with surveys and data management.
- Pursue options for active management within rights-of-way that occur on the refuge.
- Increase active edge management around existing agricultural fields by extending edge habitats into agricultural fields (not necessarily edge feathering into forest).
- Expand acquisition area to incorporate areas to facilitate scrub/shrub habitat establishment/enhancement and conducted maintenance of habitats to maintain desired conditions.
- Develop inventorying and monitoring plan for scrub/shrub bird species found on refuge lands.

Objective A-8 Shorebirds - Implement late July through August shorebird surveys within improved habitats in coordination with partners.

Discussion: KDFWRs' species occurrence data shows that approximately 25 species of shorebirds have been documented in the three counties in which Clarks River NWR is located. There is a high probability that many of these species utilize the refuge in some capacity throughout the year. Use is most likely limited to resting and feeding habitat during migration. Some of the shorebird species observed through the limited surveys that have been conducted include: lesser yellowlegs, solitary sandpiper, and semi-palmated sandpiper (all species of concern in the region). It is likely that the observation of shorebird species would greatly increase through consistent, annual shorebird surveys. Such surveys would also contribute to regional and national efforts to monitor, protect, and conserve a richly varied and diverse shorebird community.

Suitable shorebird habitat includes managed waterfowl impoundments (during drawdown) and agricultural fields that flood periodically throughout the year. Most of the current open water areas are not conducive to shorebird use due to excessive water depth; however, several suitable areas exist within the current approved acquisition boundary, as well as within the proposed expanded boundary. These areas would be considered as potential habitat development sites if acquired.

Strategies:

- During development of a refuge moist-soil management plan, incorporate alternate years and units for shorebirds that will coincide with necessary changes in water management for that unit (such as early drawdown).

- Annually, designate at least one water management unit specifically for fall shorebird use, monitor and record vegetation and shorebird response. When possible, a high priority should be placed on shorebird management at the unit to allow increased public access and viewing.
- Conduct shorebird counts on at least one water management unit, with emphasis on fall migration (July-October);
- Hire biologist and/or biological technician to assist with surveys and data management.
- Construct or establish at least six shorebird management units throughout the current refuge acquisition boundary.
- Expand acquisition area to incorporate areas conducive to shorebird habitat establishment/enhancement.
- Develop inventorying and monitoring plan for shorebird species found on refuge lands.

Objective A-9 Waterbirds - Annually monitor waterbird presence, habitat use, and abundance during post-breeding periods.

Discussion: Kentucky species occurrence data suggest that nearly 40 species of waterbirds have been documented in the three counties in which Clarks River NWR is located. There is a high probability that many of these species utilize the refuge in some capacity throughout the year. A few species of heron and egret are common throughout much of the year, whereas the majority of the species in this group use the refuge seasonally or as a stopover point during migration in the spring and fall. Through limited surveys, a number of species have been observed on the refuge with approximately ten species known to nest in the area. To date, five rookeries have been located on the refuge, with the most common location being directly along the river's edge in mature bottomland hardwood stands. Feeding areas consist of managed waterfowl impoundments and flooded agricultural fields. Where agricultural fields provide sporadic feeding opportunities, managed impoundments can be gradually manipulated to provide a constant food source throughout the year. Since this action would affect other management objectives, specific areas would need to be set aside for this purpose, if waterbird management is determined to be a high priority.

Strategies:

- Encourage and sustain natural hydrology on the refuge and upstream as possible (such as improving sheet flow past Dogtown Road with bridges or larger culverts), and work locally to reduce the amount of sedimentation entering the river.
- Inventory and monitor existing populations of waterbirds on or adjacent to the refuge, by specific species searches (such as little blue heron, least bittern, and king rail) or compilation of volunteer bird checklists.
- Consider cooperative management or acquisition of the extensive marsh habitats upstream of the refuge (under the powerlines at Dogtown Road) for waterbirds.
- Develop moist-soil and water management capacity to provide potential for deeper water (up to 8 – 10 inches) in late summer and opportunity for development of emergent marsh vegetation.
- Monitor any known rookeries on the refuge for species composition and numbers. Determine nest productivity and fledgling dispersal patterns (on refuge) for waterbird species.
- Consider implementation of marsh bird inventory both on and adjacent to refuge.
- Develop inventorying and monitoring plan for wading bird species found on refuge lands.
- Hire biologist and/or biological technician to assist with surveys and data management.

Objective A-10 American Woodcock - Determine presence of late fall/wintering woodcock via nocturnal/late evening surveys on several important open land sites.

Discussion: American woodcock use of refuge lands would seem limited as available habitats during the winter months are usually subject to flooding. Some breeding does occur, but at this time there are few areas on the refuge that support optimal breeding conditions (i.e., canebrakes or very dense understory patches). These conditions may increase with recommended forest management to promote more open canopies and denser patches of understory. Protocols for surveying American woodcock should be used when conducting surveys if staffing and other refuge priorities permit.

Strategies:

- Review literature and work with partners to design and implement a valid, feasible refuge-specific survey protocol.
- Conduct surveys of American woodcock using fields during winter and spring.
- Develop inventorying and monitoring plan for woodcock found on refuge lands.
- Hire biologist and/or biological technician to assist with surveys and data management.

Objective A-11 Big Game Species - Continue deer herd health checks utilizing the Southeast Cooperative Wildlife Disease Study (SCWDS) Unit at the University of Georgia. Utilize state harvest reporting systems to track harvest/population data. Implement annual turkey brood survey in June through August, annual gobbler counts, and deer check station.

Discussion: Clarks River NWR contains a diversity of habitat types, and significant wildlife diversity. The bottomland hardwoods and open lands provide ideal habitat for many game species of interest. The current primary resident big game species of interest are deer and turkey. These species often thrive in early successional habitats, including agricultural land when intermixed with forests, especially if dominated by mast-producing species. All of these habitats are currently found on the Clarks River NWR and significantly contribute to the population of deer and turkey.

White-tailed deer are a popular species with the public for the wildlife-dependent uses of hunting, wildlife observation, and photography. Deer move freely across refuge boundaries, making it difficult to manage for a specific number of individuals given the size of their range and seasonality of use of the refuge. However, the refuge can monitor the population size and distribution to determine if the population is increasing beyond carrying capacity or if animals are concentrating in areas resulting in vegetation damage. By monitoring the availability, diversity, and use of understory woody and herbaceous plants by deer, the refuge would be able to better understand the pressure being exerted on the habitat, and therefore make habitat and harvest recommendations.

Although deer age/weight data would be helpful in determining harvest recommendations, collection of such information is time consuming and would require dependence on state personnel and volunteers running any desired on-refuge check stations. Exclosures to help monitor deer foraging impacts and to gauge population densities should also be considered with 5-7 year interval deer herd health checks in cooperation with the SCWDS at the University of Georgia.

Chronic wasting disease is a transmissible spongiform encephalopathy of deer and elk. It has not been found in Kentucky to date, but the high profile of this disease makes it crucial for the Service to cooperate with the state and other federal agencies in monitoring for the disease. These management actions are necessary to support the big game public use program.

Strategies:

- Conduct strict evaluation of open lands identified for appropriateness of open land management prior to conversion to non-open land habitat.
- Develop GIS capabilities or GIS partnerships to identify power or gas line rights-of-way within the refuge acquisition boundary.
- Develop working relationship with gas and power companies to maintain rights-of-way in a state desirable for resident game species.
- Develop protocol to estimate deer population on the refuge (browse survey).
- Continue to partner with SCWDS to conduct deer herd health checks on the refuge.
- Develop GIS capabilities or partnerships to identify open lands within the refuge acquisition boundary.
- Partner with KDFWR to monitor occurrence of chronic wasting disease in Kentucky and neighboring states.
- Hire biologist and/or biological technician to assist with surveys and data management.
- Apply adaptive management to determine best practices to use in response to monitoring data on deer population and habitat.
- If deer population increases beyond carrying capacity, work with KDFWR to reduce the herd size by adjusting season length, bag limits, and method of take.

Objective A-12 Small Game Species - Utilize state hunter log reporting systems to track harvest/population data related to small game species (dove, opossum, raccoon, rabbit, and squirrel). Utilize refuge-specific hunter log reporting system to update public use opportunities.

Discussion: Many species of small game are present on the refuge, including raccoon, rabbit, opossum, squirrel, and dove. Before management strategies can be developed, a basic understanding of the species that use the refuge needs to be acquired.

The KDFWR have several reporting systems in place to track the harvest of such species as deer, turkey, and waterfowl. Utilization of these reporting systems should be explored for reporting refuge harvest of small game species.

Strategies:

- Research literature, including range maps, for species that should occur in western Kentucky.
- Implement a variety of survey techniques to sample for presence and abundance of small game species.
- Explore on-refuge harvest reporting approaches to obtain additional small game data.
- Develop inventorying and monitoring plan for small game species found on refuge lands.
- Hire biologist and/or biological technician to assist with surveys and data management.

Objective A-13 Nongame Mammals - Develop comprehensive species list of mammals utilizing the refuge. Expand studies and research on species occurrence, relative abundance, and distribution.

Discussion: Clarks River NWR has served as the study area for several mammalian research projects through cooperation with undergraduate students from the nearby Murray State University. Studies are generally small scale and of low complexity. These include determining the most effective scent attractants, bait preferences, and species presence/absence surveys. A total of five nongame species were documented including mice, rats, and a shrew. Past studies

have focused primarily on small terrestrial species, therefore it is expected that with a more intensive survey protocol, this number would increase dramatically. Refuge staff have begun to develop a more extensive procedure that can be implemented as the opportunity presents itself through the availability of additional staff or trained volunteers.

Strategies:

- Research literature, including range maps, for species that should occur in western Kentucky.
- Implement a variety of survey techniques to sample for presence and abundance of potential species.
- Develop inventorying and monitoring plan for small nongame mammals species found on refuge lands.
- Hire biologist and/or biological technician to assist with surveys and data management.

Objective A-14 Amphibians and Reptiles - Continue to conduct baseline reptile and amphibian studies, inventories, and surveys, and analyze data for forming management decisions.

Discussion: The refuge provides habitat for at least 10 species of salamander, 10 species of frogs and toads, 4 species of lizards, 19 species of snakes, and 9 species of turtles. So far, staff have confirmed the presence of over 50 reptiles and amphibians (through informal surveys).

Clarks River NWR received funding for, and conducted, its first malformed amphibian survey in 2007 and 2008. The malformation rates of the species sampled from select areas on the refuge were found to be within the normal expected range, about 3 percent. Staff would continue to monitor malformation rates in refuge amphibian populations.

Strategies:

- Design and implement an inventory protocol including call surveys, drift fence arrays configured with pitfall and funnel traps, and cover boards with valid sampling methodologies for all major habitats throughout the year.
- If species of concern are documented on the refuge, then management actions would be reviewed for benefits and impacts.
- Consider using university or USGS personnel and/or university professionals to conduct surveys using acceptable scientific census techniques.
- Review the National Partners for Reptiles/Amphibians Plan. Also look into the North American Amphibian Monitoring Program (NAAMP) for monitoring techniques.
- Continue to sample anurans with the current call survey protocol at a minimum of every other year in order to monitor population trends. Special effort should occur during the late-February to mid-April period to look for spadefoot toads (*Scaphiopus hurteri*) along the western boundary of the refuge in areas with predominantly sandy soils.
- Develop inventorying and monitoring plan for amphibian and reptiles species found on refuge lands.
- Hire biologist and/or biological technician to assist with surveys and data management.

Objective A-15 Fisheries - Continue conducting fish contaminant study and implement fish species occurrence, relative abundance, distribution, and analyze data to inform management decisions.

Discussion: The riverine characteristics of Clarks River proper (East Fork) appear to support a diverse community of fish, mussels, and aquatic invertebrates. It would be beneficial to use results of past fish surveys to compute an Index of Biotic Integrity for the East Fork. This would allow the refuge to evaluate the overall community health of the river based on the species composition, tropic structure, and general condition of the fish community. Other agencies should be contacted to determine if additional information is available on such wildlife populations (fish, invertebrates, mussels, etc.).

Strategies:

- Contract with KDFWR or a university for an updated and comprehensive survey of the Clarks River fisheries.
- Hire biologist and/or biological technician to assist with surveys and data management.
- Establish an inventorying and monitoring plan for fish found on the tefuge.

Objective A-16 Invertebrates - Continue to conduct baseline invertebrate surveys and implement invertebrate species occurrence, relative abundance, and distribution and analyze data to inform management decisions. .

Discussion: Aside from mussels and the American burying beetle, survey information is limited. Dr. Mike Floyd, a Service biologist with the Kentucky Ecological Services Field Office, has conducted several nights of light trapping in an attempt to capture caddis flies (*Trichoptera spp.*). Numerous species were captured; however, a detailed list has not been furnished to the tefuge. Dr. Bill Black of the Society of Kentucky Lepidopterists has also conducted several nights of light trapping in cane (*Arundinaria gigantea*) stands to document cane-dependrnt moth species. Numerous species were captured, and the tefuge is anticipating a detailed list of captures. Refuge staff have also collected and photographed dozens of species of insects, crayfish, and mollusks. It is the refuge's intention to identify and document both common and rare species in order to provide a photographic guide of the fauna of Clarks River NWR for public education and recreation.

Strategies:

- Consult literature to determine best survey methods to implement. Establish an inventorying and monitoring plan for aquatic and terrestrial invertebrates found on the refuge.
- Work with partners to identify existing or potential negative impacts to water quality and address with appropriate management actions.
- Hire biologist and/or biological technician to assist with surveys and data management.

Objective A-17 Mussels - Conduct periodic comprehensive mussel surveys, conduct additional continuous water quality assessments, assess reproduction, density, and propagation opportunities.

Discussion: Freshwater mussels are the most jeopardized animal group in North America, with 60 percent of species being classified as either threatened or endangered (Ricciardi et al. 1998). The introduction of invasive, exotic mussels, such as the zebra mussel, has threatened some species of native mussels with extinction. The Mississippi River Basin has the largest number of endemic freshwater mussels in the world (Ricciardi et al. 1998); however, the zebra mussel has been extirpating local populations of native mussels in the basin since the early 1990s. Zebra mussels have been documented in eighteen Kentucky counties, including Marshall and McCracken. None have been documented within the Clarks River. The Asian clam, another exotic species, is

widespread throughout much of the eastern United States; its distribution in the Clarks River is unknown. Although surveys within the refuge have been sporadic and not fully inclusive, 25 species have been identified within the refuge boundary. Extensive efforts should be made to compile a detailed community composition report including threatened and endangered species, common native species, and invasive exotic species.

Strategies:

- Consult literature to determine best survey methods to implement.
- Conduct additional mussel surveys with assistance from the Frankfort, Kentucky, Ecological Services Office, USGS, and/or universities.
- Conduct habitat assessments of reaches along the Clarks River to assess habitat suitability for mussel population enhancement projects.
- Establish a mussel inventorying and monitoring plan for mussels found on the refuge.
- Work with partners to identify existing or potential negative impacts to water quality and address with appropriate management actions.
- Hire biologist and/or biological technician to assist with surveys and data management.

Objective A-18 Bats of Special Concern – Indiana and Gray Bat, Southeastern Myotis (See State Wildlife Action Plan) - Continue conducting and expand summer bat surveys. Utilize mist net and Anabat surveys to establish baseline population data in the wake of white-nose syndrome, and determine if the Indiana and/or gray bat occur on the refuge. Analyze data to inform management decisions, and foster research.

Discussion: Gray bats (*Myotis grisescens*) live year-round in caves or cave-like habitats. At present, the species is not known to roost (or rear young) within the refuge, but gray bats do have the potential to forage along the East Fork of Clarks River, because the species feeds primarily on aquatic insects (e.g., caddisflies, mayflies) that fly above rivers and lakes.

The Indiana bat (*Myotis sodalis*) utilizes a wide array of forested habitats, including riparian forests, bottomlands, and uplands for both summer foraging and roosting habitat. Indiana bats have the potential to occur within the refuge, because unlike gray bats, their summer roosting (and maternity) habitat consists of trees, not caves. Indiana bats typically roost under exfoliating bark, in cavities of dead and live trees, and in snags (i.e., dead trees or dead portions of live trees). Trees in excess of 16 inches diameter at breast height (DBH) are considered optimal for maternity colony roosts, but trees in excess of 9 inches DBH appear to provide suitable maternity roosting habitat. Male Indiana bats have been observed roosting in trees as small as 3 inches DBH. Female Indiana bats usually prefer trees with good solar exposure. At present, Indiana bats have been documented from only one of the three counties (McCracken) in which the refuge occurs and also exist in several adjacent counties: Ballard, Calloway, Carlisle, Hickman, Livingston, and Trigg. Large numbers of Indiana bats have been collected on nearby Fort Campbell Military Reservation in association with a maternity colony that exists there. Refuge surveys to date have not recorded the Indiana bat.

Both the Indiana bat and gray bat may be subject to the devastating effects of white-nosed syndrome, which primarily affects the bats during the winter hibernation period. The refuge has undertaken efforts in association with the Service's Kentucky Ecological Services Field Office to conduct baseline surveys of bat community composition prior to the spread of this pathogen into the area. Surveys are conducted by driving road transects with a bat call detector mounted on the vehicle. Refuge staff chose to monitor one transect within the refuge. Data is sent to a central location for analysis and

compilation into an assessment report. The duration of the study is currently undetermined and will depend heavily upon the finding of the regional biologists who are coordinating the effort.

Clarks River NWR has the potential to support the gray bat and Indiana bat during the summer brood rearing period. Management must consider all project work undertaken during the summer months when tree removal is required. On-refuge project work that could potentially impact the Indiana or gray bat will require additional consultation with the Kentucky Field Office pursuant to Section 7 of the Endangered Species Act.

Strategies:

- Study and note protocols as outlined in the Indiana Bat Draft Revised Recovery Plan - 1999.
- Work with KDFWR, universities, and other partners to conduct refuge-specific bat studies that focus on endangered, threatened, or bats of special concern.
- Consult with the Kentucky Field Office and utilize Service survey protocols when conducting bat surveys for any proposed project work during the summer months (e.g., sampling consisting of one collection site per-square-kilometer of potential habitat).
- Determine where suitable "roost" trees/stands could be present and sample to determine usage by Indiana bats or bats of special concern.
- Work with the Kentucky Field Office to establish baseline bat usage of refuge habitats using Anabat survey methods and protocols.
- Establish an inventorying and monitoring plan for bats found on the refuge.
- Hire biologist and/or biological technician to assist with surveys and data management.

Objective A-19 Species of Special Concern – American burying beetle - Conduct survey to document presence/absence of the endangered American burying beetle.

Discussion: The American burying beetle was known historically from much of eastern North America, an area extending from Canada and northern Michigan to the southeastern Atlantic coast and westward to Oklahoma, Texas, and Nebraska. At present, the species is generally restricted to the periphery of its former range, encompassing portions of seven states: Arkansas, Massachusetts, Nebraska, Oklahoma, Rhode Island, South Dakota, and Texas. It has been reintroduced in Ohio. The species has not been observed in Kentucky since the 1970s, when the species was collected in adjacent Trigg County (the exception may be a Land Between the Lakes collection at Hematite Lake in the early 1980s – personal communication with Steve Bloemer, Senior Wildlife Biologist at Land Between the Lakes. The species is nocturnal, feeding on carrion and specializing on small vertebrate carcasses that they bury and provide as food for developing larvae. Preferred habitat is poorly understood but can include oak-pine woodlands, open fields, oak-hickory forest, open grasslands, and edge habitat. Some of these habitats do occur on the refuge, especially significant amounts of woodland and edge habitats. The species' range in Oklahoma and Arkansas has increased with more intensive survey efforts, suggesting that similar efforts in adjacent states (like Kentucky) could reveal additional populations. Its potential presence on the refuge was investigated during the summer of 2010 through the placement of baited pitfall traps in a variety of habitats. Trapping protocol followed the methods described by Bedick (2004), which are a modified version of the Service's (1991) method. Several carrion beetle species were captured and identified during the survey; however, the presence of the American burying beetle was not observed.

Strategies:

- Continue to evaluate the need to document potential presence of the American burying beetle through coordination with the Kentucky Field Office.
- Assess the need to establish an inventorying and monitoring plan for carrion beetles and other related insect populations.

Objective A-20 Exotic Invasive Wildlife Species - Inventory and control exotic and invasive wildlife species through integrated pest management practices.

Discussion: Three invasive animals found on the refuge include the Asian clam, an exotic freshwater mussel that competes for resources against native mussels, big-head carp (*Hypophthalmichthys nobilis*), an Asian freshwater fish species, and the European starling (*Sturnus vulgaris*), an aggressive, abundant blackbird that competes with native songbirds for nesting cavities. The starling is also considered a crop pest, a nuisance at urban roosts, and may transmit diseases to swine when raiding feeding stations (Johnson and Glahn 2009). The zebra mussel, fire ant, and emerald ash borer are found in or near the region in which the refuge is located and are invasive wildlife species of concern.

Strategies:

- Develop a basic species list of invasive wildlife (inventory) on the refuge and prioritize areas of greatest management concern.
- Implement an aggressive control program to reduce/eliminate invasive nonnative species where feasible to minimize or eliminate their impacts to native wildlife species.
- Develop an exotic invasive wildlife action plan that includes inventorying, monitoring, and management protocols.
- Seek alternative funding sources to address invasive animal concerns.
- Work with adjacent landowners to encourage participation in control efforts.
- Hire biological technician to assist with surveys, mapping, data management, and control efforts.

Objective A-21 Nuisance Animals - Inventory, monitor, and control nuisance animals to help meet refuge objectives and/or provide public safety.

Discussion: Nuisance animal species of concern on the Clarks River NWR primarily include beaver, coyote, and feral and free-ranging domestic animals. Management of these animals should be an integral part of refuge management to ensure wildlife and habitat objectives on refuge lands are met. Uncontrolled beaver populations can cause extensive habitat damage in bottomland hardwood forests through the creation of dams, which lead to inundation of trees during the growing season. Forests susceptible to damage developed in the absence of permanent inundation. Changes in the surrounding land use, over time (logging, farming, and road construction), has the potential to create opportunities for beaver activity that results in negative impacts to bottomland hardwood forests. In these instances, beaver dam removal is required and a reduction in the local beaver populations may also be required to prevent permanent changes to pre-existing forests or where restoration work has been implemented.

Coyotes are numerous on the refuge and surrounding lands. Populations are regulated by the abundance of prey availability. Coyotes are not believed to have significant impacts on current wildlife populations in the Clarks River area; however, they are considered a nuisance species because of their potential impacts on neighboring landowners (predation of cats, chickens, and other small domesticated livestock). Habitat protection and management on the refuge has the potential to indirectly increase

coyote populations and potentially increase depredation of domesticated animals on lands adjacent to the refuge. In these instances, localized coyote population management may be required.

Being omnivores, feral swine utilize virtually every component of the habitat and directly compete with native wildlife once introduced. They significantly reduce the habitat carrying capacity of native wildlife and adversely affect plant communities. Feral swine have been documented as occurring at the nearby Land Between the Lakes National Recreation Area. If introduced to refuge lands, their presence will compromise the refuge's efforts in bottomland hardwood reforestation, wetland restoration, and overall wildlife management.

Feral and free ranging domestic animals are a significant problem on Refuges and other public lands, especially if the area is located near a metropolitan or high residential area. Animals of primary concern are cats and dogs. Cats and dogs are predators by nature and have major direct impacts on wildlife populations. Cattle, horses, goats, and sheep also present problems, such as habitat destruction, but to a lesser degree. The objectives of implementing nuisance animal control are to prevent/minimize negative impacts to wildlife resources, priority public use programs and eliminate non-compatible/prohibited activities. Government policies and regulations governing feral and free ranging domestic animals exist and should be utilized as necessary and appropriate to address any nuisance species issues associated with domestic animal species.

Strategies:

- Implement an aggressive control program in accordance with state and federal policies and regulations to reduce/eliminate feral or free ranging domestic animal species on Refuge lands.
- Develop a nuisance feral and free ranging animal action plan that includes control, monitoring and management protocols.
- Seek alternative funding sources to address feral and free ranging nuisance domestic animal concerns.
- Work with adjacent landowners to encourage participation in control efforts.
- Hire biological technician to assist with control efforts.

HABITAT MANAGEMENT

Goal B. Habitat Management: Conserve, restore, and enhance diverse bottomland hardwood forests, open lands, and associated habitats essential to support sustainable populations of migratory and resident wildlife species.

Objective B-1 Bottomland Hardwood Forest Restoration and Protection - Strategically restore and protect bottomland hardwood forest habitat in the Clarks River Basin where opportunities exist and as appropriate. Inventory and monitor survival and wildlife response.

Discussion: The landscape of the lower Clarks River Basin and refuge area is a mosaic of forestland, grassland/pastureland, and agriculture land. The forest blocks are also generally fragmented and bisected or interspersed with non-forest land use, the largest contiguous blocks are around 1,000 acres. Although relatively small, these blocks of bottomland hardwood forest habitat are some of the largest remaining intact forest stands within the Clarks River watershed.

The bottomland hardwood forest component of the lower Clarks River (East and West Fork) is the dominant cover type and is considered to be some of last significant stands of bottomland hardwood habitat in western Kentucky. These forestlands are comprised of several forest subtypes and stand conditions (See Chapter II, Biological Resources, Habitat). Tree species found among these forest types range from sweetgum and hickories on the higher sites, cherrybark oak and post oak on the intermediate sites, and pin oak, green ash, and overcup oak on the lower sites, with slough margins containing occasional bald cypress. The majority of the forests is at various stages of development resulting from diverse past treatments while in private ownership. Additionally, there are some 639 acres of young plantations. However, latter stage forest is scarce in the area, and is not well represented on the refuge.

Because of the developing nature of the refuge, it is recommended that careful consideration be given to open-lands before reforestation. For a given area, the emphasis may not be on creating a larger forest block, but instead there may be a greater need for warm-season grasses, canebrakes, scrub/shrub, moist-soil units, or retention of row crops. Because of the permanence of reforestation, deference should be given to these other uses until the options are eliminated through consideration of potential acquisitions and landscape habitat management objectives.

Softwood plantations were established on the Westvaco tracts prior to purchase and inclusion into the Clarks River NWR. Since the primary goal was the production of pulp fiber, no hard mast trees were planted. The bulk of the 639 acres was planted in 1978 through 1985; one pine plantation was planted in 1997. The plantations were planted on an approximate 12' by 8' spacing (roughly 450 trees per acre) and have not been thinned. Currently, the older plantations are advanced in height greater than 40 feet, providing a beneficial overstory component, but the plantations demonstrate no development of lower vegetative layers. The trees are now crowded and future growth potential is limited.

Two of the plantation species are not native to the Clarks River NWR area; these are European black alder and loblolly pine. The alder has the potential to provide wildlife benefits, but it is a nonnative species. Loblolly pine is a North American native, but is considered out of its natural range in this area; naturally occurring pines are limited to shortleaf and Virginia pine but neither occur on refuge lands.

In 1999, a project was initiated to enhance the plantation diversity by underplanting various bottomland hardwood mast-producing trees. Approximately 50,000 seedlings were underplanted in sweetgum, sycamore, and black alder plantations. The project also included bird surveys and thinning of the overstory plantation, but these applications were not accomplished due to planning and resource shortfalls.

The plantations will need to undergo unique interim management to enhance them to a point of desirable habitat; eventually they can be managed under the same methodology as the extant forests. It is recommended that all European alder and loblolly pine trees be removed. Even though these trees are providing forest structure, they are not native trees and will reproduce and continue to present a problem. Pine trees could be used for bat brood habitat, but they are currently too shaded for bat use. The abundant native hardwood regeneration beneath these plantations should promote a mixed hardwood forest within a few decades, if the off-site plantings are removed through harvest or other means of removal.

The sweetgum and sycamore plantations should be improved immediately. A survival check should be initiated on the underplanting and the following treatment implemented as soon as feasible. Remove every two rows and leave the third. The third row should also be thinned to about 75 trees per acre. It is important to test the sprouting ability of the sweetgum and sycamore before implementing the treatment. If the trees sprout, then the stumps will have to be chemically treated

immediately after being cut. If during a pretreatment evaluation, it is found that there is not sufficient oak or other desirable regeneration, then the winter after the cut, oak and other desirable mast-producing species should be underplanted at a minimum rate of 150 per acre.

The plantation stands will need to be reevaluated periodically and more overstory may need to be removed to release the underplanted seedlings. This may need to be accomplished by girdling or chemical injection if a commercial operation could not be supported. The over-story canopy is important because it provides the structure of a young forest; however, the purpose of the treatments is to develop a desirable under- and mid-story and diversify both the species composition and vegetative structure.

Strategies:

- Develop and implement a Forest Management Plan as a part of the Habitat Management Plan, and use General Guidelines for Hardwood Forest Management as Desired Future Conditions in bottomland hardwood forest prescriptions.
- Strategically increase forest block size where appropriate through continued acquisition, restoration, and boundary expansion.
- Initiate immediate action to improve plantations for wildlife use by coordinating with Service's Regional Office to develop interim Forest Management Plan.
- Protect, maintain, and restore, where appropriate, bottomland hardwood habitats within the Clarks River watershed.
- Conduct inventorying and monitoring of bottomland hardwoods habitats to maintain diverse and viable stands for the benefit of bottomland hardwood-dependent species.
- Hire forester and/or forestry technician to assist with inventorying, monitoring, data management, restoration, mapping, and stand enhancement/restoration activities.

Objective B-2 Bottomland Hardwood Forest - Develop a Forest Management Plan including inventories and silvicultural treatments to improve forest management capability for migratory birds, threatened and endangered species, and a diversity of forest-stand age classes. Initiate immediate action to improve pre-existing plantations. Acquire and protect additional lands where bottomland hardwood habitat exists or where the potential for restoration is suitable and appropriate.

Discussion: Overall, the current conditions of the forests are the result of former alterations; however, most contain a component of desirable over-story species. With lack of disturbance, most stands have grown to full stocking and full crown closure. Full stocking and the age of the forest stands imply that the trees have reached a point where growth has begun to slow and a stage of stem exclusion will occur over several years (i.e., weaker stems will gradually senesce as others become dominant). Full crown closure has resulted in minimal development of subsequent vegetative layers; mid-story, under-story, and regeneration. Most stands are also even-aged, indicated by the presence of the intolerant trees in the over-story, and the narrow range of diameters. The average diameters within stands appear to range from 12 to 16 inches at breast height.

On any given site, the flood regime and soil types dictate the species composition or forest type; even minor changes in elevation effect suitable species, regeneration potential, and site productivity. Forests of Clarks River NWR are small, but diverse, and management recommendations will need to address each stand individually as it is evaluated.

Given the current landscape context and acquisition boundary of Clarks River NWR, the role of forest is to provide habitat and forage for species requiring only intermediate forest block sizes. Cursory findings of the Monitoring Avian Productivity and Survivorship (MAPS) program indicate that the forests of Clarks River are used by forest interior birds, but it is possible that the refuge is a sink for breeding birds. The primary emphasis of forest management should focus on improvement of habitat for birds and wildlife requiring smaller forest blocks, and improving forest habitats overall for bird use during migration.

The objectives of Clarks River NWR are to provide wintering habitat for migratory waterfowl, nesting habitat for wood ducks, habitat for non-game migratory birds, and opportunities for wildlife-dependent recreation. These objectives dictate the necessity of active forest management. The current conditions represent an altered state from the natural system, and if left to passive management would perpetuate an undesirable forest in terms of refuge objectives. Currently, the forest productivity in terms of mast, forage, and cover is lacking and without intervention this trend will continue for decades. In the long term, the forest will most likely shift to shade tolerant species such as elm, hickory, maple, hackberry, and others; the structure of the forest will remain fairly homogenous. The importance to waterfowl, and other refuge target species, of shade intolerant species, such as red oaks, white oaks, pecan, sweetgum, cannot be overlooked. These shade intolerant species need active management to regenerate. There are additional benefits to active management such as increased mast production, release of dominant trees to grow larger faster and provide the benefits of older stage trees (cavities, decay, limb structure, and other niches), production of understory cover and forage, development of mid-story canopy, and development of forest diversity in terms of species composition and structure.

Overall, the management scheme for the forests of Clarks River NWR is recommended to be unevenaged. Unevenaged management implies that there will be several age classes of trees present in the forest stands. There is no set rotation age for a forest in uneven-aged management for wildlife because a component of large and old trees will always be retained. An entry cycle of 10 to 15 years is recommended to implement individual tree selection and group selection. The individual tree selection should strive to release from competition desirable species; this will promote enhanced growth, crown spread, and mast production. The group selection cuts should be geared towards release of advanced regeneration, or establishment of desirable regeneration. To accomplish these objectives, group selection cuts will need to range from .5 to 1.5 acres in size, and should include tapering of the edges to further allow sunlight penetration to the core area of the regeneration holes. Also, seed trees either around the perimeter and/or a few within the holes can be retained to enhance the probability of regeneration, and provide over-story structure.

Strategies:

- Develop GIS database to assimilate information pertinent to refuge forest management planning and administration.
- Extensively inventory forest to adequately and better assess current conditions.
- Develop and Implement Forest Management Plan as a part of the refuge's Habitat Management Plan and use General Guidelines for Hardwood Forest Management as Desired Future Conditions in bottomland hardwood forest prescriptions.
- Conduct forest management activities that create multi-layered canopy conditions through thinning, group selections, and larger openings (1/2 to 2 acres), to improve under-story tree species to provide food and cover, maintain/improve mast and fruit production, and to encourage red oak regeneration for future stands.

- Initiate immediate action to improve plantations for wildlife use by coordinating with Service's Regional Office to develop interim Forest Management Plan.
- Cooperate with USDA Forest Service, Land Between the Lakes, for implementation of fire management plan.
- Hire forester and/or forestry technician to assist with inventorying, monitoring, data management, restoration, mapping, and stand enhancement/restoration activities.

Objective B-3 Water Management - Increase water management capabilities at a minimum of seven locations and continue to assess water management needs as new lands are acquired.

Discussion: Water management capabilities on the refuge are limited but are a refuge priority. Eleven water control structures, approximately 4 miles of levee and one well provide the extent of the refuge's current water management capabilities. Achieving waterfowl and shorebird objectives on refuge lands will be dictated by therRefuge's success of developing additional infrastructure that provides water control. As suitable sites are acquired and funding secured, construction of levee systems and installation of wells should continue to be a high priority. Acreages associated with the refuge water management abilities must be adequate to allow for rotation of crops, maintenance of moist-soil management units, and impoundments dedicated to shorebird management such that a significant reduction in available habitat is not incurred in any given year.

Strategies:

- Habitats with water management capability are preferred sites for waterfowl and shorebirds, and efforts to improve water management capability throughout the refuge should continue (pumps, water control structures, storage reservoirs, wells, etc.).
- Investigate the feasibility of utilizing treated water from the Benton, Kentucky, sewage treatment ponds to flood waterfowl and other waterbird habitats.
- Consider developing additional habitats that provide water management capability. Efforts should first focus on development opportunities where tributaries enter the Clarks River bottom. Large levees that attempt to exclude floodwaters from entering water management areas where crops are grown should be avoided.
- In opportunistic areas (old ditches, cuts, elevated topographic futures, etc.) seek to increase the "winter" duration of shallow-flooded forests from periods of 3-4 days to longer durations of 14-21 days.
- Consult with engineers from Natural Resources Conservation Service or Duck Unlimited on sites believed suitable for improving water management capabilities.

Objective B-4 Moist-soil - Provide an additional minimum of 200 acres of moist-soil habitats to help meet an array of life-history nutritional needs (protein, minerals, and invertebrates) of waterfowl and other species. Provide high-priority shorebird species with quality habitat and food resources during fall migration (late July through September).

Discussion: Although high-energy foods (corn, milo, and rice) serve an important component of high stress periods (migration, cold weather, etc.), much of the year is often characterized as a time of more moderate energy needs.

During late winter (late February and March) and early spring periods, nutritional needs of waterfowl (protein, minerals, etc.) increase due to molts and preparation for egg laying. Moist-soil vegetation comprised of native grasses, sedges, smart weeds, etc., meet a more extensive variety of foraging needs, including invertebrates (needed for breeding females and shorebirds.) However, these moist-

soil habitats most often require good, active water management to meet average/good food production at preferred water depths (6" to 12"). Water management capabilities should include the ability to actively flood such units to desired depths at required times and to maintain/release water as needed. A series of moist-soil units distributed across the refuge could be accomplished by developing a system of low-head dikes, water control structures, wells, pumping, etc., to provide shallow water and seasonal inundation/dewatering for preferred foods.

Strategies:

- Establish and maintain sufficient water control infrastructure (pumps, internal levees, ditches, control gates, wells, etc.), to enable intensive management of moist-soil sites.
- Have annual water management plans prepared for moist-soil units. Inspect each unit, bi-weekly, during the early spring/summer to change/refine management manipulations to better ensure sites with good food production.
- Place water control gauges at all key impoundments, to correlate water levels and practices to plant responses. Implement a habitat monitoring program to assess "performance" of water management units. As the stated objectives reflect "full-pool capabilities," better knowledge of actual performance is needed to evaluate objectives. This could be accomplished through the use of staff-gauges and/or collection of GPS points that can be utilized in GIS.
- Utilize topographic reviews, photo reconnaissance, field inspection, and engineering to determine suitable sites for moist-soil units.
- Develop moist-soil units to achieve shallow water capability (6" to 12") and good water delivery control (wells, pumping, gravity flow, etc.)
- Consider the use of low-level terraces in some areas and maintain desirable water levels for feeding.
- Conduct moist-soil plant composition surveys to assist in judging when moist-soil units should be disked or disturbed by other methods. Normally most moist-soil units will need to be shallow-disked every 3-5 years to increase the percentage of plants considered to be of good food value for waterfowl. Strive for conditions where at least 50 percent of the plant composition is considered to be of good to fair value for waterfowl.
- Soil disturbance activities designed to keep moist-soil units in early successional stages should have a rotational management scheme so a mix of habitats is available (a mosaic of moist-soil habitats for late summer/fall, winter periods, etc.). Do not dewater all moist-soil units at the same time, instead stagger drawdowns throughout the late spring and summer.
- In those moist-soil units where early flooding resulted in food resources being flooded too deep for waterfowl to utilize (i.e. the hunting area) consider a slow drawdown in January, February, or March that will permit waterfowl to utilize newly exposed food resources.
- Hire biologist and/or bio-technician to conduct moist-soil management activities including inventories, monitoring, mapping, and water manipulations.

Objective B-5 Cropland - Maintain sufficient cropland acreage to ensure waterfowl and other wildlife objectives are achieved. Investigate use of force-account farming in combination with cooperative farming to achieve refuge objectives.

Discussion: Currently, there are approximately 700 acres of croplands on the refuge, with several hundreds more within the approved acquisition boundary. The refuge receives 25 percent of planted crops via cooperative farming or may receive other approved actions to improve habitats for wildlife as dictated by Service policy. Crops typically planted to be retained by the refuge are corn, millet, milo, sunflowers, or wheat. Soybeans are also planted on refuge lands, but are retained by the cooperating farmer.

The high-energy foraging provided by row crops, such as corn, is an important component in meeting caloric needs of waterfowl during the winter period. Additionally, such open lands/habitats provide food for numerous other wildlife species that include doves, quail, and big game species such as turkey and deer.

Cooperative farming is used as a habitat management tool, and a decision will eventually have to be made regarding how much is required to support refuge purposes and what could become surplus to wildlife needs. In those farmed areas eventually kept for producing forage for wildlife, a focus should be placed on sites with future water management development potential; not highly prone to flood, and/or not capable of significantly reducing fragmentation issues. For such newer refuges, other needs must also be taken into account concerning loss of regional agricultural production, commitments to previous landowners, and goods and services received to benefit refuge wildlife objectives. There needs to be a balance between the acres of croplands managed and other key habitat types (flooded forest, grasslands, scrub/shrub, emergent marshes, moist-soil communities, etc).

Refuge crop shares for ducks should be in areas where water can be manipulated (flooded), and for geese in large open (non-grassy) areas. Additionally, it is desirable to have 3-4 cooperative farmers and to ensure that some proportions of corn/beans are planted each year (not all corn one year and all beans another year—but try to approach a 50-50 or 60-40 ratio overall within the refuge croplands). If there are wet planting seasons when corn cannot be planted, grain sorghum and/or millets should be considered as an alternative on certain sites.

Establishing cropland field borders of natural vegetation of at least 30-50 feet in width is also recommended and these would have to be maintained in early successional stages. Additionally, some consideration should be given to feathering some borders of forest and adjacent agricultural fields (i.e., reducing the basal area of the forest edge to allow sufficient light that encourages some invasion of grasses, forbs, and shrub or brush into 100'–150' of the forest). In all areas, Best Management Practices should be utilized on all retained croplands. It is recommended that all refuge croplands be enrolled in USDA farm programs to ensure cooperative farmers have access to program benefits. Program participation and eligibility can be maintained for each tract, including moist-soil units, by inclusion in the annual USDA planted acreage report. Moist-soil acreage should be reported as native grasses during years not planted to an agricultural crops. Failure to maintain a cropping history (make an annual acreage report) can later result in potential Swamp Buster and/or Section 404 violations in moist-soil units related to an agriculture crop.

Strategies:

- Use historic information to determine if the assumption of duration and timing of flooding in bottomland hardwoods is factual. If not, then the quantity of managed moist-soil and flooded croplands may need to be increased to meet lack of waterfowl foraging habitat objectives.

- A portion of the standing unharvested corn should be made available (bush-hogging, dragging, etc.) to waterfowl at the close of the refuge waterfowl hunt season to determine if waterfowl will utilize this food resource. Doing this for several consecutive years will help make this determination as opposed to just 1 or 2 years.
- Increase the amount of managed, flooded unharvested crops and moist soil whenever the opportunity occurs. A short-term (5-10 years) objective might be 30-50 acres of flooded corn and 100-150 acres of flooded moist soil.
- Utilize cooperative farming to obtain refuge objectives, and obtain 20-25 percent as a refuge share.
- Use Best Management Practices to conserve soils, reduce erosion, etc.
- Try and maintain at least three cooperative farmers.
- Work toward a closer annual planting of 50-50 proportions of corn and beans acreage on refuge croplands.
- Enroll farmed lands in USDA farm programs.
- Investigate use of force-account or cash-account farming (as opposed to cooperative farming) to achieve refuge objectives, thus significantly reducing the area of croplands needed.
- Develop a cropland management plan as a part of the refuge's habitat management plan.
- Hire biologist and/or biological technician to conduct moist-soil management activities including inventorying, monitoring, mapping, water manipulations, etc.

Objective B-6 Grasslands - Increase native warm-season grassland habitat as open lands are acquired and where appropriate. Implement a Fire Management Plan to allow prescribed fire for maintenance of native warm-season grasslands.

Discussion: Approximately 80 acres have already been converted from fescue or agricultural land to native warm-season grass habitats on refuge lands less prone to inundation. However, saturated ground conditions during attempts to burn have impacted the maintenance of these habitats. Prior to establishing grassland habitats, consideration should be given to soil types, flood risks, forest fragmentation, maintenance feasibly, and proximity to similar habitat types. For the refuge to contribute to the grassland habitat development focus in western Kentucky in any significant manner, establishment of oak-savanna grasslands in *xero-hydric Flatwoods* habitats and restoration in uplands associated with the refuge's proposed boundary expansion proposal will be necessary.

Strategies:

- Determine local grassland habitat objectives (through participation in regional bird conservation planning).
- Apply adaptive resource management concepts to experiment locally with timing and frequency of disturbance, and vegetation and bird response.
- Utilize nest searches to determine nest productivity of high-priority grasslands species (grasshopper sparrow, Henslow's sparrow), and adjust grassland habitat acreage as needed to meet determined objectives.
- Explore options for oak-savanna grassland development in xero-hydric flatwood habitats. Work with partners (TNC, USFS, and QU) to assist with grassland habitat maintenance through use of fire.
- Consider appropriateness of grassland habitat establishment on a site-specific basis, including but not limited to, soils, difficulty of maintenance, fragmentation, other habitat restoration priorities, adjacent habitat types, and benefits to priority species of wildlife of management focus.

- Hire a biologist and/or biological technician to conduct inventorying, monitoring, mapping, and grassland restoration and maintenance.

Objective B-7 Cane Breaks - Reestablish viable cane communities and help expand and maintain current cane sites. Inventory and monitor survival and wildlife response.

Discussion: During the biological review, numerous giant cane patches were observed throughout the refuge. Although, most of these current patches were small in size, vast cane patches probably were significant during pre-settlement time periods. Cane was often found on natural levees next to rivers and on higher elevation terraces farther away from river channels. Because cane was commonly found on these higher terraces and was much easier to clear and put into crop production than bottomland hardwoods, these areas were often some of the first areas cleared for agricultural production. Giant cane is an important component of bottomland hardwood wetland complexes in the southeastern United States. Cane provides important habitat for a variety wildlife species including: swamp rabbits, Swainson's warblers, bobwhite quail, and a host of other birds, mammals, and insects.

Giant cane restoration is generally more difficult than bottomland hardwoods. However, there is a great deal of interest in cane restoration, and in recent years techniques suitable for cane restoration on larger scales have been developed. Although cane restoration costs may be three to four times that of bottomland hardwood restoration, attempts to restore giant cane are considered very worthwhile in terms of the unique wildlife habitat values provided in bottomland hardwood wetland systems. Efforts should be made to determine the pre-settlement distribution of giant cane within the current refuge acquisition boundary and adjoining areas. This information is often available from the original land surveyor's notes, which may have been previously studied by local university researchers. If not, efforts should be made to implement this type of pre-settlement land plant cover research with local universities. Once some idea of the distribution, extent, topographical location and corresponding soil types of historical pre-settlement cane is determined, the refuge should consider pursuing giant cane restoration on some sites suitable for restoration. Cane restoration may provide an important alternative to bottomland hardwood restoration on some sites, where there are concerns regarding patch size of resulting forest. Cane restoration adds some diversity to bottomland hardwood forests, while contributing a unique habitat preferred by a suite of species of concern.

Cane restoration could be done force account (using government personnel and equipment) by the refuge on a portion of current cropland by planting into existing cropland buffer strips. Giant cane has shown an ability to provide excellent riparian buffer benefits such as reducing soil erosion, slowing water runoff, and increasing nutrient uptake. The Natural Resources Conservation Service is currently developing standardized planting and management protocols for giant cane establishment in riparian buffers. The refuge should explore opportunities to partner with the Natural Resources Conservation Service to demonstrate giant cane restoration and to promote it as a conservation measure throughout the Clarks River watershed.

Strategies:

- Encourage more dense stands of cane by providing increased light to areas already containing cane.
- Pursue cane plantings/restoration on suitable sites.
- Determine pre-settlement distributions (see old surveyor notes, local university studies, etc.).
- Explore opportunities to partner with the Natural Resources Conservation Service to demonstrate cane restoration.

- Consider appropriateness of cane habitat establishment on a site-specific basis, including but not limited to, soils, difficulty of maintenance, fragmentation, other habitat restoration priorities, adjacent habitat types, and benefits to priority wildlife species.
- Hire a biologist and/or biological technician to conduct inventorying, monitoring, mapping, and cane restoration and maintenance.

Objective B-8 Invasive Plant Species - Implement control measures and monitoring of invasive plant species (Japanese stilt grass, reed canary grass, *Sericea lespedeza*, *Mimosa, etc.*) as appropriate. Improve basic biological information on occurrence and distribution of flora and fauna influencing the refuge. Prepare a refuge Inventorying and Monitoring Plan (IMP) in accordance with Service guidelines.

Discussion: There are numerous exotic/invasive species now on the refuge and expanding their range in the region. Noxious invasive plant species have long been recognized as harmful to man and this is reflected in the passage of federal laws such as the Federal Pest Plant Act of 1957, the Federal Noxious Weed Act of 1974, and the Nonindigenous Aquatic Nuisance Act of 1990. President Clinton signed Executive Order 13112 in 1999, directing all appropriate federal agencies to combine resources to prevent the introduction of invasive species and to minimize their impacts on human health, the environment, and the economy. Concern about the impacts of invasive species is reflected in many state laws. The Kentucky Exotic Pest Plant Council (EPPC) was established in 2000 and is one of 650 members of the Southeast Exotic Pest Plant Council.

Invasive plants monitored by the EPPC are classified in one of three categories depending on the level of threat posed, (i.e., severe, significant, or lesser). Plants considered a severe threat are highly invasive, can displace native plants, and are or could become widespread in the state. Those considered a significant threat are generally confined to disturbed areas but they may spread into natural areas. Those considered a lesser threat are confined to disturbed areas and do not easily invade natural areas.

Refuge staff has identified 21 different species on the EPPC watch list, severe (8), significant (5), and lesser (8) (Appendix I). For most of the species, the populations appear to be small and limited in distribution. The results of a refuge-wide botanical survey by Dr. Dwayne Estes of Austin Peay State University, Clarksville, Tennessee, are expected soon and will include detailed information on common, rare, and invasive flora.

Surveys should continue to be performed to inventory and monitor invasive plant presence and to determine their impacts. When deemed detrimental to the management goals of the refuge, control measures should be taken whenever possible. Control of these species should be prioritized by refuge managers, as their levels of environmental impact are variable. The following are invasive species that are likely to or have the potential to occur on the refuge and impact native flora and fauna.

Terrestrial exotic plants are the most serious threat to the biological integrity of native habitats. Although many species of exotic plants are now present throughout the southeast, two species of significant concern are Chinese tallow tree and Japanese climbing fern. Both of these plants aggressively spread throughout the forest with little hope of being eradicated. Refuge personnel should aggressively treat these two species, should they be identified as present on the Clarks River NWR. Tallow would be particularly detrimental to the refuge fields managed for waterfowl and shorebirds. Japanese climbing fern is a fast growing vine, preferring moist soils, which can completely shroud everything in its path. It has the ability to kill trees directly by blocking sunlight, and adds extra mass to trees acting as a sail, which causes uprooting during high winds. This species is becoming widespread throughout the southeast.

There are several invasive aquatic plant species of concern. Most of these are capable of forming dense mats over the surface of the water. When this occurs, dissolved oxygen levels in the water may become too low to support oxygen-dependent aquatic species (fish, mollusks, etc.). The invasives compete with native species and can cause habitat degradation. They may also inhibit waterfowl and other animal use and boat navigation. The efficiency of water control structures may also be affected if left uncontrolled. When infestations occur, herbicidal applications are normally the most effective control measure. Biological control for certain species may also be achieved with the use of sterile grass carp (*Ctenopharyngodon idella*) in waterbodies that are not prone to flooding. Alligatorweed (*Alternanthera philoxercoides*), common salvinia (*Salvinia minima*), Giant salvinia (*Salvinia molesta*), hydrilla (*Hydrilla verticillata*), and water hyacinth (*Eichhornia crassipes*) are invasive species known to exist in areas of the southeast and should be considered priorities for control.

Strategies:

- Invasive terrestrial and aquatic plants should be mapped using a GPS and entered into a GIS system.
- Establish a monitoring program of invasive plants to determine rate of spread by annually mapping areas of infestation and comparing to previous year's range.
- After comparison, calculate rate of growth (spread) by invasive plant species of priority management concern.
- Treat at least 5 percent of invasive plants annually.
- Communicate with the state for new invaders, granting opportunities, cooperation possibilities, etc.
- Hire a refuge biologist to assist with the development of priority areas and species for control, mapping, to secure funding for control work, and to aggressively work with partners.
- Ensure private lands biologists communicate with neighbors for interest in developing cooperative projects for invasive species control.
- Develop a complete floristic survey of rare or listed plants.

RESOURCE PROTECTION

Goal C. Resource Protection: Identify, conserve, and protect natural and cultural resources through partnerships, acquisition, and land protection programs within the Clarks River watershed.

Objective C-1 Refuge Land Protection - Identify and acquire highest priority tracts within the acquisition boundary. Focus on purchase of railroad right-of-way to facilitate public and management access. Expand acquisition boundary to promote access, establish upland buffers adjacent to existing refuge lands critical to bottomland species that rely on elevated areas during winter and/or flood events, and to ensure remaining contiguous bottomland habitats in the lower Clarks River watershed are protected.

Discussion: Currently, about 8,700 acres of an approximate 19,605-acre approved refuge acquisition boundary have been acquired through fee-title acquisitions. These acquisitions have been made possible through the Land and Water Conservation Fund. The approved acquisition boundary consists of a narrow corridor within the floodplain of the East Fork of the Clarks River. Lands within this area are approximately 68 percent forested, 24 percent agricultural, and 3 percent freshwater marsh and open water. The percentage of land within the Clarks River floodplain that remains forested is atypical of most floodplain lands today. Some of the last contiguous blocks of bottomland hardwood forest habitat found in western Kentucky are along the Clarks River, which makes it

extremely significant to resident and migrating wildlife. Similar blocks of bottomland hardwood habitat are located on the West Fork of the Clarks River, although some channelization of the primary river channel has occurred.

The KDFWR identified 251 Species of Greatest Conservation Need (SGCN) in the State's Wildlife Action Plan and then identified Priority Conservation Areas (PCA) where SGCN habitat and species occurrence records most overlapped (KCWCS 2010). The resulting analysis depicted the region of western Kentucky to be the most ecologically important PCA (KCWCS 2010) of all PCA's identified. This region is referred to as the Mississippi-Ohio Valley Plains PCA, and has been identified as the richest ecological "hotspot" in Kentucky, with 149 of the 251 SGCN (61 percent) (Figures 9 and 10). It is also recognized as the second largest identified "hotspot" in size (1.4 million acres) in Kentucky. As ecologically significant as the area is, only 4 percent of the lands identified in the area are publicly owned.

Strategies:

- Assess inholdings, consult private landowners, and acquire land from willing sellers.
- The Service's Realty Division will work with the refuge manager to identify willing sellers.
- Identify priority tracts for acquisition located within the approved acquisition boundary.
- Use aerial photography and staff's knowledge first identify and pursue priority areas. Contact landowners to ensure interest and work with the Realty Division to identify willing sellers and complete the land acquisition process in a timely manner.
- Focus on gaining maximum railroad right-of-way lands to improve public and management access.

Objective C-2 Future Land Protection - Seek land protection partnerships to achieve congressionally authorized refuge boundary expansion of 34,269 acres within the Clarks River Floodplain, to improve buffer conditions, contribute to biological objectives, close gaps between existing tracts, and improve public access. The proposed expansion of 34,269 acres would bring the total refuge acquisition boundary to approximately 53,874 (Figure 11; Appendix E).

Discussion: On a larger landscape scale, refuge and private land efforts need to be applied across a watershed area, at a minimum, in concert with other various agencies and stakeholders to promote a strategic habitat management to conservation of wildlife resources in the Clarks River Basin.

The refuge contains some of the last remaining intact bottomland hardwood wetlands within the Clarks River watershed. Although the Clarks River has not been channelized itself, most of the floodplain has been altered by local drainage efforts associated with agriculture. The refuge is basically at the lowest point in the watershed and consequently all land use activities in the watershed have an impact to some degree on refuge resources. Long-term restoration of floodplain structures and functions should be the ultimate goal in the watershed, but the refuge's current land acquisition boundary does not contain sufficient acreage to sustain long-term floodplain structures and functions. Expanding the current refuge acquisition boundary should include, at a minimum, lands within the 100-year floodplain of the East and West Forks of the Clarks River. However, residential and commercial development most likely precludes this as a viable approach. Adjustments will be required to account for areas within the floodplain that have significant development or high developmental potential. Roads (county and state) should be used, rather than arbitrary lines, as acquisition boundaries to simplify in-out determinations and ensure access to refuge lands for public use and management activities.

Figure 9: Kentucky's priority conservation areas (KCWCS 2005)

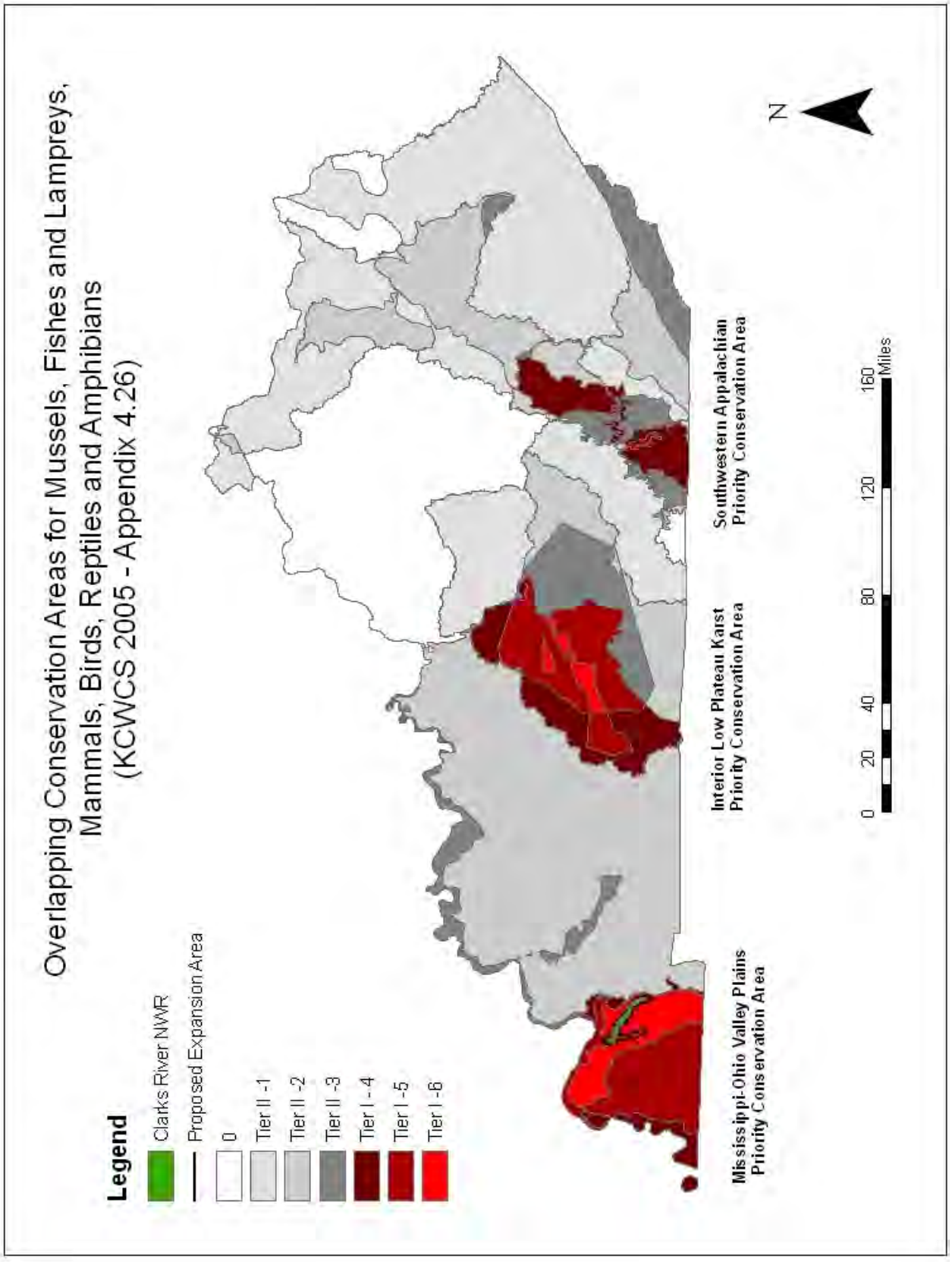
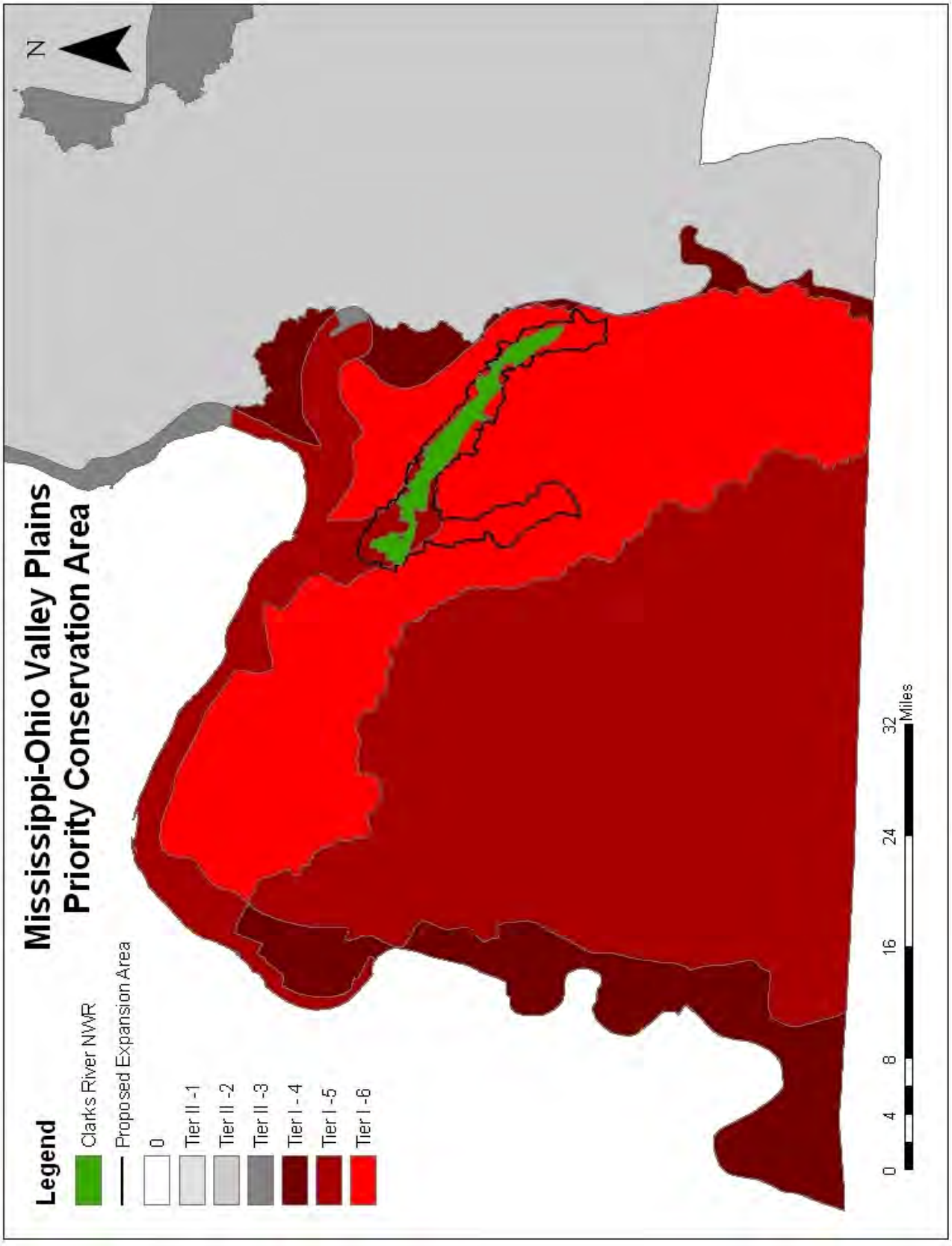


Figure 10: Clarks River NWR and expansion area in the Mississippi-Ohio Valley Plains PCA



The refuge's land acquisition program has been very successful thus far.
The refuge currently has fee-title ownership of about 8,634 acres, with an approved acquisition boundary of approximatley 19,605 acres. Fee-title lands are distributed as follows: Graves County (56 acres), Marshall County (5,970 acres) and McCracken County (2,608 acres). Lands are purchased on a willing-seller basis only. The proposed expansion of 34,269 acres would bring the total refuge acquisition boundary to approximately 53,874 acres and would protect lands along the East and West Forks of the Clarks River (Figure 11) (Appendix E).

The proposed expansion boundary contains land ownership patterns, of predominantly private ownership, with approximately 50 percent of the tracts being 10 acres or less in size and approximately 95 percent of the tracts being 100 acres or less in size (Table 5) (Appendix E). Three categories of land acquisition have been established, with the highest priority being the Priority 1 tracts (Figure 12). Table 5 and Figure 12 display these general priorities, although some parcels within an area may be a higher or lower priority due to a particular habitat feature or juxtaposition to adjoining refuge lands. In determining the extent of the proposed expansion area and the priority of the lands for conservation, the following qualitative criteria were used:

1) Protection of bottomland hardwoods;
2) Conservation of migratory birds;
3) Contribution to the goals of other conservation plans;
4) Contribution to the recovery of listed species (protection of occupied or historic habitat);
5) Potential for bottomland hardwood, cane brake, and savanna/prairie restoration;
6) Contribution to water quality in the Gulf of Mexico; and
7) Ability to offset anticipated climate change impacts.

Table 5: A summary of expansion area parcel size classes by acres and percent

County	Priority	Size Class (acres)						Area Totals
		<10	11-25	26-50	51-100	101-200	>200	
Marshall	1	342	94	96	70	25	5	632
McCracken	1	148	38	29	23	10	7	255
Graves	2	207	63	64	40	16	2	392
Graves	3	102	45	26	23	4	0	200
Size Class Totals		799	240	215	156	55	14	1,479
Percent by Size Class		54	16	14.5	10.5	4	1	100

These lands would be acquired primarily through fee-title acquisition from willing sellers only. Leases, easements, and management agreements will also be considered where appropriate. For example, certain parcels are enrolled in Natural Resources Conservation Service landowner programs. State lands would continue to be managed by the KDFWR (i.e, Kaler Bottoms WMA).

Strategies:

- Focus on biological/environmental voids and gaps that could be filled via land additions to increase public access, provide better water management capabilities, facilitate existing refuge habitat goals and objectives (decrease fragmentation of forests, grasslands, canebrakes, etc.), and that reduce impacts of land use adjacent to and within the Clarks River watershed.

- Continue to build relationships that support refuge land acquisitions through improvement of public use opportunities on the refuge.
- Continue to acquire lands from willing sellers.
- Conduct planning and seek approval for acquisition boundary expansion to include upland buffers and lands along the West Fork of the Clarks River.

Objective C-3 Private Land Protection - In coordination with partners, protect priority lands and utilize a strategic approach to help enhance ecological and environmental health within the Clarks River watershed.

Discussion: The refuge should use a preliminary list of resource issues as a starting point for conversations with local conservation interests. Since all the land surrounding the refuge is in private ownership, developing a good cooperative working relationship with the Natural Resources Conservation Service and the Soil and Water Conservation District (SWCD) will be very important in order to address landscape scale resource issues. The refuge's Friends Group and the Ecological Services' Private Land's biologist can potentially play an important role in helping to identify resource issues and generate interest among private landowners and other state and federal resource conservation agencies/groups to become involved with landscape resource planning efforts.

Lands within the current refuge acquisition boundary occur entirely within the floodplain of the East Fork of the Clarks River. The proposed expansion areas include upland buffers to the existing refuge and a comparable mix of wetland habitat and upland buffers on the West Fork of the Clarks River (Figure 13). Native habitats on the refuge and proposed expansion area include two upland communities and nine wetland communities including bottomland hardwood forest (rare in Kentucky), and post oak flatwoods (very rare in Kentucky). The proposed expansion will provide habitat restoration opportunities for bottomland hardwood forests, oak savanna, cane brakes, and possibly even small amounts of prairie.

Several different types of wetland forest, upland forest, pasture, agricultural lands, managed impoundments, waterways associated with streams and rivers, beaver ponds, and freshwater marshes define the habitat and associated wildlife diversity of the refuge and proposed expansion area (Table 6).

Table 6: A summary of refuge habitat types by percent of area

HABITAT TYPES	Percent Refuge Lands	Proposed Expansion Areas		
		Priority 1	Priority 2	Priority 3
Wetland Forest	72.0	25.1	47.3	25.0
Agriculture Land	22.0	39.3	25.5	31.7
Pasture/Grassland	1.0	18.2	11.9	15.9
Scrub/Shrub Wetland	2.0	0.6	6.6	10.8
Open Water	1.0	2.2	1.0	0.8
Upland Forest (deciduous)	2.0	13.1	7.3	15.4
Upland Forest (coniferous)	0.0	0.7	0.4	0.4
Rural Residential	0.0	0.8	0.0	0.0
TOTAL	**100**	**100**	**100**	**100**

Figure 11. Current and proposed acquisition boundaries for Clarks River NWR

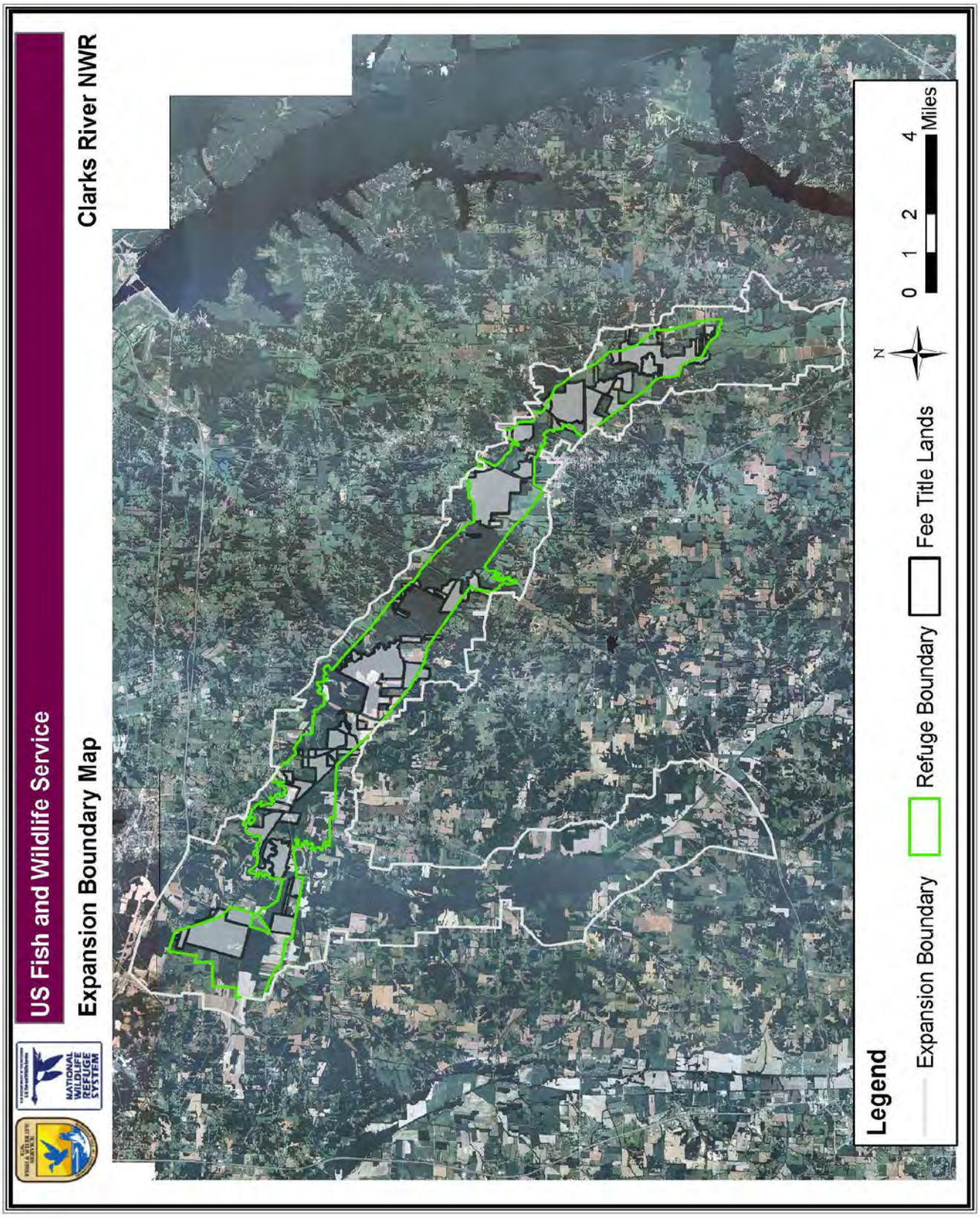
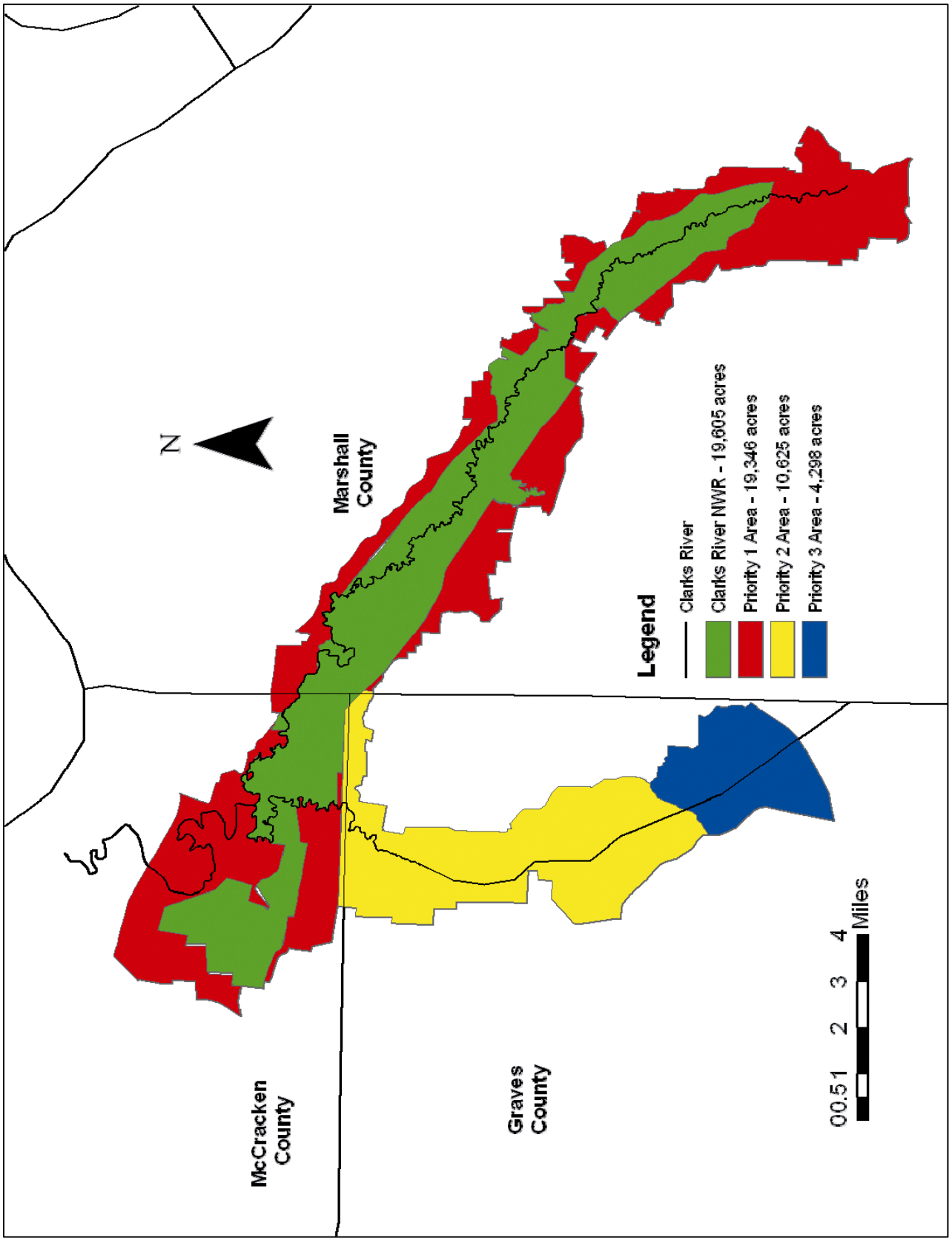


Figure 12: Clarks River NWR and the prioritized proposed expansion area



The ratio of wetland forest to upland forest and agricultural and pasture lands in the Priority 1 area on the East Fork of the Clarks River reflects a need to protect uplands around the existing refuge (which lies entirely in the floodplain) and conserve those species (i.e. reptiles, amphibians, mussels, fish, and crayfish), which depend on water quality and the proper mix of upland and wetland habitats to complete their life cycle. The upland habitats will also improve access to the refuge for the general public and staff, an issue critical to optimal management. Less than 1 percent of the Priority 1 expansion area includes land classified as rural residential.

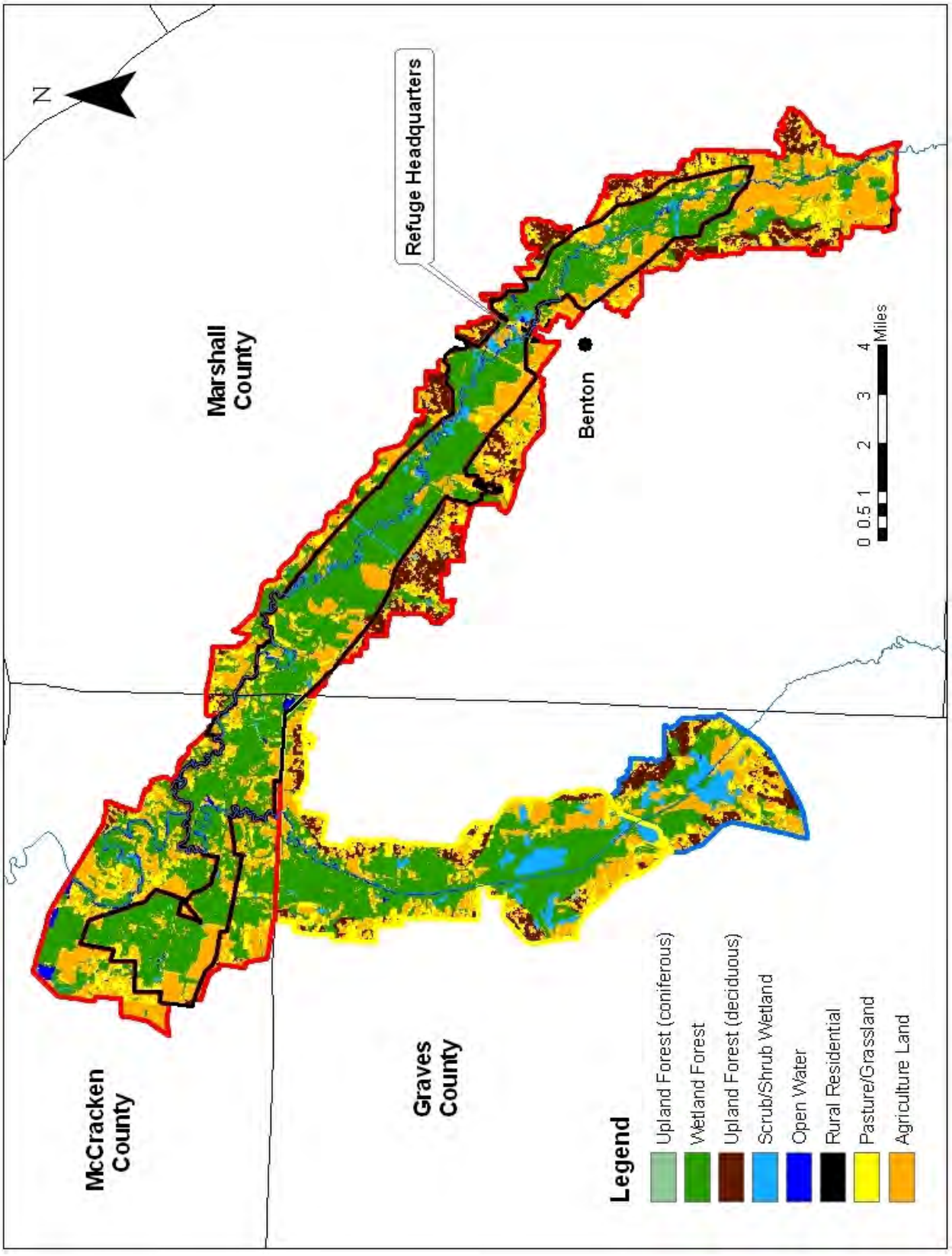
When compared to the refuge, the lower ratio of wetland forest and higher ratio of agricultural land in the Priority 2 and Priority 3 expansion areas on the West Fork of the Clarks River indicate a higher level of floodplain disturbance and the need, or opportunity, for bottomland hardwood reforestation and other land management practices to improve water quality for trust aquatic resources in the watershed. The higher ratio of pasture/grassland likewise indicates an opportunity for upland habitat restoration, either oak forest, oak savanna, or prairie depending on topography, soil, and historic conditions. The largest prairie in western Kentucky, perhaps an artifact of Native American land management practices, was centered in Graves County on uplands bisected by the West Fork of the Clarks River.

Strategic landscape resource planning will help address issues that not only affect wildlife but people as well. Some of these issues include: sedimentation rates from surrounding lands, wetland sediment deposition rates, stream incision and lateral gullying, flood frequencies and duration, water quality, wetland loss, forest condition, and forest fragmentation. Several existing Natural Resources Conservation Service programs are already addressing some of these resource issues in the watershed. The refuge should coordinate and assist NRCS with these programs to the extent possible. The Wetland Reserve Program (WRP) is a good tool to not only restore wetlands, but it also helps reduce sedimentation and can reduce forest fragmentation. The refuge should work with NRCS in an attempt to target WRP around the refuge acquisition boundary. This would in affect broaden perpetual wetland restoration efforts beyond the refuge acquisition boundary. The Conservation Reserve Program (CRP) is available to take highly erodible land out of crop production and help reduce sedimentation. Other programs, such as EQIP and WHIP, are also available through NRCS to help private landowners with soil, water, and wildlife habitat assistance. There is a need for an extensive GIS database to identify and incorporate various land use types and forest stand conditions on the refuge, the immediate surrounding area, and the overall watershed. Such a database should also incorporate private land incentive projects, contaminants, water quality and hydrology, and wildlife surveys. This will aid in the refuge planning and will facilitate landscape-level management within the Clarks River Basin.

Strategies:

- Private lands biologist will seek interested landowners in areas of high priority for reforestation and other priority habitat improvement projects.
- Work through a variety of programs to provide technical and financial assistance necessary to provide additional migratory bird habitat to benefit refuge objectives, specifically wintering waterfowl habitat adjacent to the refuge.
- Work with the NRCS, FSA, private landowners, KDFWR, and other partners to designate priority conservation areas to provide incentives that will encourage landowners to implement practices that will benefit trust resources, refuge purposes, and landscape conservation goals.

Figure 13: Clarks River NWR and proposed expansion area habitat types



Objective C-4 Watershed Protection - Continue active participation in Four Rivers Basin Team. Work with regional hydrologist, state and local counties, and other partners to conduct hydrologic investigations of the Clarks River. Analyze data and implement appropriate management actions.

Discussion: Developing a landscape resource planning effort will be a challenge for the refuge. The long-term value of the refuge, as a sustainable bottomland hardwood wetland resource, may well depend on conservation accomplishments at the landscape level. The refuge should attempt to promote the idea of landscape resource planning through its contacts with various state and federal agencies and through its refuge Friends group. The refuge does not have to be the lead in such an effort, but needs to be an active promoter and participant. Special funding is available through NRCS, EPA, Kentucky Division of Water (DOW), and other entities to support this type of landscape resource planning approach. Landscape planning helps not only to identify issues and then develop cooperative efforts to address, but once you have a cooperative watershed group with a "plan" it is much easier to generate support.

The riverine characteristics of the Clarks River support a diverse community of fish, mussels, and aquatic invertebrates. It would be beneficial to use results of past fish surveys to compute an Index of Biotic Integrity (BI) for the river. This would allow the refuge to evaluate the overall community health of the river based on the species composition, tropic structure, and general condition of the fish community. Other agencies should be contacted to determine if additional information is available on such wildlife populations (fish, invertebrates, mussels, etc.).

With the channelization of the West Fork of the Clarks River and the increased run-off from past and current land use on both forks of the river, the flooding regime in the lower Clarks River watershed is altered to deep floods of short duration. Opportunities should be sought to maintain areas of water in the forests during the winter months with minimal investment. Options include plugging or filling manmade ditches instead of developing extensive dikes. Retention of winter floodwaters could significantly benefit migrating waterfowl, even if the waters were retained for as little as two weeks. Leaf litter deterioration and invertebrate production begins after about 14 days of inundation. Remote imagery taken during flood events in winter months would be extremely useful in identifying flooded areas, suitable sites for water retention, and drainage patterns. Optimal species for greentree reservoir management are pin oak dominated stands, lower site red oaks, and overcup oak/green ash forest types. Greentree reservoir management of Cherrybark oak/post oak forests would be productive in the short term but unnatural and unsustainable in terms of forest ecology and would result in a species shift to more flood tolerant species over time.

Strategies:

- Utilize a landscape approach with partners and landowners to help enhance ecological/environmental health of the refuge.
- Inventory the landscape resource issues impacting the refuge and specify each in as explicit terms as possible.
- Develop good working relationships and cooperative ventures/partnerships with key agencies (NRCS, SWCD, EPA, KDFWR, etc.) conservation groups, and the refuge Friends group.
- Compute Index of Biotic Integrity scores for the Clarks River.
- Obtain better data on other hydrological characteristics of the Clarks River.
- Utilize a trained geomorphologist to address such issues as flow regime, stability, discharge, and/or Rosgen stream types.

- Explore other River system influences such as river aggrading (filling with sediment), degrading or stable, historical attributes (entrenched stream, braided historically, flood duration and timing, etc.), and historic and current land use impacts.

Objective C-5 Water Quality - Conduct comprehensive continuous water quality and flow condition assessments on the Clarks River within the refuge.

Discussion: The water quality of Clarks River will determine the health of this riverine environment. Upstream of the refuge, an 11-mile stretch of the river has been placed on the state's 303(d) list of impaired waters. This reach was only partially supporting of the aquatic life use designation and non-supporting of the primary contact recreation use designation. Although there is some improvement downstream, additional studies are warranted. Non-profit groups such as The Four Rivers Basin Team, Watershed Watch, and the Kentucky Waterways Alliance may be able to provide additional water quality data for the Clarks River watershed.

Strategies:

- Determine current water quality status.
- Coordinate with TVA, USGS, DOW, or other groups to better document water quality and stream flows.
- Develop proposals to secure funding for water quality assessments and utilize resources of Murray State University to the degree possible.
- Hire biologist and/or biological technician to assist in developing water quality proposals, partnerships, data collection, and analysis.

Objective C-6. Contaminants: Conduct additional contaminant studies and initiate biological assessment work on Clarks River within the refuge.

Discussion: Additional contaminant studies using fish and invertebrates would be useful in order to evaluate habitat and water quality conditions of the river. State water divisions/agencies need to be contacted to obtain any inventory data on water quality and to encourage establishing sampling points and gauges on refuge sections of the river. Non-profit groups, such as the Four Rivers Basin Team, Watershed Watch and Kentucky Waterways Alliance, may be able to provide additional water quality data.

Strategies:

- Work with NRCS, USGS, USACE, DU, and others to complete a geomorphologic and hydrological evaluation of existing refuge conditions, and to examine the potential benefits and negative impacts from any proposed levee breaching, irrigation system modification or installation, or wetland construction, etc., on the refuge.
- Establish water quality baseline for the refuge. Coordinate with state and Service's Kentucky Field Office to determine if sampling sites on the refuge are needed.
- Work with partners to restore the hydrology of the refuge where applicable and in the best interest of the Service, and contribute to the health of the entire watershed. Ensure that opportunities for fish and wildlife habitat are enhanced and do not materially detract from the purposes of the refuge.
- Consider additional contaminant studies and begin more biological assessment work involving the water quality and flow conditions of the Clarks River.

- Hire refuge biologist and/or biological technician to assist with partnership development and to coordinate contaminant investigations on the refuge.

Objective C-7 Cultural and Historical Resources - Complete comprehensive historical and archaeological resource survey on current refuge and any additional lands acquired.

Discussion: Although none of the refuge sites covered by this Draft CCP/EA are known to be eligible for inclusion on the National Register of Historic Places at this time, the refuge will continue to protect any newly discovered or unknown resources.

Strategies:

- Maintain records of refuge survey data for cultural and archaeological sites.
- Monitor for vandalism and degradation of sites identified.
- Contact Regional Archaeologist prior to construction or significant ground disturbance projects and complete a request for Cultural Resource Review Form to determine appropriate steps necessary for compliance.
- Within 5 years of Final CCP approval, refuge manager or designee will look into taking the Overview for Cultural Resources Management Requirements Course.
- Ensure cultural resource management and protection strategies are integrated into refuge management plans such as Fire Management Plan, Road Maintenance Plan, etc.
- A layer for archaeological and historic sites will be integrated into the refuge's GIS database.
- Maintain data as confidential per National Historic Preservation Act and Archaeological Resources Protection Act.
- As archaeological and cultural resources are newly discovered, coordinate with the Regional Archaeologist to get them cataloged and assure appropriate archival.

VISITOR SERVICES

Goal D. Visitor Services: Promote environmental education and interpretation opportunities and enhance compatible wildlife-dependent public uses, including hunting, fishing, wildlife observation, and wildlife photography on Clarks River NWR.

Discussion: The Improvement Act, the organic legislation of the Refuge System, designates six wildlife-dependent "priority public uses." These are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. National refuge policy encourages refuges to offer these opportunities and to seek out additional resources when needed. These activities foster an appreciation and understanding of wildlife and the outdoors.

Objective D-1 General - Develop a Visitor Services Plan. Construct staffed visitor center and improve visitor access and program support. Coordinate with other regional and state visitor services' entities to enhance regional visitation and extended stays. Add additional park rangers (law enforcement and public use) to enhance additional visitor services.

Discussion: The Service provides recreational opportunities that reflect the unique qualities and features of each national wildlife refuge. Opportunities vary on each refuge for compatible wildlife-dependent recreation and must be evaluated against the compatibility standards, public desires, and other recreational opportunities in the area. A Visitor Services Plan will evaluate the best fit for recreational opportunities in line with maintaining the biological integrity of the refuge. Visitor contact

and information must be provided to allow visitors to gain the most information from their visit and provide a safe environment for wildlife and people. To maintain a visitor services program and the impacts of such, volunteers will be used to maximize wildlife-dependent recreational opportunities and do so in a manner to allow visitors to take away a better understanding of wildlife and their role in the environment. A visitor services program creates a greater awareness of the biological environment, a better understanding of each individual's role in the environment, and promotes a conservation ethic in refuge visitors.

Strategies:

- Develop an up-to-date Visitor Services Plan that reflects current legislation, director's orders, initiatives, policy, and the mission of the refuge, the Refuge System and the Service. The plan should also address the current and future visitor services and recreation needs of refuge visitors.
- Coordinate and collaborate with KDFWR regarding public use programs, biological issues, and law enforcement coordination.
- Hire a full-time park ranger (public use) to coordinate and facilitate the visitor services program.
- Expand the visitor's services program to the extent possible without sacrificing program quality.
- Evaluate a user fee for recreation programs.
- Seek recreation fee grant funding to accomplish recreation and environmental education projects.

Objective D-2 Hunting - Ensure quality hunting opportunities during refuge hunting seasons by evaluating additional quota hunts, participation in recreational fee program, improvement of access points, and utilization of time and space zoning.

Discussion: The Service recognizes hunting as one of the six priority public uses of the Refuge System. It is a legitimate and appropriate public use of the Refuge System that is deeply rooted in American culture. Hunting can promote a unique understanding and appreciation of wildlife, their behavior, and habitat requirements.

Hunting visits make up the largest portion of public use (estimated 85 percent) on Clarks River NWR. Most game species regulations on the refuge are aligned with state season dates and harvest limits. All refuge-specific regulations are listed in the general hunting and fishing brochure, which is updated annually.

With the opening of white-tailed deer gun season, many hunters enter the parcels of land along the Clarks River floodplain. Permission to access through private land is crucial to enter some Service-owned lands, when not bordered by a public road. S ince there are few contiguous pieces of property, deciphering boundaries and locating access points can be difficult for first-time users. Posting and maintaining boundaries require constant attention but is crucial to ensure refuge users conduct hunting and other activities in the appropriate locations.

Waterfowl hunting is the next most popular recreation pursuit on the refuge. Farming and moist-soil management practices on refuge lands provide a substantial food source for populations of waterfowl. Waterfowl feed in areas along the Clarks River floodplain when waters breach the bank. The Sharpe-Elva Water Management Units are offered as quota waterfowl hunts from morning until noon on selected days during the waterfowl season. .

Strategies:

- Refuge will participate in annual state hunt coordination meetings to discuss proposed refuge hunting programs and regulations as possible.
- Maintain communication on hunting issues that the state may have regarding opportunities or modifications to these programs.
- Update the Hunt Plan as needed to ensure the highest quality opportunity.
- Develop and place signage at graveled parking areas and boundaries for hunting and other public uses where appropriate, and designate these areas on hunting brochure maps.
- Continue managing and conducting annual hunt program evaluations.
- As appropriate, evaluate adding a deer and turkey quota hunt and consider recreation fee options. Designate entry/access points into hunting areas, to aid law enforcement, and to reduce conflict with other user groups and private landowners.
- Hire biologist and/or biological technician to assist with hunt coordination activities, data collection, and wildlife population monitoring.
- Hire additional law enforcement officer to aid in regulation enforcement and public safety.

Objective D-3 Fishing - Continue to develop fishing opportunities on accessible reaches of Clarks River, in the waters of small ponds, and on a lake in the Environmental Education and Recreation Area (EERA), which is universally accessible. Create an additional universally accessible fishing pond on north end of the refuge. Develop fishing step-down management plan.

Discussion: Refuge waters are open year-round for sport fishing. Regulations follow Kentucky seasons and creel limits unless specified to be different in the refuge's hunting and fishing brochure. Areas may be closed seasonally to provide sanctuary for waterfowl and other wildlife. Access to refuge waters is allowed and encouraged although most accessible areas of the Clarks River are only suited to small johnboats.

A 5-acre public fishing pond was recently opened within the Environmental Education and Recreation Area just outside the city limits of Benton, Kentucky, and is open 7 days a week, during daylight hours only. Specific regulations on fishing within the EERA can be found within the Refuge Hunting and Fishing Regulation brochure.

Strategies:

- Conduct youth fishing days at EERA fishing pond.
- Develop fishing brochure with map.
- Continue to involve partners in the management of the fishing pond and EERA.
- Add a monofilament recycling bin made with PVC that will protect birds and aquatic life as it stores the discarded line for safe disposal.
- The underwater artificial structures may result in snagging by anglers. If this presents a problem, consider marking each with a pipe or a small floating device.
- Encourage use of non-lead weights when updating the next edition of the fishing brochure.
- As more land is acquired, develop fishing areas and update publications.
- Hire biologist and/or biological technician to coordinate and facilitate fisheries management on the refuge.
- Evaluate the refuge fishing program annually.
- Develop a refuge Fishing Plan.

Objective D-4 Wildlife Observation and Photography - Provide a quality wildlife observation and photography program by continuing current opportunities and developing additional trails, trailhead parking, kiosk, and photography blind(s). Develop a recreation and education area on north end of refuge.

Discussion: The refuge is presently open year-round, except for closures in some areas for waterfowl sanctuaries, environmental education activities, or due to safety concerns. A wide variety of wildlife is easily observed throughout the refuge. Visitors may drive on designated roads and hike throughout the refuge.

The EERA provides walking trails, an observation platform, a gazebo that overlooks a moist-soil/grassland demonstration area, and an environmental education pavilion. A paved walking trail loops around a 5-acre man-made public fishing pond, which is located between the refuge maintenance shop and one of the three moist-soil units. A paved parking area and an information kiosk are located near the entrance of the area. A site-specific entrance sign is located along the road leading to the site.

Strategies:

- Ask the Friends Group to help promote and host a digital photography workshop and contest to get specific photographs for future use on the refuge. This could be done in conjunction with a birding event, such as the Audubon Christmas bird count. This can help solicit wider membership within the Friends Group, engage a wider audience, and offer a unique opportunity in the area.
- Call Murray State University or Western Kentucky University to find volunteers that may be willing to help conduct this program. Advertise in local papers seeking volunteers with digital camera expertise. Make this an annual event. Place a spotting scope at the Pond Path Lookout along the fishing pond trail platform.
- Evaluate using the existing Sharpe/Elva Water Management Unit duck blinds as photography blinds and possibly conducting guided birding tours outside of hunting season.
- As refuge lands are acquired and connected, develop a trail, trailhead parking, and kiosk on the Heath tract to encourage wildlife viewing and photography. Minimize rifle hunting and possibly add a youth or universally accessible hunt in this area.
- Evaluate the possibility of working with partners and landowners to develop an observation area and trail connecting the headquarters office with Happy Hollow Overlook. If developed, rename it Clarks River NWR overlook.
- Working with partners and landowners, evaluate the railroad bed as a future Rails-to-Trails project.
- Evaluate areas of deer and migratory waterfowl use and determine whether additional viewing blinds could be installed for photography or educational purposes.
- Hire park ranger (public use) to coordinate and facilitate wildlife observation and photography on the refuge.
- Evaluate annually the refuge's wildlife observation and photography program.

Objective D-5 Environmental Interpretation - Provide a quality environmental interpretation program by maintaining existing and increasing interpretive signage, programs, and literature through increased partnerships and promotion of environmental interpretation programs.

Discussion: Opportunities and information are provided to visitors to enable them to pursue wildlife observation, wildlife photography, and environmental interpretation. Visitor interpretive trails, observation towers, etc., allow visitors to develop an understanding of and appreciation for natural resources, while promoting refuge use in an appropriate and compatible manner. Providing visitors with safe, quality wildlife observation and photography opportunities fosters ethical behavior, which results in minimal disturbance to wildlife and plants and an appreciation for natural resource conservation.

Interpretive activities are often the visitor's first contact with the refuge, the refuge message, and possibly even his/her first contact with a conservation issue and wildlife. Through these contacts, visitors' attitudes and behaviors can be positively influenced toward the Service and the Refuge System.

Strategies:

- Place interpretive panels and/or kiosks on walking trails and at selected parking areas.
- In coordination with city and county planners and other conservation agencies, develop an interpretive display of conservation properties for the surrounding area.
- Promote and schedule interpretive events with assistance from partners, volunteers, and the refuge Friends group.
- Hire park ranger (public use) to coordinate and facilitate interpretive programs, signage, panel, and brochure development.
- Recruit and train volunteers to assist with environmental interpretation programs.
- Develop and maintain at least four parking areas on each side (east and west) of the refuge with kiosks that provide maps, rules, and regulations and explain wildlife-dependent recreational opportunities.

Objective D-6 Environmental Education - Increase curriculum-based educational information and programs. Maintain environmental education shelter and EERA. Increase partnerships to promote environmental education programs.

Discussion: The refuge is currently providing environmental education activities on an "as available" basis. The demand for environmental education is significant with group requests being made almost daily. A part-time position was added and specifically dedicated to environmental education planning and programs; however, this position is only temporary. Over 50 different schools are located within 20 miles of the refuge. Refuge personnel and volunteers are managing to accommodate approximately 22,000 students annually, but the number could easily be quadrupled with adequate personnel resources.

A formal environmental education program called "Connect to Nature" has been instituted by the refuge. This program has been very successful and has been in place for 6 years. The program has been grant funded since its inception and has fostered partnerships that have added to its success. Middle school teachers participating in the program have demonstrated dedication to the project and will be a key resource in future programming. An urgent need to have a refuge staff person capable of devoting significant amounts of time to this program is essential to expand and build upon the program's success.

The visitor services review team visited the Happy Hollow overlook as a possible future site for environmental education, interpretation, and wildlife lookout. Before the Service purchased the land, the site had been previously developed for residential purposes. These developed areas have septic and electric facilities, and a paved road access that meanders through the wooded hillside culminating at an overlook. The overlook area has enough space for a small facility with parking and the site affords itself a bird's eye view of the Clarks River, with the possibility of future facilities for environmental education and interpretation of migratory birds, raptors, etc.

Strategies:

- Ensure education programs include core messages.
- Develop a variation of table top exhibit panel themes and general refuge information for local programs.
- Develop a trail, trailhead parking, and kiosk at other locations. Change the emphasis of those areas from hunting to hiking to encourage wildlife viewing and photography. During the next revision of the interpretive kiosk middle panel at the EERA, revise the map and text so that it fulfills ADA standards (i.e., contrast behind legend and title, shorten legend, make it bigger, etc.)
- Recruit and train volunteers to assist with environmental education programs.
- Hire full-time park ranger (public use) to coordinate and facilitate environmental education programs.

Objective D-7 Special Uses - Hiking, Biking, Walking, and Horseback Riding - Allow special uses (e.g., horseback riding, hiking, and biking) where appropriate and compatible.

Discussion: Special use activities on the refuge at this time are minimal. Permits may be issued for uses that are normally not permissible to the general public. Examples of permit uses that are most common include mobility impaired or other types of access, right-of-way maintenance, dog training, and research. Special conditions are always developed and must be followed by the permittee to ensure compatibility.

Strategies:

- Coordinate with Service's Regional) Office to develop procedures to address any commercial activity proposed on refuge.
- Monitor permitted activities to ensure compliance and assess the impact of the use on refuge resources.
- Make sure there are up-to-date appropriate use forms and compatibility determinations for all uses.

REFUGE ADMINISTRATION

Goal E. Refuge Administration: Achieve full staffing level identified in Service national staffing model with associated secured funding and facilities necessary to achieve the Refuge System's mission.

Discussion: The administrative functions associated with the refuge include a wide array of activities that are imperative to supporting the mission of the Refuge System and the purpose of the refuge. Refuges must have appropriate staff, facilities, and equipment in order to accomplish their goals and objectives and fully contribute as a unit of the Refuge System in accomplishing the mission of the Service.

Objective E-1 Staffing - Maintain office assistant, refuge manager, assistant refuge manager, engineering equipment operator, and park ranger (law enforcement). Add a wildlife biologist, biological technician, term GIS specialist, assistant manager trainee, park rangers (visitor services and law enforcement), and maintenance worker.

Discussion: Current staff includes a refuge manager, an assistant refuge manager, an equipment operator, a law enforcement officer, an administrative officer, and a part-time park ranger (public use). During the summer months, general maintenance responsibilities increase significantly and additional part-time help is hired in the form of student temporaries. At Clarks River NWR, two to four students are hired each year from universities throughout the country.

Additional full-time staff is required to ensure permanence and progression of refuge programs, and to ensure that Clarks River NWR contributes to its full potential in achievement of the Service Mission and as a conservation unit of the Refuge System. In 2008, a national workforce planning exercise was conducted to estimate full-time staff required to administer each refuge nationwide at optimal levels. The model used information submitted in the Refuge Annual Performance Plan (RAPP). Numbers predicted were then evaluated for "fatal errors" and adjustments made within each region under nationally agreed-upon criteria. Regional adjustments were made to the Clarks River NWR prediction, because use and program activities are still increasing. After adjustments, a full-time staff of ten permanent employees was recommended for operation and maintenance of Clarks River NWR.

Strategies:

- Provide continuing education and training opportunities to all staff to ensure a highly competent and motivated team.
- Provide employees with safe and efficient equipment and vehicles for refuge operations and maintenance.
- Place priority on hiring a full-time wildlife biologist and assistant manager trainee.
- Prioritize funding of at least three STEP positions during critical periods and a term GIS specialist.
- Place priority on hiring a full-time park ranger (public use) to function as volunteer coordinator, Friends liaison, media specialist, environmental education specialist, outdoor recreation planner, and to manage the public use programs and facilities. Continue to hire other full-time staff identified to reach optimum refuge operation (maintenance worker, biological technician, and park ranger (law enforcement).
- Recruit qualified volunteers and interns to fill staffing gaps until funding for full-time employees becomes available.
- Hire term and part-time employees as funding allows to fill staffing gaps until full-time employee funding becomes available.

Objective E-2 Facilities - Repair and maintain existing facilities, building, and roads and maintain refuge programs that can provide safe and efficient refuge operations. Build a new visitor center on Clarks River NWR.

Discussion: The headquarters for Clarks River NWR is located in Benton, Kentucky. The building was constructed in 2002, and serves as the primary point of contact for most refuge visitors. A new maintenance shop was constructed in 2007, to replace the old shop, a horse barn, which was acquired with a tract of land located on Highway 408 east of Benton. The shop is adequate to meet current refuge needs and will likely remain so for many years to come. A four room bunkhouse was also constructed in 2008. This facility has tremendously improved the refuge's ability to recruit temporary help and foster research partnerships. The refuge currently maintains about 1.25 miles of graveled road at Mallard Point and several small parking lots throughout the refuge. Additional parking lots are needed on certain public roads to provide access for visitors to enjoy the refuge. Public roads are narrow, shoulders are often non-existent, and the terrain does not permit visitors the latitude to simply pull off of the road safely out of the way of traffic. Future plans include construction of a full-scale visitor's center adjacent to the Purchase Parkway overlooking the Benton Bottoms, a part of the Clarks River floodplain.

Located on Highway 408 in Benton, Kentucky, is the Environmental Education and Recreation Area. The EERA features a 5-acre universal access fishing pond, approximately 2.5 miles of trails, an outdoor gazebo, a wildlife observation platform, an environmental education shelter, and a public restroom facility.

Strategies:

- Repair and maintain facilities, buildings, trails, and roads.
- Implement Refuge Operating Needs System (RONS) and Service Asset Maintenance Management Systems (SAMMS) projects to maintain and improve refuge infrastructure and resources.
- Coordinate road maintenance with state and counties.
- Hire a full-time maintenance worker.

Objective E-3 Equipment - Maintain and replace current equipment and acquire additional tractors with implements, and staff vehicles as needed.

Discussion: The refuge has a variety of equipment available to support resource management and maintenance activities which include vehicles, tractors, ATV's, a crawler dozer, and backhoe. This equipment meets the basic needs of the refuge at this time. However, replacements will be necessary over time and specialized equipment will be required in the future.

Strategies:

- Repair and maintain equipment and implements in a safe and efficient operating status.
- If contract or force-account farming is utilized to meet wildlife needs, acquire funds for special equipment.
- Hire a full-time maintenance worker.

Objective E-4 Refuge Friends Group - Foster, expand, and facilitate the Friends of Clarks River NWR through additional staff and support.

Discussion: There is an active Friends group in place helping support refuge projects. It does not have any direct financial income or means of obtaining such income at this time. A bookstore/gift shop has been suggested, but the placement and value of this proposition are being evaluated. Grant dollars and partnerships have been the Friend group's primary funding source for projects.

Strategies:

- Update agreements with current and future Friends groups.
- Share examples of brochures and newsletters from other regional Friends groups.
- Talk to Friends group about developing corporate sponsorships.
- Develop an MOU or MOA with Friends group to support refuge mission and refuge manager priorities.
- Work with Regional Friends Group Coordinator to build the core leadership, organization, and membership.
- Manager should solicit support for new board members on a continuing basis.
- Develop volunteer group within Friends group membership to develop interpretive programs.
- Consider having Friends group members play an active role as roving interpreters at EERA during peak use.
- Evaluate the maintenance area and Happy Hollow as potential resident volunteer work-camper sites. The maintenance facility could be a potential site for "Site Hosts" at the EERA.
- Send one or more Friends group members to the Regional and National Friends group conferences.
- Hire park ranger (public use) to coordinate and facilitate the Friends group and its activities.

Objective E-5 Volunteers and Partnerships - Foster, expand, and facilitate volunteers and partnerships through addition of permanent staff.

Discussion: Clarks River NWR relies on volunteer support primarily for outreach events, public tours, environmental education, and maintenance. Volunteer support on refuges throughout the country account for approximately 25 percent of the work accomplished. Volunteers are an important and vital asset to refuges; however, they need direction and support from staff to efficiently conduct project work and other assigned activities. The refuge manager currently coordinates volunteer projects and activities, but other duties prevent the attention required to sustain a large volunteer core. An additional public use specialist will be necessary if a large volunteer core is to be adequately coordinated and supported.

Strategies:

- Have volunteers assist with repair and maintenance of facilities, buildings, and roads.
- Hire a park ranger (public use) to develop and coordinate volunteer projects.
- Recruit volunteers using www.volunteer.gov/gov, Texas A & M intern site, Workcamper magazine, and local news releases. (Work with Regional Volunteer Coordinator).
- Establish and schedule job responsibilities and duties before recruiting volunteers.
- Develop a volunteer packet or handbook with safety rules, work assignments, FAQ's, etc.
- Consider assigning volunteer management to the next staff person hired if public use specialist has not been hired. This person should attend the next volunteer training offered at NCTC, work with entire staff to establish work assignments, etc.
- Establish an Americorp team or hire YCC to complete refuge work duties.
- Work with all staff to identify jobs and tasks that can be done by volunteers. Recruit a front desk volunteer and focus on projects for the front desk volunteers to work on during slow times in the visitor contact area.

V. Plan Implementation

INTRODUCTION

Refuge lands are managed as defined under the Improvement Act of 1997. Congress has distinguished a clear legislative mission of wildlife conservation for all national wildlife refuges. National wildlife refuges, unlike other public lands, are specifically dedicated to the conservation of the Nation's fish and wildlife resources and wildlife-dependent recreational uses. Priority projects emphasize the protection and enhancement of fish and wildlife species first and foremost, but considerable emphasis is placed on balancing the needs and demands for wildlife-dependent recreation and environmental education.

To accomplish the purpose, vision, goals, and objectives contained in this Draft CCP/EA for Clarks River NWR, this section identifies specific projects, funding, and personnel needs, along with partnership opportunities, and required step-down management plans.

This Draft CCP/EA focuses on the importance of funding the operation and maintenance needs of the refuge to ensure the refuge staff can achieve the goals and objectives identified as crucial to fulfill the purpose for which the refuge was established. The refuge's role in protecting and providing habitat for migratory waterfowl, birds, and endangered species is critical. Proposed priority public use programs will establish opportunities for wildlife-dependent recreation.

PROPOSED PROJECTS

Listed below are the proposed project summaries and their associated costs for fish and wildlife population management, habitat management, resource protection, visitor services, and refuge administration over the next 15 years (Table 7). This proposed project list reflects the priority needs identified by the public, planning team, and refuge staff based upon available information. These projects were generated for the purpose of achieving refuge-specific objectives and strategies. The primary linkages of these projects to those planning elements are identified in each summary.

FISH AND WILDLIFE POPULATION MANAGEMENT

Provide a Wildlife Biologist to conduct essential biological activities relative to wildlife and habitat management RONS 2211: Develop a professional science-driven biological program at Clarks River NWR to achieve wildlife and habitat conservation goals identified in the refuge's land protection plan, state conservation plans, and that contribute to the Service mission. Program development requires the addition of a full-time wildlife biologist position to ensure program success and integrity. Responsibilities include coordinating with conservation partners, assessing current refuge biological conditions through surveys and research, planning, implementation of wildlife and habitat initiatives, and applicable monitoring. Position contributions will serve to meet local and regional conservation objectives and goals, but also serve as a catalyst to attain landscape goals related to the Service's Strategic Habitat Conservation initiative, climate change initiative, and/or other national or global conservation pursuits. *(Linkages: Goal A, Objectives A-1-22.)*

Recurring Costs: $98,000 Special Project Cost: $98,000

Improve Biological Support (Biological Technician): Currently Clarks River NWR is being heavily used by the public for economic and recreational purposes. By adding a biological technician to the staff, the refuge would be able to improve severely degraded habitat, increase the presence of native wildlife, and decrease unauthorized public uses of these lands. The biological technician would better enable sound science-based management decision-making. *(Linkages: Goal A, Objectives A-1-22.)*

Recurring Costs: $68,000 Special Project Cost: $65,000

Conduct Critical Wildlife Surveys: Science-based inventorying and monitoring of wildlife and species of concern populations are critical to ensuring the biological integrity of the refuge. This project will provide information collected to serve as the basis for developing habitat management plans and will influence all refuge management activities. A systematic inventorying and monitoring program will enable the refuge to make informed management decisions and valuable long-term contributions to national and regional objectives for waterfowl, aquatic species such as mussels and fish, migratory and resident birds, reptiles and amphibians, and species of special concern.

Standardized census and survey techniques will be employed and all data compiled into databases, including GIS, for spatial analysis. This information is critical to formulating management actions and evaluating bottomland hardwood reforestation and management, moist-soil unit manipulation, and other refuge programs. All data will be shared with appropriate state and federal partners in an effort to advance landscape management. *(Linkages: Goal A, Objectives A-1-22.)*

Recurring Costs: $25,000 Special Project Cost: $100,000

Invasive and Nuisance Species Project: This project will provide information on the expansion of animals and plants that are considered potential threats to the Clarks River NWR. By monitoring the movement and spread of such, effective wildlife management resources and treatments could be employed on the refuge. Invasive species directly compete with native species, reducing habitat carrying capacity, adversely affecting wildlife reproduction and/or recruitment, and have the capacity to completely alter plant communities within an area or region. Nuisance species can also have significant negative impacts through real or perceived negative impacts on native plants and animals and require attention to ensure activities do not compromise priority management objectives or refuge programs.

Control of invasive and nuisance species on the refuge will be conducted by staff using various control techniques or through professional damage control personnel to supplement the refuge staff's invasive/nuisance control efforts. *(Linkages: Goal A, Objectives A-1-22.)*

Recurring Costs: $25,000 Special Project Cost: $100,000

Wildlife and Habitat Geospatial Analysis: Increase capability and capacity for Geospatial analysis on wildlife and habitat management. This project will acquire necessary equipment and software (ENVI) in order to process images, conduct geospatial analyses and maintain databases. Included in this project is the hiring of a term GIS specialist and associated training for refuge staff. *(Linkages: Goal A, Objectives A-1-22.)*

Recurring Costs: $100,000 Special Project Cost: $125,000

HABITAT MANAGEMENT

Improve water level management for wintering waterfowl RONS 2279, 1940, 2285: Clarks River NWR is in the early stages of development. Establishment of water management capabilities on suitable sites is critical to achieving local, regional, and national waterfowl priorities. Enhancement or development of water level management would be conducted on prior converted wetlands to restore the values and functions of the sites. Restoration work will include ditch plugs, levee construction, vegetation management, installation of shallow-water wells, and diesel, electric, or solar powered power units. The refuge currently manages eight impoundments but only two are supported with well capabilities. The proposed activities will significantly increase the refuge's ability to achieve migratory bird, water quality, and public use objectives. This project will also help provide a missing link in the migratory corridor of waterfowl and shorebirds associated with the Clarks River watershed. These projects are supported by other conservation partners, as well as the local community, because of the economic and recreational opportunities the projects facilitate. Plant and wildlife monitoring will be conducted at regular intervals to ensure biological objectives are attained. Enhanced water management capabilities will help the refuge meet its objectives and contribute more substantially to regional and international migratory bird habitat and population objectives *(Linkages: Goal A, Objectives A- 1-4; Goal B, Objectives B-3-5.)*

Recurring Costs: $10,000 Special Project Cost: $355,000

Provide information and capability necessary to promote and sustain desired forest conditions RONS 4183: Improve forest conditions on approximately 6,500 acres of refuge lands to meet habitat conditions identified as critical for the management of migratory birds and bottomland hardwood forest conservation on Clarks River NWR. Condition of existing refuge forestland is marginal because of pre-refuge ownership, which included timber high-grading and plantation establishment with off-site tree species. Elements to achieve desired conditions will require the use of qualified forestry professionals to inventory existing stands, provide recommendations, prepare prescriptions/planning documents, and administer approved improvement actions. Pre- and post-monitoring of migratory bird use, forest reproduction, and vigor will be conducted to ensure that objectives of forest health and structure are achieved. Achievement of desired forest conditions will promote global efforts to reduce carbon in the atmosphere and benefit wildlife. *(Linkages: Goal B, Objectives B-1-2.)*

Recurring Costs: $25,000 Special Project Cost: $175,000

Invasive Plant Species Control: Control invasive, exotic plants such as reed canary grass, Japanese stilt grass, *Sericea lespedeza*, *Mimosa,* and other species infesting Clarks River NWR. The refuge's biological integrity is threatened by a variety of invasive plant species. This project will provide for range expansion monitoring and help to develop and implement an integrated pest management (IPM) program to control invasive plants. Invasive plant occurrence will be mapped and quantified with appropriate IPM strategies applied to control invasive plant species. Strategies will include chemical, mechanical, and biological control techniques. *(Linkages: Goal A; Goal B, Objective B-1-9).*

Recurring Costs: $35,000 Special Project Cost: $45,000

RESOURCE PROTECTION

Land acquisition: Through fee-title purchases, and only from willing sellers, the Service will continue to purchase interest in the remaining 10,400 acres within the existing approved acquisition boundary and 32,539 acres within the expanded acquisition boundary. The Service will acquire

interest in the identified lands to prevent conflicting land uses and to provide the management flexibility required to protect and manage the habitat as a national wildlife refuge. Additionally, this project will serve to improve buffer conditions; contribute to local, regional, and national biological objectives; eliminate inholdings; and improve public access. The acquired lands will be made available to the public for additional wildlife-dependent recreation where appropriate. All acquisitions will be from willing sellers only. Potential funding sources for this project include the Migratory Bird Conservation Fund, Land and Water Conservation Fund, and carbon sequestration and cooperative efforts with various Service partners. The estimated cost of this project is $68-$110 million (2010 costs are approximately $1600-2600/acre). *(Linkage: Goal C, Objective C-1-6.)*

Recurring Costs: $ < 10 per acre Special Project Cost: $68-110 million

Conduct comprehensive water quality analysis on the Clarks River with emphasis on sedimentation rates and effects RONS 4239: Determine sedimentation rates and effects on water quality and aquatic wildlife. Excessive sediment is considered to be the leading cause of water quality degradation. The purpose of the study is to establish baseline data and quantify historic and recent sedimentation rates on the refuge. The watershed drains 525 square miles, contains 1,579 stream miles, and is dominated by agriculture. Large commercial, industrial, and residential areas have been developed around major cities. There are two Superfund sites, three surface mines, and seventeen active Kentucky Pollutant Discharge Elimination System permits. Approximately 40 percent of 70 river miles surveyed in 2000 were deemed unfit for aquatic life due to sediment and pathogens from agricultural runoff and noncompliant permitted discharges. Landscape conservation will benefit humans, wildlife, and help reduce nutrient loading in the Tennessee, Ohio, and Mississippi Rivers, which also contribute to the "dead zone" in the Gulf of Mexico. *(Linkages: Goal C, Objectives C-1-6.)*

Recurring Costs: $15,000 Special Project Cost: $115,000

Design and conduct a comprehensive hydrological study of the Clarks River RONS 1416: Hydrological aspects of the Clarks River are poorly understood due to the absence of science-based data. Interest in understanding the dynamics associated with this river system cannot be understated and comes from a variety of affected parties (i.e., communities, private landowners, municipalities, state and federal agencies, and universities). Data that provides a better understanding of historical and current conditions is imperative to the management of the resources associated with the Clarks River NWR on many levels. Changes in the Clarks River system associated with land-use, dam construction on the Tennessee River, road construction, etc., have led to changes in sedimentation rates, flow velocity, erosion, flooding, and aquatic fauna populations. This study will provide focus of resources and will have major regional and national benefits. This project exemplifies strategic habitat conservation goals. *(Linkages: Goal C, Objectives C-1-6.)*

Recurring Costs: $30,000 Special Project Cost: $246,000

Cultural and Historical Resource Interpretation Overview of the Refuge: Using available scientific and historic information, the selected contractor will author an interdisciplinary overview of the refuge's cultural landscape as it has changed over the past 15-20,000 years. The final technical report will include, at a minimum, sections about the area's geomorphology and hydrological regime, paleoenvironmental reconstruction, the area's cultural history, the scope and scale of past archaeological investigations on and near the refuge, a detailed list of the refuge's historic properties, and future research questions. Submission of the overview report will satisfy the cultural resource objectives listed and other Service documents. Using the information generated from the overview, as well as on-going scientific archaeological investigations of the area, the selected contractor will inventory and then evaluate the

National Register's eligibility of historic properties located on the refuges. Recurring costs include conservation and protection of sites and administrative needs for existing or new sites that are found. This project will also include interpretation and display of pertinent information for the visiting public. *(Linkages: Goal C, Objective C-7.)*

Recurring Costs: $10,000 Special Project Cost: $75,000

VISITOR SERVICES

Provide quality Refuge visitor services programs RONS 1918: Develop and implement a professional visitor services program at Clarks River NWR to provide quality wildlife-dependent recreation and environmental education opportunities at levels commensurate with public demand and available refuge resources. The refuge is recognized as a valuable public resource due to community interest, area tourism, and proximity to more than 50 educational institutions. Existing partnerships, as well as the use of volunteers and temporary employees, have assumed interim program responsibilities of the refuge's visitor services program but cannot keep pace with the growing demand. A trained and dedicated staff person is essential to coordinate efforts, provide direction, and ensure long-term success. Responsibilities would include: planning and implementation of environmental education programs and special events; visitor center staffing; coordination of volunteers, Friends group, Junior Duck Stamp Contest, development and promotion of partnerships, and environmental education grant writing. *(Linkages: Goal D, Objectives D-1-6.)*

Recurring Costs: $97,000 Special Project Cost: $97,000

Provide Visitor, Resource, and Facility Protection (Law Enforcement) RONS 1416: Provide one full-time law enforcement officer to protect wildlife, lands, facilities, employees and the general public on Clarks River NWR. The Directors Order #155 requires the Service to reduce dependency on dual-function refuge officers and progress towards a full-time officer workforce. This officer will assist in fulfilling these needs by placing an officer in the field full-time to protect wildlife resources. Service wetland easement violations, trespass farming, hunting violations, and off-road vehicle use are increasing on refuge lands. Exploration for energy resources (e.g., wind, oil, and gas) is placing additional strain on wildlife habitats throughout the Region. Protection is the most basic form of wildlife management and this project will dedicate a full-time law enforcement officer to conserve and protect wildlife and wildlife habitats. *(Linkages: Goal D, Objectives D-1-6.)*

Recurring Costs: $150,000 Special Project Cost: $150,000

Visitor Center Construction and Operation: The planned visitor center for Clarks River NWR will be a focal point for environmental education and interpretation for the western Kentucky area. This center will provide a great opportunity to educate the public on local, regional, and national conservation efforts, the Service, and what the entire Refuge System has to offer in the way of natural resource management and visitor services. The size and design of the visitor center will incorporate space for housing the center's administrative staff person. The estimated cost of this project is $3-5 million for design and construction.

Recurring Costs: $ 25,000 Special Project Cost: $ 3-5 million

Improvement of Public Access (Railroad Right-of-way, Parking Areas, Trails, and Roads): Public access to the Clarks River NWR, as well as access available for management activities, is limited because of a variety of factors. Resolving issues caused by the original acquisition boundary delineation and the abandoned railroad right-of-way offer the greatest potential to enhance refuge

access. Other areas where significant improvements can be made exist by providing parking areas, trails, road improvements, and directional/interpretive signage. Opportunities to improve access exist throughout the refuge and will benefit all refuge programs and contribute to the public's recreational opportunities and conservation awareness. *(Linkages: Goal D, Objectives D-1-6.)*

Recurring Costs: $50,000 Special Project Cost: $ 150,000

REFUGE ADMINISTRATION

Provide Management, Improve Refuge Operations and Enhance Partnerships: Develop support for all refuge programs and administrative responsibilities necessary to effectively manage the Clarks River NWR, such that the refuge's contributions to the community, region, and nation achieve establishment purposes/expectations and conservation mission of the Service. Refuge manager interaction with conservation partners, community leaders, and the public are restricted due to daily administrative responsibilities associated with existing refuge programs (biological, law enforcement, environmental education, public use, volunteer and intern program, etc.), budget, data summarization and reporting, personnel management, research/monitoring inventories, property management, land acquisition, intra- and inter-agency coordination, Friends group support, etc. An assistant manager trainee to assist with all refuge programs and administrative responsibilities is essential to ensure efficient and effective oversight of the public lands at Clarks River NWR. *(Linkages: Goal E, Objectives E-1-5.)*

Recurring Costs: $120,000 Special Project Cost: $120,000

Maintain service infrastructure and equipment RONS 2268: Provide ability to service and maintain refuge equipment and infrastructure valued at more than $10 million, to ensure all aspects of daily refuge management and significant refuge programs (biological, visitor services, law enforcement) are fully supported. The proper management of government investments in the form of refuge equipment, buildings, roads, levees, etc., requires the addition of a full-time maintenance position. Responsibilities include regular and routine maintenance of all small and heavy equipment, 4,000-square-foot maintenance facility, 2,000-square-foot administrative building, 2,400-square-foot bunkhouse, 1,200-square-foot environmental education facility, 10 miles of roads and trails, 5 miles of levees, numerous parking areas, signs, kiosks, wildlife observation structures, etc. A maintenance worker position will serve all refuge operations and is critical to the continued efficiency and cost management associated with the oversight of public lands at Clarks River NWR. *(Linkages: Goal E, Objectives E-1-5.)*

Recurring Costs: $89,000 Special Project Cost: $89,000

Equipment for Sustained Operations: Heavy equipment is essential to conduct land management initiatives in support of all refuge programs (biological, public use and education, law enforcement, volunteer, etc.). Needed equipment includes a 350-400 HP tractor and 14-17 yard dirt pan ($250,000), trackhoe ($200,000), and diesel transport truck and lowboy trailer ($130,000). Specific work to be supported includes access enhancement, improvement of water management capabilities through levee construction and pipe installations, as well as other habitat restoration work, etc. *(Linkages: Goal E, Objectives E-1-5.)*

Recurring Costs: $10,000 Special Project Cost: $580,000

Resident Volunteers: Develop four resident Camper Pads with shared facilities/amenities on the refuge to facilitate all refuge programs through experienced and dedicated volunteers. Camper pads allow for extended work periods. Volunteers in the Camper program have proven to be a valuable asset to refuges around the country because of their dedication, and do not have limited time constraints which allows for proper training and efficient work. All refuge programs benefit from the Camper program, because the bulk of refuge limitations result from staff shortfalls. Work Campers cannot replace permanent staff but can significantly enhance refuge programs. *(Linkages: Goal E, Objectives E-1-5.)*

Recurring Costs: $15,000 Special Project Cost: $50,000

FUNDING AND PERSONNEL

Table 7. Summary of projects

PROJECT TITLE	RECURRING ANNUAL COST*	FIRST YEAR COST*	FTEs
Provide a Wildlife Biologist to conduct essential biological activities relative to wildlife and habitat management	$98,000	$98,000	1
Improve Biological Support	$68,000	$65,000	1
Conduct Critical Wildlife Surveys	$25,000	$100,000	
Invasive and Nuisance Wildlife Species Project	$25,000	$100,000	
Wildlife and Geospatial Analysis	$1000,000	$125,000	
Improve water level management for wintering waterfowl	$10,000	$355,000	
Improve water management capabilities for existing impoundments	$20,000	$450,000	
Provide information and capability necessary to promote and sustain desired forest conditions	$25,000	$175,000	
Invasive Plant Species Control	$35,000	$45,000	

PROJECT TITLE	RECURRING ANNUAL COST*	FIRST YEAR COST*	FTEs
Land acquisition	$1,600 – 2,600 per acre	$68-110 Million	
Conduct comprehensive water quality analysis on the Clarks River with emphasis on sedimentation rates and effects	$15,000	$115,000	
Design and conduct a comprehensive hydrological study of the Clarks River	$30,000	$2466,000	
Cultural and Historical Resource Interpretation Overview of the Refuge	$10,000	$75,000	
Provide quality Refuge visitor services programs	$97,000	$97,000	1
Provide Visitor, Resource, and Facility Protection (Law Enforcement)	$150,000	$150,000	1
Visitor Center Construction and Operation	$25,000	3-5 million	
Improvement of Public Access (Railroad Right-of-way, Parking Areas, Trails, and Roads)	$50,000	$150,000	
Provide Management, Improve Refuge Operations and Enhance Partnerships	$120,000	$120,000	1
Maintain service infrastructure and equipment	$89,000	$89,000	1
Equipment for Sustained Operations	$10,000	580,000	
Resident Volunteers	$15,000	$50,000	
TOTALS			6

** cost estimates are rough undocumented and funding sources would be various.*

PARTNERSHIP/VOLUNTEER OPPORTUNITIES

A key element of this Draft CCP/EA is to establish a cooperative agreement with KDFWRF, partnerships with private organizations, and other state and federal natural resource agencies. Partnerships are critically important to achieve refuge goals, leverage funds, minimize costs, reduce redundancy, and build relationships. In the immediate vicinity of the refuge, opportunities exist to establish and maintain partnerships with city and county governments from multiple jurisdictions, KDFWR, TNC, QU, DU, League of Kentucky Sportsman, Friends of Clarks River NWR, USFS, USACE, Kentucky state parks, local conservation districts, Natural Resources Conservation Districts, private businesses, local organizations, educational institutes, and private citizens.

STEP-DOWN MANAGEMENT PLANS

A CCP, when final, is a strategic plan that guides the future direction of a refuge. A step-down management plan provides more specific guidance on activities, such as habitat and visitor services management. Step-down plans (Table 8) are developed in accordance with NEPA, which requires the identification and evaluation of alternatives and public review and involvement prior to their implementation.

Table 8. Clarks River NWR step-down management plans

Step-down Plans	Completion Date
Habitat Management Plan	2012
Station Safety Plan	Annually
Law Enforcement Plan	2012
Fishery Management Plan	2013
Fire Management Plan	2015
Biological Inventorying and Monitoring Plan	2016
Nuisance Animal Plan	2014
Hunt Plan (update)	2013
Cultural Resource Protection Plan	2015
Visitor Services Management Plan	2014
Integrated Pest Management Plan	2016
Disaster Action Plan	Annually

MONITORING AND ADAPTIVE MANAGEMENT

Adaptive management is a flexible approach to long-term management of biotic resources that is directed over time by the results of ongoing monitoring activities and other information. More specifically, adaptive management is a process by which projects are implemented within a framework of scientifically driven experiments to test the predictions and assumptions outlined within a plan.

To apply adaptive management, specific surveying, inventorying, and monitoring protocols will be adopted for the refuge. The habitat management strategies will be systematically evaluated to determine management effects on wildlife populations. This information will be used to refine approaches and determine how effectively the objectives are being accomplished. Evaluations will include appropriate partner participation. If monitoring and evaluation indicate undesirable effects for target and non-target species and/or communities, then alterations to the management projects will be made. Subsequently, the CCP will be revised. Specific monitoring and evaluation activities will be described in the step-down management plans.

PLAN REVIEW AND REVISION

The CCP, when final, will be reviewed annually for development of annual work plans and budgets. It will also be reviewed to determine the need for revision. A revision will occur if and when conditions change or significant information becomes available, such as a change in ecological conditions or another major refuge expansion (different from the proposed expansion in this document). The CCP will be augmented by detailed step-down management plans to address the completion of specific strategies in support of goals and objectives. Revisions to the CCP and the step-down management plans will be subject to public review and NEPA compliance.

SECTION B. ENVIRONMENTAL ASSESSMENT

I. Background

INTRODUCTION

The Fish and Wildlife Service (Service) prepared this Environmental Assessment (EA) for Clarks River National Wildlife Refuge (NWR) in compliance with the National Environmental Policy Act (NEPA) and the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act). This EA is part of the comprehensive conservation planning process for the refuge. The Improvement Act requires the development of a comprehensive conservation plan (CCP) for all national wildlife refuges. Following a public review and comment period on the Draft CCP/EA, a final decision will be made by the Fish and Wildlife Service that will guide Clarks River NWR management actions and decisions over the next 15 years, provide understanding about the refuge and management activities, and incorporate information and suggestions from the public and refuge partners.

This Draft CCP/EA proposes a management direction for Clarks Rive NWR, which is described in detail through a set of goals, objectives, and strategies. This Draft CCP/EA addresses current management issues, provides long-term management direction and guidance for the refuge, and satisfies the legislative mandates of the Improvement Act. While this Draft CCP/EA provides general management direction, subsequent step-down plans will provide more detailed management direction and actions.

The EA determines and evaluates a range of reasonable management alternatives. The intent is to support informed decision-making regarding future management of the refuge. Each alternative presented in this EA was generated with the potential to be fully developed into a Final CCP. The predicted biological, physical, social, and economical impacts of implementing each alternative are analyzed in this EA. This analysis assists the Service in determining if the alternatives represent no significant impacts, thus requiring the preparation of a Finding of No Significant Impact (FONSI), or if the alternatives represent significant impacts, thus requiring more detailed analysis through an Environmental Impact Statement (EIS) and a Record of Decision (ROD).

PURPOSE AND NEED FOR ACTION

The purpose of this Draft CCP/EA is to establish and implement management directions for Clarks River NWR for the next 15 years. The EA is needed to set forth and evaluate a range of reasonable management alternatives for the refuge. After a public review and comment period, and based on the professional judgment of the planning team, the Service will select an alternative to be fully developed for the refuge.

The Service identified issues, concerns, and needs through discussions with the public, agency managers, conservation partners, and others. In particular, the Service's planning team identified a range of alternatives, evaluated the possible consequences of implementing each, and selected Alternative B as the proposed management action on Clarks River NWR. In the opinion of the Service and the planning team, Alternative B is the best approach to guide the refuge's management direction.

There is no current plan that identifies priorities and ensures consistent and integrated management of this refuge, thus necessitating the need for this plan.

DECISION FRAMEWORK

Based on the assessment described in this document, the Service will select an alternative to implement the CCP for Clarks River NWR. If it is determined that the selected alternative will not have a significant effect on the quality of the human environment, the CCP will be finalized and will include a FONSI. This determination will be based on an evaluation of the Service and National Wildlife Refuge System (Refuge System) mission, the purpose(s) for which the refuge was established, and other legal mandates. Assuming no significant impact is found, implementation of the plan will begin and will be monitored annually and revised when necessary.

PLANNING STUDY AREA

Clarks River NWR has acquired approximately 8,634 acres since being established in 1997. The approved acquisition boundary encompasses approximately 19,605 acres that extends along the East Fork of the Clarks River just south of Benton, Kentucky, and northwest to within 5 miles of Paducah, Kentucky (Figure 1). The acquisition boundary was expanded by 1,605 acres in 2004 to include a portion of the West Fork and its confluence with the East Fork. Refuge lands are located in Marshall, Graves, and McCracken Counties of western Kentucky, and are comprised primarily of bottomland hardwood forests and open farmlands, with small areas of warm-season grasslands.

AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY

The Service developed this Draft CCP/EA in compliance with the Improvement Act and Part 602 (National Wildlife Refuge System Planning) of the Service Manual. The actions described within this Draft CCP/EA also meet the requirements of NEPA. The refuge staff achieved compliance with this Act through the involvement of the public and the incorporation of this EA, with a description of the alternatives considered and an analysis of the environmental consequences of the alternatives (Section B, Chapters III and IV). When fully implemented, the CCP will strive to achieve the vision and purposes of Clarks River NWR.

A CCP's overriding consideration is to carry out the purposes for which a refuge was established. The laws that established this refuge and provided the funds for acquisition state the purposes. Fish and wildlife management is the first priority in refuge management, and the Service allows and encourages public use (wildlife-dependent recreation) as long as it is compatible with, or does not detract from, the refuge's mission and purposes.

COMPATIBILITY

The National Wildlife Refuge System Administration Act of 1966, as amended by the Improvement Act, states that national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans can enjoy Refuge System lands and waters. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be appropriate and compatible. A compatible use "…will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge." In addition, "wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

An interim compatibility determination is a document that assesses the compatibility of an activity during the period of time the Service first acquires a parcel of land to the time a formal, long-term management plan for that parcel is prepared and adopted. The Service has completed an interim compatibility determination for the six priority general public uses of the Refuge System, as listed in the Improvement Act. These uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

In accordance with Service guidelines and NEPA recommendations, public involvement has been a crucial factor throughout the development of the Draft CCP/EA for Clarks River NWR. This Draft CCP/EA has been written with input and assistance from interested citizens, conservation organizations, and employees of local and state agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for Clarks River NWR. The Service, as a whole, and the refuge staff in particular, are very grateful to each person who contributed time, expertise, and ideas to the planning process. The staff remains impressed by the passion and commitment of so many individuals for the lands and waters administered by the refuge.

The planning process for Clarks River NWR began with the publication of a notice of intent in the *Federal Register* on August 29, 2008 (73 FR 50981). The public was notified in the local newspapers and media of public scoping meetings held on September 23 and 25, 2008. Approximately 10 members of the public attended the public scoping meeting. Four members of the public offered their comments at the public meeting. In addition, 25 other comments have been returned to date from the general public. A complete summary of these issues and concerns is provided in Appendix D.

II. Affected Environment

For a description of the affected environment, see Section A, Chapter II, Refuge Overview.

III. Description of Alternatives

FORMULATION OF ALTERNATIVES

Alternatives are different approaches or combinations of management objectives and strategies designed to achieve the refuge's purpose and vision. They reflect the goals identified in the Draft CCP/EA; the priorities and goals of the Gulf Coastal Plain and Ozark LCC; the goals of the Refuge System; and the mission of the Service. Alternatives are formulated to address the significant issues, concerns, and problems identified by the Service and the public during public scoping.

The three alternatives identified and evaluated for the refuge represent different approaches to provide permanent protection, restoration, and management of the refuges' fish, wildlife, plants, habitats, and other resources, as well as compatible wildlife-dependent recreation. Refuge staff assessed the biological conditions and analyzed the external relationships affecting the refuge. This information contributed to the development of refuge goals and, in turn, helped to formulate the alternatives. As a result, each alternative presents different sets of objectives for reaching refuge goals. Each alternative was evaluated based on how much progress it would make and how it would address the identified issues related to fish and wildlife populations, habitat management, resource protection, visitor services, and refuge administration. A summary of the alternatives for Clarks River NWR is located in Table 9.

FEATURES COMMON TO ALL CLARKS RIVER NWR ALTERNATIVES

Although the alternatives differ in many ways, there are similarities among them. These common features are summarized to reduce the length and redundancy of the individual alternative descriptions. The same Service policies will remain in effect regarding oil and gas activities under each alternative. Certain federally mandated responsibilities, such as threatened and endangered species, archaeological and historical resources, and the payment of revenue sharing in lieu of taxes, could be accomplished under all alternatives.

DESCRIPTION OF ALTERNATIVES - CLARKS RIVER NWR

Serving as a basis for each alternative, a number of goals and sets of objectives were developed to help achieve the refuge's purposes and the mission of the Refuge System. Objectives are desired conditions or outcomes that are grouped into sets and, for this planning effort, consolidated into three alternatives for Clarks River NWR. These alternatives represent different management approaches for managing the refuge over a 15-year time frame, while still meeting the refuge's purposes and goals. The three alternatives are summarized below. A comparison of the alternatives in table form follows the general description (Table 9).

Alternative A - No Action (Current Management)
Alternative B - Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)
Alternative C - Maximize Wildlife-Dependent Public Use

Alternative A: **Current Management (No Action)**

The No Action Alternative would maintain current management approaches and was developed using anticipated conditions in the area of Clarks River NWR over the next 15 years. It assumes that current conservation management and land protection programs and activities by the Service; federal, state, and local agencies; and private organizations would continue to follow past trends. Species of federal responsibility, such as threatened and endangered species and migratory birds, would continue to be monitored at present levels. Acquisition of lands into the refuge would occur when funding is appropriated and willing sellers offer land that is identified as quality habitat.

Wildlife population monitoring and surveying would be focused primarily on waterfowl and mammal species. Additional species monitoring would occur opportunistically as partnerships and funding are available. Restoration efforts would continue as small, experimental projects, instead of larger projects that promote longer-lasting benefits.

The biological environment would remain protected, but certain systems could suffer if not systematically monitored using focal species as indicators. Management under Alternative A would not adversely impact socioeconomic values of the area, but the refuge would not achieve its potential for providing needed educational and wildlife-dependent recreational activities.

All public use programs of fishing, hunting, wildlife observation, wildlife photography, and environmental education and interpretation would continue at present levels and with current facilities, but no programs or facilities would be updated or expanded. Public use programs would not change or increase with demand and would not be adapted based on the effects on refuge resources.

In general, under Alternative A, management and administrative decisions and actions would occur when triggered by demands and sources outside the refuge, with little deliberation and planning being accomplished ahead of time. This alternative, included for the purpose of comparison to baseline conditions, is not considered to be the most effective management strategy for achieving the vision and goals of the refuge.

Alternative B: **Optimize Wildlife-Dependant Public Use and Management** *(Proposed Alternative)*

Alternative B, the Service's proposed alternative, emphasizes management of the natural resources of Clarks River NWR based on maintaining and improving wetland habitats, monitoring targeted flora and fauna representative of the surrounding Clarks River watershed, and providing quality public use programs and wildlife-dependent recreational activities. All species occurring on the refuge would be considered and certain targeted species would be managed for and monitored in addition to species of federal responsibility. These species would be chosen based on the criteria that they are indicators of the health of important habitat or species of concern. Information gaps in knowledge of aquatic species would be addressed.

Restoration efforts, habitat management, the prescribed fire program, and forest management would reflect best management practices determined after examination of historical regimes, soil types and elevation, and the current hydrological system. Management actions would be monitored for effectiveness and adapted to changing conditions, knowledge, and technology. A Habitat Management Plan would be developed to plan future habitat projects and evaluate previous actions.

Public use programs would be improved by offering more facilities and wildlife observation areas. Public use facilities would undergo annual reviews for maintenance needs and safety concerns. Overall public use would be monitored to determine if any negative impacts are occurring to refuge resources from overuse. Education programs would be reviewed and improved to complement current refuge management and current staffing. Public use programs would be updated to support and teach reasons behind refuge management actions, and to provide quality experiences to visitors. A new visitor center would be constructed. The refuge headquarters would be developed to provide more visitor services. In an increasingly developing region, a balanced program of wildlife-dependent recreational activities and protection of wildlife resources would be strived for under this alternative. Archaeological resources would be surveyed.

The refuge currently has fee-title ownership of about 8,634 acres, with an approved acquisition boundary of approximately 19,605 acres. Fee-title lands are distributed as follows: Graves County (56 acres), Marshall County (5,970 acres) and McCracken County (2,608 acres). Lands are purchased on a willing-seller basis only. Alternative B includes a proposed expansion of 34,269 acres which would bring the total refuge acquisition boundary to approximately 53,874 acres and would protect lands along the East and West Fork of the Clarks River (Appendix E). Land acquisitions within the existing and proposed acquisition boundaries would be based on importance of the habitat for target management species (Appendix E). The refuge would offer interpretation of wildlife and habitats, as well as demonstrate habitat improvements for individual landowners.

In general, under Alternative B, management decisions and actions would support wildlife species and habitat occurring on the refuge based on well-planned strategies and sound scientific judgment. Quality wildlife-dependent recreational uses, environmental education, and interpretation programs would be offered to support and explain the natural resources of the refuge.

This alternative would add six new positions to current staffing in order to continue to protect refuge resources, provide visitor services, and attain goals of facilities and equipment maintenance in the future. The biological environment would improve as adaptive and best management practices are utilized. Socioeconomic values should also increase as the refuge offers an oasis of undeveloped, green space. Areas such as this are beneficial to local ecotourism trade and residents searching for natural landscapes and environments.

Alternative C: Maximize Wildlife-Dependent Public Use

Alternative C emphasizes maximizing wildlife-dependent recreational uses on the refuge. The increase of nine staff members in addition to the existing employees would support public use activities including: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. In general, the focus of management would be on expanding public use activities to the fullest extent possible, while conducting only mandated resource protection such as conservation of threatened and endangered species, migratory birds, and archaeological resources.

All management programs for conservation of wildlife and habitat, such as monitoring, surveying, and research, would support species and resources of importance for public use enhancement. Emphasis would be placed more on interpreting and demonstrating these programs than actual implementation. Providing access with trails would be maximized as well as providing public use facilities throughout the refuge. Federal trust species and archaeological resources would be monitored as mandated, but other species targeted for management would depend on which ones the public is interested in utilizing. Habitat restoration efforts would be based on public use demands and criteria rather than methods as if planned using a strategic habitat conservation approach.

With the majority of staff time and funds supporting a public use program, wildlife-dependent recreation, and environmental education and interpretation could be more successful than in the other alternatives. Land acquisitions within the approved acquisition boundary would be based on importance of the habitat for public use. The refuge headquarters and new visitor center would be developed for public use activities such as interpretation and outreach.

COMPARISON OF THE ALTERNATIVES BY ISSUE FOR CLARKS RIVER REFUGE NWR

Table 9. Comparison of alternatives by management issue for Clarks River NWR

	Alternative A (Current Management – No Action Alternative)	**Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)**	**Alternative C** Maximize Wildlife-Dependent Public Use
FISH AND WILDLIFE POPULATION MANAGEMENT **Goal A. Protect, manage, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within the Clarks River NWR and surrounding Clarks River Watershed.**			
Waterfowl	Continue conducting bi-weekly waterfowl surveys from mid-November to mid-March annually. Current use is minimal, with highest duck-use days in late winter.	Provide adequate flooded hardwoods, moist-soil, and agriculture habitats to meet the foraging needs of about 5,000 waterfowl. Inventory data during key migration, wintering, and nesting periods in coordination with KDFWR mid-winter waterfowl aerial surveys.	Same as Alternative A.
Waterfowl Sanctuary	Maintain one sanctuary site throughout the refuge.	Maintain three sanctuary sites throughout the refuge.	Eliminate sanctuary sites on the refuge.
Wood ducks	Currently maintain 15 wood duck nesting boxes. There is currently no wood duck banding on the refuge.	Increase wood duck nest/brood habitats and nest boxes by 50% and help meet banding quotas to ensure adequate population monitoring.	Same as Alternative A.
Geese	Refuge bi-weekly waterfowl surveys from mid-November to mid-March annually.	Same as Alternative A and provide sufficient open-habitats and foraging sites to provide supplemental forage and accommodate geese during migration and wintering periods.	Same as Alternative A.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
Forest Breeding Birds	Continue to operate MAPS Station and participate in Cerulean Warbler Cornell University Survey to monitor forest breeding birds.	Same as Alternative A and monitor relative abundance and productivity of local bird population response by implementing a combination of the following: point counts distributed across all forest stand types and conditions; BBIRD plots; and additional fall banding efforts.	Eliminate MAPS station.
Grassland birds	No surveys are currently conducted.	Implement grassland songbird and bobwhite quail surveys within habitats in coordination with partners.	Same as Alternative A.
Scrub/shrub birds	No surveys are currently conducted.	Implement breeding bird surveys in scrub/shrub habitats.	Same as Alternative A.
Shorebirds	No surveys are currently conducted.	Implement late-July through August shorebird surveys within improved habitats in coordination with partners.	Same as Alternative A.
Waterbirds	No surveys are currently conducted.	Annually monitor species habitat use abundance during post-breeding periods.	Same as Alternative A.
Woodcock	No surveys are currently conducted.	Determine presence of late fall/wintering woodcock via nocturnal/late evening surveys on several key open land sites.	Same as Alternative A.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
Big Game Species	Continue deer herd health checks utilizing the Southeast Cooperative Wildlife Disease Study Unit at the University of Georgia. Utilize state harvest reporting systems to track harvest/population data.	Same as Alternative A and implement annual turkey brood survey in June through August, gobbler counts annually, and deer check station.	Utilize state harvest reporting systems to track harvest/population data.
Small Game Species	Utilize state hunter log reporting systems to track harvest/population data related to small game species (dove, opossum, raccoon, rabbit, and squirrel).	Same as Alternative A and conduct refuge-specific hunter log reporting system.	Same as Alternative A.
Nongame Mammals	Allow university studies to be conducted.	Develop comprehensive species list of nongame mammals utilizing the refuge. Expand studies and research on species occurrence, relative abundance, and distribution.	No surveys or research would be conducted
Reptiles and Amphibians	Continue baseline surveys.	Same as Alternative A and analyze data to inform management decisions.	Inventorying and monitoring would not be conducted.
Fisheries	Conduct fish contaminant studies and surveys.	Same as Alternative A and implement fish species occurrence, relative abundance, and distribution, and analyze data to inform management decisions.	Conduct surveys on public fishing areas.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
Invertebrates	Continue to conduct baseline invertebrate surveys.	Same as Alternative A and implement invertebrate species occurrence, relative abundance, and distribution and analyze data to inform management decisions.	Inventorying and monitoring would not be conducted.
Mussels	Conduct mussel surveys in Clarks River.	Conduct periodic comprehensive mussel surveys, conduct additional continuous water quality assessments, and reproduction, density, and propagation opportunities.	Research, inventorying, and monitoring would not be conducted.
Bats of Special Concern – Indiana and Gray Bat, Southeastern Myotis (See State Wildlife Action Plan)	Conduct summer bat surveys.	Continue and expand surveys listed in Alternative A, analyze data to inform management decisions, and foster research.	Research, inventorying, and monitoring would not be conducted.
Species of Special Concern – American burying beetle	Conduct survey to document presence/absence of the American burying beetle.	Same as Alternative A.	Research, inventorying, and monitoring would not be conducted.
Exotic Invasive Species	No surveys have been conducted.	Inventory and control exotic and invasive species through integrated pest management practices.	Research, inventorying, and monitoring would not be conducted.
Nuisance Animals	Limited beaver control on refuge.	Inventory, monitor, and control nuisance animals to help meet refuge objectives	Same as Alternative B and implement recreational trapping.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
HABITAT MANAGEMENT **Goal B. Conserve, restore, and enhance diverse bottomland hardwood forests, open lands, and associated habitats essential to support sustainable populations of migratory and resident wildlife species.**			
Bottomland Hardwood Forest Restoration	As additional lands are acquired, restore additional bottomland hardwood forests lands as appropriate. Approximately 250 acres have been reforested.	Same as Alternative A and inventory and monitor survival and wildlife response.	Same as Alternative A.
Bottomland Hardwood Forest Management and Conservation	No active management. Approximately 6,500 acres of bottomland hardwood forest lands acquired and protected.	Develop a forest management plan including inventories and silvicultural treatments to improve forest management capability for migratory birds, T/E species, and a diversity of forest-stand age classes. Initiate immediate action to improve pre-existing plantations. Facilitate forest management with the addition of a forester. Acquire and protect additional lands.	Same as Alternative A.
Water Management	Maintain water management capabilities at 4 locations which include approximately 129 acres.	Increase water management capabilities at a minimum of 7 locations and continue to assess water management needs as new lands are acquired. Increase pumping capabilities where appropriate.	Same as Alternative A.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
Moist-soil	Maintain 20 acres of moist-soil units.	Provide a minimum of 200 acres of moist-soil habitats to help meet an array of life-history nutritional needs of waterfowl and other species. Provide high-priority shorebird species with quality habitat and food resources during fall migration (late-July through September).	Same as Alternative A.
Cropland	Maintain approximately 650 acres of cropland using cooperative farming to help meet foraging needs of wildlife (special emphasis on ducks and geese).	Maintain sufficient cropland acreage to ensure wildlife objectives are achieved. Investigate use of force-account in combination with cooperative farming to achieve refuge objectives.	Maintain sufficient cropland acreage to ensure public use objectives are achieved. Investigate use of force-account in combination with cooperative farming to achieve refuge objectives.
Grassland Habitat	Maintain 130 acres of native warm-season grassland habitat.	Increase native warm-season grassland habitat as lands are acquired and where appropriate. Implement a Fire Management Plan to allow prescribed fire for maintenance of native warm-season grasslands.	Same as Alternative A.
Canebrakes	No inventory or management of canebrakes.	Reestablish viable cane communities and help expand and maintain existing cane sites. Inventory and monitor survival and wildlife response.	Same as Alternative A.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
Invasive plant species	No invasive plant species management has occurred. Reactive management based on severity of invasive plant species expansion and available resources.	Implement proactive control measures and monitoring of invasive plant species as appropriate. Improve basic biological information on occurrence and distribution of flora and fauna influencing the refuge. Prepare an Inventorying and Monitoring Plan (IMP) in accordance with Service guidelines.	Implement control efforts posing a severe threat to quality public use opportunities.
RESOURCE PROTECTION **Goal C. Identify, conserve, and protect natural and cultural resources through partnerships, acquisition, and land protection programs within the Clarks River Watershed.**			
Land Protection	Currently, the refuge has acquired approximately 8,634 acres. Continue active acquisition program of the remaining acreage within the current, approximate 19,605-acre acquisition boundary.	Same as Alternative A and identify and acquire highest priority tracts within the acquisition boundary. Focus on purchase of railroad right-a-way.	Same as Alternative B.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
Future Land Protection	There are no future boundary expansions proposed.	Seek land protection partnerships to achieve congressionally authorized refuge boundary expansion of 34,269 acres within the Clarks River Floodplain to improve buffer conditions, contribute to biological objectives, close gaps between existing tracts, and improve public access. The proposed expansion of 34,269 acres would bring the total refuge acquisition boundary to approximately 53,874	Same as Alternative A.
Private Land Protection	Coordinate with Ecological Services private lands biologist and partners on private land conservation projects within the watershed.	Same as Alternative A. Identify priority private lands and develop a strategic approach to help enhance ecological and environmental health within the Clarks River watershed.	Work with private landowners to improve access to the refuge for public use.
Clarks River Watershed	Participate in Four Rivers Basin Team.	Actively participate in Four Rivers Basin Team. Work with regional hydrologist, state and local counties, and other partners to conduct hydrologic investigations of the Clarks River. Analyze data and implement appropriate management actions.	Same as Alternative A.
Water Quality	No current comprehensive water quality assessments. Assess and inform public if water quality issues are reported.	Conduct comprehensive continuous water quality and flow condition assessments on the Clarks River within the refuge.	Same as Alternative A.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
Contaminants	Conducted fish and malformed amphibian studies. Assess and inform public if contaminant issues are reported.	Conduct additional contaminant studies and initiate biological assessment work on Clarks River within the refuge.	Assess and inform public if contaminant issues are reported.
Historical and Archeological Resources	Site-specific surveys are conducted prior to ground disturbance and protect known sites.	Same as Alternative A and complete comprehensive historical and archaeological resource survey on current refuge and any additional lands acquired.	Same as Alternative A.
VISITOR SERVICES **Goal D. Promote environmental education and interpretation opportunities and enhance compatible wildlife-dependent public uses, including hunting, fishing, wildlife observation, and wildlife photography on the Clarks River NWR.**			
Visitor Services Program	Operate Headquarters office as visitor contact facility.	Develop visitor services plan. Construct staffed visitor center and improve visitor access and program support. Coordinate with other regional and state visitor services entities to enhance regional visitation and extended stays. Add additional park rangers (law enforcement and public use) to enhance additional visitor services.	Same as Alternative B and provide extended services and hours through addition of staff, volunteers, and partners.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
Hunting	Ensure quality hunting opportunities during refuge hunting seasons. Continue waterfowl quota hunt.	Ensure quality hunting opportunities during refuge hunting seasons by evaluating additional quota hunts, participation in recreational fee program, improvement of access points, and utilization of time and space zoning.	Utilize state hunting seasons for all species on all refuge lands. No quota hunts. Improve and add access points.
Fishing	Continue fishing opportunities on accessible reaches of Clarks River, in the waters of small ponds, and on EERA, which is universally accessible.	Same as Alternative A and create additional universally accessible fishing pond on north end of the refuge. Develop Fisheries Management Plan	Same as Alternative A and improve bank fishing access and create additional ponds. Implement state stocking program in developed ponds.
Wildlife Observation and Photography	Continue to offer wildlife observation and photography opportunities near EERA and along refuge roadways and unimproved access routes.	Same as Alternative A. Provide a quality wildlife observation and photography program by developing additional trails, trailhead parking, kiosk, and photography blind(s). Develop recreation and education area on north end of refuge.	Same as Alternative B.
Environmental Education (EE)	Continue to provide curriculum integrated educational information and programs. Maintain EE shelter and Environmental Education Recreation Area. Continue to work with partners to promote EE program.	Increase curriculum-based educational information and programs. Maintain the EE shelter and Environmental Education Recreation Area. Increase partnerships to promote EE programs. Hire a park ranger (visitor services).	Same as Alternative B and construct additional environmental education shelter on north end of refuge with the addition of staff, volunteers, and partners.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
Environmental Interpretation	Maintain existing kiosk and interpretive signage.	Same as Alternative A and increase interpretive signage, programs, and literature. Utilize additional park ranger to increase partnerships and promote environmental interpretation programs.	Same as Alternative B with the addition of staff, volunteers, and partners.
Other Uses – Hiking, Biking, Walking, and Horseback Riding	Continue use where appropriate and compatible.	Same as Alternative A.	Promote and provide other uses where appropriate and compatible.
REFUGE ADMINISTRATION **Goal E. Achieve full staffing level identified in Service national staffing model with associated secured funding and facilities necessary to achieve the Refuge System mission.**			
Staffing	Maintain office assistant, refuge manager, assistant refuge manager, engineering equipment operator, park ranger (law enforcement), and temporary park ranger (visitor services), and three biological technicians.	Same as Alternative A and add a wildlife biologist, biological technician, term GIS specialist, assistant manager trainee, park rangers (visitor services and law enforcement) and maintenance worker.	Same as Alternative B and park ranger (visitor services), park ranger (law enforcement), and administrative assistant.
Facilities	Maintain current facilities.	Same as Alternative A. Add visitor center with administrative office space.	Same as Alternative B. Expand administrative office space for additional staff and additional environmental education facilities.
Equipment	Maintain and replace current equipment as needed.	Same as Alternative A and additional tractors with implements and staff vehicles.	Same as Alternative B.

	Alternative A (Current Management – No Action Alternative)	Alternative B Optimize Wildlife-Dependent Public Use and Management (Proposed Alternative)	Alternative C Maximize Wildlife-Dependent Public Use
Refuge Friends Group	Maintain Friends of Clarks River NWR.	Foster, expand, and facilitate through additional staff and support the Friends of Clarks River NWR.	Same as Alternative B.
Volunteers and Partnerships	Maintain existing volunteer base and partnerships.	Foster, expand, and facilitate through additional staff and support volunteers and partnerships.	Same as Alternative B.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

The alternatives development process under NEPA and the Improvement Act is designed to allow consideration of the widest possible range of issues and potential management approaches. During the alternatives development process, many different solutions were considered. The following alternative components were considered but not selected for detailed study in this Draft CCP/EA for the reason(s) described.

CUSTODIAL MANAGEMENT OF FORESTED AND WETLAND HABITAT

Under this scenario, staff would cease all management of both forest and wetland habitat at Clarks River NWR. Staff would allow natural succession to proceed unhindered on upland and bottomland sites and not control invasive emergent vegetation on the refuge or any of the impoundments. No upland invasive plant species control would be carried out and no forest thinning would take place. Moist-soil units would cease to be actively managed and farmland would be allowed to revert to forest. Refuge staff would focus their efforts on research and data collection related to successional trends and on management of public visitation to the refuge.

This alternative was considered and abandoned from detailed consideration because of the unsatisfactory outcomes it would lead to in all probability for both wildlife and habitat. In particular, if the refuge were to implement this alternative, it would be ignoring its purposes and goals, such as providing for the needs of wintering migratory waterfowl. Permitting the unchecked proliferation of invasive aquatic species would not only reduce the habitat value, but also the recreational value, adjacent impoundments, and former moist-soil units. Furthermore, the refuge's partnering agencies – including the TVA, USACE and the KDFWR – would not agree to what they would see as an abdication of the Service's wildlife and habitat management responsibilities.

IV. Environmental Consequences

OVERVIEW

This section analyzes and discusses the potential environmental effects or consequences that can be reasonably expected by the implementation of each of the three alternatives described in Chapter III of this EA. For each alternative, the expected outcomes are portrayed through the 15-year life of the CCP.

EFFECTS COMMON TO ALL ALTERNATIVES

A few potential effects would be the same under each alternative and are summarized under nine categories: environmental justice, climate change, regulatory effects, land acquisition, cultural resources, refuge revenue-sharing, water quality, air quality, and other effects.

Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities with access to public information and opportunities for participation in matters relating to human health or the environment.

None of the management alternatives described in this EA will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. Implementation of any action alternative that includes public use and environmental education is anticipated to provide a benefit to the residents residing in the surrounding communities.

Climate Change

The Department of the Interior issued an order in January 2001, requiring federal agencies under its direction that have land management responsibilities to consider potential climate change impacts as part of long-range planning endeavors.

The increase of carbon within the earth's atmosphere has been linked to the gradual rise in surface temperatures commonly referred to as global warming. In relation to comprehensive planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact to be considered in planning. The Department of Energy's *Carbon Sequestration Research and Development* (Reichle et al., 1999) defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts—grasslands, forests, wetlands, tundra, perpetual ice, and desert—are effective both in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon monoxide. The conclusions of the Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere.

Conserving natural habitat for wildlife is the heart of any long-term plan for national wildlife refuges. The actions proposed in this Draft CCP/EA would conserve or restore land and water, and would thus enhance carbon sequestration. This, in turn, contributes positively to efforts to mitigate human-induced global climate changes.

Regulatory Effects

As indicated in Appendix C, Relevant Legal Mandates and Executive Orders, the Service must comply with a number of federal laws, administrative orders, and policies in the development and implementation of its management actions and programs. Among these mandates are the Endangered Species Act of 1973, the Migratory Bird Treaty Act of 1918, and compliance with Executive Orders 11990 (Protection of Wetlands) and 11988 (Floodplain Management). The implementation of any of the three alternatives described in this EA would not lead to a violation of these or other mandates. All management activities that could affect the refuge's natural resources, including subsurface mineral reservations, utility lines and easements, soils, water and air, and historical and archaeological resources would be managed to comply with all laws and regulations. In particular, any existing and future oil and gas exploration, extraction, and transport operations on the refuge would be managed identically under each of the alternatives. Thus, the impacts would be the same.

Land Acquisition

Funding for land acquisition from willing sellers within the current and proposed expanded acquisition boundary of Clarks River NWR would come from the Land and Water Conservation Fund; the Migratory Bird Conservation Fund; Corps of Engineers mitigation programs; Carbon Sequestration/Electric Utility Partnership; or donations from conservation and private organizations. Conservation easements and leases can be used to obtain the minimum interests necessary to satisfy objectives, if the refuge staff can adequately manage uses of the areas for the benefit of wildlife. The Service can negotiate management agreements with local, state, and federal agencies, and accept conservation easements. Some tracts within the current approved boundary may be owned by other public or private conservation organizations. The Service would work with interested organizations to identify additional areas needing protection and provide technical assistance if needed. The acquisition of private lands is entirely contingent on the landowners and their willingness to participate.

Cultural Resources

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on the refuge's cultural and historic resources. Potentially negative effects could include logging, construction of new trails or facilities, and development of water impoundments. In most cases, these management actions would require review by the Service's Regional Archaeologist in consultation with the State of Kentucky Historic Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. Therefore, the determination of whether a particular action within an alternative has the potential to affect cultural resources is an on-going process that would occur during the planning stages of every project.

Service acquisition of land with known or potential archaeological or historical sites provides two major types of protection for these resources: protection from damage by federal activity and protection from vandalism or theft. The National Historic Preservation Act requires that any actions by a federal agency which may affect archaeological or historical resources be reviewed by the State Historic Preservation Office, and that the identified effects must be avoided or mitigated. The Service's policy is to preserve these cultural, historic, and archaeological resources in the public trust, and avoid any adverse effects wherever possible.

Land acquisition, within the current and expanded acquisition boundary, by the Service would provide some degree of protection to significant cultural and historic resources. If acquisition of private lands does not occur and these lands remain under private ownership, the landowner would be responsible for protecting and preserving cultural resources. Development of off-refuge lands has the potential to destroy archaeological artifacts and other historical resources, thereby decreasing opportunities for cultural resource interpretation and research.

Refuge Revenue-Sharing

Annual refuge revenue-sharing payments to Graves, McCracken, and Marshall Counties would continue at similar rates under each alternative. If lands are acquired and added to the refuge, the payments would increase accordingly.

Water Quality

Impacts to water quality from refuge activities are expected to be minimal. Agricultural practices on refuge lands have the potential to temporarily increase sedimentation and nutrient loads within the Clarks River, causing a slight adverse effect on fish productivity and diversity (Alexander and Hansen 1986). However, through the use of Best Management Practices such as vegetative buffers, no-till farming, and through following strict guidelines for application of fertilizers and pesticides, nearly all negative impacts would be neutralized. Inversely, by applying these practices to newly acquired tracts or by converting agricultural lands to grasslands or forests, the refuge has the potential to significantly reduce sedimentation and nutrient fluctuations within the watershed. The desired outcome would be an overall improvement in water quality. Additional indirect effects of sedimentation degrading water quality could occur from vegetation manipulation through harvest or forest stand improvements, but most likely these effects would not be significant.

All three alternatives have a degree of invasive plant control. Herbicide, however, would be used according to labels and Service policy, so there would be an insignificant indirect effect.

Air Quality

The refuge expects impacts to air quality to be minimal and only due to refuge and visitor's, automobile and off-road vehicle emissions. The effect of refuge-related management activities on overall air quality in the region are anticipated to be relatively negligible, especially compared to the contributions of industrial centers, power plants, and non-refuge vehicle traffic.

Other Effects

Each of the alternatives would have similar effects or minimal to negligible effects on noise, transportation, human health and safety, children, hazardous materials, waste management, aesthetics and visual resources, and utilities and public services.

SUMMARY OF EFFECTS BY ALTERNATIVE

The following section describes the environmental consequences of adopting each refuge management alternative. Table 10 summarizes and addresses the likely outcomes for the specific issues and is organized by broad issue categories.

ALTERNATIVE A. (CURRENT MANAGEMENT)

The biological integrity of the refuge would be maintained under this alternative, and the refuge purpose of conserving wetland habitat for wildlife would also continue. With regard to habitat, under Alternative A, no substantial deviations from the current status and trends would be anticipated. The quality and quantity of cropland and moist-soil habitats would continue relatively unchanged. Bottomland hardwood forests would continue to provide a natural diversity of plant and animal species found in the Clarks River watershed; however, without planned active management, habitat quality would eventually decrease. With regard to water management at Clarks River NWR, current limitations would continue to restrict water management and inhibit movement of water for the benefit of wildlife, and aquatic and wetland habitats.

Migratory and resident bird populations would remain stable. Overall, populations of various furbearer and small game mammal species would be unlikely to change. Resident bat populations are expected to remain viable, although unpredictable variables like diseases could conceivably have pronounced effects on numbers and survival. The refuge's diverse assemblage of resident reptile and amphibian species would likely remain the same. Aquatic habitats and fisheries would continue largely unchanged. Non-game and game species diversity would be maintained under this alternative.

Threatened and endangered species on the refuge would continue to be protected under the Endangered Species Act. The presence of the endangered Indiana bat and the endangered gray bat on the refuge has not been confirmed but is assumed. Both species are migratory and hibernate in caves during the winter. There are no such caves or cave-like habitats on or adjacent to the refuge. The life cycle of these species is such that they would be assumed absent from the area between October 15 and March 31. If presence on the refuge is confirmed, potential effects would be evaluated in consultation with the Kentucky Ecological Services Field Office as is required by the Endangered Species Act.

Across the refuge, a variety of invasive plant and animal species would continue to gradually encroach into native communities of flora and fauna; current control efforts are only partially successful in precluding the spread of invasives and this would continue to be the case.

Under Alternative A, the refuge would continue to acquire lands from willing sellers, but within unchanging acquisition boundaries. Outreach to private landowners in the watershed could result in additional conservation actions that benefit wildlife and the refuge; however, limited staff and resources would not allow this program to be as effective as possible. External developments beyond the refuge's boundary would continue to have long-term and widespread, relatively adverse impacts on its resources, which would likely be only partially mitigated by any efforts the refuge might undertake.

With respect to public use, overall visitor services on the refuge would likely prove insufficient to handle an expected increase in the number of visitors; thus, the quality of the visitor experience may well diminish. Nevertheless, current programs of wildlife-dependent public use would be maintained. Existing access routes and facilities on the refuge would be maintained under Alternative A. Some damage to roads, trails, parking lots, and levees due to hunter use during wet weather periods may occur. Several years of operations indicate these impacts would be minimal. The hunting of white-

tailed deer would positively impact wildlife habitat by promoting plant health and diversity. Hunting can cause some disturbance to target and non-target game species. Refuge regulations could minimize incidental disturbances by using time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users). The disturbances to hunted wildlife would be confined primarily to the hunting season.

Under Alternative A, negative impacts to soils, water, air, and other physical parameters would be mitigated to some extent, but not as much as in an adaptive management-based approach. The biological environment would remain protected, but certain systems could suffer if not systematically monitored using focused species as indicators. Management under Alternative A would not adversely impact socioeconomic values of the area, but the refuge would not achieve its potential for providing needed educational and wildlife-dependent recreational activities.

ALTERNATIVE B. OPTIMIZE WILDLIFE-DEPENDENT PUBLIC USE AND MANAGEMENT (PROPOSED ALTERNATIVE)

Implementing Alternative B would be the most effective management action for meeting the purposes of Clarks River NWR. Monitoring and surveying would be conducted systematically after assessing which species should be targeted based on their population status and ability to indicate health of important habitat. Restoration efforts, the fire program, and forest management would reflect Best Management Practices determined after examination of historical regimes, soil types and elevation, and the current hydrological system. Management actions would be monitored for effectiveness and adapted to changing conditions, knowledge, and technology. A Habitat Management Plan would be developed for future habitat projects and to evaluate previous actions. The biological integrity of the refuge would increase under this alternative, and the refuge purpose of conserving wetland habitat for wildlife would continue. With regard to habitat, under Alternative B, substantial increases in active habitat management are anticipated. The quality and quantity of cropland and moist-soil habitats would increase with better water management capabilities. Active bottomland hardwood forest management on the refuge would increase natural diversity of plant and animal species found in the Clarks River watershed. With regard to management at Clarks River NWR, protection of the West Fork of the Clarks River with a boundary expansion would increase health and ecosystem quality immensely.

Increased inventorying and monitoring of all species would allow managers to integrate adaptive management practices, track population changes, and complete species list for the refuge. Migratory and resident bird populations would increase with increased habitat management. Populations of various furbearer and small game mammal species would also likely respond positively to increased management. Resident bat populations are expected to remain viable, although unpredictable variables, like diseases, could conceivably have pronounced effects on numbers and survival. The refuge's diverse assemblage of resident reptile and amphibian species is likely to continue. Benefits to aquatic habitats and fisheries would likely increase. Other non-game and game species diversity would be maintained under this alternative.

Threatened and endangered species on the refuge would continue to be protected under the Endangered Species Act. The presence of the endangered Indiana bat and the endangered gray bat on the refuge would be inventoried and monitored on the refuge. Both species are migratory and hibernate in caves during the winter. There are no such caves or cave-like habitats on or adjacent to the refuge at this time. The life cycle of these species is such that they would be assumed absent from the area between October 15 and March 31. Disturbance to the Indiana and gray bats would be insignificant. Impacts to the maternal or foraging habitat of these species would also be insignificant.

Across the refuge, a variety of invasive plant and animal species would stop encroaching into native communities of flora and fauna through increased control efforts.

Under Alternative B, the refuge would continue to acquire lands from willing sellers, within the current and expanded acquisition boundaries. Outreach to private landowners in the watershed would result in additional conservation actions that benefit wildlife and the refuge. The current Clarks River NWR acquisition boundary is approximately 19,605 acres, of which 8,634 acres have been acquired. The proposed expansion of 34,269 acres would bring the Clarks River NWR's acquisition boundary to approximately 53,874 acres (Appendix E). The proposed expansion is consistent with the goals and objectives of the Service's Lower Tennessee-Cumberland Ecosystem team, the Gulf Coastal Plain and Ozark Landscape Conservation Cooperative, Strategic Habitat Conservation, and the overall mission of the Refuge System. Protection of lands in the expanded acquisition boundary would substantially add to the ecosystem and watershed health.

With respect to public use, overall visitor services on the refuge would likely be sufficient to handle the expected increase in the number of visitors; thus, the quality of the visitor experience would increase. Public use programs would be updated to educate visitors about the reasons for specific refuge management actions, and to provide quality experiences for refuge visitors. Options and opportunities would be explored to construct a visitor center on Clarks River NWR. In an increasingly developing region, Alternative B would strive to achieve a balanced program of wildlife-dependent recreational activities and protection of wildlife resources. Access routes and facilities on the refuge would be improved under Alternative B. Some damage to roads, trails, parking lots, and levees due to public use and management during wet weather periods may occur. Several years of operations indicate these impacts would be minimal. The hunting of white-tailed deer would positively impact wildlife habitat by promoting plant health and diversity. Hunting can cause some disturbance to target and non-target game species; however, time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) established by refuge regulations would minimize incidental disturbance. The disturbances to hunted wildlife would be confined primarily to the hunting season. Under Alternative B, negative impacts to soils, water, air, and other physical parameters would be mitigated using an adaptive management-based approach. Management under Alternative B would not adversely impact socioeconomic values of the area, but the refuge would not achieve its potential for providing needed educational and wildlife-dependent recreational activities.

This alternative proposes to add six new permanent positions to current staffing to Clarks River NWR in order to continue to protect refuge resources, provide visitor services, and attain facilities and equipment maintenance goals. No adverse effects to soils, water, air, and other physical parameters are expected under this alternative. The biological environment would improve as adaptive and best management practices are implemented. Socioeconomic values should also increase as the refuge would attract individuals searching for natural landscapes and wildlife-dependent recreation.

ALTERNATIVE C. MAXIMIZE WILDLIFE-DEPENDENT PUBLIC USE

Alternative C emphasizes managing the refuge for maximum wildlife-dependent recreational uses. This alternative would dedicate nine additional staff members and considerably more resources to managing wildlife-dependant public use on the refuge. The affects of this alternative are similar to Alternative A in terms of habitat management. The biological integrity of the refuge would stay the same as Alternative A or decrease in quality under this alternative, and the refuge purpose of conserving wetland habitat for wildlife would also continue.

With regard to habitat, under Alternative C, no substantial deviations from the current status and trends are anticipated. The quality and quantity of moist-soil, grassland, and cane brake habitats would continue relatively unchanged. Cropland habitat would be maintained to ensure maximum public use objectives are achieved. With regard to water management at Clarks River NWR, current limitations would continue to restrict water management and inhibit movement of water for the benefit of wildlife and aquatic and wetland habitats. Bottomland hardwood forests on the refuge would continue to provide a natural diversity of plant and animal species found in the Clarks River watershed; however, without planned active management, habitat quality would eventually decrease.

Migratory and resident bird populations would remain stable, although surveys of nongame species would be eliminated. Elimination of the waterfowl sanctuary area may actually decrease the use of migratory waterfowl on the refuge. Populations of various furbearer and small game mammal species may change overall due to increased hunting. Resident bat populations are expected to remain the same, although unpredictable variables like diseases could conceivably have pronounced effects on numbers and survival. These effects would be mostly unnoticed due to lack of inventorying and monitoring. The refuge's diverse assemblage of resident reptile and amphibian species is likely to continue but remain unverified. Aquatic habitats and fisheries would continue largely unchanged.

Threatened and endangered species would continue to be protected under the Endangered Species Act. The presence of the endangered Indiana bat and the endangered gray bat on the refuge has not been confirmed and further monitoring would be eliminated. If presence on the refuge is confirmed, potential effects would be evaluated in consultation with the Kentucky Ecological Services Field Office as is required by the Endangered Species Act.

Across the refuge, a variety of invasive plant species would continue to gradually encroach into native communities and control efforts would not prohibit this spread. Increased control of nuisance animal species through the use of public trapping would decrease populations which would increase quality of native populations.

Under Alternative C, the refuge would continue to acquire lands from willing sellers, within the current acquisition boundary. Protection of lands in the current acquisition boundary would be prioritized based on access and maximizing public use opportunities. This prioritization of lands may not achieve wildlife and habitat goals as quickly as Alternative B.

With respect to public use, overall visitor services on the refuge would increase in the number of visitors; however, the quality of the visitor experience may well decrease due to maximization of uses. Public use programs would be updated to educate visitors about the reasons for specific management actions, and to provide quality experiences for refuge visitors. Outreach, partnerships, and land protection would increase above Alternative A and B substantially. Options and opportunities would be explored to construct a visitor center on Clarks River NWR. In an increasingly developing region, Alternative C would maximize wildlife-dependent recreational activities, with the overall effects being a decrease in quality of habitats and use. Access routes and facilities on the refuge would be improved under Alternative C. Some damage to roads, trails, parking lots, and levees due to public use and management during wet weather periods may occur. It is possible that maximized public use may degrade these areas in excess of current use. The hunting of white-tailed deer would positively impact wildlife habitat by promoting plant health and diversity. Hunting can cause some disturbance to target and non-target game species. Time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) established by refuge regulations would try to minimize incidental disturbance; however, with maximized public use, this may become more difficult.

This alternative proposes to add nine new permanent positions to current staffing of Clarks River NWR in order to increase protection of the public, increase visitor services, and attain facilities and equipment maintenance goals. Socioeconomic values should also increase as the refuge would attract individuals searching for natural landscapes and wildlife-dependent recreation opportunities.

Table 10. Summary of environmental effects by alternative

Clarks River NWR Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
Bottomland Hardwood Forest Habitat	Opportunistic management would lead to a decrease in habitat quality. **Decreasing quality**	Actively work to restore and manage bottomland hardwood forest. **Increasing quality**	Same as Alternative A. **Decreasing quality**
Moist-soil and Cropland Habitat	Manage moist-soil and cropland with current management plan and techniques. **Stable**	Increasing water management capabilities, acreage, and cropland efficiency would optimize habitat for wetland-dependent bird species. **Increasing quality**	Manage moist-soil and cropland with current management plan and techniques **Stable**
Special Habitats – Canebrakes, Grasslands	Maintenance of current habitats would continue to provide wildlife benefits. **Stable**	Increased management, acreage, inventorying, and re-establishment. **Increasing quality**	Same as Alternative A. **Stable**
Waterfowl	Mid-winter waterfowl counts and wood duck box monitoring and maintenance would continue to assess waterfowl in the area. **Stable**	Increased habitat management and monitoring for waterfowl and wood duck boxes would benefit assessment and populations. **Increasing quality**	Same as Alternative A **Stable**
Forest Breeding Birds	MAPS Station monitoring would continue to contribute to national database and knowledge of forest breeding birds. **Stable**	Pro-active monitoring would provide quality long-term data. **Increasing quality**	Elimination of MAPS would prevent contributions to national database and knowledge of forest breeding birds. **Decreasing quality**

Clarks River NWR Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
Threatened and Endangered Species	Continued bat and beetle surveys would provide information on presence/absence of the species. **Stable**	Same as Alternative A and expand surveys of bats and beetle surveys would provide information on presence/absence of the species. **Stable**	Elimination of surveys would minimize data of the species. **Decreasing quality**
Other Wildlife	Surveys and observational data would provide minimal population information. **Stable**	Increased monitoring of species in order to assess and adapt habitat management strategies/actions would allow long-term adaptive management and provide detailed population and/or trend data. **Increasing quality**	Elimination of surveys would minimize data of species. **Decreasing quality**
Fire Management	No fire management program and therefore no change in effects. **Stable**	Utilizing fire as a management tool may have short-term negative effects to air quality and habitat but long-term benefits would mitigate for these. **Increasing quality**	Same as Alternative A. **Stable**
Invasive Plant Species	Opportunistic control invasive species would prevent increased satellite populations. **Stable**	Increased efforts to control invasive plant species would increase chances of eliminating. **Increasing quality**	Same as Alternative A. **Stable**

Clarks River NWR Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
Exotic and Invasive Species	Lack of surveys would prevent information on the presence/absence and its associated effects on existing habitat. **Decreasing quality**	Inventory and potential control would provide information and minimize negative effects on existing habitat. **Increasing quality**	Same as Alternative A. **Decreasing quality**
Nuisance Animals	Limited take of nuisance species on refuge is not decreasing populations. **Stable**	Increased methodologies and control of nuisance species would decrease populations. **Increasing quality**	Increased control of nuisance species through public trapping would decrease populations. **Increasing quality**
Environmental Education (EE), Outreach, and Interpretation	Maintain current programs. **Increasing quality**	Same as Alternative A and addition of more on- and off-site programs, visitor services specialist, and interpretive programs would help increase awareness of refuge. **Increasing quality**	Same as Alternative B and construction of additional education shelter with increased staff, volunteers, and partners would improve EE among the community. **Increasing quality**
Law Enforcement	Enforce all federal and state laws; post Refuge boundaries. **Stable**	Addition of Law Enforcement officer will increase safety and enforcement of regulations. **Increasing quality**	Addition of Law Enforcement officer will increase safety and enforcement of regulations. **Increasing quality**

Clarks River NWR Issues	Alternative A (Current Management – No Action Alternative)	Alternative B (Proposed Alternative)	Alternative C
Land Protection	Acquire lands from willing sellers through fee-title purchase within current acquisition boundary. **Increasing quality**	Same as Alternative A. Prioritization and acquisition boundary expansion provide resource and public use values **Increasing quality**	Same as Alternative A. **Increasing quality**
Public Uses	Continue to offer fishing, hunting, and wildlife observation and photography opportunities. **Stable**	Expand hunting, fishing, wildlife observation, and wildlife photography opportunities while maintaining biological quality. **Increasing quality**	Maximize fishing, hunting, wildlife observation and photography, and other opportunities. **Decreasing quality**

CUMULATIVE IMPACTS

A cumulative impact is defined as an impact on the natural or human environment, which results from the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7).

Cumulative impacts are the overall net effects on a resource that arise from multiple actions. The proposed actions would have both direct and indirect effects; however, the cumulative effects are not expected to be substantial. Impacts can "accumulate" spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time, from actions in the past, the present, and the future. Occasionally, different actions counterbalance one another, partially canceling out each other's effect on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource. In addition, sometimes the overall effect is greater than merely the sum of the individual effects, such as when one more reduction in a population crosses a threshold of reproductive sustainability, and threatens to extinguish the population.

A thorough analysis of impacts always considers their cumulative aspects, because actions do not take place in a vacuum; there are virtually always some other actions that have affected that resource in some way in the past, or are affecting it in the present, or will affect it in the reasonably foreseeable future. Any assessment of a specific action's effects must be made with consideration of what has happened, is happening, or would likely happen to that resource.

The staff is not aware of any past, present, or future planned actions that would result in a significant cumulative impact when added to the refuge's proposed actions, as outlined in the proposed alternative.

BIOLOGICAL RESOURCES

All of the alternatives are intended to maintain or improve biological resources on the refuge, in western Kentucky. The biological integrity of the refuge would be protected under the proposed alternative, and the refuge purpose would be achieved. The combination of our management actions with those of other organizations could result in significant, beneficial cumulative effects by: (1) Increasing protection and management for federal and state listed threatened or endangered species, (2) protecting habitats that are regionally declining, and (3) reducing invasive, exotic plants and animals.

Regional Bird Conservation plans; Partners in Flight; shorebird, waterbird and waterfowl plans; The Nature Conservancy ecoregion plans; the Kentucky Department of Fish and Wildlife Resources Comprehensive Wildlife Conservation Strategy; and the Kentucky wildlife and natural heritage program plans were used in determining the highest resource priorities for the refuge to protect and manage. The process allows the refuge to focus its conservation and management actions on those resources of concern that are internationally, nationally, regionally, and locally important. Positive cumulative impacts on neotropical migratory birds, waterfowl, waterbirds, species of special concern, fish, and other resident wildlife and their habitats from refuge actions are expected.

CULTURAL RESOURCES

None of the alternatives would have significant adverse cumulative impacts on cultural resources in Kentucky. Beneficial impacts would accrue at various levels, depending on the alternative, due to our proposed environmental education and interpretation programs and increased field surveys to identify and protect any sites discovered.

Under all of the alternatives, management practices on the refuge would consider potential historical resources. Projects requiring excavation are sampled using test pits in the affected area before work begins. The Service's Regional Archaeologist reviews annual management plans before projects are implemented and methods to avoid impacts on any resources are utilized.

HUMAN RESOURCES

None of the alternatives would have significant, adverse, cumulative impacts on the economy of western Kentucky. Although federal land acquisition reduces property tax revenue, it compensates affected towns with refuge revenue sharing payments, and should also reduce the costs of community services. Increased refuge visitation and tourism are expected to bring additional revenues to local communities, but we do not predict a significant increase in overall revenue in any area.

Alternative B would increase opportunities for priority, wildlife-dependent public uses, especially in wildlife observation and photography, environmental education and interpretation, and hunting. This alternative would balance wildlife-dependent public uses with wildlife and habitat management.

Under the proposed action those facilities most utilized by the public are: roads, parking lots, trails, and boat launching ramps. Maintenance or improvement of existing facilities would cause minimal short-term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. The facility maintenance and improvement activities described are periodically conducted to accommodate daily management operations and general public uses such as wildlife observation and photography. These activities would be conducted at times to reduce the amount of disturbance to wildlife. Siltation barriers would be used to minimize soil erosion, and all disturbed sites would be restored to as natural a condition as possible. During times when roads are impassible due to flood events or other natural causes those roads, parking lots, trails, and boat ramps impacted by the event would be closed to vehicular use.

RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

This section evaluates the relationship between local, short-term uses of the human environment and maintaining long-term productivity of the environment. By long-term, we mean that the impact would extend beyond the 15-year planning horizon of this Draft CCP/EA. Short-term use means less than 15 years.

All of the alternatives strive to maintain or enhance the long-term productivity and sustainability of natural resources on the refuge. To varying degrees, they propose actions that promote landscape conservation partnerships aimed at identifying and protecting important forested and wetland habitats. The alternatives strive to protect our federal trust species and the habitats they depend on, evidenced by the limits on public access during certain seasons and in some locations. Environmental education and interpretation are priorities in each alternative to encourage refuge visitors and neighbors to support and participate in environmental stewardship.

All of the alternatives propose stepped-up outreach and enforcement to prevent inappropriate, incompatible uses. Their purpose is to reduce impacts on wildlife and habitats and enhance the long-term productivity of those sites. Although the intent is the same, Alternatives A and C would not provide the staffing or funding levels to ensure that those uses could be eliminated.

The construction of new refuge facilities, such as a visitor center, trail, observation platform, and kiosks, would result in both short- and long-term impacts on soils and vegetation. Those would be localized and confined to the immediate construction sites. The new refuge facilities would provide greater environmental education and interpretation, leading to a more positive land ethic among visitors and surrounding communities. In summary, we predict that all of the alternatives would contribute positively to maintaining or enhancing the long-term productivity of the environment of western Kentucky.

UNAVOIDABLE ADVERSE IMPACTS

Under Alternative A (No Action), there are numerous unavoidable impacts, including law enforcement, that are not adequate for protecting any significant visitor use; continued degradation of the biological functions of native plant communities and wildlife habitat due to the invasion of exotic plants and nuisance animals; and a continued decrease in biodiversity. Over time, if these issues are not addressed, they would continue to impact refuge resources.

Alternative B, the proposed alternative, also has some unavoidable impacts. These impacts are expected to be minor and/or short-term in duration and the refuge would attempt to minimize these impacts whenever possible. The following sections describe the measures the refuge would employ to mitigate and minimize the potential impacts that would result from implementation of the proposed alternative.

WATER QUALITY FROM SOIL DISTURBANCE AND USE OF PESTICIDES AND HERBICIDES

Soil disturbance and siltation due to water management, road and levee maintenance, and the construction of observation towers, boat ramps, and a headquarters and visitor center are expected to be minor and of short duration. To further reduce potential impacts, the refuge would use best management practices to minimize the erosion of soils into water bodies.

Foot traffic on new and extended foot trails is expected to have a negligible impact on soil erosion. To minimize the impacts from public use, the refuge would include informational signs that request trail users to remain on the trails, in order to avoid causing potential erosion problems.

Pesticides and herbicides are used in the management of refuge lands and to control nonnative invasive species on the refuge. All pesticides and herbicides must be EPA approved, and approved by the Service review process. Additionally, best management practices and integrated pest management guidelines are followed. Long-term pesticide and use for exotic plant control could result in a slight decrease in water quality in areas prone to exotic plant infestation. Through the proper application of pesticides this is expected to have a minor impact on the environment, with the benefit of reducing or eliminating exotic plant infestations.

Forest management activities can alter water quantity and quality. Intensity of management activities determines the effect on aquatic communities. Water quantity generally applies to the size and frequency of stormflows, while water quality generally refers to the physical, chemical, and biological characteristics of the water.

Intermediate thinnings in forested stands could increase surface runoff within managed areas. This increase in surface water runoff would be temporary, lasting only until growth of existing vegetation and the establishment of new vegetation occurrs. Establishment of new vegetation and increased growth of existing vegetation should occur soon after the thinning operations as vegetation responds to increased sunlight reaching the forest floor and the increased open space in the canopy. Increased surface water runoff resulting from a decrease in infiltration rates of the soils due to compaction should be negligible after thinning treatments. Skid trails and log landings would be areas most susceptible to compaction, but they represent a small percentage of the treatment area. Disking and/or seeding skid trails and log landings would minimize the effects of compaction and soil disturbance. Slash, litter, and duff would buffer the soil against vehicle pressure, thus reducing compaction. Any thinning within streamside zones would be conducted during the dry times of the year, and skid trails would not be allowed to run parallel to streams. Crossings designated by refuge personnel would be placed perpendicular to streams to minimize streambank erosion. Log landings would be located on ridge tops to further avoid erosion.

Regeneration and restoration of forested habitat could involve intensive site preparation activities possibly including mechanical chopping, mechanical mulching, herbicide treatments, and prescribed burning plus frequent burning thereafter to reduce competition. Increased frequency of burns can decrease soil productivity by causing loss of nutrients, particularly phosphorus. Reduction of the litter cover could cause increased risk of soil damage through surface runoff and consequent erosion. Ensuring that areas with sensitive soils do not receive excessive disturbance or high-intensity burns would reduce the possibility of high erosion or impairment of soil productivity. Roads are the most common source of forest erosion and sedimentation. As miles of roads increase in a given watershed, so does the potential for watershed damage. Effects on water quality from sediment are the primary concern of road-associated erosion. Primary sources of road sediment are run-off from cut and fill areas, stream crossings, and ditches. Erosion and sedimentation (50-75 percent) from roads usually occurs during and immediately after construction. There would likely be no new road construction with the proposed alternative. Maintenance of existing roads could cause some slight sedimentation during treatment, but the removal of ruts, washouts, and reshaping of the roadbed should reduce the existing sedimentation caused by run-off.

The main effects of prescribed burning on water resources would be the potential for increased runoff due to rainfall events. When surface runoff increases after burning, it may carry suspended soil particles, dissolved inorganic nutrients, and other materials into adjacent streams and other water bodies, thus reducing water quality. These effects seldom occur after prescribed burns in this area. Generally, a properly planned prescribed burn wouldl not adversely affect water quality or quantity of ground or surface water. Nutrients released from forest litter and plants during prescribed burns are readily soluble in water. Runoff could transport those nutrients to water bodies, thus increasing their nutrient concentrations; however, most nutrients are retained through plant uptake. This beneficial effect can be greater for growing season burns than dormant season burns.

WILDLIFE DISTURBANCE

Disturbance to wildlife is an unavoidable consequence of any public use program, regardless of the activity involved. While some activities such as wildlife observation may be less disturbing than others, all of the public use activities included in the proposed alternative would be planned to avoid unacceptable levels of impact.

The known and anticipated levels of disturbance from the proposed alternative are not considered to be significant. Nevertheless, the refuge would manage public use activities to reduce impacts. Providing access for fishing opportunities allows the use of a renewable natural resource without

adversely impacting other resources. Hunting would also be managed with restrictions that ensure minimal impact on other resources. General wildlife observation may result in minimal disturbance to wildlife. If the refuge determines that impacts from the expected additional visitor uses are above the levels that are anticipated, those uses would be discontinued, restricted, or rerouted to other less- sensitive areas.

Forest management with the use of intermediate silvicultural treatments, prescribed burning, and various habitat restoration treatments may cause harm to wildlife or incidental loss of some individuals. Care would be taken to ensure that treatments are done at the correct time of year, in selected locations, and with the proper intensity to avoid potential effects to wildlife. The vast majority of wildlife would receive long-term benefits from forest habitat management and restoration.

VEGETATION DISTURBANCE

Negative effects could result from the creation, extension, and maintenance of trails that require the clearing of non-sensitive vegetation along their length. This is expected to be a minor short-term effect.

Increased visitor use may increase the potential for the introduction of new exotic species into areas when visitors do not comply with boating regulations at the boat ramps and other access points, or with requests to stay on trails. The refuge would minimize this effect by enforcing the regulations for access to the refuge's water bodies, and by installing informational signs that request users to stay on the trails.

Effects to vegetation from forest management and prescribed fire would have long-term benefits for the human and natural environment. Some vegetation would be removed or harmed due to forest management activities; however, long-term benefits to forest health and productivity would exceed losses. Effects to visual quality in the human environment due to forest management activities would be temporary and dissipate within less than one year.

USER GROUP CONFLICTS

As public use increases, unanticipated conflicts between different user groups could occur. If this should happen, the refuge would adjust its programs, as needed, to eliminate or minimize any public use issues. The refuge would use methods that have proven to be effective in reducing or eliminating public use conflicts. These methods include establishing separate use areas, different use periods, and limits on the numbers of users in order to provide safe, quality, appropriate, and compatible wildlife-dependent recreational opportunities.

EFFECTS ON ADJACENT LANDOWNERS

Implementation of the proposed alternative is not expected to negatively affect the owners of private lands adjacent to the refuge. Positive impacts that would be expected include higher property values, less intrusion of invasive exotic plants, and increased opportunities for viewing more diverse wildlife.

Negative impacts that may occur include a higher frequency of trespass onto adjacent private lands and some noise associated with increased traffic. To minimize these potential impacts, the refuge would provide informational signs that clearly mark refuge boundaries, maintain the refuge's existing parking facilities, use law enforcement, and provide increased educational efforts at the visitor center.

LAND OWNERSHIP AND SITE DEVELOPMENT

Land acquisition efforts by the Service could lead to changes in land use and recreational use patterns. However, most of the non-Service-owned lands within the refuge's approved acquisition boundary are currently undeveloped. If these lands are acquired as additions to the refuge, they would be maintained in a natural state, managed for native wildlife populations, and opened to wildlife-compatible public uses, where feasible.

Potential development of the refuge's buildings, trails, and other improvements could lead to minor short-term negative impacts on plants, soils, and some wildlife species. When building new environmental education and interpretation displays, efforts would be made to use recycled products and environmentally sensitive treated lumber. All construction activities would comply with the requirements of Section 404 of the Clean Water Act; the National Historic Preservation Act; Executive Order 11988, Floodplain Management; and other applicable regulatory requirements.

POTENTIAL IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Except perhaps in the extreme long term or under unpredictable circumstances, irreversible commitments of resources cannot be reversed. One example is an action that contributes to the extinction of a species. Once extinct, it can never be replaced.

By comparison, irretrievable commitments of resources can be reversed, given sufficient time and resources; but, they represent a loss in production or use for a period of time. One example is the maintenance of forest and scrubland as open field and grasslands. If for some reason grasslands no longer were an objective, they would gradually revert to shrub land and forest, or plantings could expedite that process.

The alternatives propose only a few actions that would irreversibly commit resources. The Service land acquisition program under Alternatives A, B, and C all propose protection of inholding properties within the current refuge acquisition boundaries. When lands become part of the refuge, their reversion to private ownership is unlikely; however, once placed in public ownership in the Refuge System, they would provide a new set of benefits to a much broader group of people. Those benefits include watershed protection, wildlife conservation, the preservation of rural character, and the expansion of wildlife-dependent recreational uses. The proposed management of the refuge would result in irretrievable and irreversible commitments of staffing and funding for the acquisition and stewardship of refuge lands.

V. Consultation and Coordination

OVERVIEW

This chapter summarizes the consultation and coordination that has occurred to date in identifying the issues, alternatives, and proposed alternative that are presented in this Draft CCP/EA. It lists the meetings that have been held with the various agencies, organizations, and individuals who were consulted in the preparation of this Draft CCP/EA.

The Clarks River NWR's Draft CCP/EA was written with the participation and assistance of refuge and Service staff, the Kentucky Division of Fish and Wildlife Resources, and the USDA Forest Service. The comprehensive conservation planning process itself began in May 2008, with the formation of a refuge planning team; a notice of intent had earlier been published in the *Federal Register.*

In August 2005, in preparation for the planning process, a team of biologists conducted a comprehensive biological review for the refuge. Participants in the biological review were drawn from the refuge and the Service, including Ecological Services, Realty, Migratory Birds, and Planning specialists; Central Hardwoods Joint Venture; Land Between the Lakes, USDA Forest Service; and Kentucky Division of Fish and Wildlife Resources.

Also in October 2007, refuge and Service personnel met to conduct a Visitor Services Review. The information and recommendations in the reports of the biological and visitor services reviews proved a valuable "point of departure" for the authors of this Draft CCP/EA.

The Service prepared a notice of intent to prepare the Draft CCP/EA, which was published in the *Federal Register* on August 29, 2008. The public was notified in the local newspapers and media of public scoping meetings held on September 23 and 25, 2008. Approximately 10 members of the public attended the public scoping meeting. Four members of the public offered their comments at the Public meeting. In addition, 25 other comments have been returned to date from the general public. Please see Chapter III of the Draft CCP for more information on public scoping and overall consultation and coordination in plan development.

CORE PLANNING TEAM MEMBERS

The core planning team consisted of the listed individuals:

Michael Johnson	Clarks River NWR, Project Leader
Tina Chouinard	Fish and Wildlife Service, Planning Team Leader
Andy Eller	Clarks River NWR, Biologist (Former)
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Stacey Hayden	Clarks River NWR, Park Ranger
Scott Simmons	Clarks River NWR, Deputy Project Leader
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INTERDISCIPLINARY PLANNING TEAM MEMBERS

Several individuals supported the planning process with participation on the biological review team, Visitor services review team, and additional special topic discussions. Their information provided additional biological support for developing objectives found in this Draft CCP/EA. Some members are internal to the Service and provided additional policy guidance and support for objective development as well.

Biological Review Team

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Other Contributors

In addition to the above-listed core and extended planning team members, a number of individuals and groups contributed to the Draft CCP/EA. These contributors participated in the scoping meeting or provided input at various stages of the planning process.

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SECTION C. APPENDICES

Appendix A. Glossary

Adaptive Management:	Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in management plan. Analysis of results help managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.
Alluvial:	Sediment transported and deposited in a delta or riverbed by flowing water.
Alternative:	1. A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2. Alternatives are different sets of objectives and strategies or means of achieving Refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues (Service Manual 602 FW 1.6B).
Anadromous:	Migratory fishes that spend most of their lives in the sea and migrate to fresh water to breed.
Biological Diversity:	The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (USFWS Manual 052 FW 1. 12B). The System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as Biodiversity.
Carrying Capacity:	The maximum population of a species able to be supported by a habitat or area.
Categorical Exclusion (CE,CX, CATEX, CATX):	A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).
CFR:	Code of Federal Regulations.
Compatible Use:	A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose(s) of the national wildlife refuge (50 CFR 25.12 (a)). A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan (CCP):	A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates (Service Manual 602 FW 1.6 E).
Concern:	See Issue
Cover Type:	The present vegetation of an area.
Cultural Resource Inventory:	A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).
Cultural Resource Overview:	A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field offices background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).
Cultural Resources:	The remains of sites, structures, or objects used by people in the past.
Designated Wilderness Area:	An area designated by the United States Congress to be managed as part of the National Wilderness Preservation System (Draft Service Manual 610 FW 1.5).
Disturbance:	Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflight).
Ecosystem:	A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.
Ecosystem Management:	Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.

Emergent Marsh	Wetlands dominated by erect, rooted, herbaceous plants.
Endangered Species (Federal):	A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.
Endangered Species (State):	A plant or animal species in danger of becoming extinct or extirpated in the state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.
Environmental Assessment (EA):	A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).
Environmental Impact Statement (EIS):	A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).
Estuary:	The wide lower course of a river into which the tides flow. The area where the tide meets a river current.
Finding of No Significant Impact (FONSI):	A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).
Goal:	Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Service Manual 620 FW 1.6J).
Habitat:	Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.
Habitat Restoration:	Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.
Habitat Type:	See Vegetation Type.
Improvement Act:	The National Wildlife Refuge System Improvement Act of 1997.

Informed Consent:	The grudging willingness of opponents to “go along” with a course of action that they actually oppose (Bleiker).
Issue:	Any unsettled matter that requires a management decision, e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or other presence of an undesirable resource condition (Service Manual 602 FW 1.6K).
Management Alternative:	See Alternative
Management Concern:	See Issue
Management Opportunity:	See Issue
Migration:	The seasonal movement from one area to another and back.
Mission Statement:	Succinct statement of the unit’s purpose and reason for being.
Monitoring:	The process of collecting information to track changes of selected parameters over time.
National Environmental Policy Act of 1969 (NEPA):	Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (40 CFR 1500).
National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57):	Under the Improvement Act, the U.S. Fish and Wildlife Service is required to develop 15-year Comprehensive Conservation Plans for all National Wildlife Refuges outside Alaska. The Act also describes the six public uses given priority status within the NWRS (i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation).
National Wildlife Refuge System Mission:	The mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

National Wildlife Refuge System:	Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; games ranges; wildlife management areas; or waterfowl production areas.
National Wildlife Refuge:	A designated area of land, water, or an interest in land or water within the System.
Native Species:	Species that normally live and thrive in a particular ecosystem.
Notice of Intent (NOI):	A notice that an environmental impact statement will be prepared and considered (40 CFR 1508.22). Published in the Federal Register.
Noxious Weed:	A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States, according to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.
Objective:	A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Making objectives attainable, time-specific, and measurable (Service Manual 602 FW 1.6N).
Plant Community:	An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community.
Preferred Alternative:	This is the alternative determined [by the decision maker] to best achieve the Refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.
Prescribed Fire:	The application of fire to wildland fuels to achieve identified land use objectives (Service Manual 621 FW 1.7). May be from natural ignition or intentional ignition.

Priority Species: Fish and wildlife species that the Washington Department of Fish and Wildlife believe require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) State-listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreation, commercial, and/or tribal importance.

Public Involvement Plan: Broad long-term guidance for involving the public in the comprehensive planning process.

Public Involvement: A process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

Public: Individuals, organizations, and groups; officials of Federal, State, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in service issues and those who do or do not realize that Service decisions may affect them.

Purposes of the Refuge: "The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit." For refuges that encompass Congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge Service Manual 602 FW 106 S).

Recommended Wilderness: Areas studied and found suitable for wilderness designation by both the Director and Secretary, and recommended for designation by the President to Congress. These areas await only legislative action by congress in order to become part of the Wilderness System. Such areas are also referred to as "pending in Congress."
(Draft Service Manual 610 FW 1.5).

Record of Decision (ROD): A concise public record of decision prepared by the Federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).

Refuge Goal: See Goal.

Purposes:	See Purposes of the Refuge.
Songbirds: (Also Passerines)	A category of birds that are medium to small, perching landbirds. Most are territorial singers and migratory.
Step-down Management Plan:	A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives (Service Manual 602 FW 1.6 U).
Strategy:	A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U).
Study Area:	The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this CCP/EIS the study area includes the lands within the currently approved Refuge boundary and potential Refuge expansion areas.
Threatened Species (Federal):	Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
Threatened Species (State):	A plant or animal species likely to become endangered in the state within the near future if factors contributing to population decline or habitat degradation or loss continue.
U.S. Fish and Wildlife Service Mission:	The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.
Unit Objective:	See Objective
Vegetation Type, Habitat Type, Forest Cover Type:	A land classification system based upon the concept of distinct plant associations.
Vision Statement:	A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System Mission and specific refuge purposes, and other mandates. We will tie the vision statement for the refuge to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates (Service Manual 602 FW 1.6 Z).

Wilderness Study Areas: Lands and waters identified through inventory as meeting the definition of wilderness and undergoing evaluation for recommendation for inclusion in the Wilderness System. A study area must meet the following criteria:

- Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation
- Has at least 5,000 contiguous roadless acres or is sufficient in size as to make practicable its preservation and use in an unimpaired condition (Draft Service Manual 610 FW 1.5)

Wilderness: See Designated Wilderness

Wildfire: A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

ACRONYMS AND ABBREVIATIONS

ADA	Americans with Disabilities Act
ATV	All-Terrain Vehicle
BCR	Bird Conservation Region
BI	Biotic Integrity
BMP	Best Management Practices
CAA	Clean Air Act
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
CRNWR	Clarks River National Wildlife Refuge
CRP	Conservation Reserve Program
CWCS	Comprehensive Wildlife Conservation Strategy
DBH	Diameter at Breast Height
DOI	Department of the Interior
DOW	Division of Water
DU	Ducks Unlimited
EA	Environmental Assessment
EE	Environmental Education
EERA	Environmental Education and Recreation Area
EI	Environmental Interpretation
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPPC	Exotic Pest Plant Council
ESA	Endangered Species Act
FAQ	Frequently Asked Questions
FONSI	Finding of No Significant Impact
FR	Federal Register
FSA	Farm Service Agency
FTE	Full-time Equivalent
FY	Fiscal Year
GIS	Geographic Information System
GMC	Genetically Modified Crops
GMO	Genetically Modified Organism
GPS	Global Positioning System
GCJV	Gulf Coast Joint Venture
IBRT	Indiana Bat Recovery Team
IMP	Inventory and Monitoring Plan
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
KDA	Kentucky Department of Agriculture
KDAQ	Kentucky Department of Air Quality
KDFWR	Kentucky Department of Fish & Wildlife Resources
KOS	Kentucky Ornithological Society
KSNPC	Kentucky State Nature Preserves Commission
LBL	Land Between the Lakes
LE	Law Enforcement
LMVJV	Lower Mississippi Valley Joint Venture
LTCE	Lower Tennessee-Cumberland Ecosystem
MAPS	Monitoring Avian Productivity and Survivorship
MMS	Mineral Management Service

MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NAAMP	North American Amphibian Monitoring Program
NAAQS	National Ambient Air Quality Standards
NABCI	North American Bird Conservation Initiative
NAWMP	North American Waterfowl Management Plan
NCTC	National Conservation Training Center
NEPA	National Environmental Policy Act
NGO	Non-Governmental Organization
NMFS	National Marine Fisheries Society
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
PCA	Priority Conservation Area
PVC	Polyvinyl chloride
QU	Quail Unlimited
RAPP	Refuge Annual Performance Plan
RM	Refuge Manual
RNA	Research Natural Area
ROD	Record of Decision
RONS	Refuge Operating Needs System
ROW	Right-of-Way
RRP	Refuge Roads Program
SAMMS	Service Asset Maintenance Management Systems
SCWDS	Southeast Cooperative Wildlife Disease Study
Service	United States Fish and Wildlife Service (also, FWS)
SGCN	Species of Greatest Conservation Need
STEP	Student Temporary Employment Program
STWG	State and Tribal Wildlife Grants
SUP	Special Use Permit
SWCD	Soil and Water Conservation District
T&E	Threatened and Endangered
TNC	The Nature Conservancy
TVA	Tennessee Valley Authority
USACE	US Army Corps of Engineers
USC	United States Code
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
WMA	Wildlife Management Area
WKU	Western Kentucky University
WRP	Wetland Reserve Program
YCC	Youth Conservation Corps

Appendix B. References and Literature Citations

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Appendix C. Relevant Legal Mandates and Executive Orders

STATUTE	DESCRIPTION
Administrative Procedures Act (1946)	Outlines administrative procedures to be followed by Federal agencies with respect to identification of information to be made public; publication of material in the Federal Register; maintenance of records; attendance and notification requirements for specific meetings and hearings; issuance of licenses; and review of agency actions.
American Antiquities Act of 1906	Provides penalties for unauthorized collection, excavation, or destruction of historic or prehistoric ruins, monuments or objects of antiquity on lands owned or controlled by the United States. The Act authorizes the President to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the Unites States.
American Indian Religious Freedom Act of 1978	Protects the inherent right of Native Americans to believe, express, and exercise their traditional religions, including access to important sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.
Americans With Disabilities Act of 1990	Intended to prevent discrimination of and make American Society more accessible to people with disabilities. The Act requires reasonable accommodations to be made in employment, public services, public accommodations, and telecommunications for persons with disabilities.
Anadromous Fish Conservation Act of 1965, as amended	Authorizes the Secretary of the Interior and Commerce to enter into cooperative agreements with states and other non-Federal interest for conservation, development, and enhancement of anadromous fish and contribute up to 50 percent as the Federal share of the cost of carrying out such agreements. Reclamation construction programs for water resource projects needed solely for such fish are also authorized.
Archaeological Resources Protection Act of 1979, as amended.	This act strengthens and expands the protective provisions of the Antiquities Act of 1906 regarding archaeological resources. It also revised the permitting process for archaeological research.

STATUTE	DESCRIPTION
Architectural Barriers Act of 1968	Requires that buildings and facilities designed, constructed, or altered with Federal funds, or leased by a Federal agency, must comply with standards for physical accessibility.
Bald and Golden Eagle Protection Act of 1940, as amended	Prohibits the possession, sale or transport of any bald or golden eagle, alive or dead, or part, nest, or egg except as permitted by the Secretary of the Interior for scientific or exhibition purposes, or for the religious purposes of Indians.
Bankhead-Jones Farm Tenant Act of 1937	Directs the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use and thus assist in such things as control of soil erosion, reforestation, preservation of natural resources and protection of fish and wildlife. Some early refuges and hatcheries were established under authority of this Act.
Cave Resources Protection Act of 1988	Established requirements for the management and protection of caves and their resources on Federal lands, including allowing the land managing agencies to withhold the location of caves from the public, and requiring permits for any removal or collecting activities in caves on Federal lands.
Clean Air Act of 1970	Regulates air emissions from area, stationary, and mobile sources. This Act and its amendments charge Federal land managers with direct responsibility to protect the “sir quality and related values” of land under their control. These values include fish, wildlife, and their habitats.
Clean Water Act of 1974, as amended	This Act and its amendments have as its objective the restoration and maintenance of the chemical, physical, and biological integrity of the Nation’s waters. Section 401 of the Act requires that Federally permitted activities comply with the Clean Water Act standards, state water quality laws, and any other appropriate state laws. Section 404 charges the U.S. Army Corps of Engineers with regulating discharge of dredge or fill materials into waters of the United States, including wetlands.
Emergency Wetlands Resources Act of 1986	This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act requires the Secretary to establish a National Wetlands Priority Conservation Plan, required the States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to import duties on arms and ammunition. It also established entrance fees at National Wildlife Refuges.

STATUTE	DESCRIPTION
Endangered Species Act of 1973, as amended	Provides for the conservation of threatened and endangered species of fish, wildlife, and plants by Federal action and by encouraging the establishment of state programs. It provides for the determination and listing of endangered and threatened species and the designation of critical habitats. Section 7 requires refuge managers to perform internal consultation before initiating projects that affect or may affect endangered species.
Energy Policy Act of 2005	Includes a section that establishes the Coastal Impact Assistance Program (CIAP), a program authorizing funds to outer continental shelf oil and gas producing states to mitigate the impact of oil and gas activities
Environmental Education Act of 1990	This act established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a Federal environmental education program in consultation with other Federal natural resource management agencies, including the Fish and Wildlife Service.
Estuary Protection Act of 1968	Authorized the Secretary of the Interior, in cooperation with other Federal agencies and the States, to study and inventory estuaries of the United States, including land and water of the Great Lakes, and to determine whether such areas should be acquired for protection. The Secretary is also required to encourage State and local governments to consider the importance of estuaries in their planning activities relates to Federal natural resource grants. In approving any state grants for acquisition of estuaries, the Secretary was required to establish conditions to ensure the permanent protection of estuaries.
Estuaries and Clean Waters Act of 2000	This law creates a Federal interagency council that includes the Director of the Fish and Wildlife Service, the Secretary of the Army for Civil Works, the Secretary of Agriculture, the Administrator of the Environmental Protection Agency and the Administrator for the National Oceanic and Atmospheric Administration. The Council is charged with developing a national estuary habitat restoration strategy and providing grants to entities to restore and protect estuary habitat to promote the strategy.
Food Security Act of 1985, as amended (Farm Bill)	The Act contains several provisions that contribute to wetland conservation. The Swampbuster provisions state that farmers who convert wetlands for the purpose of planting after enactment of the law are ineligible for most farmer program subsidies. It also established the Wetland Reserve Program to restore and protect wetlands through easements and restoration of the functions and values of wetlands on such easement areas.

STATUTE	DESCRIPTION
Farmland Protection Policy Act of 1981, as amended	The purpose of this law is to minimize the extent to which Federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. Federal programs include construction projects and the management of federal lands.
Federal Advisory Committee Act (1972), as amended	Governs the establishment of and procedures for committees that provide advice to the federal government. Advisory committees may be established only if they will serve a necessary, nonduplicative function. Committees must be strictly advisory unless otherwise specified and meetings must be open to the public.
Federal Coal Leasing Amendment Act of 1976	Provided that nothing in the Mining Act, the Mineral Leasing Act, or the Mineral Leasing Act for Acquired Lands authorized mining coal on refuges.
Federal-Aid Highways Act of 1968	Established requirements for approval of Federal highways through wildlife refuges and other designated areas to preserve the natural beauty of such areas. The Secretary of Transportation is directed to consult with the Secretary of the Interior and other Federal agencies before approving any program or project requiring the use of land under their jurisdiction.
Federal Pest Plant Act of 1957	(P.L. 85-36) prohibited the movement of plant pests from a foreign country into or through the United States unless authorized by USDA was superseded by the Plant Protection Act of 2000 (P.L. 106-224, Title IV). Under the new law, Animal and Plant Health Inspection Service (APHIS) retains broad authority to inspect, seize, quarantine, treat, destroy or dispose of imported plant and animal materials that are potentially harmful to U.S. agriculture, horticulture, forestry, and, to a certain degree, natural resources. (7 U.S.C. 7701 et seq.).
Federal Noxious Weed Act of 1990, as amended	The Secretary of Agriculture was given the authority to designate plants as noxious weeds and to cooperate with other Federal, State and local agencies, farmers associations, and private individuals in measures to control, eradicate, prevent, or retard the spread of such weeds. The Act requires each Federal land-managing agency including the Fish and Wildlife Service to designate an office or person to coordinate a program to control such plants on the agency's land and implement cooperative agreements with the States including integrated management systems to control undesirable plants.

STATUTE	DESCRIPTION
Fish and Wildlife Act of 1956	Establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also includes the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, it authorizes the Secretary of the Interior to take such steps as may be required for the development, advancement, management, conservation and protection of fish and wildlife resources including, but not limited to, research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein.
Fish and Wildlife Conservation Act of 1980, as amended	Requires the Service to monitor non-gamebird species, identify species of management concern, and implement conservation measures to preclude the need for listing under the Endangered Species Act.
Fish and Wildlife Coordination Act of 1958	Promotes equal consideration and coordination of wildlife conservation with other water resource development programs by requiring consultation with the Fish and Wildlife Service and the state fish and wildlife agencies where the “waters of a stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified” by any agency under Federal permit or license.
Improvement Act of 1978	This act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs.
Fish and Wildlife Programs Improvement and National Wildlife Refuge System Centennial Act of 2000	Recognizes the vital importance of the Refuge System and the fact that the System will celebrate its centennial anniversary in the year 2003. Established the National Wildlife Refuge System Centennial Commission to prepare a plan to commemorate the 100th anniversary of the System, coordinate activities to celebrate that event, and host a conference on the National Wildlife Refuge System. The commission is also responsible for developing a long-term plan to meet the priority operations; maintenance and construction needs for the System, and improve public use programs and facilities.

STATUTE	DESCRIPTION
Fishery (Magnuson) Conservation and Management Act of 1976	Established Regional Fishery Management Councils comprised of Federal and State officials including the Fish and Wildlife Service. It provides for regulation of foreign fishing and vessel fishing permits.
Freedom of Information Act, 1966	Requires all Federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions, official, published and unpublished policy statements, final orders deciding case adjudication, and other documents. Special exemptions have been reserved for nine categories of privileged material. The Act requires the party seeking the information to pay reasonable search and duplication costs.
Geothermal Steam Act of 1970, as amended	Authorizes and governs the lease of geothermal steam and related resources on public lands. Section 15 c of the Act prohibits issuing geothermal leases on virtually all Service-administrative lands.
Lacey Act of 1900, as amended	Originally designed to help states protect their native game animals and to safeguard U.S. crop production from harmful foreign species. This Act prohibits interstate and international transport and commerce of fish, wildlife or plant taken in violation of domestic or foreign laws. It regulates the introduction to America of foreign species into new locations.
Land and Water Conservation Fund Act of 1948	This act provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies including the Fish and Wildlife Service.
Marine Mammal Protection Act of 1972, as amended	The 1972 Marine Mammal Protection Act established a Federal responsibility to conserve marine mammals with management vested in the Department of Interior for sea otter, walrus, polar bear, dugong, and manatee. The Department of Commerce is responsible for cetaceans and pinnipeds, other than the walrus. With certain specified exceptions, the Act establishes a moratorium on the taking and importation of marine mammals as well as products taken from them.

STATUTE	DESCRIPTION
Migratory Bird Conservation Act of 1929	Established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds. The role of the Commission was expanded by the North American Wetland Conservation Act to include approving wetlands acquisition, restoration, and enhancement proposals recommended by the North American Wetlands Conservation Council.
Migratory Bird Hunting and Conservation Stamp Act of 1934	Also commonly referred to as the Duck Stamp Act", requires waterfowl hunters 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are deposited into the Migratory Bird Conservation Fund for the acquisition of migratory bird refuges.
Migratory Bird Treaty Act of 1918, as amended	This Act implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, this Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, export or import any migratory bird, part, nest, egg or product.
Mineral Leasing Act for Acquired Lands (1947), as amended	Authorizes and governs mineral leasing on acquired public lands.
Minerals Leasing Act of 1920, as amended	Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas and other hydrocarbons, sulphur, phosphate, potassium and sodium. Section 185 of this title contains provisions relating to granting rights-of-ways over Federal lands for pipelines.
Mining Act of 1872, as amended	Authorizes and governs prospecting and mining for the so-called "hardrock" minerals (such as gold and silver) on public lands.
National and Community Service Act of 1990	Authorizes several programs to engage citizens of the U.S. in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law establishes the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on Federal or Indian lands.

STATUTE	DESCRIPTION
National Environmental Policy Act of 1969	Requires analysis, public comment, and reporting for environmental impacts of Federal actions. It stipulates the factors to be considered in environmental impact statements, and requires that Federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unqualified environmental values are given appropriate consideration, along with economic and technical considerations.
National Historic Preservation Act of 1966, as amended	It establishes a National Register of Historic Places and a program of matching grants for preservation of significant historical features. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.
National Trails System Act (1968), as amended	Established the National Trails System to protect the recreational, scenic and historic values of some important trails. National Recreation Trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved State(s), and other land managing agencies, if any. National Scenic and National Historic Trails may only be designated by an Act of Congress. Several National Trails cross units of the National Wildlife Refuge System.
National Wildlife Refuge System Administration Act of 1966	Prior to 1966, there was no single Federal Law that governed the administration of the various wildlife s that had been established. This Act defines the National Wildlife System and authorizes the Secretary of the Interior to permit any use of an area provided such use is compatible with the major purposes(s) for which the area was established.
National Wildlife Refuge System Improvement Act of 1997	This Act amends the National Wildlife Refuge System Administration Act of 1966. This Act defines the mission of the National Wildlife Refuge System, establishes the legitimacy and appropriateness of six priority 'wildlife-dependent' public uses, establishes a formal process for determining 'compatible uses' of System lands, identifies the Secretary of the Interior as responsible for managing and protecting the System, and requires the development of a comprehensive conservation plan for all refuges outside of Alaska.
Native American Graves Protection and Repatriation Act of 1990	Requires Federal agencies and museums to inventory, determine ownership of, and repatriate certain cultural items and human remains under their control or possession. The Act also addresses the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency.

STATUTE	DESCRIPTION
Neotropical Migratory Bird Conservation Act of 2000	Establishes a matching grants program to fund projects that promote the conservation of Neotropical migratory birds in the united States, Latin America and the Caribbean.
Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990	Title I of P.L. 101-646 (104 Stat. 4761, 16 U.S.C. 4701, enacted November 29, 1990) established a Federal program to prevent introduction of and to control the spread of introduced aquatic nuisance species and the brown tree snake. The U.S. Fish and Wildlife Service, the U.S. Coast Guard, the Environmental Protection Agency, the Army Corps of Engineers, and the National Oceanic and Atmospheric Administration all were assigned new responsibilities, including membership on an Aquatic Nuisance Species Task Force established to develop a program of prevention, monitoring, control, and study.
North American Wetlands Conservation Act of 1989	Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, U.S. and Mexico. North American Wetlands Conservation Council is created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on Federal lands).
Refuge Recreation Act of 1962, as amended	This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging fees for public uses.
Partnerships for Wildlife Act of 1992	Establishes a Wildlife Conservation and Appreciation Fund, to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the State fish and game agencies in carrying out their responsibilities for conservation of non-game species. The funding formula is no more than 1/3 Federal funds, at least 1/3 Foundation funds, and at least 1/3 State funds.

STATUTE	DESCRIPTION
Refuge Revenue Sharing Act of 1935, as amended	Provided for payments to counties in lieu of taxes from areas administered by the Fish and Wildlife Service. Counties are required to pass payments along to other units of local government within the county, which suffer losses in tax revenues due to the establishment of Service areas.
Rehabilitation Act of 1973	Requires nondiscrimination in the employment practices of Federal agencies of the executive branch and contractors. It also requires all federally assisted programs, services, and activities to be available to people with disabilities.
Rivers and Harbors Appropriations Act of 1899, as amended	Requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States. The Fish and Wildlife Coordination Act provides authority for the Service to review and comment on the effects on fish and wildlife activities proposed to be undertaken or permitted by the Corps of Engineers. Service concerns include contaminated sediments associated with dredge or fill projects in navigable waters.
Sikes Act (1960), as amended	Provides for the cooperation by the Department of the Interior and Defense with State agencies in planning, development, and maintenance of fish and wildlife resources and outdoor recreation facilities on military reservations throughout the U.S. It requires the Secretary of each military department to use trained professionals to manage the wildlife and fishery resource under his jurisdiction, and requires Federal and State fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations.
Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948	This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.
Transportation Equity Act for the 21st Century (1998)	Established the Refuge Roads Program, requires transportation planning that includes public involvement, and provides funding for approved public use roads and trails and associated parking lots, comfort stations and bicycle/pedestrian facilities.

STATUTE	DESCRIPTION
Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended	Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.
Water Resources Planning Act of 1965	Established Water Resources Council to be composed of Cabinet representatives including the Secretary of the Interior. The Council reviews river basin plans with respect to agricultural, urban, energy, industrial, recreational and fish and wildlife needs. The act also established a grant program to assist States in participating in the development of related comprehensive water and land use plans.
Wild and Scenic Rivers Act of 1968, as amended	This act selects certain rivers of the nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values; preserves them in a free-flowing condition; and protects their local environments.
Wilderness Act of 1964, as amended	The Wilderness Act of 1964 directs the Secretary of the Interior to review every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated Wilderness Areas that do not alter natural processes. Wilderness values are preserved through a “minimum tool” management approach, which requires refuge managers to use the least intrusive methods, equipment and facilities necessary for administering the areas.
Youth Conservation Corps Act of 1970	Established a permanent Youth Conservation Corps (YCC) programs within the Department of Interior and Agriculture. Within the Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 11593, Protection and Enhancement of the Cultural Environment (1971)	States that if the Service proposes any development activities that may affect the archaeological or historic sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.
EO 11644, Use of Off-road Vehicles on Public Land (1972)	Established policies and procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.
EO 11988, Floodplain Management (1977)	The purpose of this Executive Order is to prevent Federal agencies from contributing to the “adverse impacts associated with occupancy and modification of floodplains” and the “direct or indirect support of floodplain development.” In the course of fulfilling their respective authorities, Federal agencies “shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.
EO 11989 (1977), Amends Section 2 of EO 11644	Directs agencies to close areas negatively impacted by off-road vehicles.
EO 11990, Protection of Wetlands (1977)	Federal agencies are directed to provide leadership and take action to minimize the destruction, loss of degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
EO 12372, Intergovernmental Review of Federal Programs (1982)	Seeks to foster intergovernmental partnerships by requiring Federal agencies to use the State process to determine and address concerns of State and local elected officials with proposed Federal assistance and development programs.
EO 12898, Environmental Justice (1994)	Requires federal agencies to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 12906, Coordinating Geographical Data Acquisition and Access (1994), Amended by EO 13286 (2003). Amendment of EO's & other actions in connection w/ transfer of certain functions to Secretary of DHS.	Recommended that the executive branch develop, in cooperation with State, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data. Of particular importance to CCP planning is the National Vegetation Classification System (NVCS), which is adopted, standard for vegetation mapping. Using NVCT facilitates the compilation of regional and national summaries, which in turn, can provide an ecosystem context for individual refuges.
EO 12962, Recreational Fisheries (1995)	Federal agencies are directed to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities in cooperation with States and Tribes.
EO 13007, Native American Religious Practices (1996)	Provides for access to, and ceremonial use of, Indian sacred sites on federal lands used by Indian religious practitioners and direction to avoid adversely affecting the physical integrity of such sites.
EO 13061, Federal Support of Community Efforts Along American Heritage Rivers (1997)	Established the American Heritage Rivers initiative for the purpose of natural resource and environmental protection, economic revitalization, and historic and cultural preservation. The Act directs Federal agencies to preserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage.
EO 13084, Consultation and Coordination With Indian Tribal Governments (2000)	Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 13112, Invasive Species (1999)	Federal agencies are directed to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, accurately monitor invasive species, provide for restoration of native species and habitat conditions, conduct research to prevent introductions and to control invasive species, and promote public education on invasive species and the means to address them. This EO replaces and rescinds EO 11987, Exotic Organisms (1977).
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. (2001)	Instructs federal agencies to conserve migratory birds by several means, including the incorporation of strategies and recommendations found in Partners in Flight Bird Conservation plans, the North American Waterfowl Plan, the North American Waterbird Conservation Plan, and the United States Shorebird Conservation Plan, into agency management plans and guidance documents.

Appendix D. Public Involvement

- *State involvement and date of initial contact*: The KDFWR was contacted during July 2008 (the preplanning stage of the process), individuals participated in the biological review, and are represented on the core planning team.

- *Public involvement process*: Notice of intent to prepare the comprehensive conservation plan was published in the *Federal Register* on August 29, 2008. The public was notified in the local newspapers and media of public scoping meetings held on September 23 and 25, 2008. Approximately 10 members of the public attended the public scoping meeting. Four members of the public offered their comments at the public meeting. In addition, 25 other comments were received from the general public.

Major Issues Identified:

Internally:

Fish and Wildlife Population Management
- Need baseline data on fish and wildlife populations
- Trapping – beaver
- Migratory bird management – migratory songbirds, waterfowl, minimal shorebird habitat
- Resident species management – deer, turkey
- Indiana bat use on refuge
- Aquatic species – darters, fish, mussels, cottonmouth – largest concentration

Habitat Management
- Farming – pesticide use, farmer restrictions, cooperative farming, where and how much to farm (700 acres currently)
- Need to develop moist-soil and active water management areas – develop wetland infrastructure and management capabilities
- Forest management – forest inventory, plantations (pine, hardwood)
- Invasive species concerns – mostly terrestrial, Japanese grass, honey suckle, reed canary grass, Johnson grass, fescue
- Management – fire, burning native warm-season grass, forests
- Work within Service resources to improve forest conditions (timber harvesting, reforestation)

Resource Protection
- Global warming concerns
- Garbage dumping – (household and construction debris)
- Mineral rights
- Perception of flooding associated with Clarks River – clogged with debris and more flooding than we should. Perception of promoting flooding. Public would like to see river dredged
- Sedimentation and water quality – Murray State University studying upper watershed above refuge

- Restoration of floodplain would need velocity reduction – storage areas are mostly on private lands
- Private lands protection and partnerships – increase funding and backing for this program; work with partners to get some water storage
- Fencing in relation to adjacent landowners
- Need to explain and educate about floodplain restoration
- Constituents of Soil Conservation Districts want to clear the stream under guidelines
- Because of so many differing land ownerships, managing river dredging/clearing is difficult, when you clear one area then upstream or downstream is affected – ingress/egress of equipment make it difficult to clear blockages
- Delineation of acquisition boundary
    - Access
    - Acquiring land
    - Boundary line establishment
    - Minor boundary expansion – 17-18,000 acres plus 4-5,000 acres
    - Vs Major expansion – look into major expansion
- Inholdings – key tracts identified in biological review
    - Management capabilities
    - Infrastructure
    - There are many and they vary in size

Visitor Services

- Friends group – Improve growth and membership, very supportive
- Visitor and staff access
- Maximize opportunities
- ATV use only for mobility impaired
- Fishing access and opportunities limited – river blockage makes opportunities difficult
- Hunting – keeping program
- Visitor center – congressional backing
- 40-50 schools within 20 miles of refuge
- Huge demand on environmental education and interpretation programs
- Limited land base to manage wildlife but good opportunity for EE and EI

Refuge Administration

- Priority positions to add: assistant refuge manager, park ranger (public use), biologist, MW – convert term/temporary positions into permanent
- Facilities are good

State: The KDFWR is in agreement and supports the efforts of refuge management. The state had chosen to participate actively in the CCP process by appointing two employees to the core planning team.

Tribes: Letters were provided to representatives of Eastern Band of Cherokee Indians and the Mississippi Band of Choctaw Indians requesting issues they would like to see addressed in the CCP and inviting them to participate in the process. No responses were received.

Partners: The USDA Forest Service, Land Between the Lakes, appointed one employee to the core planning team.

Public: The following comments were received from the public either at the public forum or in correspondence as noted below:

Fish and Wildlife Population Management

- Need baseline data on fish and wildlife populations
- Too many deer
- Depredation issues on crops and residential fruit, shrubs, etc., from too many deer
- Coyote populations seem to be increasing
- Fox populations seem to be increasing and pose a danger to people; fox using ground hog tunnels in barns
- Refuge has brought a large influx of wildlife
- There needs to be an effort on adjacent lands to control wildlife populations – cooperation between hunters and landowners

Habitat Management

- Control and introduce flooding to some of the hardwood bottoms for migratory waterfowl to create a unique and beneficial resource
- Install flood control structures to allow seasonal flooding of hardwood bottoms
- Does not like the fact that all the farm fields are grown up into weeds; believes fields should be leased back to farmers to raise corn for wildlife

Resource Protection

- Adjacent landowners are being negatively impacted by water drainage issues
- It is difficult to drain land and farm
- Solution to drainage problem – Clarks River should be straightened from Dog Town Road to Paducah and cleaned out
- Fencing to prevent free ranging of respondents cattle
- Trespassing on lands adjacent to refuge, destroying crops, and tearing up roads
- Drainage system on Clarks River is less to be desired for agricultural operations
- Water drainage in Marshall County is not good
- Prevent dumping/pollution in the area that would harm wildlife
- Concerned with poaching – prevent
- Concerned with illegal dumping and river pollution

Visitor Services

- Need environmental education opportunities in elementary, middle, and high school students
- Need full-time park ranger/environmental education staff or need to train more teachers
- The refuge needs to offer access for nature hiking and biking on the northern parts of the refuge
- Create bike and/or jogging trail along railroad bed; provide parking and signage for people
- Allow muzzleloader/modern firearm hunting though quota hunt/draw similar to LBL
- Move spring turkey hunts to a quota then open hunting similar to LBL
- Maintain, allow, and expand hunting (numerous comments)
- Further develop the property for public duck hunting – park and use area as first-come first-serve basis
- Maintain areas for wildlife photography
- Do not allow use of ATVs or horseback riding, among others, without hunting and wildlife focus
- Continue to allow turkey hunting

- Add park ranger (LE)
- Need more information displayed on appropriate uses
- Allow electronic calls for varmint hunting (coyotes and crows)
- Allow center fire rifle calibers for varmint hunting; to deny this is to discriminate against certain section of hunting public
- Do not create refuges, ever!
- Set up area for target shooting
- Make fishing a substantial part of the plan
- Administer hunting and fishing programs in a scientific program in partnership with KDFWR
- Create two nice picnic areas and scenic hiking trail

Refuge Administration

- Access for hunting limited on refuge

Appendix E. Land Protection Plan

Acquisition boundaries are administrative lines delineating areas in which the Service may consider negotiations with willing owners for acquisition of an interest in land. Lands within a refuge acquisition boundary do not become part of the refuge unless and until a legal interest is acquired through a management agreement, easement, lease, donation, or purchase. Lands within an acquisition boundary are not subject to any refuge regulations or jurisdiction unless and until an interest is acquired. Land interests are acquired from willing sellers/owners only. Any landowner that is within an approved acquisition boundary, even though the surrounding parcels may have been purchased by the Service, retains all the rights, privileges, and responsibilities of private land ownership. This includes, but is not limited to, the right to access, hunting, vehicle use, control of trespass; the right to sell the property to any other party; and the responsibility to pay local real estate or property taxes.

Within approved acquisition boundaries, the Service would be able to enter into negotiations for the protection of lands identified as important for conservation of wildlife. The most urgent needs for acquiring an interest in these lands are as follows:

- Bottomland hardwood forest protection
- Upland buffers
- Primary refuge access by staff and public

The proposed expansion area (Figure 11) encompasses approximately 34,269 acres and surrounds the existing refuge boundary and also encompasses portions of the West Fork of the Clarks River. Approval of this proposed 34,269-acre boundary expansion would bring the total area within the approved acquisition boundary to approximately 53,874 acres.

The proposed expansion area includes an upland habitat component to complement the existing refuge wetlands being managed and those proposed for acquisition (Figure 13). Habitat types within the area being considered in the expansion area are identical to those found in the existing acquisition boundary excluding upland. These habitats are generally categorized as wetland forest, upland forest, pasture, agricultural lands, managed impoundments, waterways associated with streams and rivers, beaver ponds, freshwater marshes, and bottomland hardwood forest, which is the primary habitat component.

The proposed expansion project is consistent with the goals and objectives of the Service's Lower Tennessee-Cumberland Ecosystem team, the Gulf Coastal Plain and Ozark Landscape Conservation Cooperative, Strategic Habitat Conservation, and the overall mission of the Refuge System. The expansion of the acquisition boundary would further the refuge's mission to conserve, restore, and protect migratory birds, especially migratory waterfowl, neotropical migratory birds, threatened and endangered species, and resident wildlife species.

Expansion of the boundary to include the subject parcels would not only protect and conserve critical bottomland hardwood forests but would provide a valuable access to these habitats that is missing and serves as a barrier to overall management objectives. It would also provide a missing life history need many wetland-dependent species require, adjacent uplands that provide a safe haven for overwintering and during flood events. The area also holds significant potential to conserve quality habitat for migratory birds, wading birds, marsh birds, and is within an area identified by Kentucky's

Department of Fish and Wildlife Resources as a Priority Conservation Area (PCA). Approximately 251 Species of Greatest Conservation Need (SGCN) were identified in the State's Wildlife Action Plan in this ecologically significant area; however, only 4 percent of the lands identified in the area have been conserved through public ownership. Implementation of the proposed expansion plan would connect state and federal lands dedicated to wildlife and habitat conservation within this region and would increase the protected area to approximately 6 percent.

CULTURAL RESOURCES

Kentucky has a rich and varied archaeological heritage, with archaeological sites located in every county of the Commonwealth. Archaeologists have recorded more than 19,000 archaeological sites in Kentucky. Prehistoric sites include seasonal camps, villages, burial mounds, and earthworks. Native Americans occupied some of these sites more than 12,000 years ago, while they occupied others less than 300 years ago.

To date, there have been site-specific archaeological surveys on the refuge; however, no properties have been determined to be eligible for the National Register of Historic Places. Cultural resource surveys within the refuge have focused on areas prior to ground disturbing habitat work. Section 106 of the National Historic Preservation Act of 1966, as amended, and Section 14 of the Archaeological Resources Protection Act, require the Service to evaluate the effects of any of its actions on cultural resources (e.g., historical, architectural and archaeological) that are listed or eligible for listing in the National Register of Historic Places. In accordance with these regulations, the Service has coordinated the review of this proposal with the Kentucky State Historic Preservation Office.

The Service believes that the proposed acquisition of lands would have no adverse effect on any known or yet-to-be identified National Register of Historic Places-eligible cultural resources. However, in the future, if the Service plans or permits any actions that might affect eligible cultural resources, it would carry out appropriate site identifications, evaluations, and protection measures as specified in the regulations and in Service directives and manuals.

All tracts acquired by the Service in fee-title would be removed from local real estate tax rolls because Federal Government agencies are not required to pay state or local taxes. However, the Service makes annual payments to local governments in lieu of real estate taxes, as required by the Refuge Revenue Sharing Act (Public Law 95-469). Payment for acquired land is computed on whichever of the following formulas is greatest: (1) Three-fourths of 1 percent of the fair market value of the lands acquired in fee-title; (2) 25 percent of the net refuge receipts collected; or (3) 75 cents per acre of the lands acquired in fee-title.

No actions would be taken that would lead to a violation of federal, state, or local laws imposed for the protection of the environment.

PROPOSED ACTION

The realignment of the refuge's land acquisition boundary proposal seeks to meet both present and future land conservation and resource protection needs for the Clarks River NWR. It is tied to many of the goals and objectives of the Draft CCP/EA. It protects additional lands critical to the management of refuge resources; improves refuge fisheries; enhances populations of listed species; protects rare and listed plants; provides high-quality habitat for migratory birds; supports the management of the forested and wetland habitat; restores habitats for migratory birds; provides

additional lands for public use; provides for a critical upland habitat component and significantly enhances access for the public use and management purposes; and protects cultural resources.

Because the proposed expansion areas provide habitat for resident and migratory songbirds and waterfowl, it is anticipated that funding for this project would be sought through the Land and Water Conservation Fund, as authorized by the Fish and Wildlife Act of 1956, as amended (16 U.S.C. 742j and the Migratory Bird Conservation Act of 1929 (16 U.S. C., Section 715d).
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FISH AND WILDLIFE SERVICE LAND ACQUISITION POLICY

The Service acquires lands and interests in lands, such as easements, and management rights in lands through leases or cooperative agreements, consistent with legislation or other congressional guidelines and executive orders, for the conservation of fish and wildlife and to provide wildlife-dependent public use for recreational and educational purposes. These lands include national wildlife refuges, national fish hatcheries, research stations, and other areas.

The Service's policy is to acquire land from willing sellers, and only when other protective means, such as local zoning restrictions or regulations, are not appropriate, available, or effective. When land is needed to achieve fish and wildlife conservation objectives, the Service seeks to acquire the minimum interest necessary to reach those objectives. If fee-title is required, the Service would give full consideration to extended use reservations, exchanges, or other alternatives that would lessen the impact on the owner and the community. Donations of desired lands or interests are encouraged.

The Service, like all federal agencies, has the power of eminent domain, which allows the use of condemnation to acquire lands and interest in lands for the public good. This power, however, requires congressional approval and would not be sought by the Service. The Service acquires lands from willing sellers. In all fee-title acquisition cases, the Service is required by law to offer 100 percent of the property's appraised market value, as set out in an approved appraisal that meets professional standards and federal requirements. The acquisition methods that could be used by the Service under this alternative are described as follows:

1. Leases and Cooperative Agreements

Potentially, the Service can protect and manage habitats through leases and cooperative agreements. Management control on privately owned lands could be obtained by entering into long-term renewable leases or cooperative agreements with the landowners. Short-term leases could be used to protect or manage habitat until a more secure land protection method could be negotiated.

2. Conservation Easements

Conservation easements give the Service the opportunity to manage lands for their fish and wildlife habitat values. Such management precludes all other uses that are incompatible with the Service's management objectives. Only land uses that would have minimal or no conflicts with the management objectives are retained by the landowner. In effect, the landowner transfers certain development rights to the Service for management purposes as specified in the easement.

Easements would likely be useful when: (1) Most, but not all, of a private landowner's uses are compatible with the Service's management objectives, and (2) the current owner desires to retain ownership of the land and continue compatible uses under the terms set by the Service in the easement. Land uses that are normally restricted under the terms of a conservation easement include:

- Development rights (e.g., residential and commercial activities);
- Alteration of the area's natural topography;
- Uses adversely affecting the area's floral and faunal communities;
- Private hunting and fishing leases;
- Excessive public access and use; and
- Alteration of the natural water regime.

3. Fee-Title Acquisition

A fee-title interest is normally acquired when: (1) The area's fish and wildlife resources require permanent protection not otherwise assured; (2) land is needed for visitor use development; (3) a pending land use could adversely impact the area's resources, or (4) it is the most practical and economical way to assemble small tracts into a manageable unit.

Fee-title acquisition conveys all ownership rights to the Federal Government and provides the best assurance of permanent resource protection. A fee-title interest may be acquired by donation, exchange, transfer, or purchase.

The Service's proposed alternative, Alternative B, would result in the acquisition of up to 34,269 acres of wildlife habitat as an expansion of Clarks River NWR. This would be accomplished through a combination of fee-title purchases from willing sellers and less-than-fee-title interests (e.g., conservation easements and cooperative agreements) from willing sellers. The Service believes these are the minimum interests necessary to conserve and protect the fish and wildlife resources in the proposed area.

In determining the extent of the proposed expansion area and the priority of the lands for conservation, the following qualitative criteria were used:

- Protection of bottomland hardwoods;
- Conservation of migratory birds;
- Contribution to the goals of other conservation plans;
- Contribution to the recovery of listed species (protection of occupied or historic habitat);
- Potential for bottomland hardwood, cane brake, and savanna/prairie restoration;
- Contribution to water quality in the Gulf of Mexico;
- Ability to offset anticipated climate change impacts;
- Contribution to KDFWR habitat and public use objectives;
- Landscape conservation efforts as a part of the America's Great Outdoors Initiative; and
- Enhancement of public recreation as it relates to the Service's priority uses.

Three categories of land acquisition have been established, with the highest priority being the Priority I lands. A description of the lands within each of the three priority groups is given below. Table 11 summarizes the Service's land protection priorities and parcel sizes. The parcel maps (Figures 14-17) show the project area and all land parcels in that area, providing detailed maps which can be used to locate each parcel.

Priority Group I

The most important resource within this proposal is lands that provide direct contiguous access to key parts of the refuge for management purposes and public use access. These lands also provide critical areas for bottomland hardwood restoration and upland buffer areas.

Priority Group II

This group represents areas surrounding the West Fork of the Clarks River, providing extended protection of the Clarks River and its associated plant and animal communities. These lands also provide important areas for bottomland hardwood restoration and/or management for migratory birds, resident wildlife, and species of special concern.

Priority Group III

This group represents lands that would complete the contiguity of river protection and provide continuous access for staff and the public. These lands also provide important areas for bottomland hardwood restoration and/or management for migratory birds, resident wildlife, and species of special concern.

Table 11. A summary of expansion area parcel size classes by acres and percent

County	Priority	Size Class (acres)						Area Totals
		<10	11-25	26-50	51-100	101-200	>200	
Marshall	1	342	94	96	70	25	5	632
McCracken	1	148	38	29	23	10	7	255
Graves	2	207	63	64	40	16	2	392
Graves	3	102	45	26	23	4	0	200
Size Class Totals		799	240	215	156	55	14	1,479
Percent by Size Class		54	16	14.5	10.5	4	1	100

Figure 14. Parcels included in the proposed Conservation Focal Area, Planning Unit Overview

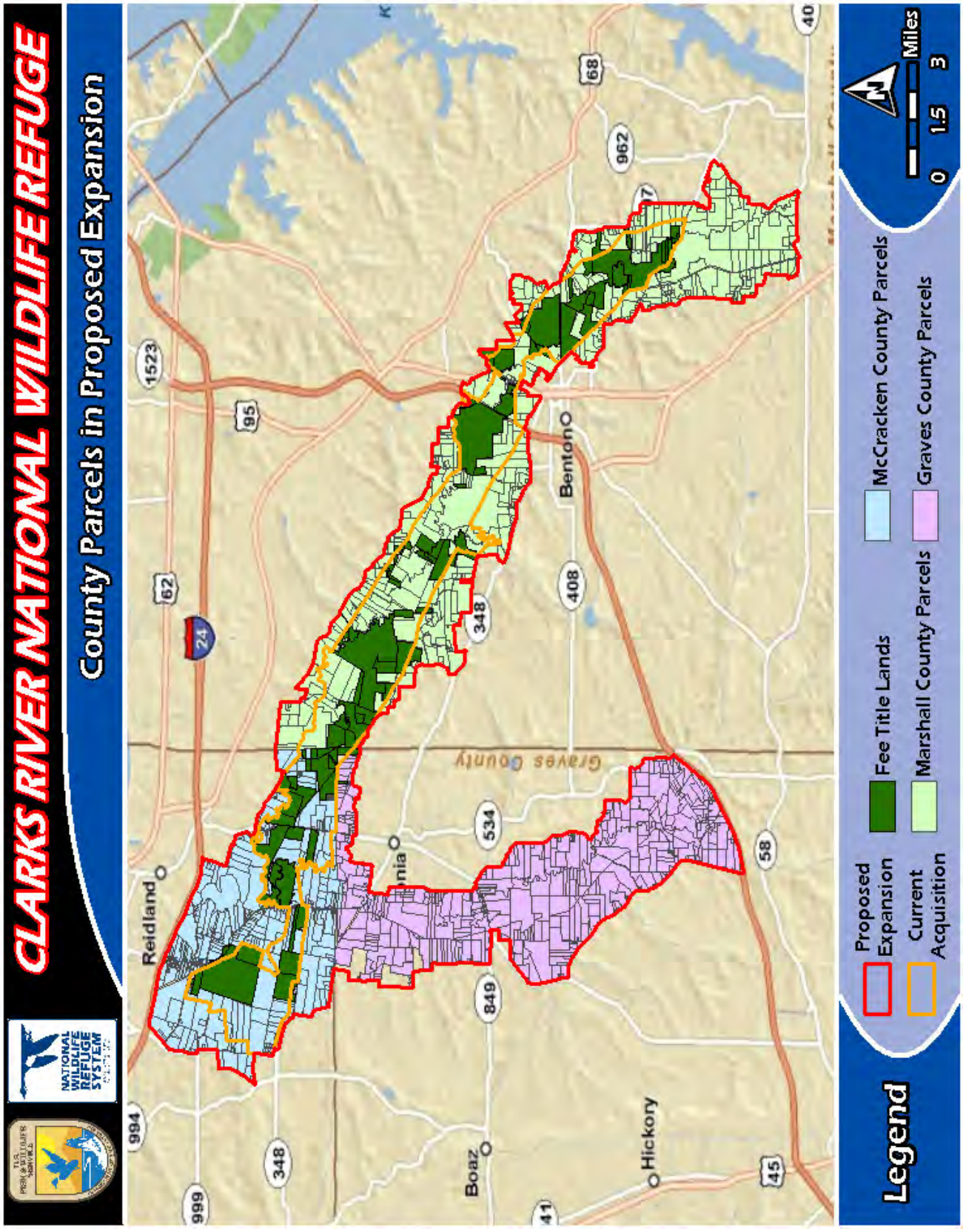


Figure 15. Detail of parcels included in the Proposed Expansion Area, Marshall County, Kentucky

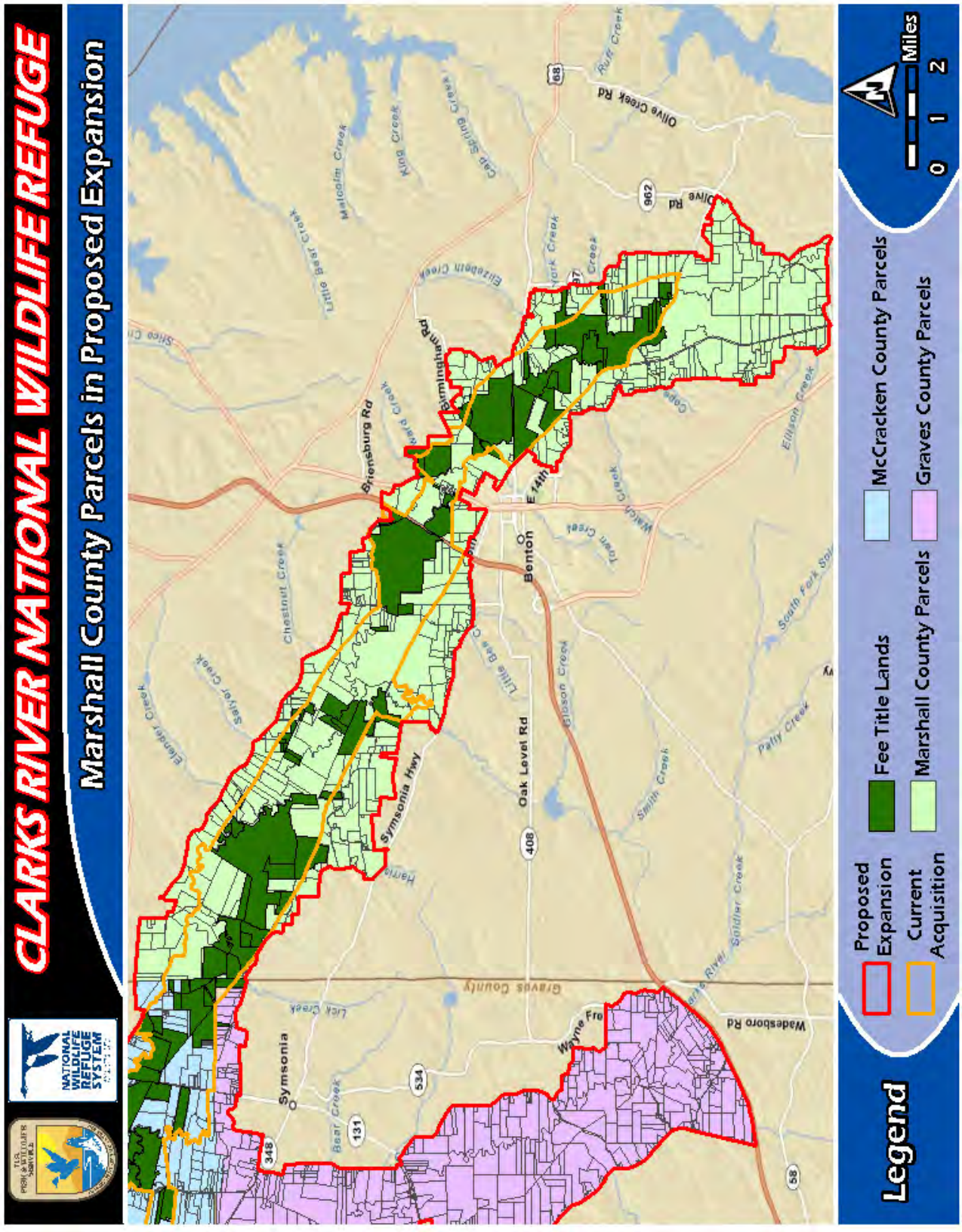


Figure 16. Detail of parcels included in the Proposed Expansion Area, McCracken County, Kentucky

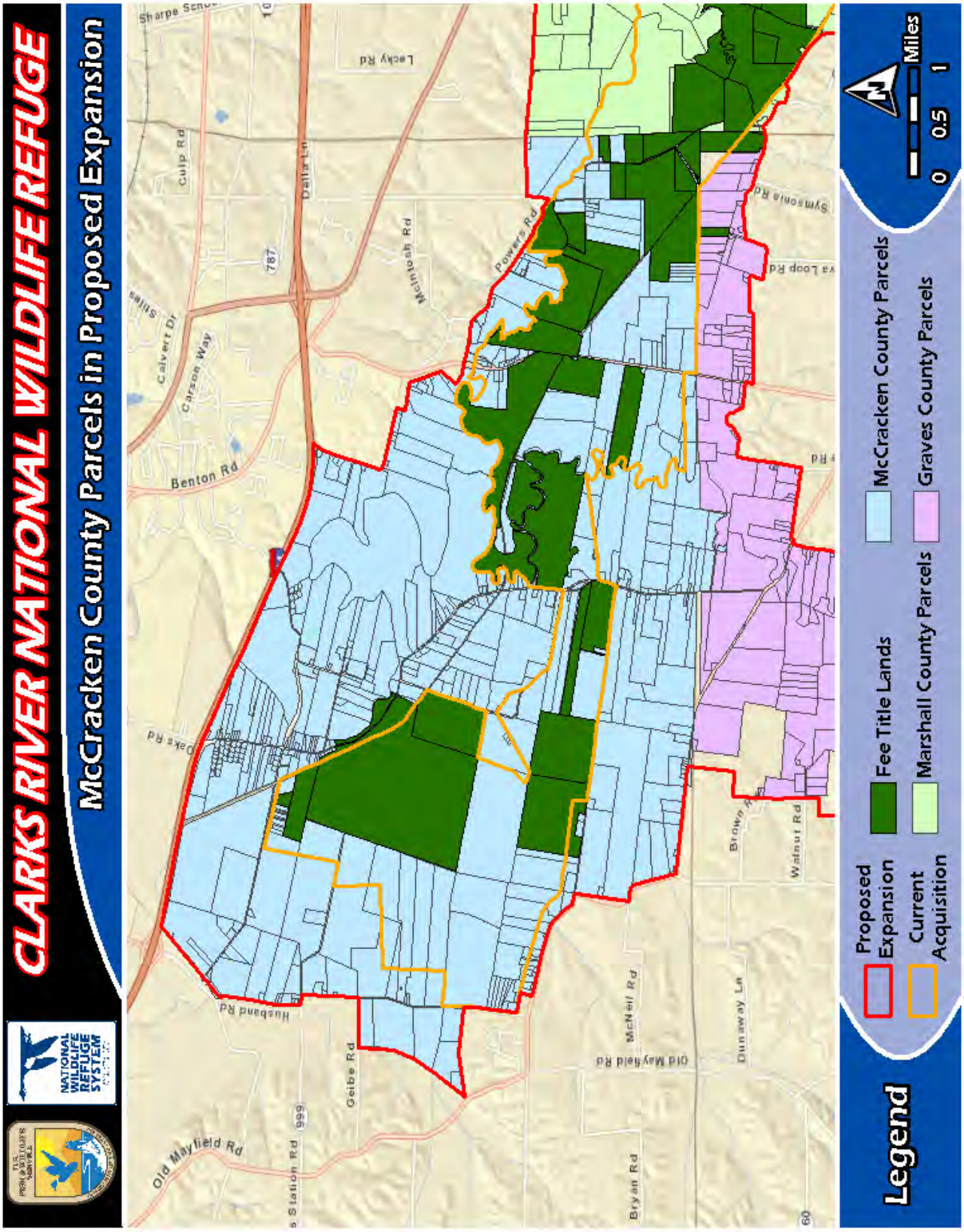
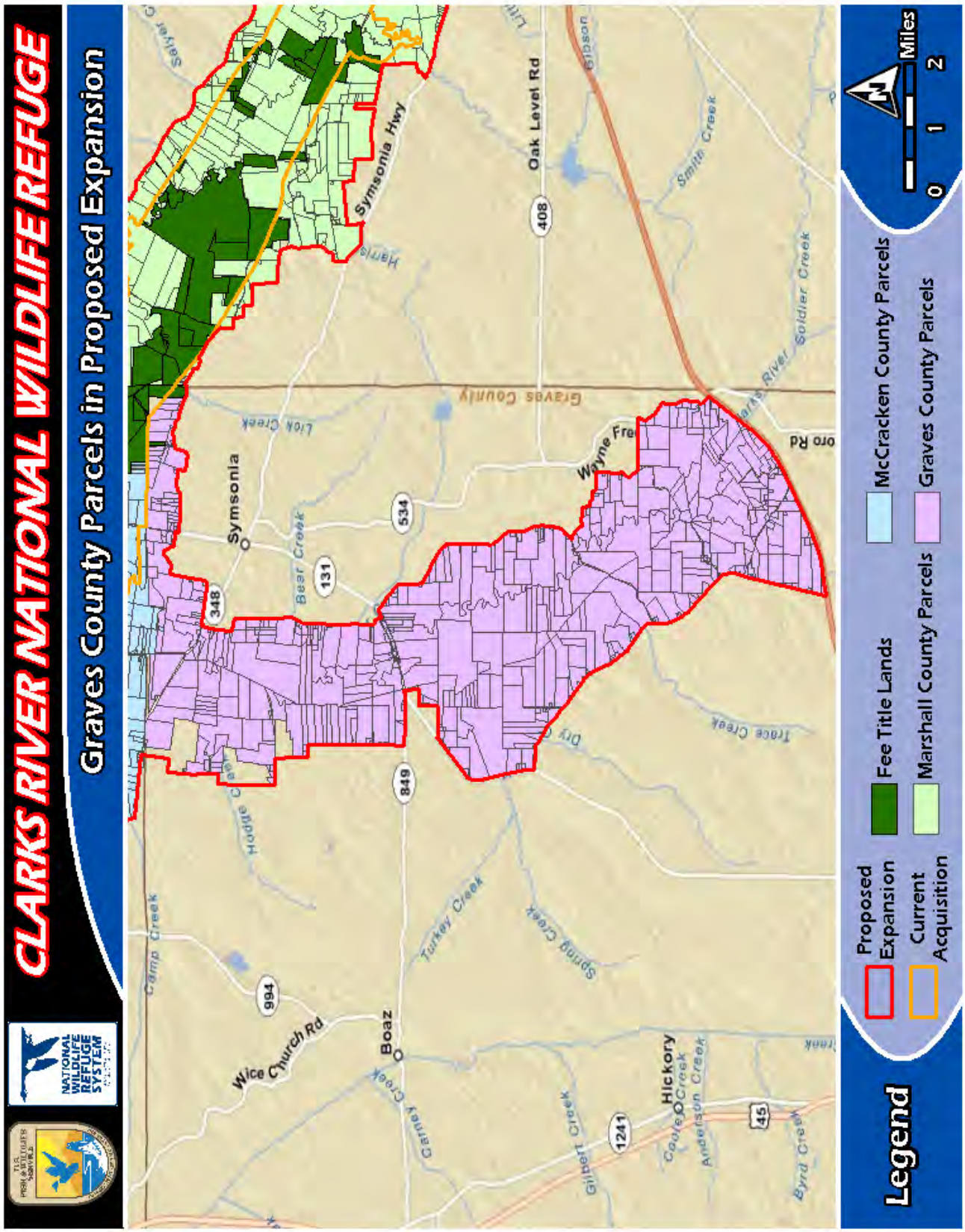


Figure 17. Detail of parcels included in the Proposed Expansion Area, Graves County, Kentucky



Interim Recreation Act Funding Analysis

Refuge Name: Clarks River National Wildlife Refuge

Date Established: 1997

Purpose(s) for which the refuge was established: The refuge was established in 1997 under the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b); 100 Stat. 3582-91)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956).

Recreational uses evaluated: (1) Hunting; (2) fishing; (3) wildlife observation and photography; (4) environmental education and interpretation; (5) cooperative farming; (6) nuisance animal control; (7) outdoor recreation including non-motorized boating, walking, hiking, jogging, and bicycling; (8) research and monitoring; (9) horseback riding; and (10) mobility-impaired ATV access.

Funding required to administer and to manage the recreational uses: Minimal funding in the amount of $100,000 will be made available to implement initial protection, hunting program, data collection, and non-consumptive uses.

Based on a review of the refuge budget allocated for recreational use management, I certify that funding is adequate to ensure compatibility and to administer and manage the recreational uses.

Project Leader: _____
(Signature/Date)

Refuge Supervisor: _____
(Signature/Date)

Regional Chief, National
Wildlife Refuge System,
Southeast Region: _____
(Signature/Date)

Appendix F. Appropriate Use Determinations

Clarks River National Wildlife Refuge Appropriate Use Determinations

An appropriate use determination is the initial decision process a refuge manager follows when first considering whether or not to allow a proposed use on a refuge. The refuge manager must find that a use is appropriate before undertaking a compatibility review of the use. This process clarifies and expands on the compatibility determination process by describing when refuge managers should deny a proposed use without determining compatibility. If a proposed use is not appropriate, it will not be allowed and a compatibility determination will not be undertaken.

Except for the uses noted below, the refuge manager must decide if a new or existing use is an appropriate refuge use. If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a new use is not appropriate, the refuge manager will deny the use without determining compatibility. Uses that have been administratively determined to be appropriate are:

Six wildlife-dependent recreational uses - As defined by the National Wildlife Refuge System Improvement Act of 1997, the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be appropriate. However, the refuge manager must still determine if these uses are compatible.

Take of fish and wildlife under state regulations - States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. The Service considers take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

Statutory Authorities for this policy:

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. This law provides the authority for establishing policies and regulations governing refuge uses, including the authority to prohibit certain harmful activities. The Act does not authorize any particular use, but rather authorizes the Secretary of the Interior to allow uses only when they are compatible and “under such regulations as he may prescribe.” This law specifically identifies certain public uses that, when compatible, are legitimate and appropriate uses within the Refuge System. The law states “. . . it is the policy of the United States that . . .compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System . . .compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management; and . . . when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated . . . the Secretary shall . . . ensure that priority general public uses of the System receive enhanced consideration over other general public uses in planning and management within the System . . . .” The law also states “in administering the System, the Secretary is authorized to take the following actions: . . . issue regulations to carry out this Act.” This policy implements the standards set in the Act by providing enhanced consideration of priority general public uses and ensuring other public uses do not interfere with our ability to provide quality, wildlife-dependent recreational uses.

Refuge Recreation Act of 1962, 16 U.S.C. 460k. The Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

Other Statutes that Establish Refuges, including the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) (16 U.S.C. 410hh - 410hh-5, 460 mm - 460mm-4, 539-539e, and 3101 - 3233; 43 U.S.C. 1631 et seq.).

Executive Orders. The Service must comply with Executive Order 11644 when allowing use of off-highway vehicles on refuges. This order requires the Service to designate areas as open or closed to off-highway vehicles in order to protect refuge resources, promote safety, and minimize conflict among the various refuge users; monitor the effects of these uses once they are allowed; and amend or rescind any area designation as necessary based on the information gathered. Furthermore, Executive Order 11989 requires the Service to close areas to off-highway vehicles when it is determined that the use causes or will cause considerable adverse effects on the soil, vegetation, wildlife, habitat, or cultural or historic resources. Statutes, such as ANILCA, take precedence over executive orders.

Definitions:

Appropriate Use
A proposed or existing use on a refuge that meets at least one of the following four conditions.

1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
3) The use involves the take of fish and wildlife under state regulations.
4) The use has been found to be appropriate as specified in section 1.11.

*Native American***.** American Indians in the conterminous United States and Alaska Natives (including Aleuts, Eskimos, and Indians) who are members of federally recognized tribes.

Priority General Public Use. A compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Quality. The criteria used to determine a quality recreational experience include:

Promotes safety of participants, other visitors, and facilities.
Promotes compliance with applicable laws and regulations and responsible behavior.
Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
Minimizes conflicts with neighboring landowners.
Promotes accessibility and availability to a broad spectrum of the American people.
Promotes resource stewardship and conservation.
Promotes public understanding and increases public appreciation of America's natural resources and the Service's role in managing and protecting these resources.

Provides reliable/reasonable opportunities to experience wildlife.
Uses facilities that are accessible and blend into the natural setting.
Uses visitor satisfaction to help define and evaluate programs.

Wildlife-Dependent Recreational Use. As defined by the Improvement Act, a use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: ___Clarks River National Wildlife Refuge_____

Use: Nuisance Animal Control

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes _X_ No ___**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate __X___**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: ___Clarks River National Wildlife Refuge_____

Use: Outdoor Recreation including non-motorized boating, walking, hiking, jogging, and bicycling

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**_ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** __X___

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: ___Clarks River National Wildlife Refuge_____

Use: Research and Monitoring

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes _X_ No ___**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate __X___**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: ___Clarks River National Wildlife Refuge_____

Use: Horseback Riding

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _**X**_ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** __X___

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: ___Clarks River National Wildlife Refuge_____

Use: Mobility-impaired ATV Access

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes _X_ No ___**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate __X___**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

Appendix G. Compatibility Determinations

Clarks River National Wildlife Refuge Compatibility Determinations

Uses: The following uses were found to be appropriate and evaluated to determine their compatibility with the mission of the Refuge System and the purposes of the refuge:

Hunting
Fishing
Wildlife observation and photography
Environmental education and interpretation
Nuisance animal control
Outdoor recreation including non-motorized boating, walking, hiking, jogging, and bicycling
Research and monitoring
Horseback riding
Mobility-impaired all-terrain vehicle access

Refuge Name: Clarks River National Wildlife Refuge, Marshall, McCracken, and Graves, Kentucky

Date Established: 1945

Establishing and Acquisition Authorities: Migratory Bird Conservation Act, Refuge Recreation Act, Executive Order 9670

Refuge Purpose: "... as a refuge and wildlife management area for migratory birds and other wildlife ..." Executive Order 9670, dated Dec. 28, 1945

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act)

"... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. 460k-1 "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. 460k-2 (Refuge Recreation Act (16 U.S.C. 460k-460k-4), as amended.

National Wildlife Refuge System Mission:

The mission of the Refuge System, as defined by the National Wildlife Refuge System Improvement Act of 1997, 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.*

Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat.1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System. March 25, 1996
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

Compatibility determinations for each description listed were considered separately. Although for brevity, the preceding sections from “Uses” through “Other Applicable Laws, Regulations, and Policies” and the succeeding sections, “Literature Cited,” “Public Review,” and the “Approval of Compatibility Determinations” are only written once within the CCP, they are part of each descriptive use and become part of that compatibility determination if considered outside of the CCP.

1) Description of Use: *Hunting*

Service policy concerning hunting on national wildlife refuges, as recorded in the Refuge Manual section 8 RM 5.1, states: "The Secretary of the Interior is authorized by the National Wildlife Refuge System Administration Act of 1966, as amended, and the Refuge Recreation Act of 1962 to permit hunting on any refuge within the Refuge System upon a determination that hunting is compatible with the major purposes for which such areas were established.

Hunting has been permitted on Clarks River NWR since 1999. The refuge is currently operating under a revised Hunt Plan completed in 2007. Refuge hunts are a useful wildlife management and public relations tool that help maintain specific animal populations at levels commensurate with habitat availability, while providing quality recreational opportunities for the general public.

All hunts fall within the framework of the Kentucky Department of Fish and Wildlife Resource's (KDFWR) open seasons and follow KDFWR regulations. Refuge-specific regulations that supplement and further restrict KDFWR regulations are reviewed annually and incorporated into the refuge's hunting and fishing brochure. A permit on the front cover of the hunting and fishing brochure must be signed by the hunter and carried on his/her person while hunting on the refuge.

Waterfowl sanctuaries are closed to all public entry and use (including hunting) from November 1 to March 31. The Sharpe-Elva Water Management Units are closed to all public entry and use from November 1 through March 31, except for quota hunt permit holders. Dogs are allowed for hunting migratory birds, squirrel, raccoon, opossum, rabbit, quail, and turkey during designated seasons only. The running or training of dogs outside the hunting season for a particular species requires a special use permit issued by the refuge.

Access to hunt areas is by walking and bicycle only. All-terrain vehicles (ATVs) are not permitted on the refuge, with one exception: mobility-impaired hunters may apply for a special use permit to use ATVs along designated trails in order to participate in the refuge hunt program. Horses and mules are prohibited on the refuge during the muzzleloader and modern gun deer hunts. Public access to hunt areas may be closed or restricted at any time necessary to protect refuge resources or visitors.

Hunting on the refuge is currently limited to the following species:

- Migratory Bird – waterfowl, mourning dove, woodcock, snipe, and crow
- Big Game – deer, turkey, and feral hog (if becomes applicable)
- Small Game – squirrel, rabbit, quail, coyote, raccoon, and opossum

The take of bobcat, river otter, beaver, and fox is not permitted on refuge lands through the refuge's hunt program.

Availability of Resources:

Adequate resources are available to ensure and administer the activity at its current level of participation. Enforcement of refuge regulations to protect trust resources and provide for a safe, quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Currently, the refuge has one full-time officer and one dual function officer. Personnel from the KDFWR and various counties' sheriff departments also patrol the area and assist refuge officers as needed.

Staff time will be required for several components of the hunting program. Primarily, this involves law enforcement, routine maintenance, and program review. Estimated time to complete each task follows:

Law enforcement	40 staff days
Maintenance tasks (parking areas, signs, and boundary)	10 staff days
Program review	2 staff days
Total time investment	54 staff days

Anticipated Impacts of the Use:

Short-term impacts:

The incidental taking of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels for this program, incidental take would be minor and would not directly or cumulatively impact population levels on the refuge or in the surrounding area. Implementation of a highly effective law enforcement program and continued development of special regulations for this use would eliminate most incidental take or other violations or safety problems.

Impacts such as trampling small invertebrates, vertebrates, or vegetation and noise disturbance will be minimal. The activities of hunters traveling to and from hunt areas and their activities while hunting will disturb some wildlife, but these disturbances are temporary, short-term, and not highly repetitive.

Long-term impacts:

Based on available information, it is anticipated that the current levels and expected future levels of hunting or other wildlife-dependent recreation activities would not directly, indirectly, or cumulatively impact any listed, proposed, or candidate species. Data gathered from future biological surveys regarding the importance or potential importance of the refuge to threatened or endangered species or critical habitat (or proposed threatened, endangered, or critical habitat) could result in changes to public use activities over time; however, these changes would have no effect on listed species.

Hunting is not expected to result in indirect or cumulative negative impacts to refuge resources. As a consumptive use, hunting will have some minimal and short-term direct impacts on refuge resources. Numbers of resident, as well as migratory species would be temporarily reduced as animals are harvested, but these individual and collective losses would be compensated by recruitment during the following reproductive season.

Public Review and Comment:

This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Clarks River NWR. In order to solicit comments, the staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will send news releases to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

___ Use is Not Compatible
_X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Hunting is permitted in accordance with the KDFWR regulations and licensing requirements. Vehicle use is permitted, restricted, or prohibited in compliance with Executive Orders 11644 and 11989. Public access to hunting areas may be closed at any time necessary to protect refuge resources or visitors. Littering, camping, fires, spotlighting, artifact hunting, target practice, baiting, use of electronic calls,

and trapping are prohibited on the refuge. Possession or use of alcoholic beverages while hunting is prohibited. Other refuge-specific regulations apply.

Refuge-specific regulations for duck, goose, and coot:

- Only portable and temporary blinds are permitted
- Decoys and blinds must be removed each day
- Only non-toxic shot is permitted
- Hunting within Sharpe-Elva Units by quota permit only after November 1
- Hunting will cease at 12 noon each day; this means decoys and equipment should be picked up and firearms unloaded
- Hunters must be out of the field by 2 p.m.

Refuge-specific regulations for dove, woodcock, snipe, and crow:

- Dove, woodcock, snipe, and crow seasons are closed during all refuge modern gun and muzzleloader deer seasons
- Only non-toxic shot is permitted
- Center fire weapons are prohibited

Refuge-specific regulations for squirrel, rabbit, and quail:

- Squirrel, rabbit, and quail seasons are closed during all refuge modern gun and muzzleloader deer seasons
- Only non-toxic shot is permitted (does not apply to rim fire)
- Center fire rifles are prohibited

Refuge-specific regulations for raccoon and opossum:

- Permitted during hours of darkness only
- Use of dogs outside hunting season is by special use permit only

Refuge-specific regulations for white-tailed deer:

- Construction or use of any permanent tree stand is prohibited
- Only climbing and /or portable stands may be used
- Tree stands may be placed in the field no earlier than two weeks prior to the opening of the season and must be removed from the field within one week after the season's end
- All stands left in the field must be identified by hunter's name and address
- Safety belts are required at all times with use of tree stand
- Hunters may not hunt by organized deer drives of two or more hunters
- Hunting of deer by the aid of or distribution of any feed, salt, minerals, or other ingestible attractants is prohibited
- Deer taken on the refuge will be telephone-checked through the state by calling 1-800-245-4263 and selecting the appropriate responses

Refuge-specific regulations for eastern wild turkey:

- Turkey taken on the refuge will be telephone-checked through the state by calling 1-800-245-4263 and selecting the appropriate responses

Refuge-specific regulations for coyote:

- May be taken without use of dogs during any daytime refuge hunt with weapons and ammunition legal for that hunt
- No electronic calls are permitted

Justification:

Hunting has long been a recreational pastime in the Clarks River area. In order to maintain and possibly improve public support of the refuge, it has been determined that Clarks River NWR will support and improve its public hunting opportunities where feasible. This decision is in direct accordance with the Improvement Act, which states that hunting is a priority public use activity that should be encouraged and expanded when possible. It is through compatible wildlife-dependent public uses that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement
Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

2) Description of Use: *Fishing*

Clarks River NWR is open to the public year-round for fishing. Regulations are in accordance with KDFWR guidelines. Fishing opportunities exist in three small ponds located on Sharpe-Elva Road, the 5-acre, universal access fishing pond at the Environmental Education and Recreation Area (EERA) on Highway 408 east of Benton, Kentucky, and along accessible reaches of the Clarks River.

Refuge-specific regulations (apply to fishing at the EERA.)

- A permit from the front cover of the refuge hunting and fishing brochure must be signed by the angler and carried on his/her person while fishing
- Daylight fishing only
- Pole fishing only (limit, one pole per person)
- No boating
- No swimming
- Creel limit for bluegill: 10 fish (no size requirement)
- Combined creel limit for channel catfish/largemouth bass: 5 fish (minimum of 12 inches in length)

Availability of Resources:

Refuge staff and resources are adequate to cover management of fishing at current levels. However, it is anticipated that an increase in this use may occur in the future. In order to provide safe and quality fishing, additional resources and staff may be needed to develop or enhance river access and fishing ponds. With increased use, additional law enforcement capabilities may be required.

Staff time will be required for several components of the fishing program. Primarily, this involves routine maintenance and law enforcement. Estimated time to complete each task follows:

Mowing along fishing banks and around facilities	3 staff days
Various maintenance tasks	4 staff days
Law enforcement	4 staff days
Total time investment	11 staff days

Anticipated Impacts of Use:

Short-term impacts:

The activities associated with fishing, including travel to and from fishing areas, may cause trampling of vegetation, small invertebrates, and vertebrates; however, these are relatively minor, and not highly repetitive.

Participation in fishing activity generally results in litter production (fishing line, food, bait containers, soda cans, and other trash) that must be removed in order to keep the refuge looking presentable. Trash is detrimental to the aesthetics of the refuge and can impact the digestive tracts of birds, turtles, fish, and other resident and migratory wildlife. The refuge will strive to reduce this problem by providing trash receptacles, working with partners to pick up litter, educating anglers about the effects of litter, and through law enforcement. Information contained in the refuge brochure concerning rules and regulations also helps keep negative impacts to a minimum. Regulations are reviewed annually and modifications are made as necessary to maintain compatibility and ensure a safe and quality fishing program.

Long-term impacts:

Fishing is not expected to have substantial, long-term, adverse impacts on fisheries or other wildlife resources at Clarks River NWR, including wildlife habitat. However, high volumes of lead have been shown to have a negative impact on soil and water quality, which ultimately reduces the quality of wildlife habitat. Fishing tackle may serve as a potential source of this harmful contaminate. The refuge can begin to confront this problem by increasing angler awareness and promoting the use of lead-free tackle. If contamination becomes a significant problem, additional measures may be imposed. These may include a ban on lead tackle and posting signs warning of possible lead contamination.

Public Review and Comment:

This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Clarks River NWR. In order to solicit comments, the staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will send news releases to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

___ Use is Not Compatible
_X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Fishing is permitted in accordance with KDFWR regulations, licensing requirements, and the following refuge regulations specific to the EERA universal access fishing pond:

- Daylight use only
- Portions of the EERA are closed to all entry from November 1 to March 31
- The EERA is for pole fishing only with a limit of one pole per person
- Use of any watercraft is prohibited
- Use of live fish for bait is prohibited
- Introduction or stocking of fish is prohibited
- Swimming is prohibited
- There is a creel limit of 10 bluegill (no size requirement)
- There is a combined creel limit of 5 channel catfish/largemouth bass (minimum of 12 inches in length)
- All other species follow statewide creel limits and size restrictions

Justification:

Fishing has long been a recreational pastime in the Clarks River area. In order to maintain and possibly improve public support, it has been determined that Clarks River NWR will support and improve its recreational fishing opportunities where possible. This decision is in direct accordance with the Improvement Act, which states that fishing is a priority public use activity that should be encouraged and expanded when possible.

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement
Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

3) Description of Use: Wildlife Observation and Photography

Wildlife observation and photography are important public uses at Clarks River NWR. Most opportunities to engage in wildlife observation and photography occur from roadways or along the abandoned railroad right-of-way. However, approximately 2.5 miles of paved, graveled, and dirt trails, an observation platform, and a gazebo have been constructed at the EERA to provide a safer environment for viewing wildlife. There are no photo blinds although such facilities are planned for future installment. Access to the refuge is by vehicle, boat, or walking. All vehicle use is restricted to designated roads and parking areas.

Availability of Resources:

Refuge staff and resources are adequate to administer the program at its current level. However, it is anticipated that an increase in these uses will occur in the near future. In order to continue to provide safe and quality wildlife observation and photography opportunities, additional resources and staff will be needed to enhance or develop additional viewing areas and provide improved facilities and programs, such as seasonal nature walks, to observe nongame wildlife. Because wildlife receives the highest priority on the refuge, public access to viewing areas may be closed at any time necessary to protect refuge resources or visitors.

Staff time will be required for several components of the wildlife observation/photography program. Primarily, this involves routine maintenance and law enforcement. Estimated time to complete each task follows:

Maintenance of established viewing areas and parking lots	4 staff days
Law enforcement presence patrols	10 staff day
Planning and development of established viewing areas	3 staff days
Total time investment	6 staff days

Anticipated Impacts of Use:

The activities of visitors engaging in wildlife observation and photography may result in some potential disturbance to wildlife. Minimal impacts in the form of trampling small vertebrates, invertebrates, and vegetation, as well as littering may occur. Significant indirect or cumulative adverse impacts to refuge resources are not expected from these activities. The establishment of specified viewing areas and facilities, such as blinds, boardwalks, platforms, towers, and trails would enhance observation and photography, as well as minimize associated visitor impacts or conflicts with other uses. Plans to provide such facilities are in progress.

Public Review and Comment:

This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Clarks River NWR. In order to solicit comments, the staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will send news releases to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

___ Use is Not Compatible
_X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Wildlife observation and photography uses will be monitored and appropriate management action will be taken to eliminate or reduce associated impacts. Closed areas must be maintained even for these non-consumptive uses.

Justification:

According to the Improvement Act, wildlife observation and photography are priority public use activities that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as these that the public becomes aware of and provides support for national wildlife refuges.

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement
Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

4) Description of Use: *Environmental Education and Interpretation*

Environmental education (EE) and interpretation activities are conducted to inform and educate the public and to provide an understanding of the value of natural resources. They also emphasize the mission of the Refuge System. Clarks River NWR has provided numerous facilities to highlight its educational opportunities. These include a visitor area within the refuge headquarters, multiple information kiosks, an observation platform, a gazebo, an outdoor classroom, and trails at the EERA. Access to these areas is by vehicle, boat, or walking only. Vehicles may only be used on designated roads and parking areas unless specific guidance has been given by refuge staff. In addition to refuge-centered educational opportunities, the staff regularly provides off-site environmental education and interpretation services at local events, such as local festivals, fishing derbies, school programs, and civic or conservation group meetings.

Availability of Resources:

Refuge staff and resources are adequate to administer the EE and interpretation program at its current level. However, it is anticipated that an increase in these uses will occur in the near future. In order to provide safe and quality environmental education and interpretation opportunities, additional resources and staff will be needed to meet the growing demand for off-refuge presentations and to develop additional interpretive facilities including trails, kiosks, and a visitor center. Plans are being developed to provide additional or improved facilities as described herein. Additionally, the utilization and development (training) of volunteers and seasonal staff serve as a supplement for environmental education and interpretation programs.

Staff time will be required for several components of the EE and interpretation program. Primarily, this involves planning, coordination, and delivering environmental education and interpretation presentations. Actual time investments may vary significantly from year-to-year as new programs begin and old programs end. However, an estimated time to complete each task follows:

Planning new EE and interpretation events/programs	14 staff days
Coordinating annual/repeatable events	3 staff days
Conducting refuge centered events	14 staff days
Conducting off-site EE and interpretation events/programs	7 staff days
Maintenance of EE sites (trails, buildings, etc.)	10 staff days
Total time investment	48 staff days

Anticipated Impacts of Use:

Short-term impacts:

Littering may occur in areas that receive heavy public use. However, this should be mitigated through the environmental education process due to the fact that proper garbage disposal, recycling, and respect for nature are all prevalent messages in today's EE and interpretation movement.

Outdoor environmental education and interpretation activities may result in disturbance of wildlife from visitors. It is possible that some small invertebrates, vertebrates, and vegetation could be trampled. However, these negative effects can be held to a minimum with proper use of designated walking/driving paths and keen observation (another strongpoint of our EE and interpretation program).

Long-term impacts:

Significant indirect or direct cumulative adverse impacts to refuge resources are not expected from these activities. Environmental education and interpretation facilities, such as blinds, boardwalks, exhibits, kiosks, and platforms, will be designed and established in a way that minimizes potential disturbance to wildlife and natural resources.

Public Review and Comment:

This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Clarks River NWR. In order to solicit comments, the staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will send news releases to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

___ Use is Not Compatible
_X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Environmental education and interpretation activities conducted outdoors are strategically located to minimize environmental impact and user conflict.

Public access to the refuge may be closed at any time necessary to ensure protection of refuge resources and visitor safety. Environmental education and outreach can be taken into the classroom, incorporated into presentations, and will be used at other forums; these activities will have no deleterious effect on the fish and wildlife of the refuge.

Justification:

According to the Improvement Act, environmental education and interpretation are priority public use activities that should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses such as this that the public becomes aware of the Refuge System and provides support for its missions.

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement
Categorical Exclusion and Environmental Action Statement
X Environmental Assessment and Finding of No Significant Impact
Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

5) Description of Use: *Research and Monitoring*

Clarks River NWR allows university students and professors, as well as governmental and non-governmental employees and volunteers, to conduct short- and long-term research and monitoring. Such research and monitoring may be conducted in various habitats throughout the refuge and with various species of migratory birds, resident wildlife, fish, and plants. The information collected provides a better understanding of the functions and responses to management actions conducted on refuge resources. Research and monitoring results help managers evaluate management actions, identify adaptive management options, and develop Best Management Practices (BMPs). The knowledge gained through research and monitoring studies allow more effective management decisions. All research and monitoring project requests will be evaluated on individual project merit and applicability to refuge programs on a project-by-project basis.

Availability of Resources:

Resources are adequate to administer research and monitoring activity at its current level. The refuge will also seek to establish and/or expand partnerships to allow continued research and monitoring projects to be conducted by other organizations on refuge lands.

Staff time will be required for several components of the research program. Primarily, this involves special use permit development and communicating with the permit holder. Actual time investments may vary significantly from year-to-year as new projects begin and old projects end. However, an estimated time to complete each task follows:

Development of Special Use Permits	2 staff days
Issuance of SUP (explaining limitations)	1 staff day
Follow-up of research progress	2 staff days
Total time investment	5 staff days

Anticipated Impacts of Use:

Short-term impacts:

Impacts such as trampling vegetation, all-terrain vehicle use, and temporary disturbance to wildlife might occur. A small number of individual plants or animals may be collected for further study. These small collections should not adversely affect refuge plant and animal populations due to restrictions associated with permits guiding the activity. Removal of plant and animal material from the refuge, as well as the potential to accidentally introduce exotic plants and animals, must be carefully monitored and controlled. Some other impacts from research include: (1) Noise disturbance from motorized vehicles that may temporarily disturb and/or displace wildlife, (2) physical presence of people or equipment that may temporarily disturb and/or displace wildlife, (3) ground disturbance from walking on site or the use of equipment, and (4) water disturbance by stirring sediments and causing temporary turbidity from equipment or walking. Despite these impacts, which are short-term, the knowledge gained from properly executed and scientifically defensible research and monitoring would provide information and justification to improve management techniques and better meet the needs of trust species. This will further enable the refuge to better achieve its purposes and the mission of the Refuge System. Research/monitoring activities on the refuge are not expected to indirectly or cumulatively impact refuge resources negatively, even though some minimal short-term and direct impacts may occur.

Long-term impacts:

Quality research leads to a greater understanding of the requirements, behaviors, and ecology of wildlife and the environment in which it lives. This increased understanding allows the refuge staff, as wildlife professionals, to make ecologically sound management decisions that will maintain or improve the quality and quantity of wildlife and its associated habitats. This concept directly promotes the mission and goals of the Refuge System.

Public Review and Comment:

This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Clarks River NWR. In order to solicit comments, the staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will send news releases to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

All researchers will be required to obtain and possess a special use permit. Individual requests to use specialized equipment such as all-terrain vehicles will be evaluated on a project-by-project basis and specified within each permit. Researchers will periodically be evaluated for compliance with permit guidelines and requirements. Periodic progress reports will also be required and a final copy of all reports and publications will be provided to the refuge. The refuge will not directly supply personnel or equipment to researchers unless arrangements are made prior to issuance of the special use permit. The refuge manager will reserve the right to delegate a staff member to accompany the permittee(s) at any time. All sampling, collecting, and releasing of plants and animals should be done in a scientifically accepted manner, such as those specified by scientific societies. Examples of these societies include the Society for the Study of Amphibians and Reptiles, the American Society of Mammalogists, the American Ornithological Society, the Ichthyologists League, the Entomological Society of America, and the Botanical Society of America. Incidental take and inadvertent trampling of vegetation or wildlife are expected to be of minimal impact and will be addressed with each permit request. Given that researchers show compliance with the restrictions set in each special use permit, research and monitoring on the refuge is considered to be compatible with the purposes for which the refuge was established.

Justification:

Sound research and monitoring programs provide a better understanding of species, habitats, and the environmental communities present on the refuge. Additional research and monitoring is needed to assess management programs used on the refuge and to evaluate alternative options. The benefit of additional knowledge will greatly outweigh any short-term disturbance or loss of individual plants or animals that may occur. This activity will provide guidance to management for meeting established purposes, goals, and objectives of the refuge.

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement
Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

6) Description of Use: *Nuisance Animal Control*

This activity will allow a managed and highly specific program for the take of nuisance animals on Clarks River NWR. This action will only be taken when the animals become harmful to refuge habitat and/or infrastructure critical to habitat management and operations. This is done to reduce the threat to trust species that inhabit or utilize the refuge. Currently, this program will specifically address beaver (*Castor canadensis*), but it may be expanded to other species if deemed necessary and is in compliance with KDFWR regulations, such as exotic or invasive species and domestic/feral animals,

or native wildlife species as it relates to prevention or control of disease outbreaks or excessive predation on trust species.

The hydrology and habitat of the refuge are such that semi-aquatic animals, especially beaver, have become prolific and degraded habitat for other wildlife uses. Beavers naturally impound water to enhance accessibility and extend usable habitat beyond the stream channel. Under normal hydrologic and population conditions, beavers are held in check by availability of water and natural predators, and under these conditions their impoundments may provide beneficial aquatic microhabitats containing scrub/shrub vegetation and trees.

However, beavers have little pressure from natural predators and populations have grown to the point that impoundments have been rebuilt for many years and impounded areas have grown in size. Over the long-term, beaver impoundments degrade wildlife habitat within and around the surrounding area as woody vegetation decreases in diversity and abundance. The water table surrounding the impoundment is elevated, which alters the forest species composition and degrades environmental quality and health. The hydrology itself is impacted as sediments and organic material from decomposing aquatic vegetation accumulates in the impoundment and impedes the ability of the site to dewater. Additionally, water quality in impounded areas is negatively affected due to increased water temperature and turbidity, as well as decreased dissolved oxygen and species diversity.

Refuge staff attempts to reduce beaver impoundment activity whenever possible. Wintertime trapping is also used to achieve moderate nuisance beaver control.

Availability of Resources:

Staff and resources are adequate to administer this program. Staff time will be required for several components of the nuisance animal control program. Primarily, this involves maintenance of water control structures, removal of beaver dams, and trapping of nuisance animals. Actual time investments may vary significantly from year-to-year as wildlife populations and activities fluctuate. However, an estimated time to complete each task follows:

Trapping nuisance animals	7 staff days
Removal of beaver dams	2 staff days
Maintenance of Refuge WCS	10 staff days
Total time investment	19 staff days

Anticipated Impacts of Use:

Short-term impacts:

The take of nuisance animals will involve the use of vehicles, ATVs, or foot travel into target areas, setting of traps or snares, and discharge of firearms, which will result in short-term disturbances similar to those associated with other refuge approved uses (e.g., hunting, fishing, and birding).

This program has the potential to decrease nuisance animal populations and reduce damage to refuge habitats and infrastructure. As the numbers of nuisance beaver decrease, the number, size, and frequency of rebuilt beaver impoundments will also decrease. The refuge will spend less time and expense on the removal of impoundments and can redirect these resources to other habitat restoration and management activities. Damage to infrastructure and habitat will be reduced.

Long-term impacts:

Degraded habitats will return to a more normal hydrologic regime and will be reclaimed by native hardwoods and natural riparian vegetation. This will result in increased benefits to trust resources and associated wildlife-dependent recreation.

Public Review and Comment:

This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Clarks River NWR. In order to solicit comments, the staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will send news releases to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

___ Use is Not Compatible
_X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- The refuge will receive no economic gain from any of its nuisance animal control practices.
- This management action does not allow trapping by the general public.
- All trapping will abide by KDFWR guidelines or otherwise by direct state approval.

Justification:

This use has been determined compatible provided the above stipulations are implemented. This use will facilitate the primary purpose of the refuge, which is to provide waterfowl habitat and to conserve other migratory birds and wildlife. This use will meet the mission of the Refuge System by conserving fish, wildlife, and plant resources on these lands and providing renewable resources for the benefit of the American public. This use will be administered in compliance with 50 CFR 29.1 and Executive Order 13112.

NEPA Compliance for Refuge Use Decision (check one below):

___ Categorical Exclusion without Environmental Action Statement
___ Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
___ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

7) Description of Use: *Outdoor Recreation*

Outdoor recreation activities include non-motorized boating, hiking, jogging, walking, and bicycling. Use of the Clarks River for canoeing and kayaking is possible throughout the refuge, but constrained by seasonal water levels; overall the use is very light. The best opportunities for hiking, walking, and jogging are currently provided on approximately 2.5 miles of paved, graveled, and dirt trails at the EERA on Highway 408 east of Benton, Kentucky. The EERA is very popular with local residents and refuge visitors, and daily use has grown steadily since the area was established. Hiking and walking are permitted elsewhere on the refuge, although, formal trails have not been developed. Jogging and bicycling has been observed on public roads passing through the refuge and is permitted on improved roads and trails. Clarks River NWR is open to public use year-round except for areas that are closed for wildlife management or administrative purposes.

Availability of Resources:

Refuge staff and resources are adequate to administer the outdoor recreation program at current levels. However, it is anticipated that an increase in these uses will occur over the coming years. In order to provide safe and quality outdoor recreation opportunities, additional resources and staff will be needed to meet the growing demand. Plans are being developed to provide additional or improved facilities such as trails and river access points.

Staff time will be required for several components of the outdoor recreation program. Primarily, this involves maintenance of established areas and planning/designing of new areas. Actual time investments may vary significantly from year-to-year as new projects begin; however, an estimated time to complete each task follows:

Planning/designing new outdoor recreation areas	2 staff days
Maintenance of outdoor recreation areas (trails, accesses)	4 staff days
Total time investment	6 staff days

Anticipated Impacts of the Use:

Outdoor recreation activities, such as non-motorized boating, hiking, jogging, walking, and bicycling, may result in minimal disturbance to wildlife from visitors. It is possible that some small vertebrates, invertebrates, and vegetation could be trampled. Littering may also occur. Significant short-term, long-term, or cumulative adverse impacts to refuge resources are not expected from these activities.

Public Review and Comment:

This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Clarks River NWR. In order to solicit comments, the staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will send news releases to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

___ Use is Not Compatible
_X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Outdoor recreation opportunities are strategically located to minimize negative impacts and user conflict. These activities will be monitored and appropriate management actions will be taken to eliminate or reduce associated impacts. All vehicle use associated with these activities is restricted to designated roads and parking areas only.

Justification:

According to the Improvement Act, priority public use activities should be encouraged and expanded where possible. It is through compatible, wildlife-dependent public uses that the public becomes aware of and provides support for national wildlife refuges. Non-motorized boating, jogging, walking, hiking, backpacking, and bicycling at the refuge, which adhere to the established regulations, are activities that are compatible with that purpose.

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement
Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

8) Description of Use: *Horseback Riding*

Horseback riding is permitted on improved refuge roads, trails, and the portions of the abandoned railroad track owned by the refuge for access purposes while engaged in wildlife related activities only. Horses and mules are not permitted off these secondary access routes for any purpose. Horses and mules are prohibited on the refuge during the muzzleloader and modern gun deer hunts.

Horseback riding will be permitted year-round during daylight hours only. Areas that are closed to the general public for wildlife management or administrative purposes will be closed to horseback riding as well. Horseback riding will be a self-initiated activity on the refuge, with no amenities provided specifically for this activity. Participants in this activity will be responsible for all aspects of their visit and use of the refuge.

Availability of Resources:

Refuge staff and resources are adequate to accommodate management of horseback riding at its current level. However, it is anticipated that an increase in this use may occur or could be provided for in the future. In order to provide safe and quality horseback riding opportunities additional resources and staff may be needed to develop or enhance access and to provide necessary law enforcement oversight.

Staff time will be required for several components of the horseback riding program. Primarily, this involves routine maintenance and law enforcement. Actual time investments may vary significantly from year-to-year as conditions change. However, an estimated time to complete each task follows:

Law enforcement	5 staff days
Maintenance of Refuge trails, roads, and parking areas	10 staff days
Total time investment	15 staff days

Anticipated Impacts of the Use:

Horseback riding on the refuge is very light and confined to existing improved roads, trials, and refuge-owned railroad right-of-way. The activities of visitors engaging in horseback riding may result in some potential disturbance to wildlife. Minimal impacts in the form of trampling of small vertebrates, invertebrates, and vegetation may occur. Litter may also increase, which could have a negative impact on wildlife. Significant short-term, long-term, or cumulative adverse impacts to refuge resources are not expected.

Public Review and Comment:

This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Clarks River NWR. In order to solicit comments, the staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will send news releases to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

	Use is Not Compatible
X	Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Horseback riding will be limited to daylight hours only and restricted to improved refuge roads, trails, and the portions of the abandoned railroad track that are owned by the refuge. All vehicle use is restricted to designated roads and parking areas only.

Justification:

According to the Improvement Act, priority public use activities should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses that the public becomes aware of and provides support for national wildlife refuges. Horseback riding supports certain wildlife-dependent activities such as wildlife observation by providing an alternative mode of travel.

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement
Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

9) Description of Use: *Mobility-impaired ATV Access*

All-terrain vehicle use is prohibited at Clarks River NWR with the following exception. Mobility-impaired individuals are allowed to use a personal ATV for access to designated areas of the refuge if a reasonable accommodation is required to participate in refuge programs. A formal request must be filed with the refuge with a verified physician's statement attesting to the nature of the disability. If approved, the individual is issued a special use permit to use an ATV for access purposes only. Mobility-impaired ATV access on the refuge is minimal; generally no more than five individuals per year are approved for the permit.

Availability of Resources:

Adequate resources are available to ensure and administer the proposed activity at its current level of participation. Enforcement of refuge regulations to protect trust resources and provide for a safe, quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Currently, the refuge has one full-time officer and one dual function officer. Personnel from the KDFWR and various sheriffs' departments from the counties also patrol the refuge and assist refuge officers as needed.

Staff time will be required for several components of the mobility-impaired ATV program. Primarily, this involves preparation of special use permits and law enforcement. Actual time investments may vary significantly from year-to-year as requests for permits fluctuate. However, an estimated time to complete each task follows:

Preparing and issuance of Special Use Permits	2 staff days
Conducting law enforcement activities	3 staff days
Maintenance of ATV trails and parking areas	5 staff days
Total time investment	10 staff days

Anticipated Impacts of the Use:

Mobility-impaired ATV access on the refuge is very light and restricted to designated areas. This activity may result in some potential disturbance to wildlife. Minimal impacts in the form of trampling small vertebrates, invertebrates, and vegetation, and littering may also occur. Significant short-term, long-term, or cumulative adverse impacts to refuge resources are not expected.

Public Review and Comment:

This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Clarks River NWR. In order to solicit comments, the staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will send news releases to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

___ Use is Not Compatible
_X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Mobility-impaired ATV access will be limited to daylight hours for hunting during designated seasons consistent with state and refuge-specific regulations. All vehicle use associated with this activity is restricted to designated roads and parking areas only.

Justification:

According to the Improvement Act, priority public use activities should be encouraged and expanded where possible. It is through compatible wildlife-dependent public uses that the public becomes aware of and provides support for national wildlife refuges. Mobility-impaired ATV access supports certain wildlife-dependent activities such as hunting by providing a reasonable access accommodation.

NEPA Compliance for Refuge Use Decision (check one below):

___ Categorical Exclusion without Environmental Action Statement
___ Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact
___ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Approval of Compatibility Determinations

The signature of approval is for all compatibility determinations considered within the Comprehensive Conservation Plan for Clarks River NWR. If one of the descriptive uses is considered for compatibility outside of the Comprehensive Conservation Plan, the approval signature becomes part of that determination.

Refuge Manager: _____
Signature Date

Regional Compatibility Coordinator: _____
Signature Date

Refuge Supervisor: _____
Signature Date

Regional Chief, National Wildlife Refuge System, Southeast Region: _____
Signature Date

Appendix H. Intra-Service Section 7 Biological Evaluations

REGION 4

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Michael Johnson, Refuge Manager
Telephone Number: (270) 527-5770 ext. 102 **E-Mail:** Michael_Johnson@fws.gov
Date: September 15, 2010

PROJECT NAME (Grant Title/Number): Clarks River National Wildlife Refuge Comprehensive Conservation Plan

I. Service Program:
- ___ **Ecological Services**
- ___ **Federal Aid**
  - ___ **Clean Vessel Act**
  - ___ **Coastal Wetlands**
  - ___ **Endangered Species Section 6**
  - ___ **Partners for Fish and Wildlife**
  - ___ **Sport Fish Restoration**
  - ___ **Wildlife Restoration**
- ___ **Fisheries**
- **_X_ Refuges/Wildlife**

II. State/Agency: Kentucky; U.S. Fish and Wildlife Service

III. Station Name: Clarks River National Wildlife Refuge; Marshall, McCracken, and Graves Counties, Kentucky

IV. Description of Proposed Action (attach additional pages as needed):
Implement the Proposed Alternative associated with the Draft CCP. See Chapter IV of the Draft CCP/EA for more details.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map: Not known to occur on refuge but the area is within the documented range of the identified species.

Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS[1]
Indiana Bat (*Myotis sodalis*)	E
Gray Myotis (*Myotis grisescens*)	E
American Burying Beetle (*Nicrophorus americanus*)	E

[1]STATUS: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species

VI. Location (attach map): Refuge map attached.

A. Ecoregion Number and Name: Lower Tennessee/Upper Cumberland

B. County and State: Marshall, McCracken, and Graves Counties, Kentucky

C. Section, township, and range (or latitude and longitude):
36°55' latitude / 88°27' longitude

D. Distance (miles) and direction to nearest town: Between 0.5-16 miles from Benton, Kentucky.

E. Species/habitat occurrence: Bottomland hardwood forest

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item V. B (attach additional pages as needed):

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Indiana Bat (*M. sodalis*) Gray Myotis (*M. grisescens*) American Burying Beetle (*N. americanus*)	None of the listed species have been documented to occur on CRNWR. However, the threatened and endangered species listed should not be impacted by the application of pesticides, insecticides and/or fungicides used on the refuge. Chemicals are applied by contractors or cooperative farmers using modern spray equipment that allows for direct application to identified target pests. By using approved IPM techniques and abiding by EPA chemical label restrictions, refuge staff feels that chemical application will have no adverse effect on these species. In addition, all proposed habitat removal or habitat alteration projects will undergo consultation with the Kentucky Ecological Services Field Office pursuant to section 7(a) (2) of the Endangered Species Act. This will ensure that any potential adverse effects are avoided or adequately addressed. Further, CRNWR staff will actively coordinate with the Kentucky Ecological Services Field Office if any future proposed or candidate species are located on CRNWR in order to ensure that potential adverse effects on those species are adequately addressed.

B. Explanation of actions to be implemented to reduce adverse effects:

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/ MINIMIZE IMPACTS
Indiana Bat (*M. sodalis*)	Since these species are not yet known to occur on CRNWR, specific actions to mitigate or minimize impacts to the species are not necessary. However, CRNWR has identified a series of actions related to chemical applications that, along with the additional requirement to consult with the Kentucky Ecological Services Field Office on habitat removal or habitat alteration projects, will minimize impacts to these species. These actions are: (1) The refuge and cooperative farmer will continue to crop scout and monitor threshold levels of target pest species. (2) The refuge and cooperative farmer will abide by all label restrictions and guidelines. (3) The refuge will monitor research on the development of biological control agents to help reduce the use of chemicals on refuge lands. (4) Continue to obtain approval of chemicals that are the safest and most environmentally friendly to use. (5) The refuge will require that all crop seeds planted will be certified and clean of noxious weeds.
Gray Myotis (*M. grisescens*)	
American Burying Beetle (*N. americanus*)	

VIII. Effect Determination and Response Requested:

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE[1] REQUESTED
	NE	NA	AA	
Indiana Bat (*M. sodalis*)	X			Concurrence
Gray Myotis (*M. grisescens*)	X			Concurrence
American Burying Beetle (*N. americanus*)	X			Concurrence

[1]*DETERMINATION/RESPONSE REQUESTED:*

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence".

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation". Response Requested for proposed or candidate species is "Conference".

_____ _____

Signature (originating station) **Date**

_____

Title

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence _____ Nonconcurrence _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

_____	**December 30, 2010**
Signature	**Date**
Field Office Supervisor	**Kentucky ES Field Office**
Title	**Office**

Appendix I. Wilderness Review

The Wilderness Act of 1964 defines a wilderness area as an area of federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to preserve its natural conditions and which:

1. generally appears to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;

2. has outstanding opportunities for solitude or primitive and unconfined types of recreation;

3. has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and use in an unimpeded condition; or is a roadless island, regardless of size;

4. does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management at the time of review; and

5. may contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

The lands within Clarks River NWR were reviewed for their suitability in meeting the criteria for wilderness, as defined by the Wilderness Act of 1964. Seventy-four percent of the refuge is comprised of forested land which varies accordingly with historic land uses. Portions were likely logged in the late 1800s to provide wooden ties for the railroad bisecting the refuge and fuel for the locomotives. Logging of the forest is assumed and evident in those areas lacking oaks. Oaks are considered the climax species and would be more common in a forest that has matured in the absence of man-made disturbances. Selective logging, primarily for oaks, is ongoing.

Portions of the forest were cleared for farming or grazing then later abandoned. This is evident from historic aerial photos and traces on the ground such as barbed wire fences marking old boundary lines and the numerous man-made cattle ponds scattered across the refuge. Today, 22 percent of the refuge is comprised of agricultural land distributed somewhat uniformly throughout.

The Clarks River NWR, narrow and linear in shape, is bisected by several paved public roads and utility lines and therefore has no roadless area of 5,000 contiguous acres. There are no areas on the refuge that meet the eligibility criteria for a wilderness study. Therefore, the suitability of Clarks River NWR lands for wilderness designation is not further analyzed in this plan.

Appendix J. Refuge Biota

Plants of Clarks River National Wildlife Refuge

The USDA Plants Database (*http://plants.usda.gov/*) lists over a thousand species of plants found in Graves, Marshall, and McCracken Counties. Habitat suitable for all of these species may not be found on the refuge. A 2-year long refuge-wide survey is currently being conducted by Dr. Dwayne Estes of Austin Peay University in Clarksville, Tennessee. The final list is expected to top 800 species, the results will be reported as the information becomes available. Wildflowers and vines identified by refuge staff are provided below.

Wildflowers and Vines

This is a current list of wildflowers found on the refuge. A total of 54 families, 154 genera, and 223 species are represented. Members of the aster family comprise 56 species or 25 percent of the total. All flowers marked with an asterisk (*) are nonnative and may be invasive or harmful to native habitats.

Common Name	Scientific Name	Family Name
Arrowhead, Broadleaf or Duck Potato	*Sagittaria latifolia*	Alismataceae
Artichoke, Jerusalem	*Helianthus tuberous*	Asteraceae
Aster, False	*Boltonia asteroides*	Asteraceae
Aster, Late Purple	*Aster patens*	Asteraceae
Aster, Lowrie's	*Aster lowrieanus*	Asteraceae
Aster, Old-field	*Symphyotrichum pilosum*	Asteraceae
Aster, Small-headed	*Symphyotrichum racemosum*	Asteraceae
Aster, Smooth	*Aster laevis*	Asteraceae
Aster, White Heath	*Aster pilosus*	Asteraceae
Avens, White	*Geum canadense*	Rosaceae
Bachelor's Button *	*Centaurea cyanus*	Asteraceae
Beardtongue, Foxglove	*Penstemon digitalis*	Scrophulariaceae
Bedstraw	*Galium aparine*	Rubiaceae
Beefstake Plant *	*Perilla frutescens*	Lamiaceae
Bellflower, Tall	*Campanula americana*	Campanulaceae
Bindweed, Hedge	*Calystegia sepium*	Convolvulaceae
Bittercrest, Hoary *	*Cardamine hirsuta*	Brassicaceae
Bitterweed	*Helenium amarum*	Asteraceae
Blackberry, Southern	*Rubus argutus*	Rosaceae
Black-Eyed Susan	*Rudbeckia hirta*	Asteraceae
Blazing Star, Rough	*Liatris aspera*	Asteraceae
Blue-Eyed Grass, Stout	*Sisyrinchium angustifolium*	Iridaceae
Bluestar	*Amsonia tabernaemontana*	Apocynaceae
Bluet, Large or Summer	*Houstonia purpurea*	Rubiaceae
Bluet, Small	*Houstonia pusilla*	Rubiaceae
Boneset	*Eupatorium perfoliatum*	Asteraceae
Buckwheat, False	*Polygonum scandens var dumetorum*	Polygonaceae
Bush Clover, Smooth Creeping	*Lespedeza repens*	Fabaceae
Buttercup, Hairy	*Ranunculus hispidus*	Ranunculaceae
Butterfly Pea	*Clitoria mariana*	Fabaceae

Common Name	Scientific Name	Family Name
Butterfly Weed, Pleurisy-Root	*Asclepias tuberosa*	Asclepiadaceae
Butterweed	*Senecio glabellus*	Asteraceae
Buttonbush	*Cephalanthus occidentalis*	Rubiaceae
Buttonweed, Virginia	*Diodia virginiana*	Rubiaceae
Cardinal Flower	*Lobelia cardinalis*	Campanulaceae
Cinquefoil, Common	*Potentilla simplex*	Rosaceae
Clover, Red	*Trifolium pratense*	Fabaceae
Coneflower, Thinleaf	*Rudbeckia triloba*	Asteraceae
Coreopsis, Garden	*Coreopsis tinctoria*	Asteraceae
Corn Salad, Beaked	*Valerianella radiata*	Valerianaceae
Cranesbill, Carolina	*Geranium carolinianum*	Geraniaceae
Cress, Winter	*Barbarea vulgaris*	Brassicaceae
Cross Vine	*Bignonia capreolata*	Bignoniaceae
Crownbeard, White	*Verbesina virginica*	Asteraceae
Daisy, Oxeye *	*Chrysanthemum leucanthemum*	Asteraceae
Dandelion, False	*Pyrrhopappus carolinianus*	Asteraceae
Dandelion, Potato	*Krigia dandelion*	Asteraceae
Dayflower, Asiatic *	*Commelina communis*	Commelinaceae
Dayflower, Virginia	*Commelina virginica*	Commelinaceae
Daylily, Orange or Common *	*Hemerocallis fulva*	Liliaceae
Dead Nettle, Purple *	*Lamium purpureum*	Lamiaceae
Dodder, Common	*Cuscuta gronovii*	Cuscutaceae
Dragonhead, False; Obedient Plant	*Physostegia virginiana*	Lamiaceae
Elderberry, Common	*Sambucus canadensis*	Caprifoliaceae
Elephant's Foot, Leafy	*Elephantopus carolinianus*	Asteraceae
Evening Primrose, Common	*Oenothera biennis*	Onagraceae
Eyebane	*Chamaesyce nutans*	Euphorbiaceae
False Foxglove, Spreading	*Aureolaria patula*	Scrophulariaceae
Flag, Southern Blue	*Iris virginica*	Iridaceae
Flat-Topped Goldenrod, Miss. Valley	*Euthamia leptocephala*	Asteraceae
Flax, Common Yellow	*Linum medium var texanum*	Linaceae
Fleabane, Daisy	*Erigeron annuus*	Asteraceae
Fleabane, Marsh	*Pluchea camphorata*	Asteraceae
Fleabane, Philadelphia	*Erigeron philadelphicus*	Asteraceae
Fogfruit, Lanceleaf	*Phyla lanceolata*	Verbenaceae
Garlic, Wild or Canada	*Allium canadense*	Liliaceae
Gaura, Biennial	*Gaura biennis*	Onagraceae
Gerardia, Fascicled Purple	*Agalinis fasciculata*	Scrophulariaceae
Germander, American; Sage, Wood	*Teucrium canadense*	Lamiaceae
Goldenrod, Common	*Solidago canadensis*	Asteraceae
Goldenrod, Curtis'	*Solidago curtisii*	Asteraceae
Goldenrod, Early	*Solidago juncea*	Asteraceae
Goldenrod, Zigzag	*Solidago flexicaulis*	Asteraceae
Green Dragon	*Arisaema dracontium*	Araceae
Ground Cherry, Angular	*Physalis angulata*	Solanaceae
Ground Ivy	*Glechoma hederacea*	Lamiaceae
Groundnut	*Apios americana*	Fabaceae
Hawkweed, Hairy	*Hieracium gronovii*	Asteraceae
Heal All, Selfheal	*Prunella vulgaris*	Lamiaceae

Common Name	Scientific Name	Family Name
Hedge Nettle, Smooth	*Stachys tenuifolia*	Lamiaceae
Hemlock, Poison *	*Conium maculatum*	Lamiaceae
Hemlock, Water	*Cicuta maculata*	Apiaceae
Hempweed, Climbing	*Mikania scandens*	Asteraceae
Henbit	*Lamium amplexicaule*	Lamiaceae
Honeysuckle, Japanese *	*Lonicera japonica*	Caprifoliaceae
Hop Clover, Low	*Trifolium campestre*	Fabaceae
Horseweed	*Conyza canadensis*	Asteraceae
Ipecac, American; Indian-physic	*Porteranthus stipulatus*	Rosaceae
Ironweed, New York	*Vernonia noveboracensis*	Asteraceae
Ironweed, Tall	*Vernonia gigantea*	Asteraceae
Jacob's Ladder, Greek Valerian	*Polemonium reptans*	Polemoniaceae
Jewelweed, Spotted Touch-Me-Not	*Impatiens capensis*	Balsaminaceae
Joe-Pye Weed, Hollow	*Eupatorium fistulosum*	Asteraceae
Knotweed, Virginia or Jumpseed	*Polygonum virginianum*	Polygonaceae
Lespedeza, Sericea *	*Lespedeza cuneata*	Fabaceae
Lettuce, Florida Blue	*Lactuca floridana*	Asteraceae
Lettuce, Prickly	*Lactuca serriola*	Asteraceae
Lizard's Tail	*Saururus cernuus*	Saururaceae
Lobelia, Downy	*Lobelia puberula*	Campanulaceae
Loosestrife, Lanceleaf	*Lysimachia lanceolata*	Primulaceae
Loosestrife, Winged	*Lythrum alatum*	Lythraceae
Love in a Puff, Balloon Vine	*Cardiospermum halicacabum*	Sapindaceae
Mallow, Prickly	*Sida spinosa*	Malvaceae
Mayapple	*Podophyllum peltatum*	Berberidaceae
Meadow Beauty, Maryland	*Rhexia mariana*	Melastomataceae
Mild Water-Pepper	*Polygonum hydropiperoides*	Polygonaceae
Milkweed, Aquatic	*Asclepias perennis*	Asclepiadaceae
Milkweed, Purple	*Asclepias purpurascens*	Asclepiadaceae
Milkweed, Swamp	*Asclepias incarnata*	Asclepiadaceae
Milkwort, Curtiss'	*Polygala curtissii*	Polygonaceae
Mint, Stone	*Cunila origanoides*	Lamiaceae
Mistflower	*Conoclinium coelestinum*	Asteraceae
Monkey Flower, Sharpwing	*Mimulus alatus*	Scrophulariaceae
Morning Glory, Common*	*Ipomoea purpurea*	Convolvulaceae
Morning Glory, Ivyleaf *	*Ipomoea hederacea*	Convolvulaceae
Morning Glory, Small White*	*Ipomoea lacunosa*	Convolvulaceae
Mountain Mint, Loomis'	*Pycnanthemum loomisii*	Lamiaceae
Mountain Mint, Narrowleaf	*Pycnanthemum tenuifolium*	Lamiaceae
Mullein, Common	*Verbascum thapsus*	Scrophulariaceae
Mullein, Moth	*Verbascum blattaria*	Scrophulariaceae
Mustard, Field	*Brassica rapa*	Brassicaceae
Naked-Flowered Tick Trefoil	*Desmodium nudiflorum*	Fabaceae
Nettle, Horse	*Solanum carolinense*	Solanaceae
Nightshade, Common	*Solanum ptychanthum*	Solanaceae
Orchid, Purple Fringeless	*Platanthera peramoena*	Orchidaceae
Pansy, Field	*Viola rafinesquii*	Violaceae
Pea, Partridge	*Chamaecrista fasciculata*	Fabaceae
Peanut, Hog	*Amphicarpaea bracteata*	Fabaceae

Common Name	Scientific Name	Family Name
Phlox, Downy	*Phlox pilosa*	Polemoniaceae
Phlox, Fall	*Phlox paniculata*	Polemoniaceae
Phlox, Smooth	*Phlox glaberrima*	Polemoniaceae
Phlox, Wild Blue or Woodland	*Phlox divaricata*	Polemoniaceae
Pilewort	*Erechtites hieraciifolia*	Asteraceae
Pimpernel, False	*Lindernia dubia*	Scrophulariaceae
Pink, Deptford *	*Dianthus armeria*	Caryophyllaceae
Pink, Fire	*Silene virginica*	Caryophyllaceae
Pink, Indian	*Spigelia marilandica*	Loganiaceae
Pink, Rose	*Sabatia angularis*	Gentianaceae
Pokeweed	*Phytolacca americana*	Phytolaccaceae
Pussytoes, Plantainleaf	*Antennaria plantaginifolia*	Asteraceae
Quaker Ladies, Innocence	*Houstonia caerulea*	Rubiaceae
Queen Anne's Lace *	*Daucus carota*	Apiaceae
Ragweed, Common	*Ambrosia artemisiifolia*	Asteraceae
Ragweed, Great	*Ambrosia trifida*	Asteraceae
Ragweed, Lanceleaf	*Ambrosia bidentata*	Asteraceae
Rattlesnake Weed	*Hieracium venosum*	Asteraceae
Redstem, Valley	*Ammannia coccinea*	Lythraceae
Rose Mallow, Swamp	*Hibiscus moscheutos*	Malvaceae
Rose, Prairie	*Rosa setigera*	Rosaceae
Rue Anemone	*Thalictrum thalictroides*	Ranunculaceae
Ruellia, Hairy	*Ruellia caroliniensis*	Acanthaceae
Sage, Lyre-Leaved	*Salvia lyrata*	Lamiaceae
Sandvine	*Ampelamus albidus*	Asclepiadaceae
Seedbox	*Ludwigia alternifolia*	Onagraceae
Senna, Southern Wild	*Senna marilandica*	Fabaceae
Shepherd's Purse	*Capsella bursa-pastoris*	Brassicaceae
Sicklepod	*Senna obtusifolia*	Fabaceae
Skullcap, Downy	*Scutellaria incana*	Lamiaceae
Skullcap, Hairy	*Scutellaria elliptica*	Lamiaceae
Skullcap, Small	*Scutellaria parvula*	Lamiaceae
Smartweed, Common *	*Polygonum hydropiper*	Polygonaceae
Smartweed, Pennsylvania	*Polygonum pensylvanicum*	Polygonaceae
Smartweed, Scarlet	*Polygonum amphibium*	Polygonaceae
Snakeroot, Sampson’s	*Orbexilum pedunculatum*	Fabaceae
Snakeroot, Virginia	*Aristolochia serpentaria*	Aristolochiaceae
Sneezeweed, Autumn	*Helenium autumnale*	Asteraceae
Sneezeweed, Purple-Headed	*Helenium flexuosum*	Asteraceae
Soapwort, Bouncing Bet	*Saponaria officinalis*	Caryophyllaceae
Spanish Bayonet	*Yucca filamentosa*	Agavaceae
Spider Lily, Carolina	*Hymenocallis caroliniana*	Liliaceae
Spiderwort, Virginia or Widow’s Tears	*Tradescantia virginica*	Commelinaceae
Spring Beauty, Virginia	*Claytonia virginica*	Portulacaceae
Spurge, Flowering	*Euphorbia corollata*	Euphorbiaceae
Spurge, Prostrate	*Chamaesyce maculata*	Euphorbiaceae
Spurge, Toothed	*Euphorbia dentata*	Euphorbiaceae
St. Andrew's Cross	*Hypericum hypericoides*	Clusiaceae
St. Johnswort, Coppery	*Hypericum denticulatum*	Clusiaceae

Common Name	Scientific Name	Family Name
St. Johnswort, Dwarf	*Hypericum mutilum*	Clusiaceae
St. Johnswort, Spotted	*Hypericum punctatum*	Clusiaceae
Stonecrop, Ditch	*Penthorum sedoides*	Crassulaceae
Strawberry Bush	*Euonymus americana*	Celastraceae
Strawberry, Wild	*Fragaria virginiana*	Rosaceae
Sundrops	*Oenothera fruticosa*	Onagraceae
Sunflower, Hairy	*Helianthus mollis*	Asteraceae
Sunflower, Narrowleaf	*Helianthus angustifolius*	Asteraceae
Sunflower, Paleleaf Woodland	*Helianthus strumosus*	Asteraceae
Sunflower, Stiff-Haired	*Helianthus hirsutus*	Asteraceae
Sweet Cicely	*Osmorhiza longistylis*	Apiaceae
Sweet Clover, White *	*Melilotus albus*	Fabaceae
Tea, Prairie	*Croton monanthogynus*	Euphorbiaceae
Tearthumb, Arrow-leaved	*Polygonum sagittatum*	Polygonaceae
Thistle, Bull *	*Cirsium vulgare*	Asteraceae
Thistle, Nodding	*Carduus nutans*	Asteraceae
Thoroughwort, Late Flowering	*Eupatorium serotinum*	Asteraceae
Thyme, Basil *	*Calamintha nepeta*	Lamiaceae
Tickseed Sunflower, Ozark	*Bidens polylepis*	Asteraceae
Tobacco, Indian	*Lobelia inflata*	Campanulaceae
Toothwort, Cutleaf	*Dentaria laciniata*	Brassicaceae
Toothwort, Slender	*Dentaria heterophylla*	Brassicaceae
Trillium, Prairie or Recurved	*Trillium recurvatum*	Liliaceae
Trout Lily, White	*Erythronium albidum*	Liliaceae
Trumpet Creeper	*Campsis radicans*	Bignoniaceae
Turnsole, Indian Heliotrope *	*Heliotropium indicum*	Boraginaceae
Venus' Looking Glass	*Triodanis perfoliata*	Campanulaceae
Vervain, Blue	*Verbena hastata*	Verbenaceae
Vervain, White	*Verbena urticifolia*	Verbenaceae
Vetch, Crown *	*Coronilla varia*	Fabaceae
Vetch, Smooth	*Vicia dasycarpa*	Fabaceae
Violet, Common Blue	*Viola sororia var. sororia*	Violaceae
Violet, Marsh Blue	*Viola cucullata*	Violaceae
Violet, Yellow Woodland	*Viola pubescens*	Violaceae
Virgin's Bower	*Clematis virginiana*	Ranunculaceae
Water Primrose, Creeping	*Ludwigia peploides*	Onagraceae
Water Primrose, Wingstem	*Ludwigia decurrens*	Onagraceae
Waxweed, Blue	*Cuphea viscosissima*	Lythraceae
Wild Potato Vine	*Ipomoea pandurata*	Convolvulaceae
Wingstem	*Verbesina alternifolia*	Asteraceae
Wood Sorrel, Common Yellow*	*Oxalis stricta*	Oxalidaceae
Wood Sorrel, Illinois	*Oxalis illinoensis*	Oxalidaceae
Wood Sorrel, Violet	*Oxalis violacea*	Oxalidaceae
Yam, Chinese *	*Dioscorea polystachya*	Dioscoreaceae
Yam, Wild	*Dioscorea villosa*	Dioscoreaceae
Yarrow, Milfoil	*Achillea millefolium*	Asteraceae

Shrubs and Trees

This is a list of trees found, or likely to be found, on the refuge. The list was generated by refuge staff and Martina Hines, ecologist for the Kentucky State Nature Preserves Commission during preparation of a refuge vegetation map. A total of 22 families, 33 genera, and 60 species are represented. There are 13 oak species which represent 22 percent of the total. The list will be updated pending completion of a 2-year refuge-wide plant survey by Austin Peay State University.

Common Name	Scientific Name	Family Name
Ash, Green	*Fraxinus pennsylvanica*	Oleaceae
Ash, Pumpkin	*Fraxinus profunda*	Oleaceae
Ash, White	*Fraxinus americana*	Oleaceae
Beech, American	*Fagus grandifolia*	Fagaceae
Birch, River	*Betula nigra*	Betulaceae
Birch, Sweet	*Betula lenta*	Betulaceae
Blackgum	*Nyssa sylvatica*	Nyssaceae
Boxelder	Acer negundo	Aceraceae
Buttonbush	*Cephalanthus occidentalis*	Rubiaceae
Cherry, Black	*Prunus serotina*	Rosaceae
Cottonwood, Eastern	*Populus deltoides*	Salicaceae
Cypress, Bald	*Taxodium distichum*	Cupressaceae
Dogwood, Flowering	*Cornus florida*	Cornaceae
Dogwood, Gray	*Cornus foemina racemosa*	Cornaceae
Dogwood, Swamp	*Cornus foemina*	Cornaceae
Elm, American	*Ulmus americana*	Ulmaceae
Elm, Winged	*Ulmus alata*	Ulmaceae
Farkleberry	*Vaccinium arboretum*	Ericaceae
Hickory, Mockernut	*Carya tomentosa*	Juglandaceae
Hickory, Pignut	*Carya glabra*	Juglandaceae
Hickory, Shagbark	*Carya ovata*	Juglandaceae
Hickory, Water	*Carya aquatica*	Juglandaceae
Holly, American	*Ilex opaca*	Aquifoliaceae
Hophornbeam	*Ostrya virginiana*	Betulaceae
Hornbeam, American	*Carpinus caroliniana*	Betulaceae
Locust, Black	*Robinia pseudoacacia*	Fabaceae
Locust, Water	*Gleditsia aquatica*	Fabaceae
Maple, Red	*Acer rubrum*	Aceraceae
Maple, Silver	*Acer saccharinum*	Aceraceae
Maple, Sugar	*Acer saccharum*	Aceraceae
Oak, Black	*Quercus velutina*	Fagaceae
Oak, Cherrybark	*Quercus pagoda*	Fagaceae
Oak, Chestnut	*Quercus prinus*	Fagaceae
Oak, Northern Red	*Quercus rubra*	Fagaceae
Oak, Overcup	*Quercus lyrata*	Fagaceae
Oak, Pin	*Quercus palustris*	Fagaceae
Oak, Post	*Quercus stellata*	Fagaceae
Oak, Shumard	*Quercus shumardii*	Fagaceae
Oak, Southern Red	*Quercus falcata*	Fagaceae
Oak, Swamp Chestnut	*Quercus michauxii*	Fagaceae
Oak, Swamp White	*Quercus bicolor*	Fagaceae

Common Name	Scientific Name	Family Name
Oak, White	*Quercus alba*	Fagaceae
Oak, Willow	*Quercus phellos*	Fagaceae
Pawpaw	*Asimina triloba*	Annonaceae
Persimmon	*Diospyros virginiana*	Ebenaceae
Planertree	*Planera aquatica*	Ulmaceae
Possumhaw	*Ilex decidua*	Aquifoliaceae
Redcedar, Eastern	*Juniperus virginiana*	Cupressaceae
Sassafras	*Sassafras albidum*	Lauraceae
Serviceberry, Downy	*Amelanchier arborea*	Rosaceae
Spicebush, Northern	*Lindera benzoin*	Lauraceae
Sugarberry	*Celtis laevigata*	Ulmaceae
Sweetgum	*Liquidambar styraciflua*	Hamamelidaceae
Sycamore, American	*Platanus occidentalis*	Platanaceae
Tuliptree	*Liriodendron tulipifera*	Magnoliaceae
Tupelo, Water	*Nyssa aquatica*	Nyssaceae
Walnut, Black	*Juglans nigra*	Juglandaceae
Willow, Black	*Salix nigra*	Salicaceae
Willow, Virginia	*Itea virginica*	Grossulariaceae
Winterberry, Common	*Ilex verticillata*	Aquifoliaceae

Insects of Clarks River National Wildlife Refuge

Butterflies and Moths

The Society of Kentucky Lepidopterists (*http://bioweb.wku.edu/faculty/Marcus/KYLeps.html*) lists nearly 600 species of butterflies and moths that occur in Graves, Marshall, and McCracken Counties. Society members have volunteered to survey the refuge, the results will be reported as the information becomes available. Habitat suitable for all of these species may not be found on the refuge. The list below is comprised of species that have been identified on the refuge. Nine families, 31 genera, and 34 species are represented.

Common Name	Scientific Name	Family Name
Brown, Appalachian	*Satyrodes appalachia*	Nymphalidae
Buckeye, Common	*Junonia coenia*	Nymphalidae
Checkered-Skipper, Common	*Pyrgus communis*	Hesperiidae
Clearwing, Snowberry	*Hemaris diffinis*	Sphingidae
Comma, Eastern	*Polygonia comma*	Nymphalidae
Crescent, Pearl	*Phyciodes tharos*	Nymphalidae
Fritillary, Gulf	*Agraulis vanillae*	Nymphalidae
Fritillary, Variegated	*Euptoieta claudia*	Nymphalidae
Hairstreak, Gray	*Strymon melinus*	Lycaenidae
Harvester	*Feniseca tarquinius*	Lycaenidae
Lady, Painted	*Vanessa cardui*	Nymphalidae
Monarch	*Danaus plexippus*	Nymphalidae
Moth, Clymene	*Haploa clymene*	Arctiidae
Moth, Luna	*Actias luna*	Saturniidae

Mourning Cloak	*Nymphalis antiopa*	Nymphalidae
Orangetip, Falcate	*Anthocharis midea*	Pieridae
Question Mark	*Polygonia interrogationis*	Nymphalidae
Scape Moth, Yellow-collared	*Cisseps fulvicollis*	Arctiidae
Silkmoth, Promethea	*Callosamia promethea*	Saturniidae
Skipper, Silver-spotted	*Epargyreus clarus*	Hesperiidae
Skipper, Zabulon	*Poanes zabulon*	Hesperiidae
Snout, American	*Libytheana carinenta*	Nymphalidae
Sphinx, Banded	*Eumorpha fasciatus*	Sphingidae
Sphinx, Elm	*Ceratomia amyntor*	Sphingidae
Sulphur, Clouded	*Colias philodice*	Pieridae
Sulphur, Cloudless	*Phoebis sennae*	Pieridae
Sulphur, Orange	*Colias eurytheme*	Pieridae
Swallowtail, Black	*Papilio polyxenes*	Papilionidae
Swallowtail, Eastern Tiger	*Papilio glaucus*	Papilionidae
Swallowtail, Pipevine	*Battus philenor*	Papilionidae
Swallowtail, Zebra	*Eurytides marcellus*	Papilionidae
Tailed-Blue, Eastern	*Cupido comyntas*	Lycaenidae
White, Checkered	*Pontia protodice*	Pieridae
Wood-Nymph, Beautiful	*Eudryas grata*	Noctuidae

Common Name	**Scientific Name**	**Family Name**
Amberwing, Eastern	*Perithemis tenera*	Libellulidae
Dancer, Blue-fronted	*Argia apicalis*	Coenagrionidae
Dancer, Blue-tipped	*Argia tibialis*	Coenagrionidae
Darner, Swamp	*Epiaeschna heros*	Aeshnidae
Dasher, Blue	*Pachydiplax longipennis*	Libellulidae
Jewelwing, Ebony	*Calopteryx maculata*	Calopterygidae
Meadowhawk, Blue-faced	*Sympetrum ambiguum*	Libellulidae
Pondhawk, Eastern	*Erythemis simplicicollis*	Libellulidae
Skimmer, Widow	*Libellula luctuosa*	Libellulidae
Whitetail, Common	*Plathemis lydia*	Libellulidae

Other Insects

Common Name	**Scientific Name**	**Family Name**
Aphid, Oleander	*Aphis nerii*	Aphididae
Beetle, American Carrion	*Necrophila americana*	Staphylinoidae
Bug, Assassin, Orange	*Pselliopus barberi*	Reduviidae
Bug, Box Elder	*Boisea trivittata*	Rhopalidae
Bug, Leaf-footed	*Acanthocephala terminalis*	Coreidae
Bug, Leaf-footed, Eastern	*Leptoglossus phyllopus*	Coreidae
Bug, Wheel	*Arilus cristatus*	Reduviidae
Cricket, Red-headed Brush	*Phyllopalpus pulchellus*	Gryllidae
Euphoria, Emerald	*Euphoria fulgida*	Scarabaeidae
Hunter, Caterpillar	*Calosoma scrutator*	Carabidae
Killer, Eastern Cicada	*Sphecius speciosus*	Carbronidae
Leaf Beetle, Milkweed	*Labidomera clivicollis*	Chrysomelidae

Meadow Katydid, Black-legged	*Orchelimum nigripes*	Tettigoniidae
Spittlebug, Two-lined	*Prospia bicincta*	Cercopidae
Stinkbug, Green	*Acrosternum hilare*	Pentatomidae
Tiger Beetle, Six-spotted	*Cicindela sexgutata*	Carabidae
Unnamed	*Chlaenius tricolor*	Carabidae

Freshwater Mussels of Clarks River National Wildlife Refuge

Freshwater mussels found or once found in the Lower Tennessee River watershed, of which the Clarks River is a part are listed below. Two families, 28 genera, and 43 species are represented. Surveys to locate other species are ongoing. Some mussels are listed by the Service as a candidate for listing (C) or endangered (E) under the Endangered Species Act of 1973 or a species of management concern (SOMC). Other mussels are listed by the Kentucky State Nature Preserves Commission (KSNPC) as Endangered (E) or a species of Special Concern (SC).

Species marked with an asterisk (*) occur on the refuge.

Common Name	**Scientific Name**	**Family Name**	**USFWS**	**KSNPC**
Bankclimber	*Plectomerus dombeyanus*	Unionidae		
Black Sandshell	*Ligumia recta*	Unionidae		
Bleufer	*Potamilus purpuratus*	Unionidae		E
Butterfly	*Ellipsaria lineolata*	Unionidae		
Deertoe *	*Truncilla truncata*	Unionidae		
Ebonyshell *	*Fusconaia ebena*	Unionidae		
Elephant Ear *	*Elliptio crassidens*	Unionidae		
Fanshell	*Cyprogenia stegaria*	Unionidae	EE	
Fawnsfoot	*Truncilla donaciformis*	Unionidae		
Flat Floater *	*Anodonta suborbiculata*	Unionidae		
Flutedshell *	*Lasmigona costata*	Unionidae		
Fragile Papershell *	*Leptodea fragilis*	Unionidae		
Giant Floater *	*Pyganodon grandis*	Unionidae		
Hickorynut	*Obovaria olivaria*	Unionidae		
Kidneyshell	*Ptychobranchus fasciolaris*	Unionidae		SC
Longsolid	*Fusconaia subrotunda*	Unionidae		
Mapleleaf *	*Quadrula quadrula*	Unionidae		
Mucket	*Actinonaias ligamentina*	Unionidae		
Ohio Pigtoe *	*Pleurobema cordatum*	Unionidae		
Orangefoot Pimpleback	*Plethobasus cooperianus*	Unionidae	E	E
Paper Pondshell *	*Utterbackia imbecillis*	Unionidae		
Pimpleback *	*Quadrula pustulosa*	Unionidae		
Pink Heelsplitter *	*Potamilus alatus*	Unionidae		
Pink Mucket	*Lampsilis abrupta*	Unionidae	E	E
Pistolgrip *	*Tritogonia verrucosa*	Unionidae		
Plain Pocketbook *	*Lampsilis cardium*	Unionidae		
Pocketbook *	*Lampsilis ovata*	Unionidae		E
Purple Lilliput *	*Toxolasma lividus*	Unionidae		E
Purple Wartyback	*Cyclonaias tuberculata*	Unionidae		
Pyramid Pigtoe	*Pleurobema rubrum*	Unionidae		E
Ring Pink	*Obovaria retusa*	Unionidae	E	E

Rock Pocketbook *	*Arcidens confragosus*	Unionidae		
Round Pigtoe	*Pleurobema sintoxia*	Unionidae		
Sheepnose	*Plethobasus cyphyus*	Unionidae		SC
Spectaclecase	*Cumberlandia monodonta*	Margaritiferidae		E
Spike	*Elliptio dilatata*	Unionidae		
Threehorn Wartyback *	*Obliquaria reflexa*	Unionidae		
Threeridge *	*Amblema plicata*	Unionidae		
Common Name	**Scientific Name**	**Family Name**	**USFWS**	**KSNPC**
Wabash Pigtoe *	*Fusconaia flava*	Unionidae		
Wartyback *	*Quadrula nodulata*	Unionidae		
Washboard *	*Megalonaias nervosa*	Unionidae		
White Heelsplitter *	*Lasmigona complanata*	Unionidae		
Yellow Sandshell *	*Lampsilis teres*	Unionidae		

Fish of Clarks River NWR

Fish found or once found in the Lower Tennessee River watershed, of which the Clarks River is a part are listed below. Twenty-one families, 60 genera, and 157 species are represented. Surveys to locate other species are ongoing. Some fish are listed by the Service as endangered (E) under the Endangered Species Act of 1973 or a species of management concern (SOMC). Other mussels are listed by the Kentucky State Nature Preserves Commission (KSNPC) as Threatened (T), Endangered (E); species of Special Concern (SC) or extirpated (X), no longer found in the watershed.

Species marked with an asterisk (*) occur on the refuge.

Common Name	**Scientific Name**	**Family Name**	**USFWS**	**KSNPC**
Bass, Largemouth *	*Micropterus salmoides*	Centrarchidae		
Bass, Rock	*Ambloplites rupestris*	Centrarchidae		
Bass, Smallmouth	*Micropterus dolomieu*	Centrarchidae		
Bass, Spotted *	*Micropterus punctulatus*	Centrarchidae		
Bass, Striped	*Morone saxatilis*	Moronidae		
Bass, White	*Morone chrysops*	Moronidae		
Bass, Yellow	*Morone mississippiensis*	Moronidae		
Bluegill *	*Lepomis macrochirus*	Centrarchidae		
Bowfin	*Amia calva*	Amiidae		
Buffalo, Bigmouth	*Ictiobus cyprinellus*	Catostomidae		
Buffalo, Black *	*Ictiobus niger*	Catostomidae		SC
Buffalo, Smallmouth *	*Ictiobus bubalus*	Catostomidae		
Bullhead, Black	*Ameiurus melas*	Ictaluridae		
Bullhead, Brown *	*Ameiurus nebulosus*	Ictaluridae		
Bullhead, Yellow *	*Ameiurus natalis*	Ictaluridae		
Burbot	*Lota lota*	Gadidae		SC
Carp, Bighead*	*Hypophthalmicthys nobilis*	Cyprinidae		
Carp, Common *	*Cyprinus carpio*	Cyprinidae		
Carp, Grass	*Ctenopharyngodon idella*	Cyprinidae		
Carp, Silver	*Hypophthalmicthys molitrix*	Cyprinidae		
Carpsucker, Highfin	*Carpiodes velifer*	Catostomidae		
Carpsucker, River	*Carpiodes carpio*	Catostomidae		

Catfish, Blue	*Ictalurus furcatus*	Ictaluridae		
Catfish, Channel *	*Ictalurus punctatus*	Ictaluridae		
Catfish, Flathead	*Pylodictis olivaris*	Ictaluridae		
Chub, Creek *	*Semotilus atromaculatus*	Cyprinidae		
Chub, River	*Nocomis micropogon*	Cyprinidae		
Chub, Silver	*Macrhybopsis storeriana*	Cyprinidae		
Chubsucker, Lake	*Erimyzon sucetta*	Catostomidae		T
Chubsucker, Western Creek	*Erimyzon claviformis*	Catostomidae		

Common Name	**Scientific Name**	**Family Name**	**USFWS**	**KSNPC**
Crappie, Black	*Pomoxis nigromaculatus*	Centrarchidae		
Crappie, White *	*Pomoxis annularis*	Centrarchidae		
Darter, Banded	*Etheostoma zonale*	Percidae		
Darter, Bandfin *	*Etheostoma zonistium*	Percidae		
Darter, Blackside *	*Percina maculata*	Percidae		
Darter, Bluebreast	*Etheostoma camurum*	Percidae		
Darter, Bluntnose	*Etheostoma chlorosoma*	Percidae		
Darter, Brighteye	*Etheostoma lynceum*	Percidae		E
Darter, Channel	*Percina copelandi*	Percidae		
Darter, Cypress *	*Etheostoma proeliare*	Percidae		T
Darter, Dusky *	*Percina sciera*	Percidae		
Darter, Fantail *	*Etheostoma flabellare*	Percidae		
Darter, Firebelly	*Etheostoma pyrrhogaster*	Percidae	SOMC	E
Darter, Goldstripe	*Etheostoma parvipinne*	Percidae		E
Darter, Greenside	*Etheostoma blennioides*	Percidae		
Darter, Guardian *	*Etheostoma oophylax*	Percidae		
Darter, Gulf	*Etheostoma swaini*	Percidae		E
Darter, Harlequin *	*Etheostoma histrio*	Percidae		
Darter, Johnny	*Etheostoma nigrum*	Percidae		
Darter, Mud	*Etheostoma asprigene*	Percidae		
Darter, Orangethroat	*Etheostoma spectabile*	Percidae		
Darter, Rainbow	*Etheostoma caeruleum*	Percidae		
Darter, Redline	*Etheostoma rufilineatum*	Percidae		
Darter, Relict	*Etheostoma chiensense*	Percidae	E	E
Darter, River *	*Percina shumardi*	Percidae		
Darter, Saddleback *	*Percina vigil*	Percidae		
Darter, Scaly Sand	*Ammocrypta vivax*	Percidae		X
Darter, Slabrock	*Etheostoma smithi*	Percidae		
Darter, Slenderhead	*Percina phoxocephala*	Percidae		
Darter, Slough *	*Etheostoma gracile*	Percidae		
Darter, Speckled *	*Etheostoma stigmaeum*	Percidae		
Darter, Stripetail *	*Etheostoma kennicotti*	Percidae		
Drum, Freshwater *	*Aplodinotus grunniens*	Sciaenidae		
Eel, American	*Anguilla rostrata*	Anguillidae		
Flier*	*Centrarchus macropterus*	Centrarchidae		
Gar, Alligator	*Atractosteus spatula*	Lepisosteidae	SOMC	E
Gar, Longnose	*Lepisosteus osseus*	Lepisosteidae		
Gar, Shortnose *	*Lepisosteus platostomus*	Lepisosteidae		
Gar, Spotted	*Lepisosteus oculatus*	Lepisosteidae		
Goldeye	*Hiodon alosoides*	Hiodontidae		

Common Name	Scientific Name	Family Name	USFWS	KSNPC
Goldfish	*Carassius auratus*	Cyprinidae		
Herring, Skipjack	*Alosa chrysochloris*	Clupeidae		
Hogsucker, Northern *	*Hypentelium nigricans*	Catostomidae		
Lamprey, American Brook	*Lampetra appendix*	Petromyzontidae		T
Lamprey, Chestnut	*Ichthyomyzon castaneus*	Petromyzontidae		SC
Logperch	*Percina caprodes*	Percidae		
Madtom, Brindled *	*Noturus miurus*	Ictaluridae		
Madtom, Brown	*Noturus phaeus*	Ictaluridae		E
Madtom, Elegant	*Noturus elegans*	Ictaluridae		
Madtom, Freckled *	*Noturus nocturnus*	Ictaluridae		
Madtom, Least	*Noturus hildebrandi*	Ictaluridae		E
Madtom, Mountain	*Noturus eleutherus*	Ictaluridae		
Madtom, Northern	*Noturus stigmosus*	Ictaluridae	SOMC	SC
Madtom, Tadpole	*Noturus gyrinus*	Ictaluridae		
Minnow, Bluntnose *	*Pimephales notatus*	Cyprinidae		
Minnow, Bullhead	*Pimephales vigilax*	Cyprinidae		
Minnow, Cypress	*Hybognathus hayi*	Cyprinidae		E
Minnow, Flathead	*Pimephales promelas*	Cyprinidae		
Minnow, Pugnose *	*Opsopoeodus emiliae*	Cyprinidae		
Minnow, Silvery *	*Hybognathus nuchalis*	Cyprinidae		
Minnow, Suckermouth *	*Phenacobius mirabilis*	Cyprinidae		
Mooneye	*Hiodon tergisus*	Hiodontidae		
Mosquitofish, Western *	*Gambusia affinis*	Poeciliidae		
Mudminnow, Central *	*Umbra limi*	Centrarchidae		T
Paddlefish	*Polydon spathula*	Polyodontidae		
Perch, Pirate *	*Aphredoderus sayanus*	Aphredoderidae		
Perch, White	*Morone americana*	Moronidae		
Perch, Yellow	*Perca flavescens*	Percidae		
Pickerel, Chain	*Esox niger*	Esocidae		SC
Pickerel, Grass *	*Esox americanus*	Esocidae		
Pike, Northern	*Esox lucius*	Esocidae		
Pumpkinseed	*Lepomis gibbosus*	Centrarchidae		
Quillback *	*Carpiodes cyprinus*	Catostomidae		
Redhorse*	*Moxostoma* spp.	Catostomidae		
Redhorse, Black	*Moxostoma duquesnei*	Catostomidae		
Redhorse, Blacktail	*Moxostoma poecilurum*	Catostomidae		E
Redhorse, Golden *	*Moxostoma erythrurum*	Catostomidae		
Redhorse, River	*Moxostoma carinatum*	Catostomidae		
Redhorse, Silver	*Moxostoma anisurum*	Catostomidae		
Redhorse, Smallmouth	*Moxostoma breviceps*	Catostomidae		
Sauger	*Sander canadensis*	Percidae		
Shad, Alabama	*Alosa alabamae*	Clupeidae	SOMC	E
Shad, Gizzard *	*Dorosoma cepedianum*	Clupeidae		
Shad, Threadfin	*Dorosoma pretenense*	Clupeidae		
Shiner, Bigeye *	*Notropis boops*	Cyprinidae		
Shiner, Blacktail	*Cyprinella venusta*	Cyprinidae		SC
Shiner, Bluntface	*Cyprinella camura*	Cyprinidae		E
Shiner, Channel	*Notropus wickliffi*	Cyprinidae		

Shiner, Emerald *	*Notropis atherinoides*	Cyprinidae		
Shiner, Ghost	*Notropis buchanani*	Cyprinidae		
Shiner, Golden	*Notemigonus crysoleucas*	Cyprinidae		
Shiner, Mimic	*Notropis volucellis*	Cyprinidae		
Shiner, Pallid	*Hybopsis amnis*	Cyprinidae	SOMC	E
Shiner, Red	*Cyprinella lutrensis*	Cyprinidae		
Shiner, Redfin *	*Lythrurus umbratilis*	Cyprinidae		
Shiner, Ribbon *	*Lythrurus fumeus*	Cyprinidae		
Shiner, River *	*Notropis blennius*	Cyprinidae		
Shiner, Rosyface	*Notropis rubellus*	Cyprinidae		

Common Name	**Scientific Name**	**Family Name**	**USFWS**	**KSNPC**
Shiner, Sand	*Notropis stramineus*	Cyprinidae		
Shiner, Scarlet	*Lythrurus fasciolaris*	Cyprinidae		
Shiner, Silverband	*Notropis shumardi*	Cyprinidae		
Shiner, Spotfin	*Cyprinella spiloptera*	Cyprinidae		
Shiner, Spottail	*Notropis hudsonius*	Cyprinidae		
Shiner, Steelcolor *	*Cyprinella whipplei*	Cyprinidae		
Shiner, Striped	*Luxilus chrysocephalus*	Cyprinidae		
Shiner, Taillight	*Notropis maculatus*	Cyprinidae		T
Silverside, Brook *	*Labidesthes sicculus*	Atherinidae		
Silverside, Inland	*Menidia beryllina*	Atherinidae		T
Stonecat	*Noturus flavus*	Ictaluridae		
Stoneroller, Central	*Campostoma anomalum*	Cyprinidae		
Stoneroller, Largescale *	*Campostoma oligolepis*	Cyprinidae		
Sucker, Blue	*Cycleptus elongatus*	Catostomidae		
Sucker, Spotted *	*Minytrema melanops*	Catostomidae		
Sucker, White	*Catostomus commersoni*	Catostomidae		
Sunfish, Banded Pygmy	*Elassoma zonatum*	Elassomatidae		
Sunfish, Bantam	*Lepomis symmetricus*	Centrarchidae		
Sunfish, Dollar	*Lepomis marginatus*	Centrarchidae		E
Sunfish, Green *	*Lepomis cyanellus*	Centrarchidae		
Sunfish, Longear *	*Lepomis megalotis*	Centrarchidae		
Sunfish, Orangespotted *	*Lepomis humilis*	Centrarchidae		
Sunfish, Redbreast	*Lepomis auritus*	Centrarchidae		
Sunfish, Redear	*Lepomis microlophus*	Centrarchidae		
Sunfish, Redspotted	*Lepomis miniatus*	Centrarchidae		T
Topminnow, Blackspotted *	*Fundulus olivaceus*	Fundulidae		
Topminnow, Blackstripe *	*Fundulus notatus*	Fundulidae		
Walleye	*Sander vitreus*	Percidae		
Warmouth *	*Lepomis gulosus*	Centrarchidae		

Crayfish of Clarks River NWR

Crayfish found in the Lower Tennessee River watershed, of which the Clarks River is a part, are listed below. One family, five genera, and 17 species are represented. Some crayfish are listed by the Kentucky State Nature Preserves Commission (KSNPC) as Threatened (T), Endangered (E) or species of Special Concern (SC).

Species marked with an astericks (*) occur on the refuge.

Common Name	Scientific Name	Family Name	KSNPC
Bigclaw Crayfish	*Orconectes placidus*	Cambaridae	
Blood River Crayfish	*Orconectes burri*	Cambaridae	T
Cajun Dwarf Crayfish	*Cambarellus shufeldtii*	Cambaridae	SC
Calico Crayfish	*Orconectes immunis*	Cambaridae	
Depression Crayfish	*Cambarus rusticiformis*	Cambaridae	
Devil Crayfish*	*Cambarus diogenes*	Cambaridae	
Digger Crayfish	*Fallicambarus fodiens*	Cambaridae	
Gray-Speckled Crayfish	*Orconectes palmeri palmeri*	Cambaridae	E
Painted Devil Crayfish	*Cambarus ludovicianus*	Cambaridae	
Common Name	**Scientific Name**	**Family Name**	**KSNPC**
Painted Mudbug	*Cambarus species A*	Cambaridae	
Red Swamp Crayfish *	*Procambarus clarkii*	Cambaridae	
Saddle Crayfish*	*Orconectes durelli*	Cambaridae	
Shrimp Crayfish	*Orconectes lancifer*	Cambaridae	E
Swamp Dwarf Crayfish	*Cambarellus puer*	Cambaridae	E
Vernal Crayfish	*Procambarus viaeviridis*	Cambaridae	T
Western Highland Crayfish	*Orconectes tricuspis*	Cambaridae	
White River Crawfish *	*Procambarus acutus*	Cambaridae	

Amphibians and Reptiles of Clarks River NWR

The checklist of reptiles and amphibians below was generated by noted herpetologist John MacGregor of the KDFWR for the Jackson Purchase region, western Kentucky. Twenty-one families, 52 genera, and 87 species are represented. Habitat suitable for all the species listed below may not be found on the refuge.

Species marked with an asterisk (*) have been found on the refuge.

Salamanders

Common Name	Scientific Name	Family Name
Spotted Salamander *	*Ambystoma maculatum*	Ambystomatidae
Marbled Salamander *	*Ambystoma opacum*	Ambystomatidae
Mole Salamander *	*Ambystoma talpoideum*	Ambystomatidae
Smallmouth Salamander *	*Ambystoma texanum*	Ambystomatidae
Eastern Tiger Salamander*	*Ambystoma tigrinum tigrinum*	Ambystomatidae
3-toed Amphiuma	*Amphiuma tridactylum*	Amphiumidae
Eastern Hellbender	*Cryptobranchus alleganiensis*	Cryptobranchidae
Spotted Dusky Salamander	*Desmognathus conanti*	Plethodontidae
Southern Two-lined Salamander	*Eurycea cirrigera*	Plethodontidae
Three-lined Salamander	*Eurycea guttolineata*	Plethodontidae
Longtail Salamander *	*Eurycea longicauda*	Plethodontidae
Cave Salamander	*Eurycea lucifuga*	Plethodontidae
Four-toed Salamander *	*Hemidactylium scutatum*	Plethodontidae
Mudpuppy	*Necturus maculosus*	Proteidae
Central Newt *	*Notophthalmus viridescens*	Salamandridae
Northern Zigzag Salamander	*Plethodon dorsalis*	Plethodontidae

Northern Slimy Salamander *	*Plethodon glutinosus*	Plethodontidae
Mississippi Slimy Salamander*	*Plethodon mississippi*	Plethodontidae
N/S Red Salamander	*Pseudotriton ruber ssp.*	Plethodontidae
Western Lesser Siren *	*Siren intermedia nettingi*	Sirenidae

Frogs

Common Name	Scientific Name	Family Name
Cricket Frog *	*Acris crepitans*	Hylidae
American Toad *	*Bufo americanus*	Bufonidae
Fowler's Toad *	*Bufo fowleri*	Bufonidae
Eastern Narrowmouth Toad	*Gastrophryne carolinensis*	Microhylidae
Bird-voiced Treefrog	*Hyla avivoca*	Hylidae
Cope's Gray Treefrog *	*Hyla chrysoscelis*	Hylidae
Green Treefrog *	*Hyla cinerea*	Hylidae
Spring Peeper *	*Pseudacris crucifer*	Hylidae
Upland Chorus Frog *	*Pseudacris triseriata feriarum*	Hylidae
Northern Crawfish Frog *	*Rana areolata circulosa*	Ranidae
Bullfrog *	*Rana catesbeiana*	Ranidae
Green Frog *	*Rana clamitans*	Ranidae
Southern Leopard Frog *	*Rana sphenocephala*	Ranidae
Wood Frog	*Rana sylvatica*	Ranidae
Eastern Spadefoot	*Scaphiopus holbrookii*	Pelobatidae

Lizards

Common Name	Scientific Name	Family Name
Six-lined Racerunner *	*Cnemidophorus sexlineatus*	Teiidae
Coal Skink	*Eumeces anthracinus*	Scincidae
Five-lined Skink *	*Eumeces fasciatus*	Scincidae
Southeastern Five-lined Skink	*Eumeces inexpectatus*	Scincidae
Broadhead Skink	*Eumeces laticeps*	Scincidae
Fence Lizard *	*Sceloporus undulatus*	Phrynosomatidae
Ground Skink *	*Scincella lateralis*	Scincidae

Snakes

Common Name	Scientific Name	Family Name
Copperhead *	*Agkistrodon contortrix*	Viperidae
Cottonmouth *	*Agkistrodon piscivorus leucostoma*	Viperidae
Worm Snake *	*Carphophis amoenus*	Colubridae
Scarlet Snake	*Cemophora coccinea*	Colubridae
Kirtland's Snake	*Clonophis kirtlandii*	Colubridae
Black Racer *	*Coluber constrictor*	Colubridae
Timber Rattlesnake	*Crotalus horridus*	Viperidae
Ringneck Snake *	*Diadophis punctatus*	Colubridae
Black Rat Snake *	*Elaphe o. obsoleta*	Colubridae
Mud Snake *	*Farancia abacura*	Colubridae

Eastern Hognose Snake	*Heterodon platirhinos*	Colubridae
Prairie Kingsnake *	*Lampropeltis calligaster*	Colubridae
Scarlet Kingsnake	*Lampropeltis elapsoides*	Colubridae
Black Kingsnake *	*Lampropeltis getula nigra*	Colubridae
Red Milk Snake	*Lampropeltis triangulum syspila*	Colubridae
Mississippi Green Water Snake	*Nerodia cyclopion*	Colubridae
Copperbelly x Yellowbelly *	*Nerodia e. flav. x neglecta*	Colubridae
Broad-banded Water Snake *	*Nerodia fasciata confluens*	Colubridae
Diamondback Water Snake *	*Nerodia rhombifer*	Colubridae
Midland Water Snake *	*Nerodia sipedon pleuralis*	Colubridae
Rough Green Snake *	*Opheodrys aestivus*	Colubridae
Pine Snake	*Pituophis melanoleucus*	Colubridae
Pigmy Rattlesnake	*Sistrurus miliarius streckeri*	Viperidae
Brown Snake *	*Storeria dekayi*	Colubridae
Northern Redbelly Snake *	*Storeria o. occipitomaculata*	Colubridae
Southeastern Crowned Snake	*Tantilla coronata*	Colubridae
Western Ribbon Snake	*Thamnophis proximus*	Colubridae
Eastern Ribbon Snake *	*Thamnophis sauritus*	Colubridae
Eastern Garter Snake *	*Thamnophis sirtalis*	Colubridae
Western Earth Snake *	*Virginia valeriae elegans*	Colubridae

Turtles

Common Name	**Scientific Name**	**Family Name**
Smooth Softshell	*Apalone mutica*	Trionychidae
Spiny Softshell *	*Apalone spinifera*	Trionychidae
Common Snapping Turtle *	*Chelydra serpentina serpentina*	Chelydridae
Painted Turtle *	*Chrysemys picta ssp.*	Emydidae
Common Map Turtle	*Graptemys geographica*	Emydidae
Mississippi Map Turtle	*Graptemys kohnii*	Emydidae
Ouachita Map Turtle	*Graptemys ouachitensis*	Emydidae
False Map Turtle	*Graptemys pseudogeographica*	Emydidae
Mud Turtle *	*Kinosternon subrubrum*	Kinosternidae
Alligator Snapping Turtle	*Macrochelys temminckii*	Chelydridae
River Cooter	*Pseudemys concinna*	Emydidae
Musk Turtle *	*Sternotherus odoratus*	Kinosternidae
Eastern Box Turtle *	*Terrapene carolina carolina*	Emydidae
Red-eared Slider *	*Trachemys scripta elegans*	Emydidae

Mammals of Clarks River NWR

The refuge is located within the range of the animals found on the list below. A total of 15 families, 34 genera, and 43 species are represented. Efforts to locate the remaining species are ongoing.

Species marked with an asterisk (*) have been documented on the refuge.

Common Name	Scientific Name	Family Name	USFWS	KSNPC
Armadillo *	*Dasypus novemcinctus*	Daspodidae		
Bat, Eastern Red *	*Lasiurus borealis*	Vespertilionidae		
Bat, Evening *	*Nycticeius humeralis*	Vespertilionidae		S
Bat, Gray	*Myotis grisescens*	Vespertilionidae	E	T
Bat, Indiana	*Myotis sodalis*	Vespertilionidae	E	E
Bat, Silver-haired *	*Lasionycteris noctivagans*	Vespertilionidae		
Beaver *	*Castor canadensis*	Castoridae		
Bobcat *	*Lynx rufus*	Felidae		
Chipmunk, Eastern	*Tamias striatus*	Sciuridae		
Cotton Rat, Hispid	*Sigmodon hispidus*	Muridae		
Cottontail, Eastern *	*Sylvilagus palustris*	Leporidae		
Coyote *	*Canis latrans*	Canidae		
Deer, White-tailed *	*Odocoileus virginianus*	Cervidae		
Fox, Gray *	*Urocyon cinereoargenteus*	Canidae		
Fox, Red*	*Vulpes vulpes*	Canidae		
Harvest Mouse, Eastern *	*Reithrodontomys humulis*	Muridae		
Mink *	*Mustela vison*	Mustelidae		
Mole, Eastern	*Scalopus aquaticus*	Talpidae		
Mouse, Cotton *	*Peromyscus gossypinus*	Muridae		T
Mouse, Deer *	*Peromyscus maniculatus*	Muridae		
Mouse, Golden *	*Ochrotomys nuttalli*	Muridae		
Mouse, House *	*Mus musculus*	Muridae		
Mouse, Meadow Jumping *	*Zapus hudsonius*	Dipodidae		
Mouse, White-footed *	*Peromyscus leucopus*	Muridae		
Muskrat	*Ondatra zibethica*	Muridae		
Myotis, Northern *	*Myotis septentrionalis*	Vespertilionidae		
Myotis, Southeastern *	*Myotis austroriparius*	Vespertilionidae	SOMC	E
Opossum *	*Didelphis marsupialis*	Didelphidae		
Otter, River *	*Lutra canadensis*	Mustelidae		
Pipistrelle, Eastern *	*Pipistrellus subflavus*	Vespertilionidae		
Rabbit, Swamp *	*Sylvilagus aquaticus*	Leporidae		
Raccon *	*Procyon lotor*	Procyonidae		
Rice Rat, Marsh *	*Oryzomys palustris*	Muridae		
Shrew, Least	*Cryptotis parva*	Soricidae		
Shrew, Pygmy	*Sorex hoyi*	Soricidae		
Shrew, Southeastern*	*Sorex longirostris*	Soricidae		
Shrew, Southern Short-tailed *	*Blarina brevicauda*	Soricidae		
Squirrel, Eastern Fox *	*Sciurus niger*	Sciuridae		
Squirrel, Eastern Gray *	*Sciurus carolinensis*	Sciuridae		
Squirrel, Southern Flying *	*Glaucomys volans*	Sciuridae		
Vole, Prairie *	*Microtus ochrogaster*	Muridae		
Vole, Woodland *	*Microtus pinetorum*	Muridae		
Woodchuck *	*Marmota monax*	Sciuridae		

Birds of Clarks River NWR

The refuge is located within the range of the animals found on the list below. A total of 15 families, 34 genera, and 43 species are represented. Efforts to locate the remaining species are ongoing.

Species marked with an asterisk (*) have been documented on the refuge.

Common Name	Scientific Name	Order
Cooper's Hawk*	*Accipiter cooperii*	Falconiformes
Sharp-shinned Hawk*	*Accipiter striatus*	Falconiformes
Spotted Sandpiper*	*Actitis macularia*	Charadriiformes
Red-winged Blackbird*	*Agelaius phoeniceus*	Passeriformes
Wood Duck*	*Aix sponsa*	Anseriformes
Henslow's Sparrow	*Ammodramus henslowii*	Passeriformes
Grasshopper Sparrow	*Ammodramus savannarum*	Passeriformes
Northern Pintail*	*Anas acuta*	Anseriformes
American Wigeon*	*Anas Americana*	Anseriformes
Northern Shoveler*	*Anas clypeata*	Anseriformes
Green-winged Teal*	*Anas crecca*	Anseriformes
Blue-winged Teal*	*Anas discors*	Anseriformes
Mallard*	*Anas platyrhynchos*	Anseriformes
American Black Duck*	*Anas rubripes*	Anseriformes
Gadwall*	*Anas strepera*	Anseriformes
Greater White-fronted Goose*	*Anser albifrons*	Anseriformes
American Pipit	*Anthus rubescens*	Passeriformes
Golden Eagle	*Aquila chrysaetos*	Falconiformes
Ruby-throated Hummingbird*	*Archilochus colubris*	Apodiformes
Great Egret*	*Ardea alba*	Ciconiiformes
Great Blue Heron*	*Ardea herodius*	Ciconiiformes
Ruddy Turnstone	*Arenaria interpres*	Charadriiformes
Lesser Scaup*	*Aythya affinis*	Anseriformes
Redhead*	*Aythya Americana*	Anseriformes
Ring-necked Duck*	*Aythya collaris*	Anseriformes
Greater Scaup*	*Aythya marila*	Anseriformes
Canvasback*	*Aythya valisineria*	Anseriformes
Tufted Titmouse*	*Baeolophus bicolor*	Passeriformes
Cedar Waxwing*	*Bombycilla cedrorum*	Passeriformes
American Bittern	*Botaurus lentiginosus*	Ciconiiformes
Canada Goose*	*Branta Canadensis*	Anseriformes
Great Horned Owl*	*Bubo virginianus*	Strigiformes
Cattle Egret*	*Bubulcus ibis*	Ciconiiformes
Bufflehead*	*Bucephala albeola*	Anseriformes
Common Goldeneye	*Bucephala clangula*	Anseriformes
Red-tailed Hawk*	*Buteo jamaicensis*	Falconiformes
Rough-legged Hawk	*Buteo lagopus*	Falconiformes
Red-shouldered Hawk*	*Buteo lineatus*	Falconiformes
Broad-winged Hawk*	*Buteo platypterus*	Falconiformes
Green Heron*	*Butorides virescens*	Ciconiiformes
Lapland Longspur	*Calcarius lapponicus*	Passeriformes
Least Sandpiper*	*Calibris minutilla*	Charadriiformes

Common Name	Scientific Name	Order
Dunlin	*Calidris alpine*	Charadriiformes
Baird's Sandpiper	*Calidris bairdii*	Charadriiformes
Red Knot	*Calidris canutus*	Charadriiformes
White-rumped Sandpiper*	*Calidris fuscicollis*	Charadriiformes
Stilt Sandpiper	*Calidris himantopus*	Charadriiformes
Western Sandpiper	*Calidris mauri*	Charadriiformes
Pectoral Sandpiper*	*Calidris melanotos*	Charadriiformes
Ring-billed Gull*	*Calidris melanotos*	Charadriiformes
Semipalmated Sandpiper	*Calidris pusilla*	Charadriiformes
Chuck-will's-widow*	*Caprimulgus carolinensis*	Caprimulgiformes
Whip-poor-will*	*Caprimulgus vociferus*	Caprimulgiformes
Northern Cardinal*	*Cardinalis cardinalis*	Passeriformes
Pine Siskin	*Carduelis pinus*	Passeriformes
American Goldfinch*	*Carduelis tristis*	Passeriformes
House Finch*	*Carpodacus mexicanus*	Passeriformes
Purple Finch*	*Carpodacus purpureus*	Passeriformes
Turkey Vulture*	*Cathartes aura*	Ciconiiformes
Veery*	*Catharus fuscescens*	Passeriformes
Hermit Thrush*	*Catharus guttatus*	Passeriformes
Gray-cheeked Thrush*	*Catharus minimus*	Passeriformes
Swainson's Thrush*	*Catharus ustulatus*	Passeriformes
Willet	*Catoptrophorus semipalmatus*	Charadriiformes
Brown Creeper	*Certhia americana*	Passeriformes
Belted Kingfisher*	*Ceryle alcyon*	Coraciiformes
Chimney Swift*	*Chaetura pelagica*	Apodiformes
Semipalmated Plover	*Charadrius semipalmatus*	Charadriiformes
Killdeer*	*Charadrius vociferus*	Charadriiformes
Snow Goose	*Chen caerulescens*	Anseriformes
Ross's Goose	*Chen rossii*	Anseriformes
Black Tern	*Chlidonias niger*	Charadriiformes
Common Nighthawk*	*Chordeiles minor*	Caprimulgiformes
Northern Harrier*	*Circus cyaneus*	Falconiformes
Marsh Wren	*Cistothorus palustris*	Passeriformes
Yellow-billed Cuckoo*	*Coccyzus americanus*	Cuculiformes
Black-billed Cuckoo*	*Coccyzus erythropthalmus*	Cuculiformes
Northern Flicker*	*Colaptes auratus*	Piciformes
Northern Bobwhite*	*Colinus virginianus*	Galliformes
Rock Pigeon*	*Columba livia*	Columbiformes
Olive-sided Flycatcher*	*Contopus cooperi*	Passeriformes
Eastern Wood-Pewee*	*Contopus virens*	Passeriformes
Black Vulture*	*Coragyps atratus*	Ciconiiformes
American Crow*	*Corvus brachyrhyncos*	Passeriformes
Fish Crow*	*Corvus ossifragus*	Passeriformes
Blue Jay*	*Cyanocitta cristata*	Passeriformes
Trumpeter Swan*	*Cygnus buccinator*	Anseriformes
Tundra Swan	*Cygnus columbiabus*	Anseriformes
Mute Swan	*Cygnus olor*	Anseriformes
Black-throated Blue Warbler	*Dendroica caerulescens*	Passeriformes

Common Name	Scientific Name	Order
Bay-breasted Warbler*	*Dendroica castanea*	Passeriformes
Cerulean Warbler*	*Dendroica cerilea*	Passeriformes
Yellow-rumped Warbler*	*Dendroica coronata*	Passeriformes
Prairie Warbler*	*Dendroica discolor*	Passeriformes
Yellow-throated Warbler*	*Dendroica dominica*	Passeriformes
Blackburnian Warbler	*Dendroica fusca*	Passeriformes
Magnolia Warbler*	*Dendroica magnolia*	Passeriformes
Palm Warbler	*Dendroica palmarum*	Passeriformes
Chestnut-sided Warbler	*Dendroica pensylvanica*	Passeriformes
Yellow Warbler*	*Dendroica petechia*	Passeriformes
Pine Warbler*	*Dendroica pinus*	Passeriformes
Blackpoll Warbler	*Dendroica striata*	Passeriformes
Cape May Warbler	*Dendroica tigrina*	Passeriformes
Black-throated Green Warbler*	*Dendroica virens*	Passeriformes
Bobolink	*Dolichonyx oryzivorus*	Passeriformes
Pileated Woodpecker*	*Drryocopus pileatus*	Piciformes
Gray Catbird*	*Dumetella carolinensis*	Passeriformes
Little Blue Heron*	*Egretta caerulea*	Ciconiiformes
Snowy Egret*	*Egretta thula*	Ciconiiformes
Alder Flycatcher	*Empidonax alnorum*	Passeriformes
Yellow-bellied Flycatcher*	*Empidonax flaviventris*	Passeriformes
Least Flycatcher*	*Empidonax minimus*	Passeriformes
Willow Flycatcher	*Empidonax traillii*	Passeriformes
Acadian Flycatcher*	*Empidonax virescens*	Passeriformes
Horned Lark*	*Eremophila alpestris*	Passeriformes
Rusty Blackbird*	*Euphagus carolinus*	Passeriformes
Merlin	*Falco columbarius*	Falconiformes
Peregrine Falcon	*Falco rusticolus*	Falconiformes
American Kestrel*	*Falco sparverius*	Falconiformes
American Coot	*Fulica americana*	Gruiformes
Wilson's Snipe	*Gallinago delicata*	Charadriiformes
Common Snipe*	*Gallinago gallinago*	Charadriiformes
Common Loon	*Gavia inmer*	Gaviiformes
Common Yellowthroat*	*Geothlypis trichas*	Passeriformes
Sandhill Crane	*Grus canadensis*	Gruiformes
Blue Grosbeak*	*Guiraca caerulea*	Passeriformes
Bald Eagle*	*Haliaeetus leucocephalus*	Falconiformes
Worm-eating Warbler*	*Helmitheros vermivorus*	Passeriformes
Black-necked Stilt	*Himantopus mexicanus*	Charadriiformes
Barn Swallow*	*Hirundo rustica*	Passeriformes
Wood Thrush*	*Hylocichla mustelina*	Passeriformes
Yellow-breasted Chat*	*Icteria virens*	Passeriformes
Baltimore Oriole*	*Icterus galbula*	Passeriformes
Orchard Oriole*	*Icterus spurius*	Passeriformes
Mississippi Kite*	*Ictinia mississippiensis*	Falconiformes
Dark-eyed Junco*	*Junco hyemalis*	Passeriformes
Loggerhead Shrike	*Lanius ludovicianus*	Passeriformes
Herring Gull	*Larus argentatus*	Charadriiformes

Common Name	Scientific Name	Order
Bonaparte's Gull	*Larus philadelphia*	Charadriiformes
Short-billed Dowitcher	*Limnodromus griseus*	Charadriiformes
Long-billed Dowitcher	*Limnodromus scolopaceus*	Charadriiformes
Swainson's Warbler	*Limnothlypis swainsonii*	Passeriformes
Hooded Merganser*	*Lophodytes cucullatus*	Anseriformes
Red-bellied Woodpecker*	*Melanerpes carolinus*	Piciformes
Red-headed Woodpecker*	*Melanerpes erythrocephalus*	Piciformes
Wild Turkey*	*Meleagris gallopavo*	Galliformes
Swamp Sparrow	*Melospiza georgiana*	Passeriformes
Lincoln's Sparrow	*Melospiza lincolnii*	Passeriformes
Song Sparrow*	*Melospiza melodia*	Passeriformes
Common Merganser	*Mergus merganser*	Anseriformes
Red-breasted Merganser	*Mergus serrator*	Anseriformes
Northern Mockingbird*	*Mimus polyglottos*	Passeriformes
Black-and-white Warbler*	*Mniotilta varia*	Passeriformes
Brown-headed Cowbird*	*Molothrus ater*	Passeriformes
Great Crested Flycatcher*	*Myiarchus crinitus*	Passeriformes
Yellow-crowned Night-Heron*	*Nyctanassa violacea*	Ciconiiformes
Black-crowned Night-Heron*	*Nycticorax nycticorax*	Ciconiiformes
Connecticut Warbler*	*Oporornis agilis*	Passeriformes
Kentucky Warbler*	*Oporornis formosus*	Passeriformes
Mourning Warbler	*Oporornis philadelphia*	Passeriformes
Eastern Screech-Owl*	*Otus asio*	Strigiformes
Ruddy Duck	*Oxyura jamaicensis*	Anseriformes
Osprey*	*Pandion haliaetus*	Falconiformes
Northern Parula*	*Parula americana*	Passeriformes
House Sparrow*	*Passer domesticus*	Passeriformes
Savannah Sparrow	*Passerculus sandwichensis*	Passeriformes
Fox Sparrow	*Passerella iliaca*	Passeriformes
Indigo Bunting*	*Passerina cyanea*	Passeriformes
American White Pelican	*Pelecanus erythrorhynchos*	Pelecaniformes
Cliff Swallow*	*Petrochelidon pyrrhonota*	Passeriformes
Double-crested Cormorant*	*Phalacrocorax auritus*	Pelecaniformes
Wilson's Phalarope	*Phalaropus tricolor*	Charadriiformes
Rose-breasted Grosbeak*	*Pheucticus ludovicianus*	Passeriformes
Downy Woodpecker*	*Picoides pubescens*	Piciformes
Hairy Woodpecker*	*Picoides villosus*	Piciformes
Eastern Towhee*	*Pipilo erythrophthalmus*	Passeriformes
Scarlet Tanager*	*Piranga olivacea*	Passeriformes
Summer Tanager*	*Piranga rubra*	Passeriformes
American Golden-Plover*	*Pluvialis dominica*	Charadriiformes
Black-bellied Plover	*Pluvialis squatarola*	Charadriiformes
Horned Grebe	*Podiceps grisegena*	Podicipediformes
Pied-billed Grebe*	*Podilymbus podiceps*	Podicipediformes
Carolina Chickadee*	*Poecile carolinensis*	Passeriformes
Blue-gray Gnatcatcher*	*Polioptila caerulea*	Passeriformes
Vesper Sparrow	*Pooecetes gramineus*	Passeriformes
Sora*	*Porzana carolina*	Gruiformes

Common Name	Scientific Name	Order
Purple Martin*	*Progne subis*	Passeriformes
Prothonotary Warbler*	*Protonotaria citrea*	Passeriformes
Common Grackle*	*Quiscalus guiscula*	Passeriformes
American Avocet	*Recurvisostra americana*	Charadriiformes
Ruby-crowned Kinglet*	*Regulus calendula*	Passeriformes
Golden-crowned Kinglet	*Regulus satrapa*	Passeriformes
Bank Swallow	*Riparia riparia*	Passeriformes
Eastern Phoebe*	*Sayornis phoebe*	Passeriformes
American Woodcock*	*Scolopax minor*	Charadriiformes
Ovenbird*	*Seiurus aurocapillus*	Passeriformes
Louisiana Waterthrush*	*Seiurus motacilla*	Passeriformes
Northern Waterthrush*	*Seiurus noveboracensis*	Passeriformes
American Redstart*	*Setophaga ruticilla*	Passeriformes
Eastern Bluebird*	*Sialia sialis*	Passeriformes
Red-breasted Nuthatch	*Sitta canadensis*	Passeriformes
White-breasted Nuthatch*	*Sitta carolinensis*	Passeriformes
Yellow-bellied Sapsucker*	*Sphyrapicus varius*	Piciformes
Dickcissel*	*Spiza americana*	Passeriformes
American Tree Sparrow	*Spizella arborea*	Passeriformes
Chipping Sparrow*	*Spizella passerina*	Passeriformes
Field Sparrow	*Spizella pusilla*	Passeriformes
Northern Rough-winged Swallow*	*Stelgidopteryx serripennis*	Passeriformes
Caspian Tern	*Sterna caspia*	Charadriiformes
Forster's Tern	*Sterna forsteri*	Charadriiformes
Barred Owl*	*Strix varia*	Strigiformes
Eastern Meadowlark*	*Sturnella magna*	Passeriformes
European Starling*	*Sturnus vulgaris*	Passeriformes
Tree Swallow*	*Tachycineta bicolor*	Passeriformes
Carolina Wren*	*Thryothorus ludovicianus*	Passeriformes
Brown Thrasher*	*Toxostoma rufum*	Passeriformes
Lesser Yellowlegs*	*Tringa flavipes*	Charadriiformes
Greater Yellowlegs*	*Tringa melanoleuca*	Charadriiformes
Solitary Sandpiper*	*Tringa solitaria*	Charadriiformes
House Wren*	*Troglodytes aedon*	Passeriformes
Winter Wren	*Troglodytes troglodytes*	Passeriformes
Buff-breasted Sandpiper	*Tryngites subruficollis*	Charadriiformes
American Robin*	*Turdus migratorius*	Passeriformes
Eastern Kingbird*	*Tyrannus tyrannus*	Passeriformes
Barn Owl	*Tyto alba*	Strigiformes
Orange-crowned Warbler	*Vermivora celata*	Passeriformes
Golden-winged Warbler	*Vermivora chrysoptera*	Passeriformes
Tennessee Warbler*	*Vermivora peregrina*	Passeriformes
Blue-winged Warbler*	*Vermivora pinus*	Passeriformes
Nashville Warbler*	*Vermivora ruficapilla*	Passeriformes
Yellow-throated Vireo*	*Vireo flavifrons*	Passeriformes
Warbling Vireo*	*Vireo gilvus*	Passeriformes
White-eyed Vireo*	*Vireo griseus*	Passeriformes
Red-eyed Vireo*	*Vireo olivaceus*	Passeriformes

Common Name	Scientific Name	Order
Philadelphia Vireo	*Vireo philadelphicus*	Passeriformes
Blue-headed Vireo	*Vireo solitarius*	Passeriformes
Canada Warbler*	*Wilsonia canadensis*	Passeriformes
Hooded Warbler*	*Wilsonia citrina*	Passeriformes
Wilson's Warbler	*Wilsonia pusilla*	Passeriformes
Mourning Dove*	*Zenaida macroura*	Columbiformes
White-throated Sparrow*	*Zonotrichia albicollis*	Passeriformes
White-crowned Sparrow	*Zonotrichia leucophrys*	Passeriformes

Appendix K. List of Preparers

This appendix summarizes the consultation and coordination that has occurred to date in identifying the issues, alternatives, and proposed action that were presented in this Draft CCP/EA. It lists the meetings that have been held with the various agencies, organizations and individuals who were consulted in the preparation of the Draft CCP/EA.

The Draft CCP/EA for Clarks River NWR was written with the participation and assistance of refuge and Service staff; the KDFWR, and the USDA Forest Service, Land Between the Lakes. The planning process itself began in August 2008, with the formation of a refuge planning team; a notice of intent to develop the CCP had earlier been published in the *Federal Register*.

In December 2005, in preparation for the comprehensive planning process, a team of biologists conducted a comprehensive biological review for the refuge. Participants in the biological review were drawn from the refuge and the Service, including specialists from the Ecological Services, Realty, and Planning divisions, and the USDA's Natural Resources Conservation Service.

Also in 2005, refuge and Service personnel met to conduct a visitor services review. The information and recommendations in both the biological and visitor services reports proved a valuable "point of departure" for the authors of this plan. Subsequently, the refuge hosted public scoping meetings on September 23 and 25, 2008, and began an outreach campaign through various media to collect ideas and concerns from all stakeholders. Please refer to Chapter III of Section A for more information on the public scoping process and the overall consultation and coordination that were achieved during the development of the Draft CCP/EA.

CORE PLANNING TEAM MEMBERS

The following individuals comprised the core planning team:

Michael Johnson	Clarks River NWR, Project Leader
Tina Chouinard	Fish and Wildlife Service, Planning Team Leader
Andy Eller	Clarks River NWR, Biologist (Former)
Lee Andrews	FWS Ecological Services, Field Supervisor, Frankfort, KY Office
Alan Whited	Clarks River NWR, Partners for Fish and Wildlife Biologist (Former)
Pat Hahs	KY Department of Fish and Wildlife Resources, Program Manager
Chris Garland	KY Department of Fish and Wildlife Resources, Wildlife Biologist
Steve Bloemer	USDA Forest Service, Land Between the Lakes, Senior Wildlife Biologist
Stacey Hayden	Clarks River NWR, Park Ranger
Scott Simmons	Clarks River NWR, Deputy Project Leader
Kent Ozment	Clarks River NWR, Biologist

INTERDISCIPLINARY CCP CORE TEAM MEMBERS

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Rick Kanaski	FWS, Atlanta, GA; Regional Archaeologist
Evelyn Nelson	FWS, Atlanta, GA; Writer/Editor
Randy Musgraves	FWS, Atlanta, GA; Formatting and Print Coordination
Rosamond Hopp	FWS, Atlanta, GA; Regional Planning Coordinator

INTERDISCIPLINARY PLANNING TEAM MEMBERS

Several individuals supported the planning process with participation on the biological review team, visitor services review team, and additional special topic discussions. Their information provided additional biological support for developing objectives found in this plan. Some members are internal to the Service and provide additional policy guidance and support for objective development as well.

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Sarah Welker	Cross Creeks NWR
David Moody	St. Marks NWR

LAND PROTECTION PLAN EXPANSION TEAM

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