Biological Assessment

for the
Land and Resources Management Plan

USDA Forest Service

Southern Region

Golden Pond, KY

Land Between The Lakes
National Recreation Area

October 2004

Biological Assessment

for the Land and Resource Management Plan

Land Between The Lakes National Recreation Area

United States Department of Agriculture
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United States Department of the Interior

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October 27, 2004

Mr. William Lisowsky
United States Forest Service
Land Between the Lakes
National Recreation Area
100 Van Morgan Drive
Golden Pond, Kentucky 42211

Subject: FWS #05-0008; Biological Assessment for the Land Between the Lakes Land and Resource Management Plan, Trigg County, Kentucky

Dear Mr. Lisowsky:

This responds to your October 22, 2004, letter requesting our review of the Biological Assessment (BA) prepared for the Land Between the Lakes (LBL) Land and Resource Management Plan (LRMP). Within the BA, the effects of the LBL LRMP on the following five federally listed endangered and threatened species and their habitats were evaluated. These species include:

Common Name	Scientific Name	Federal Status
Bald eagle	*Haliaeetus leucocephalus*	threatened
Interior least tern	*Sterna antillarum athalassos*	endangered
Gray bat	*Myotis grisescens*	endangered
Indiana bat	*Myotis sodalis*	endangered
Price's potato bean	*Apios priceana*	threatened

Specifically, you have requested our concurrence with your determination that the implementation of the LBL LRMP is not likely to adversely affect the above listed threatened and endangered species under Section 7 of the Endangered Species Act.

In the BA, LBL has made a determination of "not likely to adversely affect" for each of the species listed above. LBL based these determinations on the following species-specific factors:

Bald Eagle

1. Proposed vegetation management activities will continue to provide suitable perching, roosting, and nesting habitat for bald eagles.
2. Stream, wetland, and riparian area management and LRMP standards will maintain or improve stability, function, and water quality of streams, ponds, and lakes. Stable or improved water quality would be beneficial in maintaining an aquatic forage base for eagles.

3. Although recreation use is expected to increase slightly, Area Plan direction and standards, continued provision of wildlife refuges, implementation and enforcement of habitat and nest protection guidelines, and education of visitors will all contribute to minimizing disturbance to bald eagles on LBL.
4. The Forest Service (FS) will continue to consult on a project-by-project basis on those projects that are proposed to occur within the primary and/or secondary management zones for LBL's bald eagle nests.

Interior Least Tern

1. Stream, wetland, and riparian area management and LRMP standards will maintain or improve stability, function, and water quality of streams, ponds, and lakes. Stable or improved water quality would be beneficial in maintaining an aquatic forage base for least terns.
2. Watersheds will be managed to provide resilient and stable conditions to ensure the quality and quantity of water necessary to protect ecological functions, and to protect shoreline habitat.
3. Least tern habitat in the adjacent reservoirs is frequently inundated by reservoir water level fluctuations, and is not within the jurisdiction of FS to manage.
4. Should this species be found to occur on LBL or along LBL shoreline, consultation would be held with the Kentucky Field Office (KFO) pursuant to Section 7.

Gray bat

1. Summer or winter caves suitable for gray bats do not exist on LBL.
2. Water quality, stream corridors, and lake shorelines will be protected through management of water resources and implementation of LRMP standards. These resources will continue to provide foraging areas and an aquatic prey base for gray bats.
3. A small increase in recreation use is not expected to adversely impact this species due to the absence of caves and the implementation of LRMP standards to protect foraging areas and water quality.
4. Potential adverse effects to gray bats will be considered on a project-by-project basis. If potential foraging habitat is proposed for alteration during the summer foraging months, or other actions that could potentially constitute a take, consultation will be held with the KFO.

Indiana bat

1. Winter hibernacula do not exist for the Indiana bat on LBL.
2. Vegetation management will provide for a predominantly oak-hickory forest with large, older age-class trees, den trees, and snags that will continue to provide trees with exfoliating bark across the LBL landscape for potential roost and maternity sites.
3. Water quality, stream corridors, and lake shorelines will be protected through management of water resources and implementation of LRMP standards. These resources will continue to provide foraging areas and an aquatic prey base for bats.
4. A small increase in recreational use is not expected to adversely impact this species due to the absence of caves and the implementation of LRMP standards to protect terrestrial and aquatic resources.
5. Although Indiana bats have not been found on LBL, periodic monitoring for bats will

continue, and project-specific inventory will be implemented as needed. If Indiana bats are found on LBL, consultation will be held with the KFO.

Price's Potato Bean

1. Monitoring and management of five known Price's potato bean sites in consultation with the KFO, along with continued long-term monitoring of these populations, will help to maintain or increase known populations of this species on LBL.
2. Vegetation management activities resulting from LRMP implementation are expected to increase potential habitat for Price's potato bean during the planning period by opening the forest canopy in selected locations, which could result in new populations.
3. Projected increases in recreational use will be monitored, and appropriate measures will continue to be enforced to protect known populations and any newly discovered populations from potential adverse effects of recreational use.
4. The potential to propagate the species in new locations will be explored with the KFO and others, which would be beneficial for the species.

We have determined that the information provided in the BA and draft LRMP is sufficient for us to evaluate the potential adverse and beneficial effects of implementation of the LRMP on the species listed above. We have also evaluated the species-specific conservation and protection measures that were identified in the BA and draft LRMP and believe that these factors will programmatically avoid and/or minimize potential adverse effects to these species. Based on these factors and LBL's commitment to continue consulting with the KFO on a project-by-project basis relative to potential adverse effects on these listed species that may still occur in spite of implementation of the species-specific conservation and protection measures, we concur with LBL's determination of "not likely to adversely affect" for the bald eagle, interior least tern, gray bat, Indiana bat, and Price's potato bean. In view of this, we believe that the requirements of section 7 have been fulfilled. However, LBL's obligations under section 7 must be reconsidered, however, if: (1) new information reveals that the proposed project may affect listed species in a manner or to an extent not previously considered, (2) the proposed project is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed project.

We appreciate the opportunity to review the BA and draft LRMP and to provide comments on this project. If you have any questions on this letter or its contents, please contact me at 502-695-0468.

Sincerely,

Virgil Lee Andrews, Jr.
Field Supervisor

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Biological Assessment
for the
Land Between The Lakes
Land and Resource Management Plan

October 2004

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Summary

Objectives of this Biological Assessment (BA) are to:

- Comply with requirements of the Endangered Species Act (ESA) of 1973, as amended, so that actions by federal agencies will not jeopardize the existence of federally listed species, or destroy, or adversely modify their critical habitat.

- Assess the effects that implementation of the Land Between The Lakes (LBL) Land and Resource Management Plan (hereafter referred to as the "Area Plan") will have on threatened and endangered species known to exist on or near the Recreation Area.

- Provide biological input to ensure United States Forest Service (FS) compliance with the National Forest Management Act (NFMA) of 1976 and Forest Service Manual (FSM) 2670.

The effects of the LBL Area Plan on five federally listed endangered and threatened species and their habitats are evaluated. Analyses include Environmental Baseline, Management and Protection, Potential Effects, and Determination of Effect.

Determination of Effect

The Determination of Effect for bald eagle, Interior least tern, gray bat, Indiana bat, and Price's potato bean is "not likely to adversely affect." Informal consultation with the United States Fish and Wildlife Service (FWS) is required.

Introduction

Management of LBL was transferred from Tennessee Valley Authority (TVA) to the FS on October 1, 1999, under the provisions of the LBL Protection Act of 1998. The Act calls for the FS to develop an Area Plan that complies with the basic laws applicable to all national forests, and will guide management direction for the next 10 to 15 years. The Area Plan describes the public's expectations for desired conditions at LBL and the strategies for achieving the desired conditions. The Area Plan will not resolve issues in detail, but it will provide a general framework by which future decisions will be made. Forest Service plans are meant to be flexible in that they allow, but do not mandate, certain activities to take place; they do not make irretrievable commitments of resources; and they do not contain site-specific decisions (*Ohio Forestry Assn. v. Sierra Club*, 523 U.S. 726 (1998)).

Beyond transferring management responsibility for LBL, the Protection Act defines the LBL mission "to protect and manage the resources of LBL for optimum yield of outdoor recreation and environmental education for the American people. In so doing, to utilize the demonstration assignment to authorize, cooperate in, test, and demonstrate innovative

programs and cost-effective management; to help stimulate the development of the surrounding region; and to extend the beneficial results as widely as possible." This mission must be supported by the Area Plan.

The direction in the Area Plan is general and does not preclude or replace either the requirement for site-specific, project-level consideration of threatened, endangered, or proposed species or their critical habitat, or further consultation at that level, if necessary, with the United States Fish and Wildlife Service (FWS). Where needed to protect federally listed species from potential adverse effects of management activities, project areas will be evaluated for the need to inventory those species in accordance with procedures outlined in the Region 8 supplement to the FSM §2672.43 (effective February 15, 2002). This supplement provides guidance to aid in determining when project-level inventory of Proposed, Endangered, Threatened, and Sensitive (PETS) species is necessary. The Sensitive species are the Regional Forester's Sensitive species and are covered under separate documentation to the FS Regional Office (Region 8) in a Biological Evaluation. Project-level inventories are conducted to gather information on distribution and numbers of individuals within the area affected by the project. Project-level inventory is usually conducted on a small scale, and is used for the detection of federally listed species as well as sensitive species. Recovery plan direction and habitat protection guidelines for federally listed species are considered in conjunction with the project-level inventory needs.

Planning Area

Land Between The Lakes covers approximately 170,000 acres of federal land located in western Kentucky and Tennessee, and is administered by the USDA Forest Service (FS). Land Between The Lakes is an inland peninsula bordered on the west by Kentucky Lake and on the east by Lake Barkley. Land Between The Lakes ranges from 6 to 8 miles wide and is about 40 miles long. There are approximately 110,000 acres in Kentucky (Lyon and Trigg counties) and 60,000 acres in Tennessee (Stewart County).

LBL is part of the Western Highland Rim subsection of the Interior Low Plateau Physiographic Province and the Coastal Plain Physiographic Province (Fralish and Crooks 1989 and Franklin 1994). Most of the area consists of highly dissected uplands.

LBL is in the Western Mixed Mesophytic forest region, a transition zone between the Eastern Mesophytic forest region and the Western Oak-Hickory forest region (Franklin 1994). Approximately 92 percent of LBL is forested, with mostly second and third-growth hardwoods comprised mainly of oak species (Franklin 1994). The oak forest type includes white oak, southern red oak, post oak, blackjack oak, chestnut oak, black oak, and pignut hickory. Mesophytic forest species on LBL include sugar maple, American beech, mockernut hickory, pignut hickory, sweetgum, yellow poplar and elm. The oak forest cover type dominates on 82% of LBL's landscape, with mesophytic/riparian comprising 7%, and pine forest (mostly planted) on the remaining 3%.

Upland areas that once had small and scattered prairie and savanna communities have, as a result of natural forest succession, become closed canopy forest with a depleted herbaceous layer (Martin and Taylor 2002 and Franklin 1994). The cool, moist microclimate of the closed canopy forest has allowed for the invasion and succession to more mesophytic species, especially sugar maple (*Acer saccharum*) and American beech (*Fagus grandiflora*) (Franklin 1994). This transition is occurring in riparian, mesic, and transitional forest cover types. There are natural stands of shortleaf pine (*Pinus echinata*) on Devil's Backbone, Tennessee; however, they are rapidly succeeding to several species of oak (Franklin 1994).

Under TVA management, LBL standing timber volumes more than doubled, while regulated harvests improved forest quality, vigor, and wildlife habitat. Since TVA assumed ownership of LBL in 1964, wildlife population densities within LBL have reached levels similar to, and in some cases higher than other federal and state managed areas in the region. This has occurred despite a past history of overgrazing, timber exploitation and widespread erosion that dramatically reduced land productivity.

Informal Consultation History

- December 8 to 9, 2003: Lee Andrews (Field Office Supervisor) and Mindi Brady (Fish and Wildlife Biologist/Pre-development Consultation) of the FWS Kentucky Ecological Services Field Office (KFO) traveled to LBL and visited bald eagle nests that eagles had built in areas of potential disturbance. During the trip, discussion was held about the Area Plan biological assessment, and information that would be needed to evaluate determinations of effect. Other sites visited and discussed included one Price's potato bean site, Work Area 18 proposed timber sale area, a Biosphere Reserve Core Area, two native warm season grass restoration sites, Turkey Bay OHV area, and Wranglers Campground.
- May 12 to 13, 2004: Mindi Brady attended the Scientific Review of Section 3.2, Biological Environment of the Draft Environmental Impact Statement.
- June 22, 2004: Lee Andrews, Dr. Michael Floyd (Endangered Species Recovery Biologist), and Alan Whited (Western Kentucky Private Lands Biologist) of the KFO visited LBL to look at two Price's potato bean sites and discuss management efforts for species recovery. During that visit, the biological assessment and its development were discussed.
- August 17, 2004: Conference call with the KFO about the *Draft BA* for the LBL Area Plan followed by receipt by email of first review response of the preliminary draft BA.
- October 13, 2004: Receipt by email of the second review of the draft BA and conference call with Lee Andrews of the KFO to discuss the second review of the *Draft BA*.

Proposed Management Actions

The purpose of the proposed action is to develop an Area Plan for the next 10 to 15 years, as a revision to the existing Natural Resources Management Plan (NRMP) for Land Between The Lakes (TVA 1994a). The existing Natural Resources Management Plan (NRMP) was approved in 1994, and revision is needed to satisfy legal requirements and address new information about the Recreation Area and its uses. The Area Plan (FEIS Alternative Y) will guide natural resource management, environmental education, and recreation activities on the Recreation Area to meet the objectives of federal law, regulations, and policy. The proposal updates the management goals, objectives, standards, and monitoring requirements for the planning period beginning when the Area Plan is approved.

In the Area Plan, vegetation across LBL will be managed to support ecological needs for forest health and wildlife habitat, including open land, wetland areas, and old growth. The vegetation will also be managed to support the recreation/environmental education (Rec/EE) programs and goals. Restoration of riparian area function and improvements of priority watersheds will be another focus of resource improvements. Active management techniques will include the increased use of prescribed fire, which has been historically documented to foster both wildlife habitat and forest and open land regeneration needs. There will be some harvest and thinning of forest stands to promote regeneration, to foster the evolution of old growth areas, and to improve wildlife habitat for a variety of species. Some vegetation management practices will result in marketable forest products, however, ecological, forest, wildlife, and recreation/environmental education goals will determine vegetation management practices, not revenue.

Two oak-grassland demonstration areas are also part of the Area Plan, and are projected to eventually extend over a total of 8,600 acres. Oak-grassland demonstration areas will feature open canopy grasslands (less than 10 percent canopy closure) and open oak woodlands (10 to 60 percent canopy closure) interspersed in various mixtures. Understories will be dominated by native grasses and wildflowers, with sufficient oak regeneration to sustain oak on these sites over time. These areas will be created through the use of tree-thinning and fire. Historic fire return intervals of one to three years for grasslands, and five to twelve years in the wooded systems, will be used to regenerate and sustain these ecosystems on LBL. This demonstration will showcase ecological restoration and the benefits it will provide to native plants and animals and public recreation use. The vegetation will be representative of conditions prior to European settlement in the area, and environmental education will be integrated into the management of the oak-grassland demonstration areas.

Riparian areas make up only a very small percent of LBL's landscape but are of high value to the ecosystem and support species biodiversity. Most sizable floodplains on LBL were inundated by the lakes, leaving the smaller headwater riparian areas. Because of high value to water quality and aquatic life, riparian corridor standards will be implemented to protect the area's' riparian functions. Riparian corridors of native vegetation will be maintained along each side of perennial and intermittent stream courses

in order to maintain fluvial and riparian functions. Riparian corridors of 25 feet on each side of ephemeral streams, 50 to 75 feet on intermittent streams, and 100 feet on perennial streams will be implemented in the Area Plan. Timber harvests within these corridors would favor leaving exfoliating tree species for bat habitat. Watersheds will be managed to provide resilient and stable conditions to insure the quality and quantity of water necessary to protect ecological functions and support intended beneficial uses.

Area Plan direction shifts the current mix of facility-based environmental education and recreation into more dispersed opportunities. More dispersed environmental education opportunities would include things like interpretive trails, road pull-offs with kiosks, and staff-led hikes. More dispersed recreation opportunities would include camping in less developed lake access areas and bank fishing. Existing facilities would be evaluated and identified for needed improvements and the potential for realignment into other types of recreation and environmental education opportunities. No current major facilities (such as Nature Station and Brandon Spring Group Camp) would be closed, and some may even be upgraded or expanded. No closed facilities are scheduled to be reopened, and no new facilities are planned.

A significant addition to the environmental education and recreation programs will be the creation of two Nature Watch Demonstration Areas during the initial years of this Area Plan. Much of the dispersed recreation/environmental education opportunities would take place in these areas. These areas will be managed to provide nature viewing opportunities, natural history interpretation, and environmental education. Vegetation in these areas will be managed for aesthetics and wildlife viewing opportunities, as well as showcasing a variety of vegetation management activities. The Nature Station will serve as a hub for the Nature Watch Area in Kentucky, which includes the former Environmental Education Area (EEA) plus an additional 1,229 acres that adjoins the existing EEA between Taylor Bay and Crooked Creek Bay. The South Welcome Station may be a launching point for the area in Tennessee, which consists of a no hunting zone that was implemented with the 1994 Plan. Initially, the nature watch demonstration will be focused in the northern area because much of the infrastructure is already in place and needs only minimal improvements. Integrating self-guided loop trails, road pull-offs, viewing blinds and environmental education messages into these areas will engage the visitor with the natural environment.

Overall visitor use of LBL is projected to increase slightly as a result of Area Plan implementation. Visitation to LBL averaged just over 2.0 million visits per year from 1995 to 1999. Visitation from 2000 to present decreased to an average of 1.8 million visits per year. An objective in the Area Plan is to increase visitation to the former level of just over 2 million visits per year by 2015.

In summary, proposed management actions that may affect federally listed species and that will be considered in this assessment include:

- Vegetation management activities including forest management, open-lands management, prescribed burning, implementation of oak-grassland demonstration

areas, herbicide treatment of invasive, non-native plant species, and utility and road rights-of-way maintenance.

- Stream, pond, wetlands, and riparian area management to improve and maintain stability of stream banks and channels, ecological function, water quality, and wildlife habitat.
- Recreation use that includes camping; trail use including hiking, biking, equestrian, and off-highway vehicles (OHV); nature viewing; hunting; fishing; visitation to cemeteries; and management/maintenance of roads, trails, and facilities to provide for these activities.

Species Considered and Evaluated

The species list provided below (Table 1) was supplied by the KFO for inclusion in the Biological Assessment for LBL's Area Plan and EIS (letter dated July 15, 2003).

Table 1. Federally Listed Species Known to Occur, or with the Potential to Occur, on Land Between The Lakes

Species	Common Name	Status	Comments
Haliaeetus leucocephalus	Bald eagle	T	Winters along LBL shoreline and nests along shoreline and interior forest
Sterna antillarum athalassos	Interior least tern	E	Potential to occur along LBL shoreline
Myotis grisescens	Gray bat	E	Occurs on LBL; foraging only
Myotis sodalis	Indiana bat	E	Potential to occur on LBL
Apios priceana	Price's potato bean	T	Occurs at five known sites on LBL

Protection of Federally Listed Species

The Area Plan contains forest-wide standards that either directly or indirectly provide protection for federally listed species and their habitats on LBL. The following list does not include all the standards in the Area Plan, but does contain those most important to the federally listed species considered here.

- All new stream crossings will be designed and constructed to allow passage of aquatic organisms, and to not significantly alter the natural stream flow regime.

- Locate fords only where stable channel conditions will support the designed use. Maintain stream pattern and channel geometry when modifying a crossing.

- Within the area 25 feet either side of an ephemeral stream, management activities will maintain the ability of the area to filter sediment from upslope disturbances, provide sediment control within the area, and maintain channel stability downstream. New projects within areas adjacent to ephemeral streams will be designed and mitigated for soil types classified as hydric, highly erodible or occur on slopes over 30%.

- Existing barriers (e.g. streams, lakes, wetlands, roads, and trails) are used whenever possible to reduce the need for fire line construction and to minimize resource impacts. Fire line construction within riparian corridors must be designed in coordination with a resource advisor.

- Intentional establishment of non-native, invasive plant species, as defined by the Regional Forester's invasive species list, is prohibited.

- No herbicide is ground applied within 30 horizontal feet of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these corridors only to prevent significant environmental damage such as noxious weed infestations. Corridors are clearly marked before treatment so applicators can easily see and avoid them.

- Herbicides are applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human (National Research Council 1983) and wildlife health (U.S. EPA 1986). Application rate and work time must not exceed levels that pose an unacceptable level of risk to human or wildlife health. If the rate or exposure time being evaluated causes the Margin of Safety (MOS) or the Hazard Quotient (HB) computed for a proposed treatment to fail to achieve the current Forest Service R8 standard for acceptability (acceptability requires a MOS > 100 or a HQ of < 1.0 depending on the standard reported in the Risk Assessment cited) additional risk management must be undertaken to reduce unacceptable risks to acceptable levels or an alternative method of treatment must be used.

- With the exception of treatments designed to release designated vegetation selectively resistant to the herbicide proposed for use, or to prepare sites for planting with such vegetation, no soil-active herbicide is applied within 30 feet of the drip line of non-target vegetation specifically designated for retention (e.g., den trees, hardwood inclusions, adjacent untreated stands) within or next to the treated area. Side pruning is allowed, but movement of herbicide to the root systems of non-target plants must be avoided. Corridors are clearly marked before treatment so applicators can easily see and avoid them.

- No herbicide shall be broadcast ground-applied within 60 feet of any known threatened, endangered, proposed, or sensitive plant. Corridors are clearly marked before treatment so applicators can easily see and avoid them. Exceptions will be made when a treatment using herbicide is necessary to protect or prevent the loss of habitat, and a site-specific NEPA document and BE confirms that an acceptable risk from such use is possible.

- Snags and den trees will not be intentionally felled during vegetation management unless necessary to protect employee or visitor safety, to control insect or disease infestations, or for timber salvage in cases of significant events of tree mortality. In timber salvage cases, a minimum of 6 snags per acre must be retained. Retained snags may be clumped within salvage areas. Den trees are defined as being a minimum of 10 inches DBH and having a visible cavity

- Within General Forest, Oak-Grassland Demonstration and Core Prescription Areas, riparian corridors of native vegetation will be maintained along each side of perennial and intermittent stream courses in order to maintain fluvial and riparian functions. Corridors along perennial streams will be 100 feet measured from bankfull stage. Corridors along intermittent streams will be 50 to 75 feet measured from bankfull stage at a minimum. If a 50-foot corridor is used, a minimum of 20 feet adjacent to management activities must be in a maintained native grass or other suitable vegetative filter strip. The remaining corridor should be in shrubs and trees. Without a native grass or other suitable vegetative filter strip, the minimum corridor along intermittent streams must be 75 feet of natural vegetation. Further direction on riparian corridor activities may be found in the Area Plan EIS Appendix B, Riparian Background Paper.

- Wildlife refuges are closed to hunting year-round. Wildlife refuges are closed to other human disturbances during specified refuge periods.

- In riparian areas, corridor interruptions affecting both sides of the drainage should be of minimum width needed, and no more than 60 feet in length. Interruptions affecting one side of a drainage should be no greater than 300 feet parallel to the drainage.

- Protection zones, as specified in the current guidelines for bald eagle habitat management from the U.S. Fish and Wildlife Service, will be delineated and maintained around all Bald Eagle nests and communal roost sites, unless exempted or modified by the U.S. Fish and Wildlife Service.

- Buildings, cisterns, old bridges and other structures will be surveyed for bats prior to modification or demolition. If significant bat roosting is found, structures are maintained or alternate roosts provided. Alternate roosts must be appropriate based on species and size of colony and must be provided prior to modification.

- Utility corridors within riparian corridors or those that provide critical habitat will limit exposed soil and utilize habitat-sensitive maintenance strategies.

Environmental Baseline and Potential Effects for the Species Evaluated in this Biological Assessment

Bald Eagle (*Haliaeetus leucocephalus*)

Environmental Baseline

The bald eagle ranges over most of the North American continent, extending from as far north as Alaska and Canada and south to Mexico. When the bald eagle was adopted as the United States' national bird in 1782, experts believed that their numbers may have ranged from 25,000 to 75,000 nesting pairs in the lower 48 states. Since that time, the species has suffered from habitat destruction and degradation, illegal shooting, and most notably from contamination of its food source by the pesticide DDT. In the early 1960s, only 417 nesting pairs were known from the lower 48 states. In 1999, more than 5,748 nesting pairs of bald eagles were recorded for the same area, the increase resulting primarily from the 1972 ban of DDT in the United States and aided by additional protection under the Endangered Species Act (U.S. FWS 1999).

Bald eagle breeding areas are generally located within 2.5 miles of coastal areas, bays, rivers, lakes, or other bodies of water that reflect general availability of primary food sources: fish, waterfowl, rodents, reptiles, amphibians, birds, and carrion (Andrew and Mosher 1982, Green 1985, Campbell et al.1990). Although nesting territory size is variable, it typically encompasses approximately 1.6 square miles (Abbott 1978). Most nest sites are located in large wooded areas adjacent to marshes, and agricultural areas, or in logged-over areas where large scattered seed trees remain (Andrew and Mosher 1982).

A nesting territory can have more than one active nest. Individual pairs return to their same territories (areas) year after year, and territories are often inherited by subsequent generations. Thus, the same nest may be used year after year, or birds may alternate between nest sites in successive years. Bald eagles mate for life and can live 20 years or more in the wild.

Favored bald eagle nest trees are typically large diameter trees with strong lateral limbs, and are located in stands with open canopies. Nest trees in an open canopy forest have an unobstructed flight path to the nest and a wide field of view of surrounding habitat. This preference results in bald eagles selecting large, dominant nest trees in areas with previous timber harvest or along edges of forests (Lackey 1991 and Andrew and Mosher 1982).

According to the FWS Habitat Management Guidelines for the Bald Eagle in the Southeast Region (U.S. FWS 1987), the bald eagle nesting period usually extends from October 1 to May 15. However, within more northerly portions of its range, nesting can begin as early as October 30 and continue as late as August. In the LBL area, the nesting period of bald eagles begins in late fall (generally after October 30) and continues through the spring (U.S. FWS 2003).

Juvenile bald eagles reach sexual maturity at four to six years of age, and may disperse widely, though usually returning to nest within 93 miles of where they fledged (U.S. FWS 1995). Bald eagles from the northern and southernmost parts of the species range are migratory. Communal roosting sites and foraging areas are common for this species in summer and winter (U.S. FWS 1995). Winter home ranges for eagles can be very large, especially for non-breeding birds. They winter throughout their breeding range but occur more frequently along the coast in communal roosts and foraging areas.

Occurrence of Bald Eagles on Land Between The Lakes

Historically, wintering migrants and local nesting pairs were found along the Tennessee and Cumberland Rivers and in the surrounding region. Today, wintering bald eagles can be found along the nearly 300 miles of undeveloped LBL shoreline of Kentucky Lake (impoundment of the Tennessee River) and Lake Barkley (impoundment of the Cumberland River). Naturally occurring seasonal shad die-offs, caused by decreasing water temperatures in the lakes, provide ample winter food supplies. LBL midwinter eagle survey results for the period 1978 through 2004 are summarized in Figure 1. Winter counts have ranged from 39 to 152 during the period 1978 through 2004 with an average of 98 eagles per survey (USDA FS 2004). Counts are conducted during the first three weeks of January each year as part of the National Midwinter Bald Eagle Survey. Lower numbers have been observed on LBL in recent years due to unseasonably mild weather in early winter. Wintering migrants return to northern nesting areas each spring, principally the Great Lakes states and Canada.

The protection and management of bald eagles in LBL has included winter population surveys, maintenance and protection of refuge areas, and nest monitoring and protection. Aerial surveys have been conducted annually along the 300 miles of undeveloped LBL shoreline to monitor wintering populations and to locate nests.

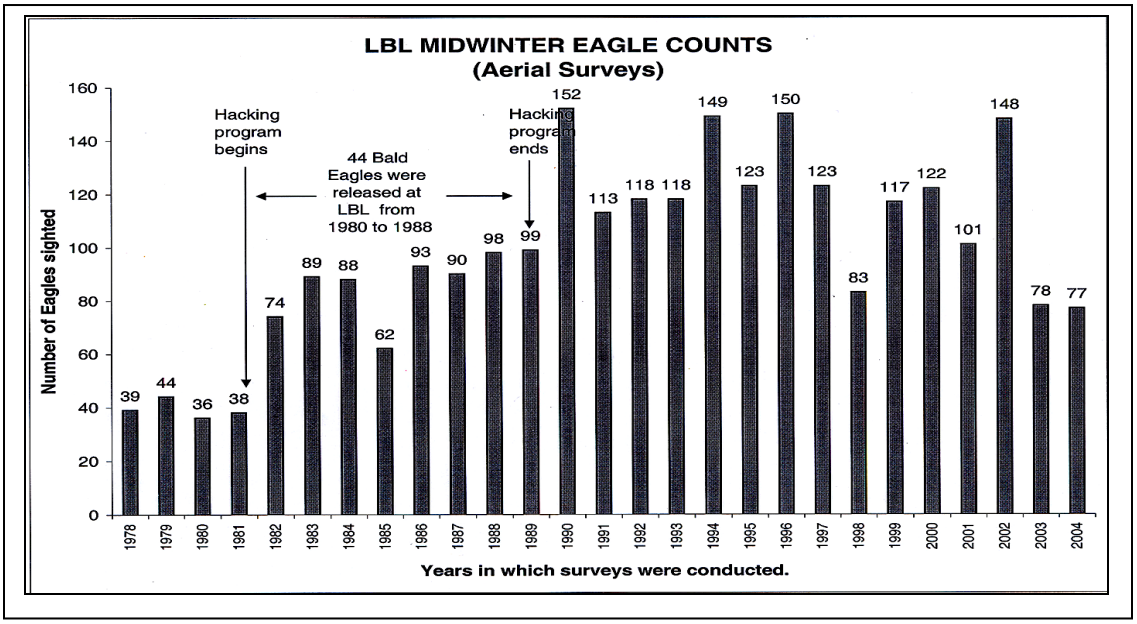

Figure 1. Number of eagles sighted during mid-winter surveys at Land Between The Lakes (1978 to 2004).

Prior to 1984, bald eagle nesting had not occurred on LBL since the 1940s (Peterson 1967). In 1975, active bald eagle recovery efforts were initiated at LBL by TVA and other cooperating agencies (Tennessee Wildlife Resource Agency; Kentucky Department of Fish and Wildlife Resources; United States Fish and Wildlife Service, and others). Recovery efforts involved population surveys, establishment of eagle refuges, protection of shoreline habitat, and a reintroduction program. Forty-four bald eaglets were released at LBL from 1980 to 1988 as part of the reintroduction program. Nesting on LBL occurred for the first time since the 1940s when an eagle released in 1981 returned with a mate and successfully nested in l984.

The number of known active bald eagle nests at LBL varies annually, and has ranged from 14 to 20 during the past five years (USDA FS 2004). Bald eagle nests on LBL have occurred along the lake shoreline and up to two and one-half miles inland on forested sites. Land Between The Lakes nesting records from 1984 to 2000 indicate that the majority of nests were built in areas with previous timber harvest. The nests were built anywhere from one to twenty-three years after a harvest and persisted from one to ten years before the nest or tree fell or was abandoned. During past timber harvests on LBL, potential eagle nest trees were left within harvest units, and the surrounding canopy was lightly thinned to create an open flight path (Ron Fox, former TVA-LBL employee, pers. comm.).

Bald eaglet fledging success in LBL has been monitored since 1984. Results are presented in Table 2.

Table 2. ***Eaglets Fledged at LBL (Kentucky and Tennessee) through the 2004-nesting season.***

YEAR	TOTALS	YEAR	TOTALS
1984	1	1995	4
1985	1	1996	6
1986	0	1997	4
1987	2	1998	5
1988	2	1999	14
1989	4	2000	18
1990	4	2001	7*
1991	4	2002	15
1992	2	2003	20
1993	9	2004	14
1994	6	**Total:**	**140**

*There was insufficient monitoring in 2001 due to lack of staff during the administrative transfer of LBL to the Forest Service.

Several factors contribute to the annual fluctuation in numbers of eaglets fledged, including weather, nesting pairs not returning to the same nest, new nests being built and not located, eaglets not visible due to viewing angle and/or limited observation time, predation, and possible human disturbance. Overall, eagle nesting at LBL has been trending in a positive direction for the past 21 years.

As can be seen from the above information, past management and protection of bald eagles at LBL has been beneficial for the species, and has helped bald eagle populations to recover in the region.

Management and Protection

In assessing the viability of this species for the LBL Area Plan, the bald eagle was given a Forest Rank of F3, meaning that the bald eagle is rare and uncommon on LBL, generally with 21 to 100 occurrences.

Management and protection of bald eagles in the Area Plan include measures to protect water quality in Kentucky Lake and Lake Barkley; vegetation management that will continue to provide predominately oak-hickory forest with large trees for perching, roosting, and nesting; protection of nesting territories; providing areas of low disturbance for wintering and nesting eagles; and continued monitoring and protection of wintering and nesting eagles.

An assessment of eleven LBL streams was conducted in 2001 (USDA FS 2002). The two major factors influencing stream conditions were 1) stream hydrology, and 2) impoundments. Water quality parameters were generally within acceptable limits. While LBL managers have little control over stream hydrology and impoundments, implementation of Area Plan objectives and standards will protect and enhance water quality in LBL's streams, which flow into the surrounding lakes. Objectives of the water resource program, as described in the Area Plan, are to maintain and enhance water quality, provide diverse aquatic and wetland habitat, protect riparian area functions, and provide information about water resource values to the public. Water resources are managed through implementation of riparian corridors as defined in Area Plan standards on pages 7-9 of this document. Intermittent and perennial streams have minimum riparian corridors of 50-75 feet and 100 feet respectively. Because of the contribution ephemeral streams make to the stream network, 25-foot zones are managed along ephemeral streams to provide for channel stability and fluvial processes in addition to water quality. Implementation of Area Plan standards will protect and enhance stream functions including filtering runoff pollutants, interchange of surface and ground waters, stabilizing stream banks and channels, and providing large woody debris and shade to the channels. These measures will enhance and protect the quality of water which flows from LBL streams into the lakes. Improved water quality in LBL's streams and surrounding lakes will be beneficial to bald eagles by continuing to provide an adequate aquatic forage base for eagles.

Combined Forest Inventory (CFI) data, collected at ten-year intervals on LBL, demonstrated a 30-year trend toward larger trees, with a major shift in the past decade from small saw-timber to trees more than 16 inches in diameter. This has enhanced perching, roosting, and nesting habitat for bald eagles on LBL. Under the new Area Plan, LBL's forests will continue to be managed to provide a predominantly oak-hickory forest with various size and age classes to meet a variety of wildlife habitat needs. Mature open oak forest, and mature woodland types will be provided. Only a small percentage of net annual growth will be harvested during the planning period, therefore, the forest will continue to grow older and larger, and will continue to provide beneficial perching, roosting, and nesting habitat for bald eagles.

Existing forested corridors will be maintained for a minimum of 100 feet inland from lake shorelines. Forest management will continue to allow for suitable perching, roosting, and nesting trees along LBL's shoreline and in the interior, to provide suitable perching, roosting, and nesting habitat. Fire management will reduce hazardous fuels accumulations and manage for a healthy, predominantly oak- hickory forest with respect to both species composition and forest canopy structure. Prior to conducting forest management activities, any potential adverse effects on bald eagles or their habitat will be evaluated and consulted on a project-specific basis with the KFO. Overall, forest management will be beneficial to bald eagles by continuing to provide suitable perching, roosting, and nesting habitat.

Nest protection measures follow those listed in U.S. FWS (1987) and are designed to avoid or minimize the potential for adverse effects to the species. Size and shape of primary and secondary nest protection zones vary according to the location and topography of the surrounding terrain. Primary and secondary zones are delineated on maps for management purposes. Primary zones in areas where human disturbance from land is likely are posted with signs to deter human entry. Posted boundaries are monitored and enforced by LBL staff and law enforcement officers. Posted areas are maintained until several weeks after eaglets have fledged, and are usually removed in early July. Specific habitat management and protection guidelines will be developed on a site-specific basis in consultation with the KFO when bald eagles nest in or near existing developed recreation sites, or in other sites where existing uses have the potential to cause disturbance which could lead to take of nesting eagles. Enforcement of protection measures will be a cooperative effort of USDA-FS, TVA, TWRA, KDFWR, USACE, and KFO.

Designated wildlife refuges will provide areas of low disturbance for wintering and nesting eagles and reduce the potential effects of Area Plan implementation on bald eagles. All existing wildlife refuges are maintained in the Area Plan. These refuges are closed to hunting year-round, and are closed to human entry during specified refuge periods (November 1 to March 15 minimum). Refuges provide abundant and unique wildlife viewing and environmental education opportunities during the refuge periods, and are popular for migratory bird viewing, especially bald eagles, shorebirds, and waterfowl. Wildlife observation takes place from the perimeter of refuges, or in specially designated areas within refuges (e.g. an observation blind where human presence is less disturbing to wildlife). However, these activities are not expected to have significant adverse effects on bald eagles due to their limited nature.

The FS will continue to monitor wintering and nesting bald eagles on LBL through aerial surveys and monitoring from the ground. Project level inventories for this species will be considered on a project-by-project basis in accordance with procedures outlined in the Region 8 supplement to the FSM §2672.43 (effective February 15, 2002). This supplement provides a decision framework to aid in determining when project-level inventory of Proposed, Endangered, Threatened, and Sensitive species is necessary. These measures will be implemented to avoid adverse effects to bald eagles on LBL. FS

will consult with KFO pursuant to Section 7 when project-level inventory shows that potential adverse effects could occur.

The bald eagle is currently listed as a threatened species. However, the U. S. Fish and Wildlife Service has proposed that the bald eagle be removed from the Threatened and Endangered Species list (U.S. FWS 1999). De-listing of the bald eagle may affect current and future management direction.

Potential Effects

Habitat relationships were defined and evaluated during the species viability assessment of the FEIS. Habitat associations identified for the bald eagle include Snag Associates; Lakeshores Associates; and Lakes (Water) Associates. Snag Associates includes species associated with standing dead trees; Lakeshores Associates includes species associated with forested lakeshores; and Lakes Associates includes species associated with open water.

Although it is known that snag habitat occurs in LBL, an inventory of the acres of this habitat is not available and is, therefore, stated as zero acres in the FEIS. The amount of acres in snag habitat is projected to rate as poor in 10 years and good in 50 years, as correlated to old growth habitat conditions. Minimal management activities within Core Areas (referred to as Biosphere Reserve Core Areas in the 1994 Plan) will provide for these habitat conditions as well as outside Core Areas in actively managed prescriptive areas such as General Forest. Snags associated with Lakeshores and Lakes would have potential use for perching, and to a lesser extent nest trees. Standards in the Area Plan (partial list pages 7-9 of this document) will provide for the protection of snags, lake shoreline habitats and water quality of lakes in LBL.

Proposed land management activities as described previously, including forest management, open-lands management, and prescribed burning will continue to provide suitable perching, nesting, and roosting habitat for bald eagles. Currently there are no bald eagle nests located in areas designated to become the oak-grassland demonstration areas, however, these areas may become more attractive for nesting eagles as this habitat type is restored.

Stream, wetland, and riparian area management and standards will maintain or improve stability, function, and water quality of streams, ponds, and lakes. Stable or improved water quality would be beneficial in maintaining an aquatic forage base for eagles.

Recreation use that includes camping; trail use including hiking, biking, equestrian, and off-highway vehicles (OHV); nature viewing; hunting; fishing; visitation to cemeteries; and management/maintenance of roads, trails, and facilities to provide for these activities will continue under the Area Plan. Recreation use during the planning period is expected to increase slightly from 1.8 million visits per year (2000 through 2003 average) to the former level (1995 through 1999) of just over 2.0 million visits per year. Human disturbance from legal or illegal recreational use of roads, trails, back-country camp sites,

and shoreline habitat could negatively affect the use of an area for nesting and/or roosting by eagles. Visitation to cemeteries, visitors viewing bald eagles within their protected management zones during the nesting season, management/use around some facilities, and trail construction/reconstruction and maintenance could also lead to potential disturbance of bald eagles.

Individual bald eagle pairs exhibit considerable variation in response to human activity. Eagles are most vulnerable to disturbance early in the nesting period. Disturbance during this period could lead to nest abandonment and/or chilled or overheated eggs or young (U.S. FWS 1987). Wildlife refuges, which provide protected areas of minimal disturbance, allow eagles that are sensitive to disturbance protected areas to move away from disturbance. Additionally, an Area Plan standard provides for protection of nest sites as follows, "Protection zones specified in the current guidelines for bald eagle habitat management from the U.S. Fish and Wildlife Service, will be delineated and maintained around all Bald Eagle nests and communal roost sites, unless exempted or modified by the U.S. Fish and Wildlife Service."

Increased emphasis on Environmental Education, implemented as part of the Area Plan, will help to get appropriate messages to visitors to educate them about bald eagles and their potential sensitivity to disturbance, and instruct them on how to reduce disturbance to bald eagles when they are in the field.

In past years, as more remote areas of LBL became occupied by eagles and the eagle population continued to increase, bald eagles began occupying less remote sites. In LBL, bald eagles have selected nest sites ranging from remote forested areas, where the likelihood of human encounter was very low, to moderately remote (e.g.. forested area adjacent to croplands) to high levels of disturbance (e.g. within the boundary of the Turkey Bay Off-Highway Vehicle (OHV) Area). In the highest disturbance area, Turkey Bay OHV Area, following consultation with the Tennessee Field Office (TFO), measures were taken to protect the nesting pair including posting the area, restricting access to a nearby shoreline feeding area, adjusting and remarking the OHV camping boundary, limiting OHV riding in the camping area, monitoring the nest and boundaries, and citing riders who violated the boundaries. With these measures in place and enforced, LBL data show the OHV nesting pair have successfully fledged one to two eaglets each year for the past five years.

As bald eagle populations continue to grow in the region, it is likely that this species will continue to choose nest sites in areas that have varying levels of human disturbance. Under the Area Plan, the FS, with assistance from volunteers, will actively monitor eagle populations and nests, provide refuge areas of low disturbance, provide nest protection according to U.S. Fish and Wildlife Service guidelines, and provide environmental education to help visitors understand and avoid unnecessary disturbance to bald eagles. In instances where a take may occur, e.g. eagles build a nest in a high-use recreation site, FS will consult with the KFO under Section 7 of the Endangered Species Act.

Determination of Effect

A determination of "not likely to adversely affect" is made for the bald eagle because:

(1) Proposed vegetation management activities will continue to provide suitable perching, roosting, and nesting habitat for bald eagles.
(2) Stream, wetland, and riparian area management and Area Plan standards will maintain or improve stability, function, and water quality of streams, ponds, and lakes. Stable or improved water quality would be beneficial in maintaining an aquatic forage base for eagles.
(3) Although recreation use is expected to increase slightly, Area Plan direction and standards, continued provision of wildlife refuges, implementation and enforcement of habitat and nest protection guidelines, and education of visitors will all contribute to minimizing disturbance to bald eagles on LBL.
(4) FS will continue to consult on a project-by-project basis on those projects that are proposed to occur with the primary and/or secondary management zones for LBL's bald eagle nests.

Interior Least Tern (*Sterna antillarum*)

Environmental Baseline

The interior least tern is an uncommon migrant and summer resident in the LBL region. The least tern's summer range is in isolated areas along the Missouri, Mississippi, Ohio, Red, and Rio Grande river systems. Its winter range is not known, but is thought to include the coastal areas of Central and South America (U.S. FWS 1990). Interior least terns feed on small fish in shallow water, usually close to their nesting site. Fishing behavior involves hovering or diving over standing or flowing water (U.S. FWS 1990).

Barren sandbars along rivers are the least tern's most common nesting habitat. However, sandbars are unstable features of the riverine landscape, and many sandbars on today's stabilized rivers are unsuitable for nesting because of vegetation encroachment, or are too low and subject to frequent inundation (U.S. FWS 1990). No known nesting has occurred by least terns in areas within LBL or immediately adjacent to LBL's shoreline. Potential habitat for this species occurs along LBL's shorelines as sand and gravel beaches. However, this habitat along LBL shorelines is greatly influenced by water level fluctuations of Kentucky Lake and Lake Barkley. Winter pool elevation for both lakes is 354 feet, but the lakes are raised during April to a summer pool elevation of 359 feet, inundating much of the habitat. In addition to scheduled fluctuations, there are repeated unscheduled fluctuations due to precipitation, navigation needs, electricity generation, mosquito control, and other factors. The lake levels are maintained by the U.S. Army Corps of Engineers (Lake Barkley) and the Tennessee Valley Authority (Kentucky Lake).

Management and Protection

In assessing the viability of this species, it was given a Forest Rank of FP in the LBL Area Plan FEIS. FP rank means that the interior least tern could possibly occur on LBL; however documented occurrences are not known.

Past management at LBL has provided protection for least tern feeding and nesting habitat by protecting water quality in LBL streams and lakes, and by protecting shorelines through implementation of forest management visual quality zones along LBL's shoreline (TVA 1994a).

Management and protection of interior least tern habitat in the Area Plan include measures to protect water quality in Kentucky Lake and Lake Barkley. Implementation of Area Plan standards, on pages 7-9 of this document, will protect and enhance water quality in LBL's streams, which flow into the surrounding lakes. Objectives of the water resource program, as described in the Area Plan, are to maintain and enhance water quality, provide diverse aquatic and wetland habitat, protect riparian area functions, and provide information about water resource values to the public. Additionally, watersheds will be managed to provide resilient and stable conditions to insure the quality and quantity of water necessary to protect ecological functions. Stream, wetland, and riparian area management and standards in the Area Plan will maintain or improve stability, function, and water quality of streams, ponds, and lakes. Improved water quality in LBL's streams and lakes will be beneficial to least terns by continuing to provide an aquatic forage base for this species.

The level of inventory for this species will be considered on a project-by-project basis in accordance with procedures outlined in the Region 8 supplement to the FSM §2672.43 (effective February 15, 2002). This supplement provides a decision framework to aid in determining when project-level inventory of Proposed, Endangered, Threatened, and Sensitive species is necessary.

The above measures will be implemented to avoid adverse effects to least tern habitat on and immediately adjacent to LBL. Additionally, FS will survey for the presence of least terns when necessary, and consult with KFO pursuant to Section 7 if interior least terns are encountered.

Potential Effects

Habitat relationships were defined and evaluated during the species viability assessment in the Area Plan FEIS. Each species was linked to one or more habitat associations. Habitat associations identified for the Interior least tern include Lakeshores Associates, which are defined as species associated with forested lakeshores. Habitat used would primarily be sand beaches and bars along lakeshores. Implementation of Area Plan standards will protect the integrity of lakeshores as much as is within control of FS. Stream, wetland, and riparian area management and standards in the Area Plan will maintain or improve stability, function, and water quality of streams, ponds, and lakes. Improved water quality

in LBL's streams, ponds and lakes will be beneficial to least terns by continuing to provide an aquatic forage base for this species.

Proposed management actions in the Area Plan are not likely to adversely effect the Interior least tern because potential interior least tern habitat will be protected, and because this species is not known to occur on LBL. Potential habitat adjacent to LBL shorelines is not within FS jurisdiction to manage. Should this species be found to occur on LBL or along LBL's shoreline, FS would consult with KFO pursuant to Section 7.

Determination of Effects

A determination of "Not likely to adversely affect." is made for the interior least tern because:

(1) Stream, wetland, and riparian area management and Area Plan standards will maintain or improve stability, function, and water quality of streams, ponds, and lakes. Stable or improved water quality would be beneficial in maintaining an aquatic forage base for least terns.
(2) Watersheds will be managed to provide resilient and stable conditions to insure the quality and quantity of water necessary to protect ecological functions, an to protect shoreline habitat.
(3) Least tern habitat in the adjacent reservoirs is frequently inundated by reservoir water level fluctuations, and is not within the jurisdiction of FS to manage.
(4) Should this species be found to occur on LBL or along LBL shoreline, consultation would be held with the KFO pursuant to Section 7.

Gray Bat (*Myotis griscesens*)

Environmental Baseline

Gray bat colonies are restricted entirely to caves or cave-like habitats for winter and summer roosts. During summer, the bats only select caves providing specific temperature and roost conditions. These caves usually are located within a half-mile of a river or reservoir (FWS 1991a). In winter, they utilize only deep, vertical caves having a temperature of 43 to 52 degrees Fahrenheit. There are nine caves believed to house roughly 95 percent of the hibernating population (U.S. FWS 1991a).

One-way migrating distance between winter and summer caves may vary from as little as 10 miles to well over 200 miles (U.S. FWS 1991a). Banding studies indicate gray bats occupy a definite summer range in relation to the roost site and nearby foraging areas over large streams and reservoirs (U.S. FWS 1991a). This species forages over rivers, streams, reservoirs, and ponds. Little is known about the actual feeding habits of gray bat, however, limited observations indicate that the majority of insects eaten are aquatic species, particularly mayflies (U.S. FWS 1991a). Summer colonies show a preference for caves located within 1.2 miles of feeding areas (U.S. FWS 1991a).

Populations of gray bats are found mainly in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee, but a few occur in northwestern Florida, western Georgia, southwestern Kansas, southern Indiana, southern and southwestern Illinois, northeastern Oklahoma, northeastern Mississippi, western Virginia, and possibly western North Carolina. Distribution within its range was always patchy, but fragmentation and isolation of populations have caused problems over the past 3 decades (U.S. FWS 1991a).

The gray bat population was estimated to be about 2.25 million in 1970; however, in 1976 a census of 22 important colonies in Alabama and Tennessee revealed an average decline of more than 50 percent. Due to protective measures taken at high priority winter and summer colony sites in the late 1970s and throughout the 1980s, the declines have been arrested at some major sites, and those populations are now stable or in some cases increasing (U.S. FWS 1991a).

Human disturbance and vandalism may have been primarily responsible for the decline. Disturbance of a maternity colony may cause thousands of young to be dropped to the cave floor where they perish. Excessive disturbance may cause a colony to completely abandon a cave. Other factors which contributed to the decline included pesticides, natural calamities such as flooding and cave-ins, loss of caves due to inundation by man-made impoundments, and possibly a reduction in insect prey over streams that have been degraded through excessive pollution and siltation. Improper cave gating or cave commercialization also contributed to some population declines (U.S. FWS 1991a).

LBL has no suitable caves for gray bats. Known caves used by gray bats near LBL include Shaw Hill Bat Cave located north of LBL in Livingston County, KY (15.6 air miles northwest of north entrance to LBL); Cool Spring Cave in Trigg County, KY (18.9 air miles east-northeast of Golden Pond Visitor Center); Big Sulfur Springs Cave in Trigg County, KY (20.5 air miles east of Golden Pond Visitor Center); Tobaccoport Cave in Stewart County, TN (about 1.3 air miles east of the LBL shoreline; and Bellamy Cave in Montgomery County, TN (17 air miles from LBL) (Gardner 1992).

Gray bats have been captured in mist nets over streams and ponds on LBL (Palmer Engineering 2003; Harvey and Britzke 2000; Moyer *et al*. 1996). Potential bat habitat was surveyed by Palmer Engineering in July and August 2002 using mist nets for 20 sample sites that included stream and upland forest habitats. Ponds and road-rut ponds were included as survey sites. A total of 376 bats representing nine species were captured, including gray bats at seven sites. A bat study was conducted by Harvey and Britzke (2000) during two time periods, June 23 to 27 and July 30 to August 5, on four stream sites and six upland sites. A total of 200 bats, representing six species, were captured: eight of the bats were gray bats. Mist-net surveys were conducted between May 15 and August 15, 1994 and 1995; additionally, a preliminary mist-net survey was conducted on eleven sites during the summer months of 1993 (Moyer *et al.* 1996). A total of 29 different sites were sampled (11 during 1993, 20 during 1994, and 14 during 1995). Two sites were located over old roads, four over ponds, one over a bay, and the remainder were located in stream corridors. A total of 557 bats representing nine species were captured, including 18 gray bats.

Management and Protection

Under TVA's 1994 management plan for LBL (TVA 1994a) gray bats were protected through the implementation of streamside management zones (SMZ's). SMZ's protected forested corridors over streams, and water quality in the streams and lakes by limiting management activities in the corridors. These measures protected stream corridors for foraging, and protected water quality to provide drinking water and an aquatic insect prey base for bats. Additionally, bat populations on LBL were monitored on a periodic basis under the 1994 plan.

In assessing the viability of this species for the Area Plan, it was given a Forest Rank of F2 in the Area Plan FEIS. This means that the gray bat is a very rare occurrence on LBL; generally with six to twenty occurrences.

Bat populations on LBL will continue to be monitored on a periodic basis in addition to project-specific inventory. The level of project inventory for gray bats will be considered on a project-by-project basis in accordance with procedures outlined in the Region 8 supplement to the FSM §2672.43 (effective February 15, 2002). This supplement provides a decision framework to aid in determining when project-level inventory of Proposed, Endangered, Threatened, and Sensitive species is necessary. Project-specific monitoring will be implemented to avoid adverse effects to the gray bat on LBL. FS will consult with KFO pursuant to Section 7 when project-level inventory shows that potential adverse effects could occur.

Protection measures for water resources in the Area Plan will benefit the gray bat. Objectives of the water resource program at LBL are to maintain and enhance water quality, provide diverse aquatic and wetland habitat, protect riparian area functions, and provide information about water resource values to the public. Water resources are managed through implementation of riparian corridors. Plan standards for intermittent and perennial streams have minimum riparian corridors of 50-75 feet and 100 feet respectively. Because of the contribution ephemeral streams make to the stream network, 25-foot zones are managed along ephemeral streams to provide for channel stability and fluvial processes in addition to water quality. Plan standards, as listed on pages 7-9 of this document, will protect stream corridors and shoreline habitat. The above measures will protect stream corridors for foraging, and protect water quality in the streams and lakes to provide drinking water and an aquatic insect prey base for bats.

Potential Effects

LBL contains no suitable summer or winter caves for gray bats (Gardner 1992). However, Tobaccoport Cave in Stewart County, TN (about 1.3 air miles east of LBL) contains gray bats. LBL has suitable streams, shorelines, and ponds for foraging, and gray bats have been captured over streams and ponds on LBL (Palmer Engineering, 2003; Harvey and Britzke 2000; Moyer et al. 1996).

Habitat relationships were defined and evaluated during the species viability assessment of the Area Plan FEIS. Habitat associations identified for the gray bat include Riparian Forest Opening Associates, Lakeshore Associates, and Ponds and Marshes Associates, all of which provide foraging areas for gray bats.

The Riparian Forest Opening Associates includes species associated with oak forest, mesophytic forest and riparian forest; with mature open forest, mature woodland, mature forest with canopy gaps, and regenerating forest structures on alluvial sites. The amount of this habitat association currently rates poor, and although there are increases in the amount during the first decade, the rating remains poor. In 50 years, increased acreage of this habitat improves the rating to fair.

Lakeshore Associates includes species associated with forested lakeshores. Ponds and Marshes Associates include species associated with this habitat type. The amount of this habitat currently in LBL ranks as fair, and in 10 and 50 years is projected to remain fair. Implementation of Area Plan standards (pages 7-9 of this document) will protect these aquatic habitat types. The effects on foraging habitat are expected to be beneficial since the riparian corridors will be managed for the benefit of aquatic/riparian resources, and Area Plan standards will protect and improve these habitats and water quality.

Recreational use is expected to increase slightly during the planning period. However, the projected small increase in recreational use resulting from Area Plan implementation is not expected to adversely affect the gray bat, primarily because the biggest threat from recreational use is disturbance of caves and LBL has no suitable caves for gray bats. Additionally, with implementation of Area Plan standards for protection of water resources, Area Plan recreational use is not expected to adversely affect gray bats.

Determination of Effects

A determination of "Not likely to adversely affect." is made for the gray bat based on:

(1) Summer or winter caves suitable for gray bats do not exist on LBL.
(2) Water quality, stream corridors, and lake shorelines will be protected through management of water resources and implementation of Area Plan standards. These resources will continue to provide foraging areas and an aquatic prey base for gray bats.
(3) A small increase in recreational use is not expected to adversely impact this species due to the absence of caves and the implementation of Area Plan standards to protect foraging areas and water quality.
(4) Potential adverse effects to gray bats will be considered on a project-by-project basis. If potential foraging habitat is proposed for alteration during the summer foraging months, or other actions which could potentially constitute a take, consultation will be held with KFO.

Indiana Bat (*Myotis sodalis*)

Environmental Baseline

The Indiana bat occurs in the Midwest and eastern United States from the western edge of the Ozark region in Oklahoma, to southern Wisconsin, east to Vermont, and as far south as northern Florida. In summer, it is apparently absent south of Tennessee; in winter, it is apparently absent from Michigan, Ohio, and northern Indiana where suitable caves and mines are lacking. In 1991 it was estimated that approximately 500,000 individuals of this species remained throughout its range (U.S. FWS 1991b).

Limestone caves and mines are used for winter hibernation. A few individuals have been found under bridges and in old buildings, and maternity colonies have been found under loose bark and in the hollows of trees (U.S. FWS 1991b).

Trees standing in sunny openings or high in the canopy are attractive as summer roost sites because the air spaces and crevices under the bark are warmer (Gardner 1992). Cavities within dead trees are preferred summer roost sites (Gardner 1992). Summer foraging by females and juveniles is limited to riparian and floodplain areas; and the males forage over floodplain ridges and hillside forests. Foraging areas average 11.2 acres per animal in midsummer. Streams are apparently not used if riparian trees have been removed. Little is known of this bat's diet beyond the fact that it consists of insects (U.S. FWS 1991b).

This species has a breeding period that usually occurs during the first 10 days of October. Limited mating may also occur in the spring before the hibernating colonies disperse (U.S. FWS 1991b). Limited observations indicate that birth and development occur in very small, widely scattered colonies consisting of 25 or so females and their young. Birth usually takes place during June with each female bearing a single offspring. Approximately 25 to 37 days are required for development to the flying stage and the beginning of independent feeding. Migration to wintering caves usually begins in August (U.S. FWS 1991b).

The Indiana bat is nearly extinct over most of its former range in the northeastern states, and since 1950, the major winter colonies in caves of West Virginia, Indiana, and Illinois have disappeared. A high degree of winter aggregation makes the species particularly vulnerable. During this period, approximately 87 percent of the entire population hibernates in only seven caves. The decline of Indiana bats is attributed to commercialization of roosting caves, habitat destruction by vandals, disturbances caused by increased numbers of spelunkers and bat banding programs, use of bats as laboratory experimental animals, and possibly insecticide poisoning (U.S. FWS 1991b).

LBL has suitable summer roosting and foraging habitat for Indiana bats including oak-hickory forest, stream corridors, and ponds. However, there are no suitable winter hibernacula sites (e.g., caves, rock shelters, abandoned mines, etc.) for Indiana bats or other threatened, endangered, or special concern bat species within LBL (Gardner 1992).

The following caves with approximate distance to LBL have been designated as Critical Habitat within the Southeast Region (U.S. FWS 1991b):

Tennessee: White Oak Blowhole Cave, Blount County, TN (238 miles to LBL)
Kentucky: Bat Cave, Carter County, KY (292 miles to Golden Pond Visitor Center, in LBL) Coach Cave, Edmonson County, KY (112 miles to Golden Pond Visitor Center in LBL)

No Indiana bats have been detected on LBL as a result of extensive mist net surveys conducted during five summers from 1993 to 2002 (Harvey and Britzke 2000; Moyer *et. al.* 1996; Rebar and Hendricks 1994; Palmer Engineering 2003) and one survey using Anabat technology (Harvey and Britzke 2000).

Management and Protection

Under TVA's 1994 management plan for LBL (TVA 1994a) Indiana bat habitat was protected through the implementation of streamside management zones (SMZ's). SMZ's protected forested corridors over streams, and water quality in the streams and lakes by limiting management activities in the corridors. Additionally, management allowed for retention of exfoliating bark species of trees in SMZ's according to guidelines in the Indiana bat recovery plan. These measures protected stream corridors for foraging and potential maternity sites, and protected water quality to provide drinking water and an aquatic insect prey base for Indiana bats. Additionally, bat populations on LBL were monitored on a periodic basis under the 1994 plan.

In assessing the viability of this species at LBL, it was given a Forest Rank of FP in the Area Plan FEIS, meaning that the Indiana bat could possibly occur on LBL; however documented occurrences are not known. Bat populations on LBL will continue to be monitored on a periodic basis under the Area Plan. Additionally, the level of inventory for Indiana bats will be considered on a project-by-project basis in accordance with procedures outlined in the Region 8 supplement to the FSM §2672.43 (effective February 15, 2002). This supplement provides a decision framework to aid in determining when project-level inventory of Proposed, Endangered, Threatened, and Sensitive species is necessary. FS will consult with KFO pursuant to Section 7 if Indiana bats are found on LBL

Protection measures for water resources in the Area Plan will benefit the Indiana bat. Objectives of the water resource program at LBL are to maintain and enhance water quality, provide diverse aquatic and wetland habitat, protect riparian area functions, and provide information about water resource values to the public. Water resources are managed through implementation of riparian corridors. Plan standards for intermittent and perennial streams have minimum riparian corridors of 50-75 feet and 100 feet respectively. Because of the contribution ephemeral streams make to the stream network, 25-foot zones are managed along ephemeral streams to provide for channel stability and fluvial processes in addition to water quality. Plan standards, as listed on pages 7-9 of this document, will protect stream corridors and shoreline habitat. These measures will

protect stream corridors for foraging, and protect water quality in the streams and lakes to provide drinking water and an aquatic insect prey base for bats.

Vegetation management under the Area Plan will continue to provide for a predominantly oak-hickory forest with large, older age-class trees that will continue to provide trees with exfoliating bark across the LBL landscape for potential Indiana bat maternity sites. Additionally, retention of snags and den trees and creation of oak woodlands will provide additional potential roosting and summer maternity sites for Indiana bats. On upper slopes and ridges across the area, grasslands (less than 10 percent canopy closure) and open oak woodlands (10 to 60 percent canopy closure) will be interspersed in variable mixtures. Understories will be dominated by native grasses and forbs. Most mid and lower slopes will support open oak forests (60 to 80 percent canopy closure), with understories containing oak regeneration in sufficient numbers to provide for sustaining oak on these sites over time. Area Plan standards, listed on pages 7 to 9 of this document, will protect stream corridors, lake shorelines, streams, ponds, and water quality for feeding and watering.

Potential Effects

No Indiana bats have been detected on LBL as a result of extensive mist net surveys and one ANABAT survey conducted during five summers from 1993 to 2002. Additionally, LBL contains no suitable winter hibernacula for Indiana bats (Gardner 1992). LBL does contain suitable habitat for foraging and potential roosting and summer maternity sites.

Habitat relationships were defined and evaluated during the species viability assessment for the Area Plan FEIS. Potential habitat associations identified for the Indiana bat include Forest Opening Associates, Riparian Forest Opening Associates, Den Tree Associates, Snag Associates, and Pond and Marshes Associates. These habitat types will provide for potential foraging, roosting, and summer maternity sites.

The Forest Opening Associates includes species associated with structural types of mature open forest; mature forest with gaps; mature woodland; and regenerating forests in all cover types. The amount of this habitat association currently rates poor, but with increases in the amount of this habitat in 10 years, the rating improves to fair. In 50 years with continued increases, the rating is projected to be good. These habitat types will provide for potential roosting, and summer maternity sites.

The Riparian Forest Opening associates includes species associated with oak forest, mesophytic forest and riparian forest; with mature open forest, mature woodland, mature forest with canopy gaps, and regenerating forest structures on alluvial sites. The amount of this habitat association currently rates poor, and although there are increases in the amount during the first decade, the rating remains poor. In 50 years, with increased acreage of this habitat, the rating is projected to be fair. These habitat types will provide for potential foraging, roosting, and summer maternity sites.

The Den and Snag Associates include species associated with partially or entirely hollow (den) trees and standing dead (snag) trees. Exfoliating bark on snags such as white oak

and den trees are important for summer and maternity roosts. Although it is known that snag and den tree habitat occurs in LBL, an inventory of the acres of these habitat types is not available for LBL and is thus stated as zero acres in the FEIS. The amount of acres in snag and den tree habitat is projected to rank as poor in 10 years and good in 50 years as correlated to old growth habitat conditions. However, the amount of snags and den trees correlated to mature forest is currently rated as very good, and will remain so over time. Minimal management activities within Core Areas will provide for these habitat conditions as well as outside Core Areas in actively managed prescriptive areas such as General Forest. Additionally, increased use of prescribed fire will result in increased snag and den tree production. Implementation of Area Plan standards will protect den trees and snags for potential use by the Indiana bat and other species. These habitat types will provide for potential roosting, and summer maternity sites for the Indiana bat.

Ponds and Marshes Associates include plant and animal species that require this habitat type for a portion of their life cycle requirements. This habitat type is primarily represented by ponds and wildlife waterholes located mostly in open lands, and small ephemeral wetlands dispersed across the landscape on LBL. Continued management of the ponds and waterholes, and some restoration of these sites, will provide potential foraging habitat and drinking water sources for this species.

The projected small increase in recreational use resulting from Area Plan implementation is not expected to adversely affect the Indiana bat, primarily because the biggest threat from recreational use is disturbance of caves, and LBL has no suitable caves for Indiana bats. Additionally, with implementation of Area Plan standards for protection of foraging and water resources, and implementation of project-level inventory and analysis when needed, Area Plan recreational use is not expected to adversely affect Indiana bats.

Determination of Effects

A determination of "Not likely to adversely affect." is made for the Indiana bat based on:

(1) Winter hibernacula do not exist for the Indiana bat on LBL.
(2) Vegetation management will provide for a predominantly oak-hickory forest with large, older age-class trees, den trees, and snags that will continue to provide trees with exfoliating bark across the LBL landscape for potential roost and maternity sites.
(3) Water quality, stream corridors, and lake shorelines will be protected through management of water resources and implementation of Area Plan standards. These resources will continue to provide foraging areas and an aquatic prey base for bats.
(4) A small increase in recreational use is not expected to adversely impact this species due to the absence of caves and the implementation of Area Plan standards to protect terrestrial and aquatic resources.
(5) Although Indiana bats have not been found on LBL, periodic monitoring for bats will continue, and project-specific inventory will be implemented as needed. If Indiana bats are found on LBL, consultation will be held with the KFO.

Price's Potato Bean (*Apios priceana*)

Environmental Baseline

Price's potato bean is a perennial herbaceous vine in the pea family. The fleshy knob at the tip of each flower is a characteristic feature of this species. Leaves are mostly divided into seven leaflets, and flowers are produced in July, followed by bean-like fruits (Chester and Ellis 2000). Price's potato bean is an inhabitant of open, mixed-oak forests, forest edges and clearings in river bottoms, ravines, and is unable to tolerate deep shade (NatureServe 2004). This species is also associated with calcareous boulders and several populations extend onto road or utility rights-of-ways (NatureServe 2004). Known populations of this species occur in four states: Alabama, Kentucky, Mississippi, and Tennessee (U.S. FWS 1993). Several populations have not been observed in recent years and are assumed to be extirpated. A recovery plan was issued for the federally threatened Price's potato bean in 1993 (U.S. FWS 1993).

Several surveys for Price's potato bean have been conducted on LBL by Kentucky State Nature Preserves Commission, Dr. Edward Chester from Austin Peay State University, and others. At the time of implementation of TVA's 1994 plan, two populations were known on LBL. In subsequent years following plan implementation, three additional populations were discovered. Five populations of Price's potato bean, are known to occur on LBL at the present time. Four populations are in Kentucky: Hematite Lake, Laura Furnace, Mammoth Furnace, and Pisgah Bay. One population is located in Tennessee near Lake Barkley.

Price's Potato Bean occurs in a variety of situations on LBL, including adjacent to lake shorelines, road rights-of-way, and limestone outcrops. All LBL populations occur with other plant species characteristic of dry to dry-mesic conditions, with the possible exception of the Pisgah Bay population that could be characterized as dry-mesic or mesic (White 2001). All populations in LBL are components of a local flora that is associated with limestone outcrops.

Management and Protection

Under TVA's 1994 management plan for LBL (TVA 1994a) Price's potato bean was monitored and managed in conjunction with Kentucky State Nature Preserves Commission and TFO. Measures were taken to protect two known populations. At one site a no-mowing zone was established along a roadside to prevent routine mowing of the site. At the second site, a popular hiking trail was rerouted to move hikers away from the population, primarily to keep them from picking the showy flowers. Both of these measures were successful in achieving their objectives. Additionally, limited management was attempted by removing canopy trees at the two sites to reduce shading, with limited success. At one of the two canopy removal sites, several trees were removed to increase light levels. The following year, one plant flowered at the site in response to increased light levels, and the number of plants increased from 16 to 22 (White 2001). At the second canopy removal site, several trees were removed from the opposite (east) side of the road, but there was minimal recovery in the number of flowering plants at this site in the following year (White 2001). During the 10 year planning period, three additional

populations were discovered, bringing the total to five, and by the end of the planning period all five populations had remained stable or declined primarily as a result of increased shading due to canopy closure or competing vegetation.

In assessing the viability of this species at LBL, it was given a Forest Rank of F1 in the LBL Area Plan FEIS, meaning that the Price's potato bean is an extremely rare occurrence on LBL; generally with one to five occurrences.

Excessive shade, ground disturbance, and dense shrubby/herbaceous competition threatened the existing populations at LBL. A total of 52 stems were found on LBL in 2001 (White 2001) and four of the five LBL sites were recommended for shade removal (the fifth site appeared to be receiving sufficient light). These measures have not yet been implemented. Increased light levels should allow flowers to develop, and increase the potential for reproduction. Based on recommendations by White (2001) and results of KFO site visits in 2003 and 2004, management and protection of this species is needed for LBL's populations. An approach to the recovery of this species was discussed with the KFO during their visit to LBL on June 22, 2004. The approach, including all treatments, will be closely coordinated with KFO, and will consider many factors in the habitat requirements for this species. Treatments will be determined in consultation with the KFO, applied on a site-specific basis, and may include shade tree removal (canopy and under-story), removal of competing vegetation through mechanical means or selective application of approved herbicides, prescribed mowing, prescribed burning, protection from routine maintenance activities such as mowing and herbicide application, exclusion of visitors from the plants and/or sites, and natural and artificial propagation. Depending on the particular prescription applied to a given site, treatment may be implemented during the growing season or the dormant season.

Recovery efforts for Price's potato bean under the Area Plan will involve continued monitoring and evaluation of the species. Monitoring of known populations will occur on an annual basis unless otherwise determined in consultation with KFO. The level of inventory for Price's potato bean for site-specific projects will be considered on a project-by-project basis in accordance with procedures outlined in the Region 8 supplement to the FSM §2672.43 (effective February 15, 2002).). This supplement provides a decision framework to aid in determining when project-level inventory of Proposed, Endangered, Threatened, and Sensitive species is necessary. If any new populations of Price's Potato Bean are found prior to or during project implementation, the KFO will be notified, and the appropriate standards and guidelines will be followed to ensure that this species and its habitats are protected. With continued monitoring and evaluation, attainment of additional information will lead to more knowledge about the species and its habitat preferences and requirements. This information may be used in the future to propagate the species in new locations in conjunction with KFO and others.

Potential Effects

Price's Potato bean has been selected in the Area Plan as a Management Indicator Species (MIS) for recovery of this species. The greatest threat to the LBL populations is shade. There is a need for shade removal on four of the five LBL sites (White, 2001).

Implementation of management prescriptions in cooperation with KFO should be beneficial to known populations.

Vegetation management activities including forest management, prescribed burning, implementation of oak-grassland demonstration areas, herbicide treatment of invasive, non-native plant species, and utility and road rights-of-way maintenance could affect this species. Habitat relationships were defined and evaluated during the species viability assessment of the FEIS. Habitat associations identified for the Price's potato bean include Forest Opening Associates which includes species associated with structural types of mature open forest; mature forest with gaps; mature woodland; and regenerating forests in all cover types. Forest opening associates' habitat potential increases for the Price's potato bean in the selected alternative in the future, with a moderate increase in the next 10 years, and a relatively large increase in potential habitat in the next 50 years (FEIS Table 3.2.8K). The amount of this habitat association currently rates poor. In ten years, the rating improves to fair, and in 50 years the rating is projected to be good. These openings will provide beneficial habitats for potential Prices's potato bean recolonization.

The projected small increase in recreational use resulting from Area Plan implementation is not expected to adversely affect Price's potato bean, primarily because protection measures already in place (restricted mowing zone and rerouted recreational trail) will remain in effect. If additional populations are discovered or become established in the future, appropriate protective measures would be coordinated with KFO.

If the above species is found prior to or during project implementation, the appropriate Area Plan standards will be followed to ensure that this species and its habitat are protected. Conservation measures for natural regeneration of the existing populations and propagation of additional populations will consider guidance from the Price's potato bean Recovery Plan (U.S. FWS 1993), state natural heritage programs, species experts, and will be closely coordinated under consultation with KFO.

Determination of Effect

A determination of "Not likely to adversely affect" is made for Price's potato bean because:

(1) Monitoring and management of five known Price's potato bean sites in consultation with KFO, along with continued long-term monitoring of these populations, will help to maintain or increase known populations of this species on LBL.
(2) Vegetation management activities resulting from Area Plan implementation are expected to increase potential habitat for Price's Potato Bean during the planning period by opening the forest canopy in selected locations, which could result in new populations.
(3) Projected increases in recreational use will be monitored, and appropriate measures will continue to be enforced to protect known populations and any newly discovered populations from potential adverse effects of recreational use.
(4) The potential to propagate the species in new locations will be explored with KFO and others, which would be beneficial for the species.

Conclusion

Objectives of this Biological Assessment (BA) were to:

- Comply with requirements of the Endangered Species Act (ESA) of 1973, as amended, so that actions by federal agencies will not jeopardize the existence of federally listed species, or destroy, or adversely modify their critical habitat.

- Assess the effects that implementation of Area Plan will have on threatened and endangered species known to exist on or near the Recreation Area.

  Provide biological input to ensure United States Forest Service (FS) compliance with the National Forest Management Act (NFMA) of 1976 and Forest Service Manual (FSM) 2670.

The Determination of Effect for bald eagle, interior least tern, gray bat, Indiana bat, and Price's potato bean is "not likely to adversely affect." This document was prepared in partial fulfillment of requirements of informal consultation with the United States Fish and Wildlife Service. The Forest Service will apply the Area Plan's applicable standards to protect and conserve these species and their habitats, and will continue consulting with KFO on a project-by-project basis as required.

Signatures of Preparers

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