Monitoring and Evaluation Report
Land Between The Lakes
National Recreation Area
Fiscal Year 2010

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All program areas were consulted in the development of this report.

A. Forest Supervisor's Certification

I have evaluated and endorsed the monitoring and evaluation results presented in this report. I have directed that the Action Plan developed to respond to these results be implemented according to the timeframes indicated, unless new information or changed resource conditions warrant otherwise. I have considered funding requirements in the budget necessary to implement these actions.

I find there are no recommended changes to the Land and Resource Management Plan (Area Plan) at this time, and therefore, it is considered sufficient to continue to guide land and resource management of Land Between The Lakes National Recreation Area for the foreseeable future.

/s/ William P. Lisowsky *5/4/11*

WILLIAM P. LISOWSKY Date
Area Supervisor

Land Between The Lakes undeveloped shoreline.

B. Introduction

This Monitoring and Evaluation (M&E) report is a comprehensive report for the last five years of implementation of the Area Plan. Accomplishments and trends at the U.S. Forest Service (USFS) Land Between The Lakes (LBL) National Recreation Area (NRA) are presented for the last five full fiscal years: FY06-FY10.

The report emphasizes the findings and conclusions that have been compiled from various monitoring activities and data sources available on the unit. As stated in Section 2 of the Area Plan, the monitoring and evaluation program is designed to serve as an important link between Plan implementation and on-the-ground accomplishments. Evaluations in this report serve as a springboard to any needed changes within the Area Plan or its implementation. The M&E program determines and informs the Area Supervisor on whether:

- Goals and Objectives are being achieved;
- Design Criteria are being followed;
- Implementation effects are occurring as predicted;
- Emerging or unanticipated issues are arising.

No major comments were received about last year's report format so most sections of this year's report remain the same. For continuity, we continued discussion of the relevant pieces from last year's report. Section D is broken up into eight pieces, one for each of the Area Plan's goals.

Each goal has a table that combines in one location the desired condition and trend statements, and relevance discussed in the Area Plan. In an effort to make this a meaningful and usable document while still being a manageable size, we have attempted to summarize only the key conclusions within the body of a "monitoring results and evaluations narrative" following each goal's table.

The heart of the report is the narrative in Section D focusing on the significant items that have driven the conclusions presented.

Citizens have a stake in understanding management effects and effectiveness at LBL. Only by hearing from you, our stakeholders and owners of the public land, can we know whether we are providing the information and program benefits you desire. Comments about LBL can always be provided by mail to the Area Supervisor, 100 Van Morgan Drive, Golden Pond, KY, 42211; by electronic mail to **comments-southern-land-between-lakes@fs.fed.us**; or by phone to Barbara Wysock, Area Planner, at 270-924-2131. We welcome your thoughts and comments about this report or any aspect of LBL management at any time.

C. Executive Summary

This report is a comprehensive 5 year M&E report where we review the progress made toward achievement of the goals and objectives of the Area Plan implementation. No major deficiencies were identified that require amendments to the Area Plan. Each section contains highlights of FY10 and trends and evaluations of the last 5 full fiscal years of the Area Plan, FY2006-FY2010. Annual M&E reports for FY2005-FY2009 are available on the LBL website at http://www.lbl.org/LRMPPlanning.html.

Despite the challenges brought on by storm events, LBL has made significant progress toward the desired conditions of the Area Plan. In particular,

- integrated projects have resulted in increased acres of prescribed fire and/or timber harvest each year;
- partnerships have been enhanced;
- visitation during the past 5 years has supported the regional economy;
- environmental education is being incorporated into natural resource and recreation projects;
- open lands management is benefiting species that require early successional habitat;
- deferred maintenance has been greatly reduced to enhance recreation and environmental education (EE); and,
- dispersed opportunities have been increased.

Some highlights of the FY2010 M&E report include:

- ❖ Heritage programmatic agreement is under draft review by consulting parties and the public. Over 200 new heritage sites were recorded.
- ❖ Stewardship agreement with National Wild Turkey Federation (NWTF) was utilized for maintaining open lands and trading log decks from ice storm for timber stand improvement.
- ❖ Dramatic restoration in the Turkey Bay Off-Highway Vehicle (OHV) Area is a model for restoration of unmanaged recreation.
- ❖ The amount of prescribed fire treatments was 10,866 acres during FY10, the highest number in LBL history. This provided for habitat improvement and environmental education opportunities.
- ❖ The Oak Grassland Restoration Demonstration Areas (OGRDA) have received vegetation treatments.
- ❖ Recovery efforts for the Price's Potato Bean and Bald Eagle have been successful on LBL. Habitat for species of concern has been created.
- ❖ American Recovery and Reinvestment Act (ARRA) monies were used for the creation of jobs and repair of infrastructure.
- ❖ Recreation was affected by spring rains resulting in the highest recorded lake levels in the ten year management of LBL by the Forest Service.

D. Monitoring Results and Evaluations

Goal 1:	**Prioritize projects to provide the greatest recreation, Environmental Education (EE), and resource stewardship benefits.**
Sub-element NFS Generic Desired Condition	"LBL will play a pivotal role in supplying and supporting the recreational and EE experiences people seek." "All vegetation management activities will be designed to sustain or improve wildlife habitats, forest health, recreation opportunities, or EE experiences." [Area Plan, Vision]
Example Area Plan Desired Condition Statement	"The responsibility for meeting this (recreational and environmental education) increasing demand will fall to those areas and entities capable of providing outdoor recreational opportunities while sustaining natural environments." "Vegetation management activities will incorporate environmental education messages, themes, and information in programs and projects as much as practical." [Area Plan, Vision]
Desired Trend Statement	"Eighty percent of all special projects will have identified and demonstrated benefits to recreation, EE, and resource stewardship." [Objective 1a]
Monitoring Questions	1. Has the Forest Service (FS) made progress toward providing satisfactory recreational and EE experiences to visitors while providing for resource stewardship? 2. Have resource management projects been integrated?
Area Plan Performance Measures	1. Trends in segmented visitation in comparison to numbers of related resource stewardship projects completed 2. Number of integrated projects being completed
Data Sources Utilized	--Summary of visitor satisfaction surveys or personal letters and notes received; visitation; and focused area accomplishments --Objective accomplishments, summary of integrated projects completed
Importance	This goal contains key emphases of the LBL Protection Act and reinforces the key purposes described for LBL when created in 1963. Optimizing efficiency and integration of resources are also primary objectives of both LBL and the agency.
What It Tells Us	The results related to this goal will provide key information about whether LBL is meeting its legislated objectives and tiering to national strategic goals.

Goal 1, Monitoring and Evaluation Narrative

LBL has completed our fifth full fiscal year using the Area Plan. First the FY10 integrated efforts will be described, and second, the five years will be evaluated. The vision of the Area Plan is steadily being achieved as we strive toward the desired conditions. Progress in recreation, environmental education, and resource stewardship has been made this year. See other sections of this report for specific accomplishments in these areas. The public, including visitors and local leaders, mostly express satisfaction with the management of LBL.

Recreation and environmental education opportunities are being enhanced through continued management of the natural resources across LBL. Visitors can now see and experience the

results of open lands management, thinning of the forest, and prescribed fire treatments. Hiking, camping, educational programs, wildlife viewing, and scenic viewing remain popular activities for visitors.

The following examples of our integrated efforts are discussed in later narrative.

- Open lands, timber, prescribed fire, non-native invasive species (NNIS), and species of concern are described in Goal 5. LBL vegetation management is being incorporated into environmental education programs described in Goal 7.
- The amount of prescribed fire treatment totaled 10,866 acres during FY10, the highest number in LBL history. This provided for habitat improvement and environmental education opportunities. The local media ran articles about the burns which explained the need for prescribed fire in LBL to a broad audience. The objective of one of the burns this year was to restore native shortleaf pine in the Devil's Backbone State Natural Area.
- An interdisciplinary team has been working on an environmental assessment on approximately 3,450 acres for wildlife habitat improvement, fuel reduction, management of shortleaf pine and hardwood stands, road improvements, and dispersed recreation. Prescribed burning, management for oak woodland, open mature oak forest, and regenerating forest are part of this assessment in the Demumbers Creek area.
- Implementation of prior year decisions resulted in over 1,800 ccf of timber being sold.
- A programmatic agreement with United States Fish and Wildlife Service (USFWS) for timber and fire programs was completed, resulting in a biological opinion from the USFWS for the Indiana bat and Price's potato bean endangered species.
- The public provided comment on the proposal to realign Lake Access and Backcountry Areas to provide satisfactory recreation opportunities and to best manage the resources.
- Heritage programmatic agreement is under draft review by consulting parties and the public. Further discussion of this can be found in Goal 2. Over 200 new heritage sites were recorded.
- ARRA projects are underway, as described in Goals 7 and 8.

Key accomplishments for the year are found in the table at the end of the Goal 8 narrative. In looking over this list for the first five fiscal years of the Area Plan implementation, it is clear that LBL is achieving the desired condition. (Also see the Goal 8 narrative.) Some highlights of the five years are:

- Implementation of large scale environmental assessments for continued maintenance of openlands, the Oak Grassland Restoration Demonstration Area in Prior Creek, and fire treatments in five areas across LBL;
- Use of the Ice Storm Assessment as groundwork for NEPA assessments;
- Regeneration of shortleaf pine using prescribed fire in the Devil's Backbone area;
- Development of a Collaborative Forest Landscape Restoration Project (CFLRP) proposal using landscape strategies; and,
- Completion of a facelift of Energy Lake Campground.

On the ground accomplishments are visible and have been increasing each year, as described throughout this report. The increased momentum is expected to be seen in the next five years of plan implementation. Visitors continue to enjoy all LBL has to offer, with scenic viewing, wildlife viewing, fishing, camping and relaxing being the top 5 activities as shown in Figure 1.

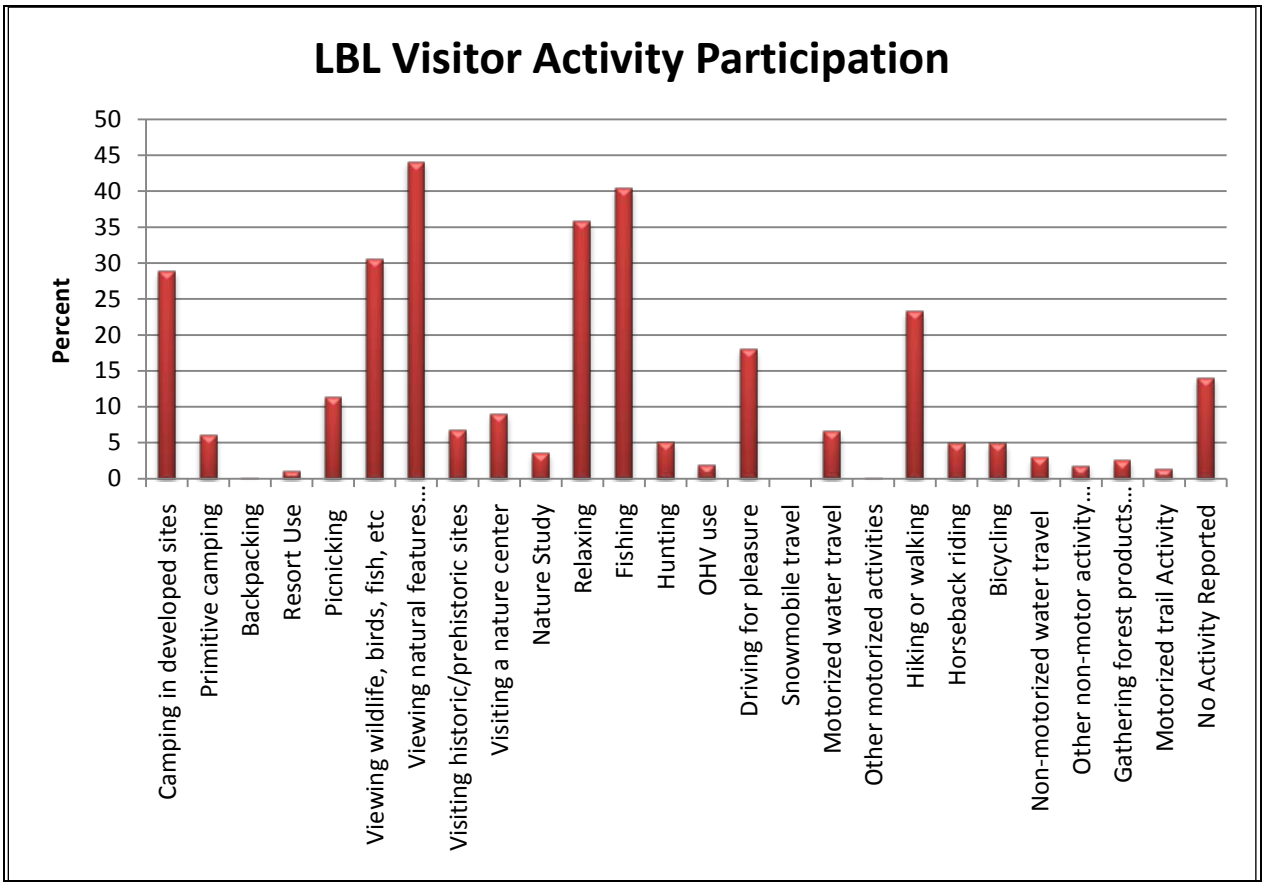


Figure 1. Visitor Participation from National Visitor Use Monitoring Survey, 2007

Customer feedback from a variety of sources, including formal surveys, personal letters, comment cards, user feedback to individual program managers, and the general consensus from communities' key contacts is predominantly positive. An important element of outdoor recreation program delivery is evaluating customer satisfaction with the recreation setting, facilities, and services provided. Satisfaction information helps managers decide where to invest in resources and to allocate resources more efficiently toward improving customer satisfaction.

Ratings of overall satisfaction at LBL are quite high. Just over ninety percent of visitors rated their overall satisfaction as either somewhat or very satisfied (National Visitor Use Monitoring Survey (NVUM) , FY2007). Ratings for each of the composite satisfaction indices at developed sites, which include developed campgrounds, environmental education facilities (i.e. Nature Station and 1850's Homeplace), developed trail heads, and picnic areas, were above the national

target of 85% satisfaction (see Table 1). For undeveloped areas, all were over 80% satisfied, but only perception of safety and access were over the national target (see Table 1).

In Fiscal Year 2012, LBL will conduct a Forest Survey, which will allow LBL to determine if any significant improvements in customer satisfaction have been made.

Figure 2. Percent of Land Between The Lakes visits by overall satisfaction rating (NVUM, FY2007)

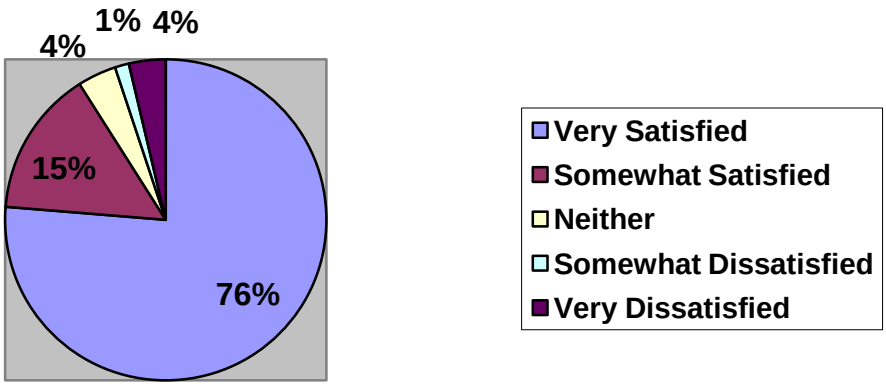


Table 1. Percent Satisfaction Index[a] scores for aggregate categories, Land Between The Lakes (NVUM, FY2007)

	Satisfied Survey Respondents (%)	
Items Rated	Developed Sites[b]	Undeveloped Areas (GFAs)
Developed Facilities (includes restroom cleanliness and facility condition)	97.2	83.3
Access (includes parking availability, parking lot condition, road condition and trail condition)	87.1	95.1
Services (includes availability of information, signage, employee helpfulness)	92.4	82.1
Perception of Safety	98.2	92.3

[a] This is a composite rating. It is the proportion of satisfaction ratings scored by visitors as satisfied or very satisfied. It is computed as the percentage of all ratings for the elements within the grouping that are at or above the target level, and indicates the percent of all visits where the person was satisfied with agency performance.

[b] This category includes both Day Use and Overnight Use Developed Sites.

Heritage

Although heritage was not reported as part of Goal 1 in past M&E reports, there has been extensive progress on integrated projects to identify and protect the resources, with the highlights presented below. Additional details on heritage accomplishments can be found in the appendix.

Fourteen heritage compliance projects were completed in 2010 as part of the integrated project workload. In addition, 193 new heritage sites identified during project compliance surveys were officially recorded in 2010 and added to the heritage site management database. LBL's priority heritage assets have been managed to standard.

There have been several notable heritage resource projects that provided satisfactory recreational and environmental education experiences to visitors while providing for resource stewardship over the last 5 years:

- re-opening of the Hillman National Heritage Trails which for the first time incorporate heritage interpretation into the hiking experience (2010; see Goal 7)
- stabilization (2007) and Phase 1 restoration (2010) of the Luther Shaw/Will Flora cabin
- vegetation removal and repairs at Center Furnace (2009)
- Moss Creek Trail re-route that successfully avoided impacts to 5 heritage sites which were incorporated into the design in a way that provided a greater user experience through this trail section (2008)

In 2010, LBL began in earnest to pursue developing a Programmatic Agreement (PA) to develop alternative procedures for fulfilling their legal requirements to complete the Section 106 process required by the National Historic Preservation Act of 1966, as amended, prior to a Federal Agency implementing projects. Once signed, the PA will streamline the required paperwork so that individual resource management projects can move forward in a more timely manner and free-up heritage staff time to address other priorities, such as focusing on resource stewardship, public education, interpretation, and outreach programs.

In conjunction with the development of the Programmatic Agreement, LBL is completing a Heritage Implementation Plan (Plan). The Plan is meant to be short-term (3-4 years), dynamic and flexible, and consist of an adaptive strategy for compliance with Section 110. While the PA will help LBL continue to make progress with Section 106 compliance, the Plan will serve as a tool to:

- Implement Section 110 compliance with its focus on Federal Agency responsibilities as stewards of our Nation's heritage resources located on public lands
- Implement the USFS National Heritage Standard
- Fill in some of the gaps in the existing Heritage Resource Management Plan (HRMP)
- Experiment with strategies and methods and develop protocols
- Provide a bridge between the existing HRMP and an updated version
- Provide accountability

Goal 2:	**Emphasize partnerships and cooperation with citizen groups, community businesses, private corporations, tourism organizations, and government agencies.**
Sub-element NFS Generic Desired Condition	"LBL will continue to be a destination point for visitors throughout the region and nation, thereby contributing to the local and regional economy." [Area Plan, Vision]
Example Area Plan Desired Condition Statement	"Maintaining and developing partnerships will be important to keeping LBL positioned as a premiere recreation/EE destination." "The public will continue to play an important role in project-level actions and decisions." [Area Plan, Vision]
Desired Trend Statement	"Establish at least one local partnership for tourism, economic development, or EE; and at least one new cooperative with a regional, state, and federal agency or organization annually in support of the LBL mission." [Objective 2a] "Increase visitation to more than 2 million visitors per year by the end of 2015 to support local and regional economies. [Objective 2b]
Monitoring Questions	3. Has the Forest Service (FS) made progress toward supporting vitality of gateway communities and maintaining/enhancing relationships with its neighbors and regional organizations?
Area Plan Performance Measures	3. Trends in visitation, levels of community participation
Data Sources Utilized	--Summary of visitation results, community participation in meetings, programs provided, grants sponsored, cooperative gateway projects, feedback from elected officials and business leaders, and visitation --Number of Memorandum of Understandings (MOUs), partnership agreements, and challenge cost share agreements with local, regional, and state agencies
Importance	This goal contains important strategies for the collaborative delivery of goods and services at LBL. It also reinforces several of the key purposes described for LBL when created in 1963, namely to work cooperatively with the gateway communities in support of their strategic direction.
What It Tells Us	The results related to this goal will provide key information about whether LBL is meeting its stated objectives to work closely with partners and communities and developing strong relationships with local, state, and regional organizations and publics.

Goal 2, Monitoring and Evaluation Narrative

Partnerships and Community Participation

Over the past five years LBL has continued to increase partnerships and cooperation with citizen groups, community businesses, private corporations, tourism organizations, and government

agencies. A few examples of this include new partnerships with the Shawnee and Cherokee National Forests and also other agencies such as the National Park Service, U.S. Fish & Wildlife, and National Wild Turkey Federation. We have also built stronger relationships with all the American Indian tribes who once inhabited the area. LBL continues to host a significant number of regional events and weekend programs that contribute greatly to area visitation and economy in both Kentucky and Tennessee. The LBL Volunteer program has continued to grow over the past five years providing valuable experience for the participants and has helped several LBL program areas reach their goals. Visitors, community leaders, congressional members, and partners, such as Quail Unlimited and the National Wild Turkey Federation, comment that they see good things happening across LBL.

LBL's visitation from 2005 to 2007 was fairly steady in numbers. Then in 2008 we began to see a slight decline. While concerning, this trend is also seen in state tourism as the nation experiences economic challenges; although within the Kentucky Western Waterlands region, tourism is beginning a return to more historical levels. LBL will continue to develop strategies for visitation growth and increasing length of stay visits in support of the regional tourism industry.

LBL continues to focus efforts towards supporting the vitality of gateway communities and maintaining relationships with neighbors and regional organizations. These communities have struggled over the past five years with the loss of key automobile and timber product industries and now many small community businesses are closing. These communities more than ever depend on tourism as a primary industry, and the region looks to LBL as the tourism industry centerpiece. The importance of tourism partnerships is recognized by the FS as critical in order for LBL to continue to be a destination of choice for visitors throughout the region and nation. Kentucky and Tennessee statistics for 2008-2009 indicate that LBL is the center of a $650 million tourism industry.

As the centerpiece for the regional tourism industry it is critical for LBL to provide current and accurate trip planning information. The number one source people turn to today for this type of information is the internet. LBL launched a market based web site in 1996 that received several prestigious awards. Since then people navigate the web differently and technology has changed; therefore, the LBL web site needed to change also. This year a new web site was designed with input from our tourism partners, Friends of LBL, the LBL Advisory Board, educators, staff and partners. The new site was launched this year (www.lbl.org) and is being very well received.

LBL is a member and active partner with 8 area Chambers of Commerce, plus regional tourism organizations such as Kentucky Western Waterland (KWW) (http://www.kentuckylakebarkley.org), the Kentucky Federal Agency Tourism Council (KFATC) (http://federal.tourism.ky.gov/), and the Lakes Region Tourism Coalition. Also, LBL staff coordinates promotions and partners with the 3 surrounding county tourism organizations. In 2010 LBL participated in the following tourism promotion events with these partners.

- Worked with KWW to staff regional tourism information exhibits at the 2010 World Equestrian Games at the Kentucky Horse Park and the annual Kentucky State Fair.
- Attended the KFATC annual meeting.

- Participated in the Lakes Region Tourism Coalition by attending monthly meetings, preparing materials for attending group tourism show and participating in developing a Truck and Tractor show as a new regional attraction. LBL also assisted the Coalition's participation in the Ft. Campbell Officer's Wives' Business Expo by providing a display.
- Worked in collaboration with Ft. Donelson, Cross Creek Wildlife Refuge and Stewart County to develop and produce information exhibits for the new Stewart County Visitor Center.
- Lyon County hosted a regional bar-b-que competition for the second year. Their goal was to establish an annual event that feeds into a national competition. LBL provided a sponsorship to support this effort.
- LBL coordinated with Trigg County tourism to position promotions in Ft. Campbell for greater impact.
- LBL cross promoted special events and programs being held in Grand Rivers, Marshall County, Trigg County, Stewart County, and Lyon County.
- LBL and the FS participated in the National NWTF Convention by hosting multiple booths in environmental education, law enforcement and fire and assisting in the teachers' workshop.

Another level of tourism promotion efforts are facilitated on the state level, including all major visitor centers in the region. In 2010, LBL continued to provide current and accurate information on LBL to these state welcome centers in addition to tourism offices and web sites. A new tourism partnership initiative was tested in 2006/2007 and continued into 2010 to provide promotion benefits for LBL and surrounding communities. The partnership was established with the regional radio station, WKDZ (http://www.wkdzradio.com/home.php), in the Murray, Cadiz, Hopkinsville, and Ft. Campbell areas. This model for media coverage is a more collaborative effort in support of regional tourism. Results, though only rough estimates by conversations with elected officials, tourism partners and LBL facility staff, do indicate the promotion partnership is resulting in increased community awareness and involvement in LBL's recreation and EE facilities.

In 2010 LBL partnered with the Shawnee National Forest to position and produce an informational exhibit for the Paducah regional airport. The exhibit quickly communicates that visitors to the area have several options for outdoor recreation in National Forest lands, all within a day drive or less.

Several new initiatives were taken in 2009 and continued in 2010 to improve the mix of services and products offered in order to draw more visitors to the area. A new campground reservation system was implemented and popular laser light shows were introduced to the Golden Pond Planetarium offerings. Tourism organizations contributed to producing a regional tourism attraction cross promotion piece that was available to audiences in the Golden Pond Visitor Center.

Throughout FY10 LBL staff identified additional opportunities to work with neighboring communities. In 2009 a diverse advisory committee comprised of citizens from our surrounding communities worked together with LBL to complete and submit the nomination for the "Woodlands Trace National Scenic Byway". "Woodlands Trace" was selected and is now

officially a National Scenic Byway and is listed on the National Scenic Byway web site. In addition, in 2010 LBL and Ft. Donelson connected to jointly plan for the 150th anniversary of the Civil War events in our region.

Environmental Education (EE) staff continued working together with partners for planning and delivering special events at LBL (such as Nature Arts Day, 1850 Wedding, Independence Day at The Homeplace, Hummingbird Festival, and others). A new twist was put on an annual event: the Agricultural Fair was redeveloped as an 1850's County Fair and Storytelling Festival, which brought in more local community participation. In an effort to reach the serious wildlife viewing sector, a new seasonal series is being developed: Nature Watch Series. The first will be in partnership with Lake Barkley State Resort Park focusing on pelicans and prairies in October.

As staff works on implementing the EE Master Plan's Goal 3 (increase and enhance EE partnerships in order to enrich audiences, programs and funding), they connect closely with our primary partner, Friends of LBL, in building working relationships with other government agencies and non-government organizations. These relationships are vital to the planning and delivery of environmental education programs offered to the public at The Homeplace and Woodlands Nature Station. Friends of LBL interpretive staff demonstrate the value and benefits of positive relationships through the following list of partners. We help each other by contributing to events and programs.

State Parks: Kentucky Dam Village; Lake Barkley State Resort Park; Paris Landing State Park; and Kenlake State Resort Park.
Conservation Organizations: Ducks Unlimited; National Wild Turkey Federation; Monarch Watch; North American Butterfly Association; North American Bluebird Society; Purple Martin Conservation Association; National Audubon Society; National Wildlife Federation; Frogwatch AZA; Operation Rubythroat; Red Wolf Coalition; Living Lands & Waters; Kentucky Waterwatch; Cumberland River Compact; and Kentucky Bowfishermen.
Universities & Colleges: Murray State University; University of Kentucky Extension; Purdue University; Austin Peay State University; Southern Illinois University; and University of Tennessee, Martin.
Federal Agencies: Natural Resource & Conservation Service; Tennessee National Wildlife Refuge; Clarks River National Wildlife Refuge; US Fish & Wildlife Service; Monitoring Avian Productivity and Survivorship (MAPS); Partners in Flight; and National Park Service.
State Agencies & Local Organizations: Kentucky Department of Fish & Wildlife Resources; Tennessee Wildlife Resources Agency; Tennessee Aquarium; Louisville Zoo; Nashville Zoo; Chattanooga Nature Center; Caldwell County Conservation District; Marshall County Public Library; Logan County Public Library.
Children's Organizations: West Kentucky 4-H; Boy Scouts of America; Trigg County High School Environment Club; Girl Scouts of America; Joshua Tree Home Educators Association.
Professional Organizations: National Association for Interpretation; Region 3 of National Association for Interpretation; Kentucky Association of Environmental Education; Tennessee Environmental Education Association, and North American Association for Environmental Education.

In 2010 areas in western TN experienced unprecedented flooding that left some communities without vital services for several days. LBL staff provided community assistance after the flood that greatly assisted local emergency response to the flood.

The Highway 68/80 improvement project is ongoing and is impacting the LBL east/west corridor (http://www.us68lbl.com/). This design/build project, managed by the Kentucky Transportation Cabinet, is viewed by the FS as a critical priority to ensure it will meet the future needs of regional commerce and tourism while protecting resources and blending with the natural environment. The Transportation Cabinet supported, and the Federal Highway Administration selected, the context sensitive design alternative that addresses these concerns. As needed progress meetings are attended by all partners and contractors. Public and employee safety concerns are always the first agenda item of the meetings. During planning and the implementation stages, other state and federal agencies were involved. United States Department of Agriculture (USDA) Natural Resources Conservation Service and Kentucky Division of Fish and Wildlife Resources staff provided, and continue to provide, input on right-of-way seeding mixtures and implementation. Kentucky Division of Water provided input and recommendations for water disposal and erosion control. Kentucky Transportation Cabinet staff conducts daily inspections and confers with LBL Forest Service on their findings. Impacts to tourism during the construction phases are being mitigated as much as possible. Some reduced visitation and travel delays can be expected at times, but this has been minimal.

Connected to the Highway 68/80 improvements The Golden Pond Target Range, located on Highway 68/80, has been renovated to a dedicated 184 yard rifle range and a dedicated 50 yard pistol range with new shooting stations. There are plans for covered firing lines and new restroom facilities. Haydon Brothers Contracting provided over $270,000 of in-kind work on site preparation. The Land Between The Lakes Association (aka Friends of LBL) organized a funds development committee to raise an additional $60K to finish the project. Also, Friends of LBL developed a grant for $25K which was submitted to the National Rifle Association. The grant was awarded. Another grant application was developed and submitted to the National Wild Turkey Federation for $20K. The application is still under review and consideration. The fund development committee has, to date, raised an additional $3,150 in private donations and continues to work to raise the balance of the funds needed to complete the project. With the funds raised to date enough work was accomplished to allow the range to be reopened in August 2010.

Partnerships, Agreements and Memoranda of Understanding (MOU)
Partnerships, agreements, and MOUs provide critical resources that augment LBL facilities and services provided for recreation, natural resource management, and EE. While they have always been a part of how LBL operates, the Area Plan places added emphasis on the value they bring to LBL and the surrounding region.

The cooperative partnership between the Forest Service and the Friends of LBL (www.friendsoflbl.org) continues to secure grants and provide critical services to help accomplish the LBL mission. Some of the FY10 Friends of LBL accomplishments are discussed under other goals, and others include:

- Involved 780 individuals from the general public in volunteer activities that produced 13,455 hours of service.
- Submitted a grant application to the Honorable Order of Kentucky Colonels for $15,956 for the purpose of replacing the telescope at the Golden Pond Observatory and adding additional equipment – received $7,653. Raised $4,444 in private donations for the telescope project.
- Obtained $2,500 donation to the School Field Trip Grant Program to achieve full funding for this year's cycle.
- Represented LBL and LBLA at 47 consumer shows, civic clubs, tourism organization meetings, chambers of commerce and events throughout the region.
- Worked with a local theatrical group to present a theatrical production at the Golden Pond Planetarium. This was done to determine the appeal of alternative forms of programming at the facility and to support a local group.

LBL for a third year accomplished work through Special Use Permits and a 10-year Challenge Cost Share Stewardship Agreement with the National Wild Turkey Federation (NWTF). Under the SUPs and this agreement, habitat was restored, enhanced, and maintained for the benefit of wildlife species, recreation opportunities, and environmental education. During this year the NWTF managed approximately 3,884 acres of wildlife openings, croplands, hayfields, and native warm season grassland on LBL. In addition to this work the NWTF played a very important role in getting tree debris cleared from fields and their accesses in the KY portion of LBL that were to be mowed, limed, and disked. LBL and NWTF are monitoring a grassland species of viability concern, the Henslow's sparrow, as described in Goal 5.

Heritage

A significant heritage project accomplished in 2009 included work performed at 5 historic sites related to the Star Lime Works community that are along the Hillman Heritage Trail. Working with employees from Swift and Staley, LBL's onsite contractor, vegetation was removed mostly by hand at Star Lime Works historic sites. Features were uncovered that had previously been totally obscured. In 2010 interpretive signs were placed in the Star Lime Works area to inform the public about the community that once existed there.

As part of the development of a Heritage Programmatic Agreement (PA) and Plan, LBL extended invitations to become a consulting party to representatives of state and federal agencies, tribes, local groups, and local county governments and 16 invitations were accepted. Heritage staff met individually with every consulting party over the last year to discuss the PA and Plan, building relationships and partnerships, and heritage resource concerns and issues.

In addition, heritage staff gave a presentation to three local community groups to answer questions about what heritage is at LBL, how the program started, where it is heading and share program highlights. In 2010 we continued to build our partnership with Fort Donelson National Park, meeting with the superintendent and members of their general management plan team to provide input for future planning and interpretation of the three Civil War forts located in or near the southern end of LBL. We also received 2 trailhead signs and frames and 1 wayside exhibit sign and frame for Fort Henry that both agencies developed together. One of the new trailhead signs will be installed at a new turnout and trailhead at Fort Henry that will be a more accessible

trail to the Fort Henry overlook on Kentucky Lake. At the request of Fort Donelson, the new trailhead and turnout will be able to accommodate tour groups and buses.

Another field school season for Murray State University was conducted in 2010 at Center Furnace where they continue to investigate a former slave quarters location. The summer field school was followed this fall with a one-day field class that conducted a magnetic remote-sensing investigation that yielded intriguing results for the next field school season.

The highlights of building community relations for LBL Heritage staff have been the relationships we have built with former residents of LBL. Their willingness to share their stories, visit their former home sites, and piece together histories with us is overwhelming. Another highlight of 2010 was the opportunity to visit and meet members of 5 of our recognized American Indian Tribes that reside in Missouri, Oklahoma, and North Carolina.

Resource Management

The forest management and wildlife staff worked together in FY2010 to expand upon the partnership and projects in collaboration with the National Wild Turkey Federation (NWTF). NWTF played a pivotal role in helping LBL execute two necessary projects through the use of a stewardship contract. The first half of this stewardship project involved the trading of decked sawtimber, the byproduct of opening LBL's road system after the 2009 ice storm. This allowed the sawtimber to be utilized and removed from LBL's road sides where it would have posed a transportation and wildfire safety issue in the years to follow. The second half of the stewardship project involved trading the value of the log decks removed by NWTF to implement a service contract for woodland habitat improvement. A contract sawyer crew was hired and thinned 218 acres (via a cut and leave operation) of forest within the Prior Creek OGRDA using chainsaws. By salvaging the value of sawtimber logs that had been cleared from LBL's infrastructure, NWTF helped the Forest Service improve 218 acres of woodland habitat conditions without the use of appropriated funding.

LBL secured two grants through the ARRA for biomass utilization in two neighboring counties. These demonstrative projects will convert woody biomass to energy and show a direct benefit to the appropriate county facility. The two projects will benefit the Lyon County School system and the Trigg County Hospital. LBL has partnered with the state's regional planning and development agency known as the Pennyrile Area Development District (PADD). PADD's expertise in grant writing, administration, and engineering will be invaluable for project oversight and collaboration with county officials. Both of these projects are moving forward.

The forest management staff continues to engage members of the local forest products community. For example, this year LBL staff attended the Wood Expo in Madisonville, KY, to discuss and explore new markets for woody biomass in Western Kentucky. An informational meeting was held for local timber industry representatives to explain the forest management program at LBL under the Forest Service. These and other contacts resulted in new inquiries and interest in our vegetation management program.

2010 LBL Visitation

LBL still continues to host a significant number of regional events and weekend programs (http://www.lbl.org/CALGate.html) that contribute greatly to area visitation. Visitation to these events and programs continues to grow and contribute economically to the local area. Visitation to EE facilities is also discussed under Goal 3 of this report.

Overall visitation for LBL was down by 3.5% in FY10 compared to FY09 (Figure 3). Visitation losses can be contributed to many factors. Two big factors that we believe had a major effect on LBL's overall visitation this year was the regional economy with high unemployment rates and economic fear, as well as Hwy 68/80 road construction that affected several sites such as Fenton, Archery/Rifle Range, Devils Elbow, and easy access to The Trace. These contributed to a loss of more than 25,000 visits.

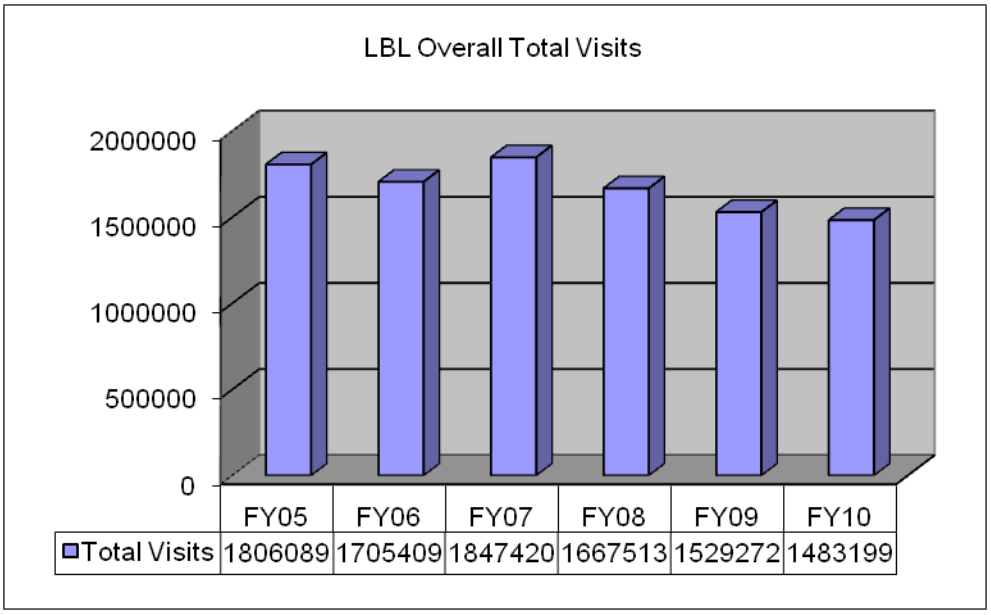


Figure 3. LBL Visitation

In targeted LBL recreational facilities where EE is deeply rooted, as in the case of the day-use facilities (The Homeplace and Woodlands Nature Station), participation has increased slightly or stayed steady each fiscal year since our Area Plan-inspired focus (Figure 4). Since the Area Plan's implementation, LBL has taken more of a Local Market Advertising effort focusing on Day-Use facilities which has helped contribute to the increase in admissions for The Homeplace and Woodlands Nature Station and exposed more individuals to LBL's Environmental Education mission.

	% Change from Previous Year				
Participation/Visitation	FY06 (% change)	FY07 (% change)	FY08 (% change)	FY09 (% change)	FY10 (% change)
The Homeplace (Admissions)	+7	+9	-2	+4	-3 %
Woodlands Nature Station (Admissions)	+8	+10	0	+10	+2%
Brandon Spring Group Center (Overnights)	+9	+2	-6	-4	-9%

Figure 4. EE Facility Participation in Programs[1]

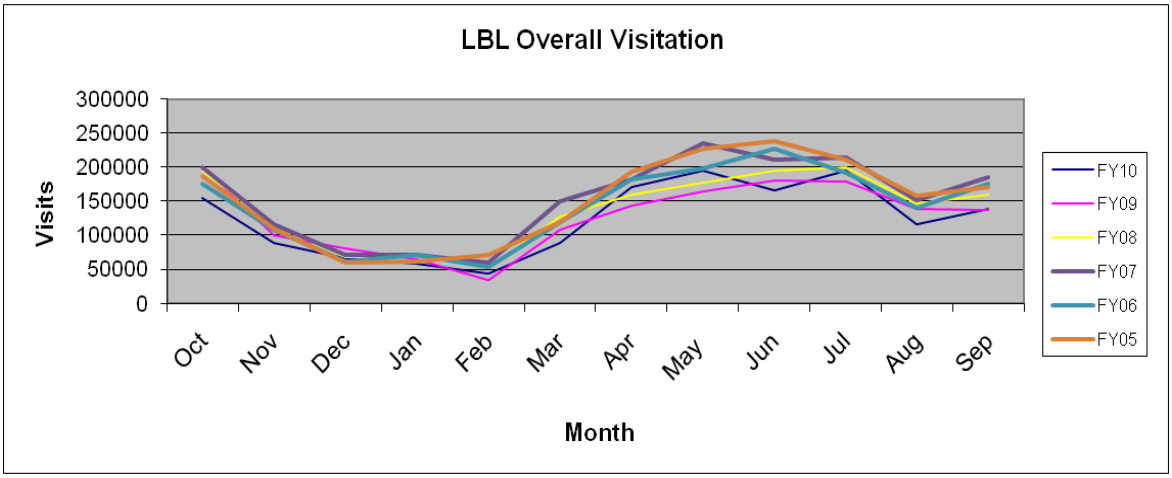


Figure 5. LBL Overall Visitation [2]

Since 2007, LBL's visitation has been declining. Visitation decreased by approximately 20% between FY07 and FY10 (see Figures 3 and 5). While it is hard to pin point why, there are several economic factors that could be contributing.

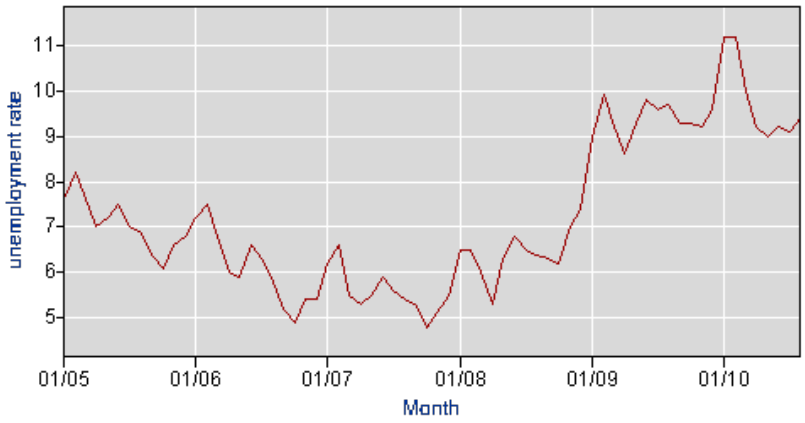
- Dramatic Rise in unemployment rates since 2007 (see Figure 6).
- CPI Inflation increase of 12% from 2005 to 2010 and 5% from 2007 to 2010. (Bureau of Labor Statistics)
- Stagnant or Decreased Median Incomes in KY, TN, MO, IN, and IL (see Figure 7).

[1] Visitation for The Homeplace and Nature Station are based on the point-of-sale or retail management system. Brandon Springs Group Center visitation is provided by the Center's housing reports.
[2] Overall visitation is derived from traffic counts.

The past three years have been difficult on the regional and local economies. With the three factors above taking place at the same time, it can create economic fears and unknowns which can play a major role in individuals' decisions on how to spend discretionary income.

Even though we have seen an overall decrease in visitation, developed facilities overall remain strong with little or no decrease in visitation.

Figure 6. West KY Unemployment Rate 2005 -2010 (Bureau of Labor Statistics)



West TN Unemployment Rate 2005 – 2010 (Bureau of Labor Statistics)

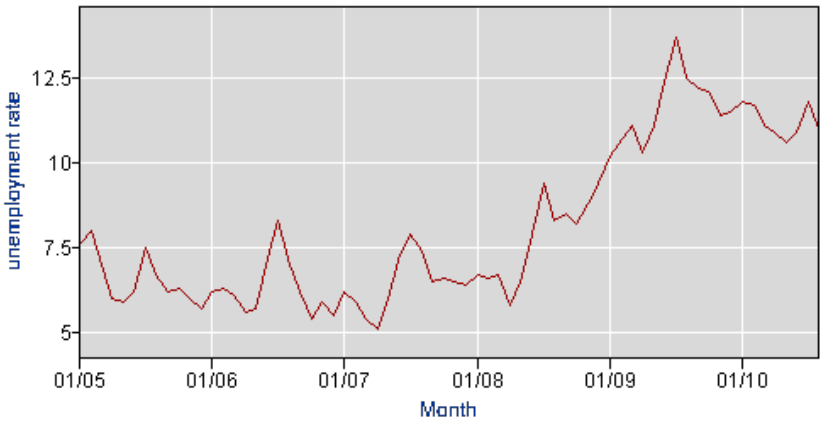


Figure 7. Median Income of Households for IL, IN, KY, MO, and TN

Median Income of Households by State Using Three-Year Moving Averages: 2005 to 2009

(Income in 2009 CPI-U-RS adjusted dollars (28).

State	2007-2009		2006-2008		2005-2007	
	Median income	Standard error	Median income	Standard error	Median income	Standard error
United States	50,618	115	51,118	118	51,381	128
Illinois	53,413	773	53,049	817	53,090	780
Indiana	46,579	832	47,913	887	48,007	893
Kentucky	41,489	775	41,270	757	41,046	785
Missouri	47,408	903	46,960	878	47,415	884
Tennessee	40,895	787	41,819	750	43,067	751

Source: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplements. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see www.census.gov/apsd/techdoc/cps/cpsmar10.pdf[PDF].

Goal 3:	**Utilize a variety of methods and opportunities to provide an EE message to every visitor.**
Sub-element NFS Generic Desired Condition	"EE messages, information and principles will be incorporated into all projects on LBL through diverse cooperative, interdisciplinary efforts designed to potentially reach every visitor to LBL." [Area Plan, Vision]
Example Area Plan Desired Condition Statement	"EE will emphasize more non-facility-based messages, programs, and projects. The current EE facilities will remain hubs for expansion of the reach and effect of the EE programs and projects. EE programs will be integrated with recreation activities and will provide messages and information to recreational visitors that make them more aware of the importance of sustaining their environmental surroundings while participating in their desired activity." "Self-guided loop trails, road pull-offs, viewing blinds, and EE messages in these areas (Nature Watch Demonstration Areas) will engage visitors with the natural environment. "EE will be an integral component of activities in the Oak Grassland Demonstration Areas. Visitors will be able to watch and learn about the application of various vegetation management practices used to restore native ecological communities." [Area Plan, Vision]
Desired Trend Statement	"Ensure that 80% of LBL communications, programs, and activities have an interwoven EE message." [Objective 3a] "An average of one to two user impact challenges will be addressed annually through EE." [Objective 3b]
Monitoring Questions	4. Has the FS made progress toward successfully changing behaviors as a result of EE experiences to visitors?
Area Plan Performance Measures	4. Trends in on-site visitor behaviors and visitor comment surveys.
Data Sources Utilized	--Summary of visitor information surveys or personal letters and notes received, project accomplishments, annual monitoring results, programs, and communication products completed
Importance	This goal contains one of the key emphases of the LBL Protection Act and reinforces the key purposes described for LBL when created in 1963. Effective delivery of conservation education messages is also a primary objective of both LBL and the agency.
What It Tells Us	The results related to this goal will provide key information about whether LBL is meeting its legislated objectives.

Goal 3, Monitoring and Evaluation Narrative

Over the past five years, there has been a progression of behavioral changes. The overarching program or banner for encouraging ethical behavior is "Respect the Resource". We have used this as our battle cry and recognizable reminder for many behaviors we are encouraging. As a result, campers are recycling; visitors to our day use facilities are recycling; visitors are using re-usable water containers instead of disposable water bottles; fishing line is being recycled instead of accumulating as trash and endangering wildlife; and, OHV riders are learning to stay on the trail and not destroy the area where they ride.

Other environmental education programs have encouraged people to plant native plants at home, consider organic gardening, build bluebird and bat roosting boxes, and turn their yards into backyard habitat for monarch butterflies, birds, bats and other wildlife. Our programs are designed so that visitors can apply what they learn at LBL to their homes and communities.

Respect the Resource and Volunteers

Under the banner of "Respect the Resource", LBL continued to recycle and increase the opportunities to keep recyclables out of trash headed for landfills in 2010. Prior to National Public Lands Day, in addition to paper and cardboard (which are not weighed), we had recycled 5,718 pounds of plastic, aluminum, glass, and batteries. See Figure 8. In addition, 52,524 pounds of scrap metal was recycled.

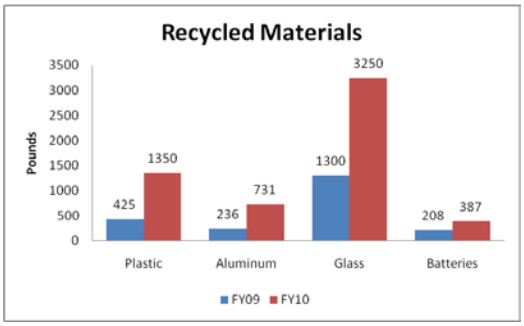


Figure 8. Recycled Materials

National Public Lands Day 2010 saw several volunteer events including 2 clean-up sites (Neville Bay and Empire Farm shoreline). Over 100 volunteers collected and sorted over 3,800 lbs. of trash and recyclables. New recycle bins have been purchased to be installed at the major campgrounds and Brandon Spring and a partnership agreement is being written with Western Kentucky Recycling Corporation, who will process the recyclables. We look forward to continuing to increase the percentage of our trash that is recycled. The staff and visitors are responding well to the opportunities to conserve resources in this way.

Our volunteer program is another form of education with solid action. In FY2010, volunteers have contributed 123,600 hours, collecting trash, improving many miles of trail, pulling invasive weeds, working on heritage restoration projects, and helping out at special events for Environmental Education. This year, for National Public Lands Day events, we tapped into the specific users of 3 sites, Homeplace, Nature Station and Trails. Volunteers were actively recruited from these user groups to help us clean up the shoreline, lake and trails. This was very successful and demonstrates that the users are getting the stewardship message and taking it to heart. Our volunteer recognition dinner's theme this year, thanking them for all the hard work, was "Blood, Sweat and VolunTEERS."

Trends in volunteer hours reflect more on our improved tracking of volunteer hours. LBL has always had a strong volunteer program and the numbers show the continued strength of this program's momentum. See table below.

Year	Volunteer Hours
2010	123,579
2009	106,824
2008	112,827
2007	92,014
2006	93,047
2005	104,686

Interpretive Programs
Campground interpretive programs reached 547 children of camping families at two of our developed campgrounds, Piney and Hillman Ferry. Piney Campground and Brandon Spring Group Camp shared an apprentice position between the sites. This worked out well as the apprentice got experience in both locations, we maximized staffing for the busy seasons in each facility, and we had the benefits of a trained interpreter presenting programs at the campground.

For the 2010 Piney Campground Camper's Fair, heritage staff had a highly successful outreach program that offered participants of all ages the opportunity to learn about Native American pottery and try their hand at creating their own pots in addition to a rock art marker. One young individual spent over two hours at the tent, creating her pot. It was so successful that very little of 50 pounds of clay remained at the end of the day.

This year, in conjunction with Murray State University archaeology field school excavating portions of the former slave quarters in the historic Center Furnace community, we offered Friday walking tours to the public. This was a pilot program to see how successful the tours would be and to see if there was public interest in the excavations and history of the Center Furnace community. The weather was horribly hot and it seemed that severe thunderstorms prevailed most Friday afternoons in June. The few people that took the tour thoroughly enjoyed the experience and one gentleman fulfilled a life-long dream when he got the opportunity to dig at the site with the students. We learned that the tours are a good method for providing educational messages to visitors and we do intend to offer the tours again even if in a somewhat scaled back version; and, we plan to incorporate virtual tours and weekly updates through the LBL heritage website so we reach more potential visitors.

Over 240,000 people visited EE facilities. (See Table 2.) Attendance at our EE programs isn't the whole picture. It's not just the number of programs or people attending, but the messages they receive and how it affects their lives. Getting children out into the woods, out into LBL, and out into nature is very important for the future. Our programs offer families safe, fun, and engaging ways to interact with the natural world. The school field trips bring learning outside where the intense, vibrant experiences anchor the knowledge gained. Teachers say that classroom studies all year long are enhanced by the experiences their students have had at LBL. Too many school districts wait until <u>after</u> testing in the spring, not realizing the benefits to be gained if students come as part of their curriculum during the school year. Environmental education, and learning outdoors is not just fluff, it is essential and beneficial to students' learning. Some principals tout how their test scores improved since making LBL stays and trips a part of their teaching.

Table 2. Participation in EE Programs at Facilities

Facility and Contacts	FY06	FY 07	FY 08	FY 09	FY 10
Brandon Spring Group Center					
# attended	7,266	7,972	7,683	6,820	6,644
Groups	118	124	113	104	87
Programs		470	508	474	482
Woodlands Nature Station					
# attended	39,517	44,124	33,489	37,622	40,135
# at off site	2,117	2,117	525	1,117	3,491
Students	6,724	6,739	6,540	5,160	5,312
Golden Pond Planetarium & Visitor Center					
Visitors		114,613	94,975	84,586	78,415
# attended shows			15,117	19,388	15,545
Students			5,376	2,904	2,640
Homeplace 1850 Farm					
# attended	38,494	43,747	34,046	35,537	34,645
# at off site	1,467	1,457	500	845	425
Students	6,710	6,710	5682	4507	4,015
Elk & Bison Prairie					
# visitors		123,129	93,026	93,750	80,798

Our field trip grant program encourages new schools and classes to bring students on single and multi day field trips where the intensity of learning in the out-of-doors can revitalize their learning once they return to the classroom. An average of 43 schools and groups benefited from the field trip grant program during the past 5 years. Table 3 shows the numbers and dollars for this program. The program has progressed from LBL funding to mostly through competitive Forest Service initiatives and grants that Friends of LBL has secured.

Table 3. Field Trip Grant Program

Fiscal Year	# of Schools/Groups	# of Students	$ from LBL	$ from other FS	$ from grants and donations	Total $ allocated
2006	16/19	1249			12,000+	13,078
2007	17/21	1444		10,000	3,000	13,078
2008	21/32	2493	5,000	5,000	12,000	12,580
2009	20/25	1983			16,000	16,123
2010	22/24	1771			17,271	17,271

LBL interpreters continue to create fresh, exciting learning opportunities through special events and EE programs that teach and demonstrate through hands-on activities the wonder of nature, the value of our cultural and natural history, and the importance of stewardship of our public lands.

Figure 9. Environmental Education Groups

Goal 4:	**Manage natural and physical resources, and authorized FS activities, to reduce erosion or deterioration of riparian areas and watershed conditions.**
Sub-element NFS Generic Desired Condition	"Restoration of riparian area functioning and improvements of priority watersheds will be another focus of the resource improvements." [Area Plan, Vision]
Example Area Plan Desired Condition Statement	"Damage to natural resources caused by unmanaged recreation activities will be reduced…" "Roads will continue to be integral to many activities at LBL, but will be kept to the minimum number needed to meet the needs of multiple use management. The road system and its road segment maintenance levels will continue to be evaluated and modified, as appropriate. Evaluations will result in reconstruction or decommissioning of roads, when necessary, to improve watershed condition, facility and activity access, and wildlife habitat." [Area Plan, Vision]
Desired Trend Statement	"Within a 10-year period, improve two watersheds by one condition class." [Objective 4a] "The 10-year trend will be to reconstruct 10 to 15 miles of trail annually." [Objective 4b] "Unneeded roads will be decommissioned to improve watershed condition and wildlife habitat. The 10-year trend will be one to three miles per year." [Objective 4c] "Maintain to objective maintenance level, 75% of system roads and 75% of trails annually." [Objective 4d]
Monitoring Questions	5. Has the FS made progress in reducing erosion and improving watershed conditions and how was this accomplished? 6. Has the FS established baseline data for channel classification of its major intermittent and perennial streams?
Area Plan Performance Measures	5. Sediment transport, stream bank stability, water quality parameters, properly functioning riparian areas, watershed condition class. 6. Completion of stream classification and determination of channel function process.
Data Sources Utilized	Watershed Watch program, stream and riparian surveys, number of improved or relocated roads and trails, summary of watershed improvement projects; sample projects during program reviews to determine and document where riparian values, and soil and water resource considerations were implemented through BMPs and design criteria. --Stream inventory of substrate, Level II Rosgen channel type, average water flow (discharge), and stream bank vegetation.
Importance	This goal emphasizes LBL legislated multiple use mission and the need to direct resources and policies to sustain critical soil and water resources.
What It Tells Us	The results related to this goal will provide key information about whether LBL is meeting its legislated objectives and tiering to national strategic goals.

Goal 4, Monitoring and Evaluation Narrative

Turner Hollow Watershed

The FS is making steady progress in reducing erosion and sediment transport in order to improve watershed conditions. Turner Hollow Watershed is the most impacted watershed in LBL. The Turkey Bay OHV Area lies within Turner Hollow, therefore restoration work that is completed by the trails program leads to improvement of the watershed. This OHV area was developed by TVA and allowed unrestricted use until Forest Service assumed management of LBL. The unrestricted use led to user made trails in extremely erodible areas. Under Forest Service management Turkey Bay OHV has adopted a designated trail system that has led to a more controlled management of the resources. Restoration has been accomplished with grant money from the National Forest Foundation, FS legacy program dollars, and Century of Service with very little expenditure of LBL appropriated dollars. As described elsewhere in this report, many volunteers have supported the restoration efforts.

In 2010 approximately 90 acres of user made trails, hill climbs and associated disturbed areas were restored. Over the last 5 years almost 300 acres of watershed restoration have been accomplished in the Turkey Bay OHV Area. To accomplish this, 165,600 sq. ft. of erosion mats and 5.2 miles of sediment logs were installed, equaling 4.9% of the OHV area. See the Turkey Bay Restoration Map in the Appendix.

Also, bioengineering erosion control techniques included the use of tree root wads, fallen timber, and limbs. Additionally, 300 trees were planted by volunteers. Initial observations indicate that progress has been made toward rehabilitation in targeted areas. These areas were then designated off limits to riders in order for vegetation to take hold. Also, 5.7 miles of OHV main trails are maintained to standard 2 times yearly thus reducing erosion potential. Turkey Bay OHV area was closed for approximately 40 days during 2010 for trail and resource protection following heavy rainfall events or excessive soil moisture. The OHV area has been closed approximately 220 days from 2006 to present for resource protection.

Other Watershed Improvements

Other watershed improvements included 20 miles of trail clearing and maintenance and 12.5 miles of trail reconstruction with best management practices incorporated. Some key examples of projects undertaken in the Trails Program to maintain or improve watershed conditions are described in the narrative of this report for Goal 7. These projects include trail maintenance, monitoring, trail reroutes, and inventories.

In 2007 riparian corridor implementation was established on 432 acres throughout LBL openlands. These riparian corridors reduce sediment transport from open land maintenance, reduce erosive effects of out-of-bank flow, and improve water quality. In 2010 the increase in the quantity and quality of vegetation in these corridors resulted in reduction of sediment transport and erosion, thus improved water quality.

During FY09 and FY10, 2.8 miles of road were decommissioned. The Motor Vehicle Use Map may lead to less environmental damage occurring from use of illegal roads. In the past 6 years, 11.6 miles of road were decommissioned, meeting the desired condition of 1-3 miles per year.

In 2010, 189 of 419 miles or 45% of forest roads were maintained to standard. As in past years, not yet reaching the Area Plan objective of 75% of roads maintained to standard is due to prioritization of road maintenance focusing on high use roads needs, within budget constraints. For instance, high use roads are maintained at higher standards than regional standards, due to heavy recreational vehicle use. A secondary, but important consideration is there have been some items addressed for maintaining cemetery access. Therefore, less money is available for more remote and less-used roads. Over the past 5 years 1,335 miles, or an average of 54% annually, of forest roads were maintained to standard. This standard reduces sediment and gravel transport which improves water quality and reduces the amount of time and money spent clearing gravel and sediment from culverts. However, this falls short of the Area Plan objective of 75% of roads maintained to standard.

Roads miles in INFRA during May 2010 are shown in Table 4 below.

Table 4. Roads Miles by Maintenance Levels

MAINTENANCE LEVEL	MILES OF ROAD
Classified Roads	
5*	145
4	71
3	126
2	105
1	17
Inventoried but Unclassified Roads	
Unknown	287
Total	**751**

*Includes 119 miles of roads maintained by Kentucky and Tennessee Highway departments.
(Source: INFRA Database, May 27, 2010)

Stream Classification

In 2006, 8 miles of streams were classified, using Rosgen Level 1 and 2 methodologies, within the Crockett and Prior Creek watersheds. Both channels are steep in the headwaters, but flatten into low gradients within broad valleys near their terminus. Active transportation of sediments and bedload occurs in the headwaters. Many reaches were found to be deeply incised with active headcuts during observations in the field. These types of entrenched stream channels classified under Rosgen classification (Rosgen, 1994) as "A," "G," and "F" types, function as sediment transport reaches and are actively down-cutting. An effect of this down-cutting is a reduction of water available for riparian zone vegetation. Middle reaches are showing signs of recovery toward a more dynamic equilibrium - new type "C" channels are forming in short segments within entrenched gullied sections. Substrates are dominantly gravel-sized and embedded with fine particles. In 2010, 1.5 miles of streams were classified, using Rosgen Level 1 and 2 methodologies, within the Demumbers watershed. Demumbers Creek cross sections indicate channel incision also; substrates are small, ranging in the medium to large gravel sizes with fine

particle embeddedness. The lowest reaches of the watersheds have no defined main channels (are anastomosed) and are unstable both laterally and vertically due to lake level fluctuations.

Water Quality

Four Rivers Watershed Watch monitors 2 LBL sites on tributaries draining into Lake Barkley. These sites are located on Crooked Creek and Demumbers Creek. Hancock Biological Station (HBS) at Murray State University monitors 12 LBL sites on Kentucky Lake and its tributaries: 2 sites on Duncan Creek/Bay, 1 site at Higgins Bay, 1 site at Vickers Bay, 2 sites at Turkey Bay, 1 site at Highland Light, 1 site at Ginger Bay and 4 sites on Panther Creek/Bay. Both groups monitor for physical, chemical, and biological characteristics. Sites monitored by both groups indicate good water quality.

The 1972 Federal Water Pollution Control Act, commonly known as The Clean Water Act, requires states to assess and report current water quality conditions to Congress biannually. No LBL streams or water bodies have been listed as impaired until 2004, when Hematite Lake was first listed. Warm water aquatic habitat is not supported due to eutrophication and low dissolved oxygen. (Volume II. 303(d) List of Surface Waters Kentucky Environmental and Public Protection Cabinet Division of Water May 2008). Due to the 303(d) listing Hematite Lake will require more monitoring in FY 2011. LBL, in concert with Kentucky DOW, will develop a monitoring program during 2011.

Forest Service Contractor, Swift and Staley, monitors drinking water wells weekly. In April and May, 2009 a high coliform count was detected due to a water line leak and a boil water order was issued in Wranglers Campground, an equestrian campground/trail area. The issue was resolved and no further incidents have occurred. Other public areas tested have reported no water quality issues.

Other Surveys

In an agreement with USDA Natural Resource Conservation Service (NRCS) 63,515 acres of soils in Stewart County, TN, were re-inventoried and mapped. The project started in 2006 and ended in 2008.

In August 2007, the FS Center for Aquatic Technology Transfer (CATT) performed a survey for aquatic passage on road/stream intersections in LBL.

Goal 5:	**Use a collaborative approach to maintain and restore: 1) a diversity of plant and animal communities that support viability of associated plants, fish, and wildlife; and 2) sustainable levels of habitat and wildlife populations to support public demand for wildlife-related recreation.**
Sub-element NFS Generic Desired Condition	"Visitors to LBL will see active management of forests and other vegetation designed to support ecological needs for forest health and wildlife habitat, in addition to supporting recreational and EE goals." [Area Plan, Vision]
Example Area Plan Desired Condition Statement	"Much of the vegetation management program will be aimed at restoring ecological conditions to those best suited for sustaining native wildlife species. Vegetation management will target restoration and maintenance of oak woodlands and open oak forests, native short-leaf pine forests, canebrakes, and diverse structures characteristic of old growth forests." "Sustainable open land management will be demonstrated through ecological restoration of native grasslands, maintenance of hayfields, and rights-of-way, and continued agricultural practices. Open lands management is directed at providing habitat for wildlife, especially those species in demand for hunting and viewing. Open lands located on sites incompatible with sustaining other resources (such as in riparian corridors) will be allowed to revert to forest, or will be maintained in native grassland or canebrake." "Active management techniques will include the increased use of prescribed fire, which is documented to sustain native ecological communities and improve habitat for many wildlife species." "Habitats will be provided for native and desired non-native plants, fish, and wildlife. All vegetation management activities will be designed to sustain or improve wildlife habitats, forest health, recreation opportunities, or EE experiences. The public will continue to play an important role in project-level actions and decisions." [Area Plan, Vision]
Desired Trend Statement	"In mature oak forests, provide open forest structure on approximately 19,000 acres by the end of the first decade with a long-term objective of 31,000 acres." [Objective 5a] "In mature oak forests, provide woodland structure on approximately 6,000 acres by the end of the first decade with a long-term objective of 30,000 acres." [Objective 5b] "Provide a sustained supply of regenerating forest habitats totaling approximately 5,400 acres at any point in time. Regenerating forest will be treated predominantly within oak forests although other forest types and natural disturbances will be included." [Objective 5c] "Increase the abundance of mature forest habitats toward achieving the long-term objective of approximately 123,000 acres of mature forest, of which 52,000 acres will meet old growth criteria." [Objective 5d] "In mature forests on moist sites, provide canopy gaps on a minimum of 1,600 acres by the end of the first decade with a long-term objective of a minimum of 9,000 acres." [Objective 5e] "Create and maintain at least 250 acres of short-leaf pine forests by developing desired mature open forest and woodland structural conditions over the first decade with a long-term objective of 450 total acres of shortleaf

	pine forest." [Objective 5f] "Restore 50 acres of canebrake over the first 10 years of Area Plan implementation, with a long-term objective of 240 total acres of canebrake." [Objective 5g] "In addition to the approximately 600 acres of open lands currently in native grasses, restore native grasses and forbs to another 750 acres of current open lands within the first 10 years of Area Plan implementation, with a long-term (50-year) objective of 2,600 total acres of native grassland." [Objective 5h] "Maintain approximately 10,600 acres in open lands-cultivated and grassland cover types to support game species, early successional species, and watchable wildlife. Approximately 1,100 acres of this 10,600 will be converted from cultivated field to grassland within riparian corridors over a 10-year period to improve riparian functions." [Objective 5i] "Restore and maintain fire regimes and fire return intervals in fire dependent communities by prescribed burning an average of approximately 10,000 acres per year by the end of the first decade, with a long-term objective of 21,000 acres per year on average. Some acres will incur repeat fire application during the planning period." [Objective 5j]
Monitoring Questions	7. How well are species of viability concern being maintained on LBL? 8. How is management of LBL affecting recovery of threatened and endangered species? (Duplicate questions for Measures 9-10) 11. How is management of LBL affecting demand for wildlife-related recreation? (Duplicate questions for Measures 12-14) 15. How is management of LBL affecting special habitats and major biological communities? (Duplicate questions for Measures 15-25) 26. Is the forest less likely to be affected by insects, disease, and wildfire? (Duplicate questions for Measures 26-28) 29. Has the FS made progress towards identifying old growth stands on the ground?
Area Plan Performance Measures	7. Trends in key habitats and/or populations of viability concern species. 8. Trends in highest risk species. 9. Trends in Price's potato bean populations in relationship to Threatened & Endangered (T&E) Recovery. 10. Trends in bald eagle populations in relationship to T&E Recovery. 11. Trends in Eastern bluebird populations as a Non-game Demand species. 12. Trends in white-tailed deer populations as a Demand Game species. 13. Trends in Eastern wild turkey populations as a Demand Game species. 14. Trends in Northern bobwhite quail populations as a Demand Game species. 15. Trends in pileated woodpecker populations in relationship to Snags in Forested Situations. 16. Trends in Eastern bluebird populations in relationship to Snags in Open Forested Situations. 17. Trends in Acadian flycatcher populations in relationship to Mature Riparian Forests. 18. Trends in Northern bobwhite quail populations in relationship to Grasslands. 19. Trends in prairie warbler populations in relationship to Oak Woodlands.

	20. Trends in Great-crested Flycatcher populations in relationship to Mature Open Oak Forest. 21. Trends in wood thrush populations in relationship to Mesophytic and Riparian Forests with Canopy Gaps and Mature Forest Interior. 22. Trends in Eastern meadowlark populations in relationship to Grassland. 23. Trends in Yellow-breasted chat populations in relationship to All Forest Type Regeneration. 24. Trends in composition of aquatic communities dependent on clear water and stable channels. 25. Trends in bat population levels. 26. Trends in early, mid-, and late-successional forests by prescription group. 27. Trends in species diversity, structural diversity, age class, and stocking levels. 28. Trends in native insect and disease effects. 29. Completed inventory of old growth stands.
Data Sources Utilized	--Habitat trends for key factor indicators used in the species viability analysis assessed through ongoing inventory of vegetation cover and structure types; population status for selected species inventoried and monitored as appropriate for species or species group; species selected based on priorities identified and modified throughout plan implementation using improving information about threats and risks, and in cooperative efforts with conservation partners --Periodic survey and assessment of highest risk species occurrences; project level survey information and accomplishments --Periodic assessment of status of known occurrences; new occurrence inventory --Breeding Bird Survey/Point counts occurrence trends for the bird communities --Summary of data received in deer surveys, harvest statistics; summary of comments related to recreational uses of white-tailed deer --Summary of data received in Breeding Bird Surveys/Point counts, harvest data, and poult summaries; summary of comments related to recreational uses of Eastern Wild Turkey --Surveys similar to those done by the CATT --Collection and analysis of area bat survey data-Map and update changes through routine inventories; monitor acres by successional stage and trend; fuel monitoring following Regional protocol and condition classes --Acres of hazardous fuels treated through wildland fire use, prescribed fire, and mechanical treatments --Sample for specific insects or disease as evidence of infestations occurs following established protocols for the organisms of concern; track Forest Health Monitoring results to identify emerging concerns --Collection and analysis of old growth characteristics data, locations, and patch size
Importance	This goal contains key emphases of the LBL Protection Act and reinforces the key purposes described for LBL when created in 1963, as well as those legislated for the FS in 1998. Managing LBL under a multiple use plan should lead to many on the ground accomplishments and support primary objectives of both LBL and the agency.
What it Tells Us	The results related to this goal will provide key information about whether LBL is meeting its legislated objectives, managing ecosystems in a healthy and sustainable way, and are tiering to national strategic goals.

Goal 5, Monitoring and Evaluation Narrative

Fire

LBL has been gradually increasing its annual prescribed fire treatment acres to meet the desired conditions per the Area Plan. LBL was able to take a big step in meeting the annual average treatment acres envisioned in the plan. This year LBL and its fire militia were able to more than double the 4,984 treated acres from 2009. LBL was able to complete eighteen prescribed burns that met multiple objectives in the reduction of natural fuels, short-leaf pine restoration and the improvement of wildlife habitat on 10,866 acres. Excluding 2008, in which LBL had an abundance of rainfall during its prescribed burning season, LBL has been on a steady increase to meet the desired acres, as set in the Area Plan. All monitoring on the burns is completed post burn to see if objectives were successfully met and create lessons learned from each treatment. All results to date have met the intended objectives.

The ice storm that hit LBL in 2009 generated a lot of debris piles to burn in FY 2010; these piles were mitigated using prescribed fire in and around the Elk and Bison Prairie (EBP), Hillman Ferry, Piney, Wrangler's, and Energy Campgrounds. Other prescribed burns ranging in size from 12 to 3,360 acres occurred in the following treatment areas: Schoolhouse, Buffalo Trail, Franklin Creek, and Golden Pond Visitor Center. Additionally, prescribed fire maintained tall grass ecosystems at Turkey Bay (Gator Pit), EBP, Neville Creek, Three Ponds, and at the Nature Station. Most notably, were two prescribed burns that occurred on the north and south ends of LBL. Hillman Ferry Woods prescribed fire project was the first step in the successful re-opening and enhancement of the heritage trails. Also, LBL was able to reintroduce fire to the native short-leaf pine stand in the Devil's Backbone Treatment Area.

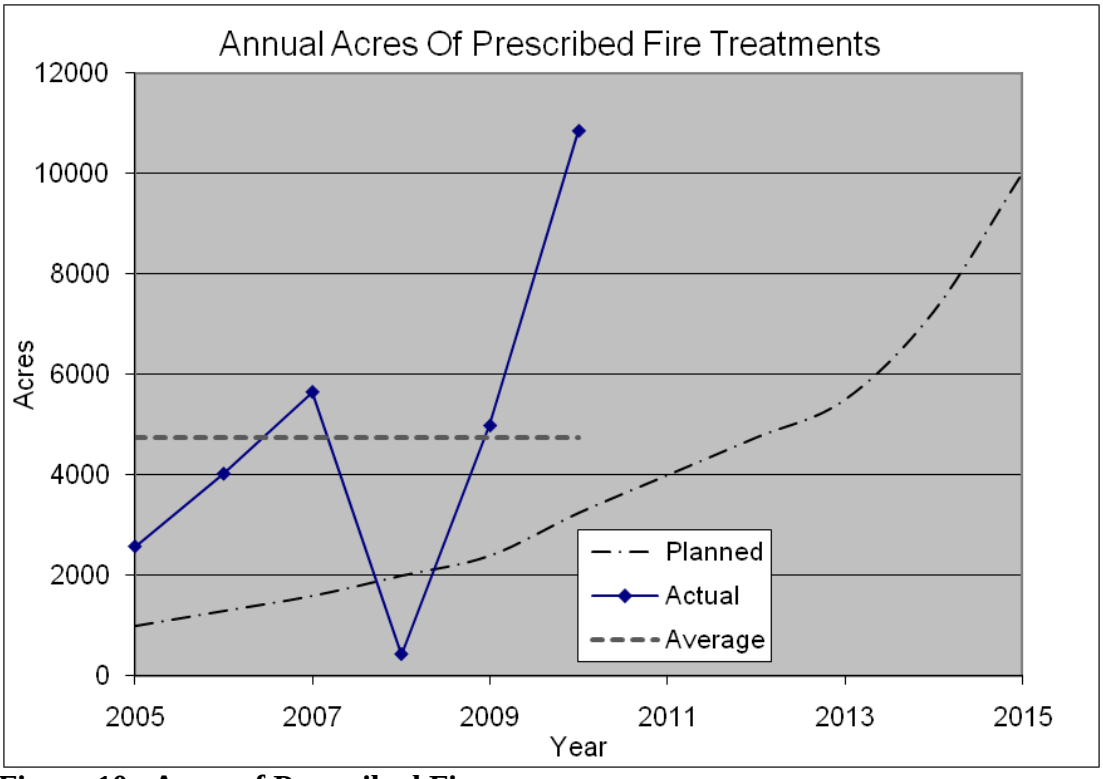


Figure 10. Acres of Prescribed Fire

Open Lands
Open land maintenance was completed on a total of 7,889 acres. Of the total acres treated, prescribed burns were done on 1,135 acres which included open land and adjacent forested areas to enhance wildlife habitat diversity. A habitat map is available each year on LBL's website. (http://www.lbl.org/pdf/10_11LBLHabitatMap.pdf).

Twenty acres of former cropland in the southern portion of LBL (Tennessee) were converted to native warm season grasses (NWSG) and forbs in 2010. In 2009 NWSG and forbs were not established due to ice storm damage clean up needs that affected our ability to complete this work. In 2007 the establishment of NWSG and forbs in LBL was evaluated in the Revised Environmental Assessment for the Continued Maintenance of Open Lands. Since the Area Plan was implemented in January 2005, approximately 236 acres of native warm season grasses have been restored on LBL (111 acres in 2005; 80 acres in 2006; 25 acres in 2008; zero acres in 2007 and 2009; and 20 acres in 2010). See the graph below.

For 2011 we are planning to begin the process of converting approximately 32 acres of cool season grass hayfields to warm season grass hayfields in the Tennessee portion of LBL and 33 acres of cropland to NWSG in the Kentucky portion of LBL.

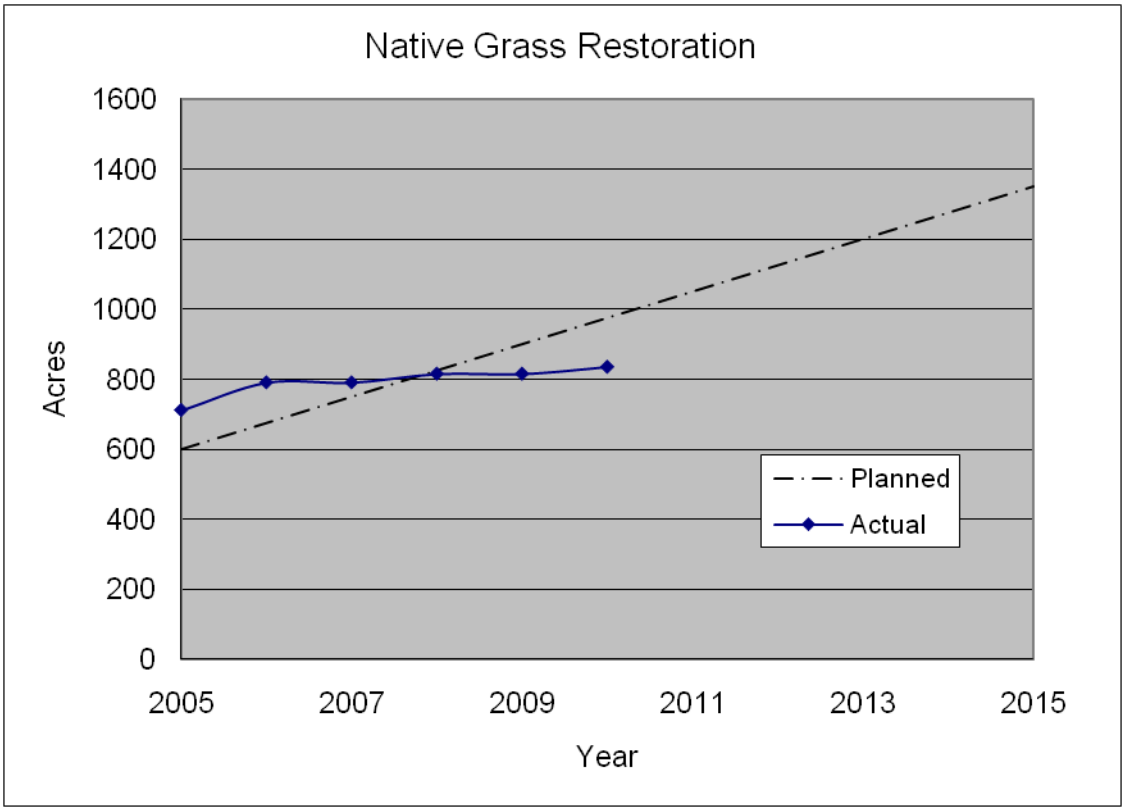


Figure 11. Native Grass Restoration

Non-Native Invasive Species

An LBL non-native invasive species strategy was completed on June 26, 2009. The strategy identifies risk/threat levels at the Forest Service Region 8 and Kentucky and Tennessee state levels for non-native invasive species (NNIS) aquatic and terrestrial flora and fauna on LBL. This strategy also prioritizes areas for NNIS-free or controlled conditions. NNIS known to occur on LBL and are high risk within Region 8 include: Japanese barberry, autumn olive, English ivy, Chinese privet, European privet, Japanese honeysuckle, Morrow's honeysuckle, Japanese stilt-grass, white mulberry, Japanese knotweed, tall fescue, purple crown-vetch, and Johnson grass. The Chinese yam, bicolor lespedeza and feral/wild pig are to be eradicated wherever found.

Japanese barberry, English ivy, Morrow's honeysuckle, white mulberry, and Japanese knotweed are not predicted to be an increasing threat as there are few occurrences of the species within LBL and/or they are found primarily in association with old home-sites that are protected from ground disturbing activities. The remaining species continue to be a high risk for spreading and threatening desirable vegetation based upon annual open land inspections, botany surveys within proposed vegetation management project areas and reports of feral pig sightings across LBL. Approximately 5,114 acres were inventoried for feral pigs based upon areas with recent and old reported sightings and feral pig field mark signs. Monitoring of the pig is being done in efforts to locate and trap the populations for their removal and eradication due to the resource damage they cause.

The LBL-wide NNIS strategy and Revised Environmental Assessment for the Continued Maintenance of Open Lands lists many other plant species that threaten ecological communities in LBL (e.g. Sericea lespedeza). Control accomplishments of these NNIS and high risk NNIS in 2010 are provided in the following paragraphs.

In 2010, 498 acres were treated to reduce/control invasive plant species within open lands with a combination of fire, mowing, tree grinder and approved herbicides. Landscape prescribed burns decreased the amount of vegetation to mow and grind and enhanced the capabilities to treat NNIS with herbicides. The overall success rate for the control of NNIS was variable with the following results: control of sericea lespedeza targeted with triclopyr in warm season grass open lands, control of undesirable species targeted with imazapic prior to planting warm season grasses in former cropland fields and mowing sickle-pod (*Senna obtusifolia*) before seed-head production in the newly established warm season grasses were all good (76-90% successful); the control of species such as fescue, Johnson grass, and foxtail targeted with glyphosate in the Elk and Bison Prairie and on open lands to be established in spring wildlife plantings was marginal (26-50% successful); and grinder work to remove autumn olive and loblolly pine trees in native warm season grass stands was excellent (95% successful). The areas targeted for autumn olive and loblolly pine will be monitored for re-sprouting and treated with an herbicide to eradicate them from the sites. Monitoring and continued treatments will be required to reduce the occurrence of NNIS across LBL.

Acres treated since 2005 have included 587 acres in 2005, 465 acres in 2006, 280 acres in 2007, 168 acres in 2008, and 250 acres in 2009.

Species of Concern

Price's Potato Bean

Permanent monitoring plots were established in 2005 and 2006 at five known locations of the federally threatened Price's potato bean (*Apios priceana*) in LBL. Four sites occur in Kentucky and the fifth is in Tennessee. In 2005 and 2006 baseline survey data was collected at all the sites. At the time of the surveys, the sites were in fair to good condition with flowering plants at two of the five sites. Since that time, the populations had become stagnant and non-flourishing due to over-story canopy shading and shrub competition. A plan was drafted in 2008 in coordination with the US Fish and Wildlife Service (USFWS), Kentucky State Nature Preserves Commission (KSNPC), and the Tennessee Department of Environment and Conservation (TDEC) for the recovery of Price's potato bean on LBL that included canopy removal from these sites.

In 2009 canopy removal was accomplished on three of the four Kentucky sites for a total of three acres threatened and endangered terrestrial habitat improvement. The shade tree removal was a big success with flowering clusters and bean pods produced at all treated sites. Beans were collected by the US Fish and Wildlife Service (USFWS) and Forest Service staff from 188 pods produced on nine vines at one of the sites. At this site, approximately 290 seeds were planted uphill of the existing plants the day of collection in efforts to expand the plant population. The USFWS kept approximately 170 seeds for research purposes.

In 2010, shade tree removal and girdling occurred on the other Kentucky site not treated in 2009 and on two sites that responded well to the 2009 treatments for a total of three acres threatened and endangered terrestrial habitat improvement. Based upon field surveys, flowers and bean pods were present on vines at three of the four Kentucky sites. The fourth Kentucky site did not produce flowers after treatment; however the vines present were in fair to good condition compared to 2009 when no vines were observed and in 2008 when they were in poor condition. The bean seeds planted at one of the Kentucky sites in the fall of 2009 failed to produce any vines this year. The Tennessee population has declined since 2006 with plant vines dwindling in condition and numbers; only 2-3 vines were observed flowering in 2009 and 2010.

Post-treatment permanent vegetation plot survey data was collected at three of the Kentucky sites in 2009 and the number of vines present at each of the sites in 2010 was counted. The Tennessee USFWS and TDEC met with FS staff in August to discuss shade tree removal at the Tennessee site prior to the 2011 growing season. Vine growth and flowering of Price's potato bean has increased on all the sites treated thus far; which contributes to the recovery of this species. Monitoring of populations and habitat conditions will continue to occur for all sites with implementation of the Price's Potato Bean Recovery Plan and in coordination with the USFWS, KSNPC and TDEC. The recovery plan for the LBL Price's potato bean populations will be revised as needed in cooperation with our partners and based on results obtained through management and monitoring.

Bald Eagle

The bald eagle was removed from the endangered species list in August 2007 due to successful population recovery. However, the bald eagle continues to be protected on LBL by the

Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. To ensure the species continues to proliferate, National Bald Eagle Management Guidelines and a Post-delisting Monitoring Plan (draft) have been developed and are available at: http:www.fws.gov/midwest/eagle. Winter occurrence, nesting sites, and nesting success continue to be monitored. Monitoring of eagles for LBL is done in partnership with the Kentucky Department of Fish and Wildlife Resources (KDFWR), U.S. Fish and Wildlife Services and their partners, and volunteers through the Land Between The Lakes Association (LBLA).

During the January 2010 midwinter survey, 215 bald eagles were counted along the shorelines of Kentucky Lake and Lake Barkley (159 adults and 59 immature). In the 2010 Midwinter Eagle Survey Report, KDFWR avian biologist, K. Heyden states that the harsh winter weather in early 2010 in Kentucky and further north likely led to the highest count of wintering bald and golden eagles in Kentucky's history (415 count). Severe cold, ice, snow, more shoreline ice than normal and frozen small creeks, rivers and reservoirs, forced the eagles to go to some of Kentucky's larger lakes and rivers to forage. The number of eagles counted within the LBL and surrounding lake areas was higher than any in the history of the Midwinter Eagle Survey and accounted for over half the eagles counted. Table 5 provides the history of bald eagles observed only on LBL shoreline during the Midwinter Eagle Surveys completed in 2005-2010. LBL's highest count occurred in 1996 with 150 eagles reported along LBL shoreline.

Table 5. LBL Midwinter Eagle Counts and number of eagles sighted during 2005 through 2010 aerial surveys.

2005	2006	2007	2008	2009	2010
74	45	64	87	77	118

Bald eagle fledging success in LBL has been monitored since 1984 when the first successful nesting of bald eagles occurred in Tennessee (Appendix and Table 6). In 2009 the number of eaglets successfully fledged is unknown due the inability to access nest sites as a result of the ice storm in January and recurring inclement weather through spring 2009. The 2009 nesting survey flight was delayed due to weather and surveys were done after the trees started to leaf-out; thus decreasing nest visibility from the air and detection of nests. Over the past ten years, the number of eaglets fledged from LBL nests has remained fairly constant with a slight increase in total eaglets fledged beginning in 2007 when the bald eagle was delisted.

During an aerial survey in March 2010 with KDFWR, 24 nests were checked for nesting activity. Fifteen bald eagle nests were with chicks and 3 nests had incubating adults. Of the nests with chicks, eleven nests had 2 chicks each while the other four nests had only 1 chick present. Based upon ground surveys, 7 eaglets fledged from Kentucky nests and 1 from a Tennessee nest. More eaglets are likely to have fledged; however high flood waters and debris blocked shoreline accesses in May making it difficult to do ground surveys and check eaglet fledging success.

Table 6. Eaglets Fledged at LBL (See Appendix for data back to 1984.)					
2005	**2006**	**2007**	**2008**	**2009***	**2010***
16	12	22	21	Unknown	8
*2009 and 2010, weather related events diminished ability to monitor nest sites and assess fledging success.					

Bats

LBL-wide surveys for bats have occurred every five years, after an initial 3-year baseline survey in 1993-1995 (Appendix 2). Project-specific surveys have also been conducted, which covered only small areas at LBL. Varied survey effort and technique makes it difficult to determine trends in bat populations. Ten bat species have been captured on LBL: gray, red, eastern pipistrelle, evening, little brown, northern long-eared, big brown, hoary, silver-haired, and Seminole bats. There were few notable changes in endangered (E) or Regional Forester Sensitive (RFS) species. Gray bats are the only endangered species that have been detected on LBL. They have not been captured here since 2003, although regional populations of this species are increasing. Indiana bats (E), Rafinesque's big-eared bats (RFS), and southeastern myotis (RFS) have never been detected on LBL. Evening bats and northern long-eared bats appear to have decreased at LBL; all other species either increased or remained the same during the 15 years surveyed.

Changes in 2010

A transition in survey techniques has been instituted at LBL, from mist-netting in earlier surveys, to a combination of mist-netting and recording bat calls using Anabat™ acoustical recording systems in 2000, to only recording bat calls using Anabat™ recorders in 2010. Mist-netting was discontinued in order to minimize risk of the spread of white-nose syndrome (WNS), a contagious disease causing widespread mortality to many bat species. WNS has recently spread to caves south of LBL in Tennessee, and has likely spread west to Missouri and Oklahoma. Both stationary points and mobile transects were sampled with Anabat™ recorders in 2010; the mobile transects were also sampled in 2009. The change in survey technique makes direct comparisons with other years difficult to draw. New software is being developed which will enable more specific identification of bat species from recorded call files. Some trends can be seen using existing software. The group that includes red bats, evening bats, and eastern pipistrelles made up 55% of all bats in the 2010 survey, whereas the average in other years was 86.5% of all bats. The Myotis species group made up 25% of all species in 2010, whereas from 1994-2005, Myotis made up only 11% of total species composition (Table 7). The Myotis group is the hardest hit by white-nose syndrome. The Anabat™ method of recording calls results in some unknown call recordings; these may explain some differences in proportions of bats detected. After one more year of data collection along the mobile transects (in 2011), and assuming availability of the new software, we expect to be able to better address potential population trends in bats.

Table 7. Bats detected at LBL.		
Species group	**1994-2005**	**2010**
Red bats, evening bats, eastern pipistrelles	87%	55%
Myotis bats	11%	25%

Trends at Managed Areas in LBL

Surveys have been regularly conducted in four actively managed areas of LBL: Wranglers Campground, both the north and south oak grassland demonstration areas, and the Neville Creek open lands. In each area, numbers of the group with red bats, eastern pipistrelles, and evening bats decreased by 57% in 2010 compared with earlier years, while numbers of Myotis bat species increased in all areas except the Wranglers Campground, which remained stable. Surveys prior to 2010 indicate that these areas had similar proportions of species compared to the rest of LBL (Appendix 2). Additional years of survey data are needed before any conclusions can be drawn about the changes seen in 2010.

Other Species of Concern

During botany surveys within the Demumbers Creek project area in August and September 2010, 32 new locations of Crème false indigo (*Baptisia bracteata var. leucophaea*) and three new locations of prairie dock (*Silphium pinnatifidum*) were recorded. The prairie dock findings on LBL cause this species to be moved from a Forest Rank (F1) of 1-5 occurrences to an (F2) of 6-20 occurrences. During the surveys, a total of 62 circular plots (37' radius) totaling 6 acres and 60 (10' wide) transects totaling 8.4 miles or 10 acres were surveyed. Surveys were done within areas proposed for vegetation management to determine herbaceous vegetation composition and the presence of non-native invasive and threatened and endangered plant species. Proposed management within the Demumbers Creek project area will enhance habitat conditions for the Crème false indigo and prairie dock.

Two pairs of Henslow's sparrow were observed in the North-end Nature Watch area in mid-May and again in June. The species was monitored June to September to determine nesting success. In July, two Henslow's sparrows are known to have successfully fledged from the two pairs observed during the breeding season. Desired habitat conditions are being maintained in nesting areas.

Figure 12. **Adult Henslow's sparrow on perch singing.**

Management Indicator Species

Management indicator species (MIS) were selected during the development of the LBL Area Plan to help compare effects of alternatives and as a focus for monitoring. MIS population changes are believed to be indicative of management activity effects. Inferences about ecological conditions and the status of other species within a community are general in this report as many different factors can affect populations of each species within a community, and each species' ecological niche within a community is unique. MIS selected to help indicate effects of management for resource issues are listed in Table 8. Annual breeding bird point counts, as described in the appendix, are used to measure the trends of MIS populations in comparison to the provision of the habitat types identified in Table 8.

Table 8. Management Indicator Species selected to help indicate effects of management by resource issue

Common Name	Resource Issue
Price's potato bean[1]	Recovery of this endangered species
Pileated woodpecker	Providing snags within forests
Acadian flycatcher	Provision of mature forest within riparian areas
Great-crested flycatcher	Providing mature oak forest in open structural conditions
Wood thrush	Providing complex canopy structure within mesophytic and riparian forests and providing mature forest interior habitat
Yellow-breasted chat	Providing regenerating forest habitat
Eastern wild turkey[2]	Meeting demand for hunting
Prairie warbler	Restoring oak woodlands
Eastern bluebird	Providing snags in open habitats, and meeting demand for non-game wildlife viewing
Eastern meadowlark	Providing grassland habitat
Northern bobwhite quail	Meeting demand for hunting and providing quality native grasslands
White-tail deer[3]	Meeting demand for hunting

[1]Prices potato bean is addressed in the threatened and endangered species section of this report;
[2]Eastern wild turkey is also addressed under the demand game section of this report; and
[3]White-tail deer is addressed under the demand game section of this report.

Forest Habitat Associations-MIS

Pileated Woodpecker

The pileated woodpecker requires large snags for nesting and feeding. The occurrence of this species may be correlated with forested habitats with abundant large dead trees and fallen logs which are used by other woodpeckers, owls, and numerous other birds, mammals, and amphibians. This species requires large cavity trees for nesting, and forages on dead trees and downed logs across a variety of community types. The amount of potential habitat for the pileated woodpecker is expected to increase in the first decade of implementing the Area Plan (Area Plan Final Environmental Impact Statement (FEIS) Table 3.2.7B). In 2006 to 2008 the population trend for this species declined and showed no increase in 2009 (Figure 13). In accordance with Area Plan standards a minimum of six snags per acre are retained during timber salvage sale operations; however, all snags have been retained on forest timber management sale

units. Heavy wind and ice storm damage over the past five years may attribute to some losses of standing dead trees and consequently the number of pileated woodpeckers observed. During the same time period, forest management activities and weather-related events have actually provided additional habitat for the pileated woodpecker. Population trends are expected to increase, yet it will be five to ten years before the effect of additional habitat on population will be known.

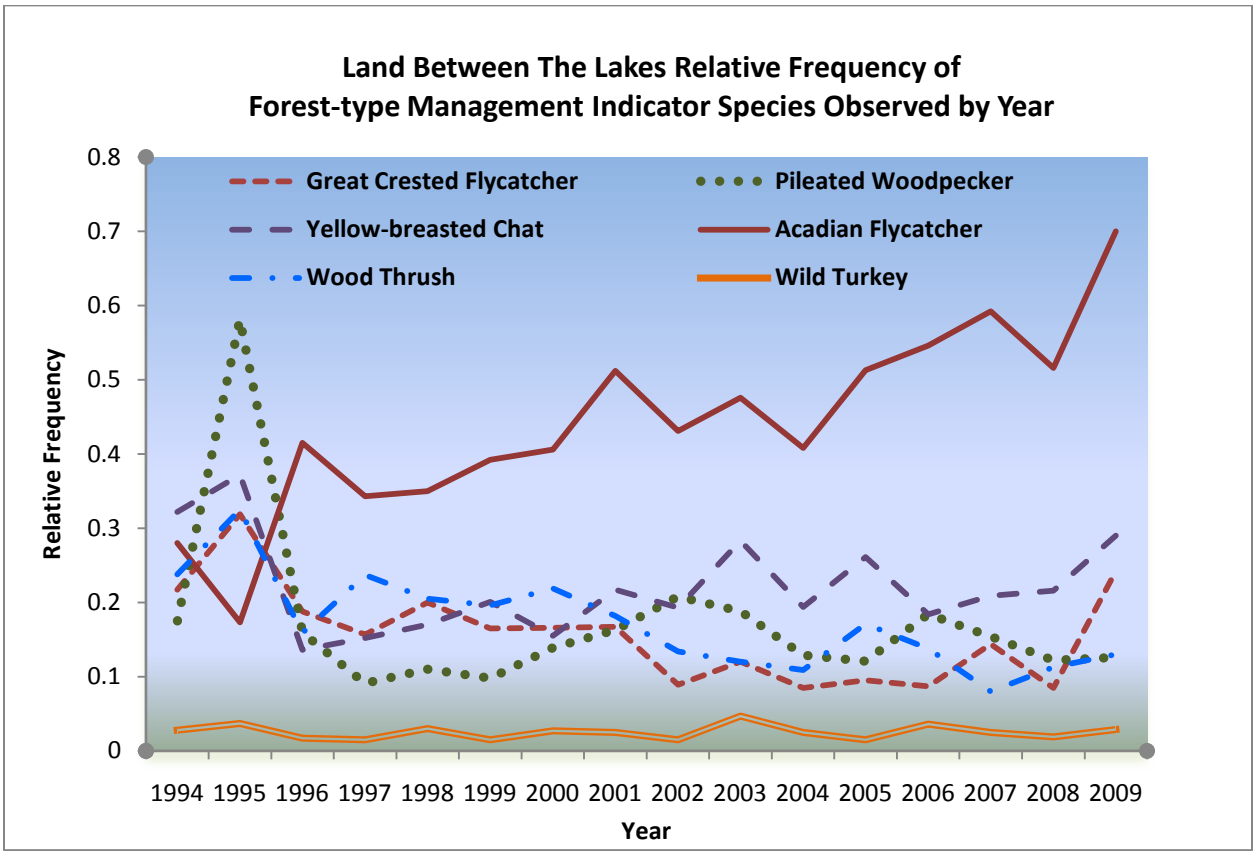


Figure 13. Land Between The Lakes relative frequency of forest-type MIS observed over all survey points by year.

Acadian Flycatcher

The Acadian flycatcher favors rich deciduous forest with moderate understory and along streams; and was chosen as an MIS to represent these conditions within mature riparian forest. Little change is expected to occur in the population trend for this species within ten years of implementing the Area Plan (Area Plan FEIS Table 3.2.4U). From 2005 to 2009 the relative distribution of the Acadian flycatcher increased on LBL by 19% whereas from 1994 to 2009 there was an overall 42% increase (Figure 13). As open lands converted to forest habitat over time, habitat for the Acadian flycatcher has been enhanced. Very little forest management has been prescribed to occur within mature riparian forest with implementation of the Area Plan. The population trend for this species is expected to remain at about the same level as indicated for 2005 to 2009.

Great-crested Flycatcher

The great-crested flycatcher is an MIS of mature open oak forest conditions of oak forest types. Key breeding requirements of this species includes somewhat open forests with a suitable tree cavity for a nest. Within the first ten years of implementing the Area Plan, the population trend for the great-crested flycatcher is expected to increase (Area Plan FEIS Table 3.2.4K). Since 2005 there has been an overall increase in the distribution of this species across LBL (Figure 13). Open oak and oak woodland habitat conditions have been created for this species as a result of forest management activities and weather-related events. Since 2005, the amount of open oak and oak woodland habitat on LBL has increased (see Forest Management section of this report). The number of acres of potential habitat for this species is expected to continue to increase and likewise for the population trend.

Wood Thrush

Wood thrush is an MIS associated with mesophytic forests and favors deciduous or mixed forest with a fairly well-developed deciduous understory, especially where moist. In addition, this species is considered for assessing the effectiveness of management for canopy gaps and complex structure in mesic forests; the effects of management on the structure of riparian forest; and the effects of management on forest interior birds due to the sensitivity to cowbird parasistism. The population trend for this MIS is expected to increase within the first ten years of Area Plan implementation (Area Plan FEIS Tables 3.2.4P and 3.2.4V). Since 2005 there has been a slight decrease in the number of wood thrush observed across LBL (Figure 13). There has been minimal management done within mesophytic and riparian forests during the past five years; however weather-related events, primarily in the Kentucky portion of LBL, have opened forest canopy which may have been a factor in some of the population trend decrease. This species will continue to be monitored; and management options will be considered as needed to maintain and improve habitat for this MIS. No change in management is warranted at this time.

Yellow-breasted Chat

Yellow-breasted chat primary habitats include secondary growth generally in dry situations that are comprised of thickets, brushy areas, woodland undergrowth, forest regeneration, and overgrown fields. This species was chosen as an MIS of forest regeneration. Within ten years of Area Plan implementation, this species population trend is expected to have a large increase (Area Plan FEIS Table 3.2.7F). Since 2006, the yellow-breasted chat population has increased slightly above the 2003 population level and almost back to the 1994 population level (Figure 13). Populations of yellow-breasted chat are expected to continue to increase with implementation of the Area Plan, such that forest regeneration acres will continue to be created and old field early succession habitat maintained.

Eastern Wild Turkey

The Eastern wild turkey occupies a wide range of habitats, with diversified habitats providing optimum conditions. Mature mast producing stands are crucial during the fall and winter, shrubby areas are critical for nesting, and herb dominated areas including native warm season grasses and agricultural areas are critical for brood rearing. Habitat conditions for this species are enhanced by prescribed burning, thinning forest stands, and development of herbaceous openings. Thinning and prescribed burning are not expected to have a direct impact on

population levels due to their high mobility. Populations of this species on LBL may fluctuate as a result of spring rains and cool temperatures during brood-rearing, and hunting pressure.

Forest management activities over the past five years are not expected to have negatively affected Eastern wild turkey population on LBL as shown in Figure 13. Since implementation of the Revised Environmental Assessment for the Continued Maintenance of Open Lands in 2007, habitat for this species has changed with the conversion of approximately 900 acres of cultivated field types to grassland and forest types. The representation of this species during breeding bird surveys is less likely as these surveys are done in mid- May to the end of June, which is after the period that males have initiated courtship calling, have completed nest egg clutch production and generally remain close to the nest. Therefore, since the breeding bird surveys are primarily auditory, there is little likelihood that the observer will hear a wild turkey calling in May or June or see a wild turkey at the observation point. The breeding bird survey is currently not a good measure in determining population trends of the Eastern wild turkey. Data presented in this report for turkey brood surveys and hunt data are more reliable in estimating populations of this species on LBL.

Wild Turkeys are a popular species for both hunters and bird watchers. The annual brood surveys conducted by LBL staff give an indication of spring breeding success. During 2010, an average 50% of hens were seen with poults, with an average of 4.4 poults per hen. These figures are very good when compared to reproduction during past years even though heavy spring rains likely reduced the number of surviving poults hatched during the earlier part of the nesting season.

Grassland Habitat Associations-MIS

Because of the current limited amount and distribution of grasslands on LBL, grassland habitat associates are poorly represented in breeding bird point counts. In years where a particular species was not detected on point counts, there are no data for that species in Figure 14.

Prairie Warbler

The prairie warbler is an MIS of oak woodlands and a species of conservation priority due to population declines range-wide and in the physiographic region (Interior-Low Plateau). Habitat restoration efforts on LBL are an important contribution to increasing populations within this region. Breeding habitat requirements for this species are saplings and shrubs, usually in open country and in poor soil. Oak woodlands are considered suitable habitat for this species about five years after the area has been created. Within ten years of implementing the Area Plan, it is predicted that small increases in habitat may correspond to small increases in populations for this species (Area Plan FEIS Table 3.2.4I).

Since 2005 some habitat for this species has been created within the north and south Oak Grassland Demonstration Areas by prescribed fire and forest thinning projects. The distribution of the prairie warbler on LBL had increased slightly from 2005- 2009 (Figure 14). Because this is such a short time for population trend observation and that habitat management for this species has merely just begun, population trend increases are not evident. The Oak Grassland Demonstration Areas and additional oak woodland created in the General Forest Prescription

Area will continue to be managed for conditions that benefit the prairie warbler and over time these conditions are expected to improve.

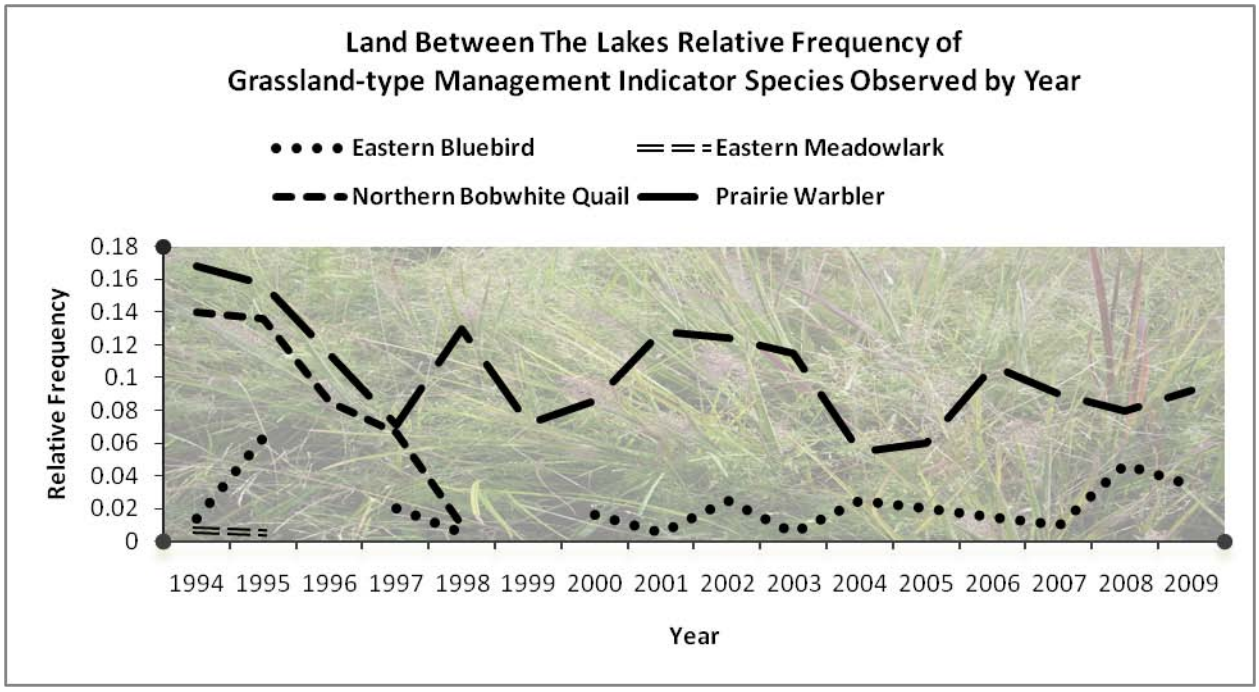


Figure 14. Land Between The Lakes relative frequency of grassland-type MIS observed over all survey points by year.

Eastern Bluebird

The Eastern bluebird nests in natural cavities in open or semi open country such as in woodland, forest edge, roadsides, and partly open situations with scattered trees. This MIS was chosen to represent open forest situations and is a watchable wildlife demand species. Eastern bluebirds increase in abundance proportionately to the amount of old growth available in open forested conditions.

Habitat has been created for the Eastern bluebird within the Oak Grassland Demonstration Areas, and within timber salvage sale areas; and has been maintained through open lands management in LBL. In Figure 14 this species distribution on LBL indicates an overall slight increase from 2004- 2009. The reason for this trend is unknown; however suitable habitat within the areas sampled is likely a major factor in the distribution shown for this species as it was poorly represented over most of the transects sampled; with only 68 birds observed from 1994 to 2009. In addition, the results of Eastern bluebird nest box surveys done across LBL in suitable habitat for fledging success rates from 2005 to 2010 averaged 83% (Table 9). Habitat conditions for this species will continue to be monitored with both survey types. Modifications of the breeding bird survey locations may be necessary to adequately represent natural cavity nesting locations in LBL.

Table 9. Project Save Our Salvia Bluebird Nest Box Survey Results 2005-2010						
Year	2005	2006	2007	2008	2009	2010
Total Number of Nest Boxes	164	165	165	165	165	170
Total Eggs Laid	1,161	1,297	1,331	1,205	1,429	1,416
Total Bluebirds Fledged	976	1,092	1,050	991	1,184	1,195
Fledging Success Rate	84%	84.2%	78.8%	82.2%	82.2%	84.3%

Eastern Meadowlark

The Eastern meadowlark prefers short to medium height grasses of the grassland community and favors somewhat taller grasses for nesting rather than foraging. This species nests on the ground in concealing herbage, is not sensitive to the density of grass cover, and will use open woodlands with grassy understory.

Since 2005, a limited amount of woodland habitat has been created for the Eastern meadowlark within the Oak Grassland Demonstration Areas, and grassland habitat has been managed on approximately 3,400 acres. The limited distribution and low frequency of occurrence of the Eastern meadowlark and its habitat on LBL have resulted in inadequate representation on LBL in the breeding bird survey results (only observed in 1994 and 1995) (Figure 14). A vegetation assessment of the existing breeding bird survey points was done in 2005 and is due to be done within the next 1-2 years as a result of management and weather-related events occurring within these areas during the past five years. In assessing the habitat conditions for the existing points, new breeding bird survey locations may be necessary to represent habitat conditions and population trends for this species on LBL in the future. As we increase habitat for this species over time, Eastern meadowlark populations may increase.

Northern Bobwhite

The Northern bobwhite was chosen as an MIS to represent habitat conditions in the grassland and cultivated community types that include brushy areas and thickets, tall herbs, grasses, and saplings (e.g. old field and hedgerows bordering cropland and woodlands). This species was also selected as a Demand MIS and is a Bird of Conservation Concern. The population trend for this species is expected to increase within ten years of implementing the Area Plan (Area Plan FEIS, Table 3.2.5F). The expected population trend is dependent upon the habitat conditions present in the grassland, cultivated community types, and woodlands.

This species has not been detected on LBL point counts since 1998 (Figure 14). This may be due to habitat changes for the survey locations no longer being favorable for Northern bobwhite and possibly the time of the year that the surveys are conducted. Males begin territorial calling in mid-April and nesting commences in mid-May. Breeding bird survey point counts are primarily auditory and are done from mid-May to the end of June. At the time and place that the surveys are done, fewer males may be calling and/or have moved out of those areas. This species is in decline within the Interior-Low Plateau and management efforts on LBL will continue to focus on habitat restoration efforts to increase habitat for Northern bobwhite. Reported sightings of Northern bobwhite are infrequent almost anywhere in LBL.

Forest Management

Forest Inventory

The Forest Management Staff has inventoried over 18,000 acres in project areas to meet the Goals and Objectives of the 2004 Area Plan (Table 10).

Table 10. Forested acres by prescription area inventoried on LBL for past five years.

Prescription Area	Acres Inventoried
General Forest	9,700
Core Areas	2,900
Oak Grassland Restoration Demonstration Area	5,500
Total Acres	**18,100**

Forest Structure and Treatments

Goal 5 of the Area Plan includes objectives for the forest structure on LBL. The current acreage in each forest structure type, and the percentage of the 10 and 50 year objectives are shown in Figure 16 and Table 12.

Overall, for the past five years forest management projects have focused on creating oak woodland conditions in the OGDRA (2,000 acres), representing an increase in open oak forest and oak woodland structure types. In areas where both thinning and prescribed burning treatments are combined the oak woodland structure type is developing faster than in areas with one treatment alone. The exception to this is xeric sites receive prescribed burning alone. Xeric sites normally have a more open canopy and the reduction in shrub and midstory layers, along with promoting herbaceous development through the use of prescribed fire, have contributed to an increase in woodland conditions.

Figure 15. Mature Woodland in Crockett Creek Timber Sale Area

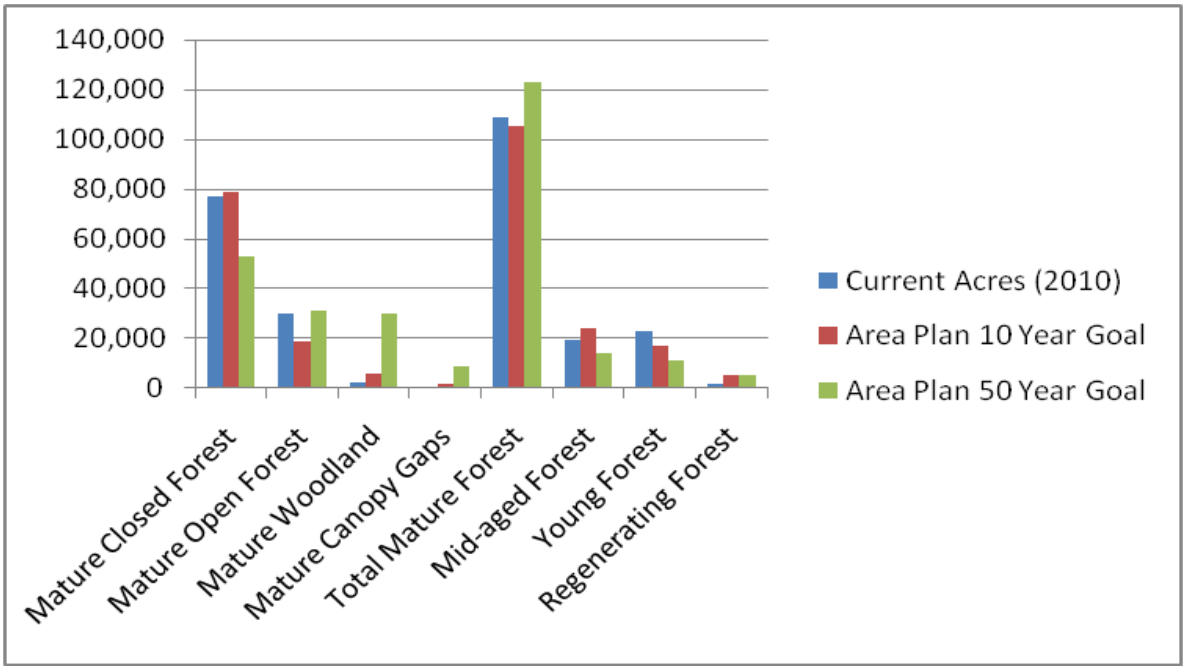
During the past 5 years, 864 acres have been harvested for timber and fire has been used on over 10,000 acres. The amount of fire treatments are shown in Figure 10 (fire section) and timber sales are shown in Table 11. In FY2010, 272 acres were harvested in the Crockett Creek timber sale, and 95 acres in the Ginger Bay Salvage Sale. Log decks from the ice storm (four acres) were traded via a stewardship agreement with NWTF for exchange of a 218-acre cut and leave woodland habitat improvement thinning in the Prior Creek OGRDA. An additional 110-acre service contract for cut and leave thinning operation was awarded and completed in the Prior Creek OGRDA, bringing the FY2010 acreage of cut and leave woodland habitat improvement thinning to 328 acres. A cumulative total of 500 acres of thinning has been completed during the past five years in the Prior Creek OGRDA. One other cut and leave improvement cut was completed in the northern Nature Watch area during FY2007 and FY2008 on 40 acres.

Table 11. Timber sales and thinning during FY10.

Sale Name	**Acres**
Crockett Creek Timber Sale	272
Ginger Bay Salvage Sale	95
Log Decks From Ice Storm	4
Prior Creek Woodland Habitat Improvement Thinning (Cut and Leave)	328

We treated xeric, dry, dry-mesic, and mesic sites with prescribed burning alone to increase acreage of mature open oak forest structure types by approximately 13,000 acres. Additionally, we treated 2,000 acres to achieve woodland conditions when thinning and prescribed burning were accomplished together.

Figure 16. A Comparison between current forested acres and the Area Plan 10 and 50 year goals.



The majority of changes to structure types and age classes are in mature forests. More woodland, canopy gaps, and regenerating structure types are needed in mature forests. (Table 12). Although some acres have returned to a regenerating forest condition through weather events and salvage operations, about half of the estimated regenerating forest acreage from five years ago has advanced to the young forest structure type. A high frequency, low intensity fire return interval will be necessary to maintain or improve open oak forest and woodland structure types on dry, dry-mesic, or mesic sites; otherwise, these areas will eventually return to a structure mix of mature closed canopy forest and mature forest with canopy gaps.

Table 12. Total forested acreage across all sites and forest structure types.

Structure Type*	Total acres from FEIS 2004	Total acreage 2010	10 Year Goal Acres	50 Year Goal Acres	Progress toward 10 year goal	Progress toward 50 year goal
Mature Closed Forest	90,316	76,863	79,000	53,000	119%	36%
Mature Open Forest	16,253	29,687	19,000	31,000	489%	91%
Mature Woodland	0	1,989	6,000	30,000	33%	7%
Mature Forest with Canopy Gaps	120	408	1,600	9,000	19%	3%

Structure Type*	Total acres from FEIS 2004	Total acreage 2010	10 Year Goal Acres	50 Year Goal Acres	Progress toward 10 year goal	Progress toward 50 year goal
Total Mature Forest	106,689	108,947	105,600	123,000	-207%	14%
Mid-aged Forest	14,817	19,480	24,000	14,000	51%	-571%
Young Forest	28,549	22,679	17,000	11,000	51%	33%
Regenerating Forest	2,536	1,482	5,400	5,450	-37%	-36%

* Structure by site types are tabulated in Appendix 7.

Overall at LBL, mature closed oak forest across all site types still remains the dominant structure type. Reductions in mature closed canopy structure types on xeric, dry, dry-mesic, and mesic sites have contributed to increases in mature woodland, open mature, and mature forest with canopy gaps structure types. This is true for both oak and mesophytic forest communities.

Riparian and shortleaf pine forest represent a smaller percentage (roughly 15%) of LBL and have shown little to no change amongst the different structure types. It is too early to determine the amount of successful shortleaf pine regeneration and establishment as a result of the Devil's Backbone prescribed burn of 2010.

In summary, regenerating forests across all forest communities have decreased in acreage. This is a direct result of the forest at LBL growing and aging into mature and middle age structure types. The amount of treatments implemented to create regenerating forest structure type over the past five years has not equaled the amount of regenerating forest advancing into the young forest structure type.

Resiliency Trends

Overall, the trend of an increase in the amount of middle to late successional forest conditions continues in the general forest and core area prescription groups. This means the predominantly oak forest will continue moving closer to physiologic maturity and will be predisposed to stresses, such as insects, disease, and wildfire, related to forest health issues. Early successional forest conditions are also likely to be affected by stresses, but not at the same severity as mid or late successional forest. This is primarily due to the younger hardwood tree's ability to vigorously resprout after some disturbance has killed or impacted the above ground portion of the plant. The absence of an early seral stage affects resiliency in terms of forest health as a whole, because early successional forests are more able to recover from catastrophic weather events such as tornados, ice storms, and other wind events.

The Oak Grassland Restoration Demonstration Area (OGRDA) prescription group has been the focus of most vegetation management projects over the last five years. This has contributed to

increased resiliency of early, middle, and late oak woodland successional conditions. These forests are less likely to be affected by insect, disease, and wildfire compared to areas where little to no active management has occurred on LBL. Resiliency has been developed through a combination of forest thinning and prescribed burning; this has reduced midstory and some overstory stocking levels (trees per acre), providing more resources (water, nutrients, and light) and space available for the remaining canopy trees to expand upon. Competing, undesirable, and suppressed vegetation has been decreased, while the healthiest trees (largest crowns, dominant canopy position, and longer lived species for the particular site type) are now capable to grow more freely. This forest is less likely to be negatively affected by wildfire now that fuel loading and fuel composition is changing. The amount of material available for ignition on the forest floor has been reduced while the type of vegetation found in the understory is shifting as well. This means if a wildfire were to occur in these areas, it would be of a lower intensity and shorter duration. This type of fire would have less of a damaging effect in terms of basal scarring to the larger trees of the canopy, and less consumption of the duff layer that protects and contains the vast majority of trees' fine root hair systems.

The concept of species diversity in hardwood forests like those at LBL can be very distinctive and complex. Although species richness can be high across a variety of sites types, much of the tree diversity in LBL's forest relates to the large number of oaks (20 species) and hickories (10 species) that can be found throughout the various forest communities and site types.

Insects and Disease

No insect infestations in hardwood stands have been detected over the past five years at LBL. Diseases associated with old age coupled with abiotic stresses such as tornadoes and ice storms are still a concern. During the past five years weather phenomena have ranged from strong wind events, flooding, a late freeze, drought-like conditions, and a large ice storm. These weather events collectively shape and contribute to the potential for insect and disease outbreaks, which are predisposing and inciting factors, respectively, of the primary forest health concern at LBL, oak decline. Another contributing factor to consider in assessing the potential of oak decline is root and canker pathogens, such as armillaria root disease and Hypoxolin canker. Hypoxolin canker can be seen on many mature red oaks (particularly scarlet and blackjack oak) throughout LBL.

Other potential pests and pathogens that may affect the forest include the two-lined chestnut borer, red oak borer, various leaf defoliators, oak wilt, and sudden oak death (SOD). Sudden oak death is new to the forests of the eastern United States. It is a real threat given the large number of oaks and other plant species that are host to the fungus (*Phytophthora ramorum*). A national SOD risk/hazard map developed by the USDA FS, National Forest Health Monitoring Research Unit, has LBL split between the high and moderate relative risk categories.

Stand level inventory data and random aerial reconnaissance are used to monitor and collect data on insects and disease at LBL. Stand level data were collected on over 18,000 acres; these data include tree mortality, signs of pests and pathogens, and abiotic damage such as wind or ice damage. Although data relating to pockets of damage and individual tree mortality or damage have been captured, large-scale insect and disease outbreaks have not been detected in areas inventoried over the past five years. Insects and disease can have an effect on oak decline at

LBL. The trip report findings submitted to LBL from the April 1, 2009 visit of William Jones, plant pathologist out of the forest health office of Forest Service Region 8, states, "oak decline has impacted the areas, as evidenced by the condition of black and red oaks." Stress brought on through multiple factors has and will continue to have an effect on the forest.

Non-native insects are of concern at LBL. The most well known and previously monitored insect is the gypsy moth. A new exotic insect of concern is the Emerald Ash Borer (EAB). These insects, especially EAB, are of concern to LBL because they are sometimes transported by human activities such as bringing firewood from quarantine areas on camping trips. No gypsy moths or EAB have been detected at LBL. The forest management staff plans to continue participating in USDA monitoring programs. It will also be important to continue to work closely with the recreation staff to promote visitor awareness and participation in reducing habits that have a real potential to spread these insect populations through camping activities.

Southern yellow pine beetle has not posed a serious threat to the total population of southern yellow pine tree species at LBL. Yellow pine species at LBL are usually in stands separated by large acreages of hardwoods, making it unsuitable for the traverse and sustainment of continuous beetle populations. In February 2009, one loblolly pine stand near Higgins Bay exhibited high mortality and symptoms common to southern yellow pine beetle outbreak. This was a small stand. If it was a pine beetle outbreak, it was several years old and an isolated case. Throughout most of LBL, the increase in mortality of southern yellow pine tree species will continue as trees damaged by the ice storm of 2009 continue to die. Pine stands damaged during the ice storm of 2009 were left with many weakened and stressed trees, which are the most susceptible to pine beetle outbreaks in the future.

The ice storm assessment of 2009 indicated there is a need to replace the damaged loblolly, eastern white, and Virginia pine stands when project level work is undertaken in these areas. The species planted in LBL years ago with the seedlings that were available at the time; and, the high planting density has made them susceptible to storm damage and insect outbreaks. LBL is also north of the loblolly pine natural range and west of the eastern white pine natural range. Loblolly pines are considered a non-native species here. Virginia pine does occur naturally in a few areas of LBL but only as a few scattered trees in the larger hardwood canopy, not as a dominant forest type. Because of these reasons, it is recommended that these planted pine stands be replaced with a pine that is native to the area. LBL is within the natural range of shortleaf pine. This species occurs naturally at LBL and has also been restored to areas in southern Illinois and northern Arkansas. Therefore, it is recommended, based on the information available, that shortleaf pine be used to replace the damaged planted pine stands in project areas.

Devil's Backbone State Natural Area, which contains the largest amount of native naturally occurring shortleaf pine at LBL, is also of concern for insect and disease outbreaks. It currently lacks any significant young to middle age shortleaf pine trees. This lack of complex age class diversity in these stands is the major concern if a southern yellow pine beetle outbreak were to occur in the area or on adjacent private lands. It will be important to monitor and track dead and dying pine trees, both planted and in naturally occurring stands, in order to confirm or dismiss this trend.

Old Growth

The forestry department has identified no old growth stands within the limited project areas inventoried (18,000 acres) over the past five years. This does not mean there is not any old growth at LBL; this is an indication that there are still many acres needing to be inventoried. The amount of forest inventoried to date is helpful in determining many forest resource needs, but it is still a small percentage (11%) of the total forest acreage at LBL.

Many current and upcoming projects propose treatments which would favor stands as possible future old growth, such as oak woodlands on xeric and dry sites and shortleaf pine forest. LBL has a long recorded history of previous logging and land uses which are the origins of most of the second and third generation forests that are present today. LBL's oak forest can be described as mostly mature in the chronological and physiological aspect, but that does not constitute existing old growth conditions. The best way to locate any stands to be considered old growth candidates is to continue and increase the current inventory process.

There are shortleaf pine stands in the Devil's Backbone area that meet the minimum age and diameter at breast height (dbh) for old growth; however, these same stands do not meet the minimum basal area and trees per acre criteria. Stands in the Prior Creek OGRDA and Demumbers Creek project area meet minimum basal area, dbh, and trees per acre for old growth classification, but do not meet the minimum age. Stands throughout these two project areas typically range in age from 60 to 90 years old; this is true for most of the oak forest here at LBL. These stands are roughly 30 to 40 years away from meeting the Region 8 minimum old growth age limit of 110 years for oak forests on xeric and dry sites. Forest age mirrors disturbance patterns of previous land use at LBL, settlement and farming, the large scale clearing of LBL's forest to support the iron industry from 1820-1860, and later demand for railroad and mining timbers well into the 1930s.

Goal 6:	Demonstrate and widely export innovative, efficient, and effective management techniques that can benefit others.
Sub-element NFS Generic Desired Condition	"Through the Demonstration Project role, the FS will continually seek to sharpen its management policies and techniques with an eye toward exporting these innovative and beneficial approaches to others locally, regionally, and nationally." [Area Plan, Vision]
Example Area Plan Desired Condition Statement	"In its demonstration role, LBL will develop and test the programs, methods, and systems by which recreation, EE, and vegetation are managed, with the intention of promoting those elements that would provide benefits to other public and private land managers and units." [Area Plan, Vision]
Desired Trend Statement	"Each year, export three to five demonstration products." [Objective 6a]
Monitoring Questions	30. Has LBL produced measurable results from demonstration projects that have lead to positive changes on other units? 31. How many demonstration products have been exported?
Area Plan Performance Measures	30. Trends and annual summary of accomplishments and results 31. Trends and annual summary of accomplishments and results
Data Sources Utilized	--Annual summary of units supported, accomplishment reports, feedback, policies changed, results; tracking, by documenting the assistance provided, support to specific organizations and agencies --Track annual accomplishments with standard tracking system
Importance	This goal contains one of the key emphases of the LBL Protection Act and reinforces the key purposes described for LBL when created in 1963. Effective delivery of conservation education messages is also a primary objective of both LBL and the agency.
What It Tells Us	The results related to this goal will provide key information about whether LBL is meeting its legislated objectives.

Goal 6, Monitoring and Evaluation Narrative

During the first few years of management by the Forest Service an informal process was used to guide the operation of the Demonstration Lab and the role needed clarification. In 2005, an oversight group was commissioned to review and formalize its role, including development of a formal charter and coordinated process for project submittals, oversight, and approval. Nine members serve on the Board of Directors, representing each level and facet of the Forest Service organization. One of the first recommendations of this board was to open up the solicitation of demonstration project proposals to the entire country.

Since 2005, the LBL Demonstration Lab has conducted 14 projects which have served all levels of the Agency. Over the last few years, the Lab has seen difficulty in soliciting new proposals throughout the Forest Service, and is working diligently with individuals on all levels of the agency to increase lab awareness. However with this challenge, the Demonstration Board

remains determined to promote and support the importance of LBL's National Demonstration Role.

In order to further expand the types of demonstrations LBL undertakes, LBL established a request for proposals to all FS units in FY2010. Of the proposals received, the Demonstration Board submitted 3 to the Regional Forester for consideration, which were subsequently approved.

In FY 2010, the Demonstration Lab continues to focus on internal projects as well. For example, LBL has been working on its internal Financial System and customer delivery processes, which includes its Point of Sale, Partnership Payments, and cost saving and efficiency ideas.

The Area Plan set a target of serving between three and six customers each year, on average. In FY2010, the LBL Demonstration Laboratory met this target by serving several units in a variety of ways, mainly in an advisor role on specific subject matter. No products were exported to other units in FY2010.

Goal 7:	**Enhance dispersed recreational and EE opportunities throughout LBL.**
Sub-element NFS Generic Desired Condition	"…management will also promote and increase support for dispersed day-use and extended-stay activities in anticipation of increased demand in dispersed recreational and educational activities and experiences. "Hunting and fishing will continue to be important dispersed recreation opportunities at LBL." [Area Plan, Vision]
Example Area Plan Desired Condition Statement	"Dispersed activities and opportunities will become an extension of the developed Rec/EE facilities and sites that currently exist." "Program and project efforts will be directed toward improving and developing self-guided trail systems for nature viewing, hiking, biking, and horseback riding. Scenic lake vistas will be opened up, and the road system will support scenic driving, access to cemeteries, and access to dispersed recreational opportunities." [Area Plan, Vision]
Desired Trend Statement	"Rehabilitate one to two areas contributing to dispersed recreation opportunities (e.g. backcountry, lake access, etc.) annually as determined by the realignment process, based on meeting present and anticipated user needs, providing resource protection, reducing maintenance costs, and reducing infrastructure." [Objective 7a] "An average of one to two miles of trail will be constructed annually." [Objective 7b] "Complete an average of one interpretive project annually within the Nature Watch Demonstration Areas and Oak-Grassland Demonstration Areas." [Objective 7c]
Monitoring Questions	32. Have dispersed recreational and EE opportunities at LBL been enhanced? (Duplicate question for Measures 32-35)
Area Plan Performance Measures	32. Trends and annual summary of accomplishments and results 33. Backlog of facility and trail maintenance needs and trends 34. Results and trends in user satisfaction ratings 35. Trends in financial resources needed and available to provide recreation opportunities
Data Sources Utilized	--Objective accomplishments, percentage of visitation utilizing dispersed Rec/EE opportunities --Analysis of Infra Deferred Maintenance Report and reporting of percent change in backlog --Summary of visitor satisfaction surveys or personal letters and notes received; objective accomplishments, integrated projects completed --Analysis of incoming funds-traditional budgets and fee collections-and costs of operations, in view of needs; reports using standard tracking systems
Importance	This goal contains one of the key program changes displayed in the LBL Area Plan and responds to concerns voiced by the visiting public during the planning process that LBL was not meeting changing customer demands through existing services.
What It Tells Us	The results related to this goal will provide key information about whether LBL is meeting its stated objectives in the Plan and is responding to the feedback of the public.

Goal 7, Monitoring and Evaluation Narrative

Challenges

2010 presented another set of challenges at LBL. The first challenge was the completion of the planning of two American Recovery and Reinvestment Act projects at LBL. The first project was the planning for 17 replacement trail bridges across LBL. This project will enhance dispersed recreation opportunities by providing year round safe trail access. The second project was the planning of a sewage treatment plant at Wranglers Campground. This plant would replace a failing system and insure continued equestrian camping opportunities at LBL. The planning of these two projects was successful and these projects were awarded to contractors in April of 2010. Construction should be completed in 2011.

Another challenge for LBL was the effects of the major storm event that dumped large amounts of rain on LBL the first weekend in May of 2010. The heavy rain did significant damage to the roads and trails across LBL. A wind event associated with these storms did significant damage to Rushing Creek Campground. The 20 plus inches of rain that inundated Nashville, Tennessee, brought significant flooding from high lake levels to LBL for most of the month of May. The high lake levels were the highest recorded in the ten year management of LBL by the Forest Service and played havoc with the recreation facilities, especially the trails system. There was major cleanup and infrastructure repair in 27 developed recreation sites and almost all of the trails on LBL. Working closely with the maintenance contractor, Swift and Staley, the Forest Service began a rapid cleanup and repair of all recreation facilities and trails. This was a great accomplishment for the region around LBL because the work was completed just before the Memorial Day holiday weekend.

2010 Recreation Program

The 2010 recreation program of work continued in conjunction with the storm cleanup, repairs, and the ARRA project planning. LBL made progress on achieving objective 7a in July with a proposed 32 point alternative for the future management of the backcountry, lake access, and day use areas across LBL. Comments were received on these proposals by September 6, 2010, and the Forest Service will begin making decisions based on this input in 2011. Another major accomplishment in 2010 was the completion of a reconstruction of the Golden Pond Target Range. The new range was opened in September of 2010 and features a 50 yard pistol range, 184 yard rifle range, and improved safety berms made from excess soil from the Highway 68/80 project.

Work continued in our cooperative effort with the state of Kentucky in the Highway 68/80 improvement project in mitigating disturbance to the dispersed and developed recreation facilities located in the right-of-way. Planning for new entrances to Fenton and Devils Elbow recreation areas off the new highway was completed. Golden Pond Picnic Area was closed and Fenton Campground and Devils Elbow Backcountry Area were significantly modified as a result of the Highway 68/80 project.

In 2010, the Forest Service developed new backpacker registration stations at North Welcome, South Welcome, and Jenny Ridge Picnic Area. The registration system provides for free camping for backpackers while providing them a place to register for safety measures.

In 2010, LBL reissued the Motor Vehicle Use Map (MVUM) with no changes from the 2009 map.

Site plans were completed for Hillman Ferry Campground, Piney Campground, and Fenton Campground. These plans outline the current and future management of these facilities.

Planning is complete for a series of accessible fishing access trails at Devils Elbow and the new entrances to Fenton and Devils Elbow recreation areas. Planning for the two bridge projects that are part of the Highway 68/80 projects has been on-going for several years. The Forest Service has provided input into bank fishing access at the entrance to both bridges, walk/bike paths across both bridges, and a possible improved ramp at Fenton.

Improvements and Deferred Maintenance

There have been some significant improvements made to the backcountry, lake access, and day use areas across LBL during the last five years. Twenty (20) accessible vault toilets have been built in dispersed campgrounds and 7 accessible vault toilets have been built in day use areas and trailheads. Two accessible vault toilets are planned and funded to be built at Fenton and Devils Elbow. Planning is complete for an accessible vault toilet at the Golden Pond Target Range and will be built when funding is available.

Improvements have been made at developed campgrounds. Among these are three bathhouses at Energy Lake Campground and a replacement, accessible gatehouse. Hillman Ferry's water system and wastewater treatment plant were enhanced to meet increased demand, including a new well house in Loop A. Hillman Ferry received two replacement bathhouses, and plans have been completed for a new gatehouse. Piney campground replaced the gatehouse, amphitheater, and outpost along with new playground equipment and outdoor shower at an improved beach.

Figure 17. New bath house at Energy Lake Campground

Most backcountry, lake access, and picnic areas have received replacement accessible tables and replacement fire rings and grills as feasible. Moss Creek day use area has been improved with picnic tables, grills and defined parking areas. Replacement courtesy docks have been built at Brandon Spring, Fenton, Energy Dam and Boswell Landing boat ramps. A new courtesy dock has been built at Nickell Branch boat ramp. Two unsafe fishing platforms were removed at Devils Elbow and Energy Dam. In total, 19 trail bridges have been replaced and the North trailhead was repaved. Roads within Taylor Bay were paved and the Fenton boat ramp parking lot was enlarged and graveled. Gravel was also placed on the parking lots at Energy Dam and Gatlin Point boating sites. As discussed earlier, the target range has been completely rebuilt

providing a safer enhanced shooting environment. All of these efforts have made progress toward rehabilitating the dispersed recreation sites throughout LBL. The implementation of the decisions resulting from the proposed 32 point alternative for the future management of the backcountry, lake access, and day use areas will continue the progress toward improving dispersed recreation at LBL.

Since FY05, $5,455,111 has been reduced from the deferred maintenance backlog. Additionally, many replacement facilities and enhancements were added over the five year period. Deferred maintenance is tracked in INFRA, a Forest Service integrated data management system for constructed features and real property accounting. The INFRA Deferred Maintenance Report provides a snapshot of the value of deferred maintenance each fiscal year. Years in the report are not directly comparable to each other. The fluctuation in deferred maintenance is influenced by many factors; the most important of which is calculation methods have changed. In addition, the facilities are now five years older and require additional maintenance as they near their life expectancy. Costs have also increased for both materials and labor while natural phenomena such as ice storms and tornadoes have added to the maintenance needs. The total deferred maintenance at recreation sites for FY10 is $9,775,497.

Trails

Monitoring efforts continued across LBL trails:

- Installation of a soil moisture monitoring station in Turkey Bay OHV Area to assist in determining when the trails need to be closed to prevent resource damage from OHV use.
- Completed trail impact monitoring for the LBL 200 Special Use OHV recreation event.

In the five years since the Area Plan was completed, 17.5 miles of trails have been constructed:

- 1 mile reconstruction of the North/South Trail near Moss Creek.
- 0.5 mile of a 1.5 mile proposed reconstruction of the North/South Trail near Smith Bay.
- 5 miles of a paved hike and bike trail along Highway 68/80. This is the first step in a proposed 13 mile hike and bike trail along the Highway 68/80 on LBL.
- Reopening of 5.5 miles of the Energy Lake Trail.
- Reconstruction of 5.5 miles of the Heritage National Recreation Trail and a trailhead at Hillman Ferry Campground closed by the storms of 2007 and 2009.

There are several trails (30.6 miles) that LBL has completed planning work on and will be constructed as soon as funds are available:

- 21 miles of trails in the Prior Creek Oak Grasslands Area including a mountain bike complex and a heritage trail.
- 1 mile of Model equestrian trail reroute needed due to storm damage from the 2008/2009 wind events.
- 8.6 miles of hike and bike trail through the woods from Golden Pond to Fenton as part of the Highway 68/80 project.

Planning was begun on several trail projects:

- 2.75 mile reroute of Equestrian Trail 11 due to the Highway 68/80 project.
- Trailhead and interpretative trail near the site of Fort Henry, a Civil War fort.
- Closure of two miles of the Shortleaf trail in the Fort Henry Trail system.

LBL is on track to meet or exceed the objectives for trails construction, Obj 7b, of one to two miles of trail per year.

During FY10, much work has been completed on existing trails. The following are the highlights:

- Completed evaluations on all hike/bike trail bridges on North/South Trail (28), Canal Loop Trail (10), Nature Station Trails (14), and Hillman Ferry Hike/Bike Trail (4).
- Bridges improved to standard – North/South Trail (3), Canal Loop Trail (1), Nature Station Trails (1), Hillman Ferry Hike/Bike Trail (3).
- Bridges decommissioned/removed – Nature Station Trails (6).
- Hosted National Trails Day and National Public Lands Day events as well as monthly volunteer trail workdays. Volunteers contributed a total of over 500 hours during these organized events.

Hunting

Thousands of hunters continue to be applying for quota hunts for deer and turkey on LBL. See Table and Graph below.

Species and Year	Quota Hunt Applications	Number Harvested During Quota Hunts
Deer		
2005	12,421	711
2006	12,312	843
2007	12,414	731
2008	11,965	796
2009	10,166	544
2010	9,307	Not available until Jan 2011
Turkey		
2005	2907	111
2006	2724	164
2007	2583	117
2008	2629	113
2009	2292	114
2010	2407	130

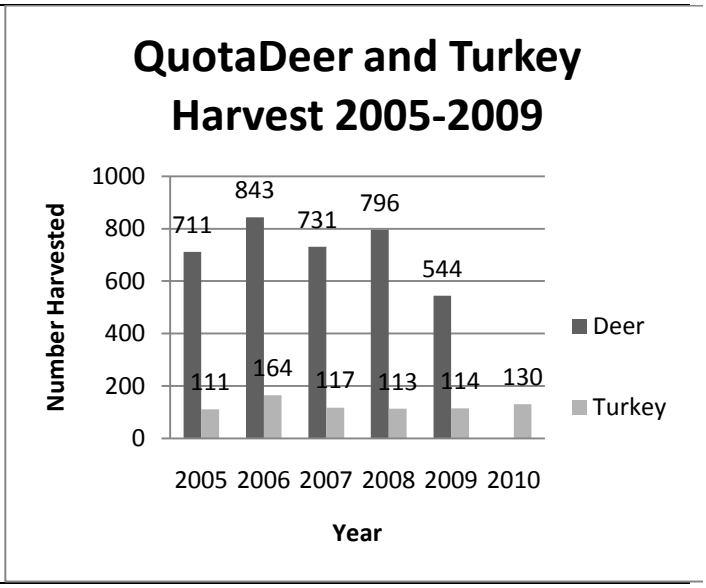


Figure 18. Quota Hunt Results

In 2009, the LBL deer quota hunt application process was converted from a paper application to an online paper-free application process, which saved a lot of paper and mailing expense. LBL turkey quota hunt applicants began using this online process for the first time during spring 2010.

Initial problems with the system combined with the fact that some hunters were not able to figure out how to use the online system caused a need to allow hunters to apply over the phone. Another significant issue that developed was the large number of hunters that applied online last year who forgot their user names and/or passwords. Due to these and other less common issues, employees were extremely busy helping applicants with their application process. Overall success of this new application process has mixed reviews from hunters due to some of the problems listed here.

A noticeably lower number of deer quota hunt applications were received for the second year in a row since the online application process was implemented (almost 860 less than in 2009 which was 1,800 less than in 2008). The reasons for the lower application numbers are believed to be a combination of applicants who were unwilling to change to the computer system and the poor condition of the economy, which may have reduced hunters' willingness to travel to LBL. This is a 24% reduction in the number of deer hunting applications when compared to the previous 4-year period average. On the other hand, LBL turkey quota hunt application numbers actually increased about 9% between 2009 and 2010.

Deer quota hunt harvest was 29% lower in 2009 than during the previous 4-year time period; however, this is mostly due to the fact that one of the adult quota hunts was eliminated on the Kentucky portion of LBL during 2009. Turkey harvest numbers were higher than during several previous years.

Environmental Education Program

Nature Watch Area received some emphasis this year as we began implementing the concept plan. LBL piloted a self-guided tour on the new web site that directed interested people to areas within the Northern Nature Watch area for wildlife viewing.
http://www.lbl.org/SelfGuidedTours.html
A revised LBL bird checklist was created. Woodlands Nature Station is the hub for disseminating information about dispersed educational activities in the Northern Nature Watch area.

Programs presented off-site of LBL include van and boat tours to view bald eagles in the winter. In fiscal year 2010, 329 visitors enjoyed these tours, seeing eagles in the wild and learning of their history and successful re-establishment in nature.

Other dispersed EE includes the new interpretive panels being created and installed. A "mobile" panel on prescribed fire is regularly seen at the Golden Pond Visitor Center, near prescribed fires such as The Homeplace burn and the burn of the prairie at the Nature Station. It is hard to calculate the number of visitors reading these panels, but it is part of our dispersed EE efforts. Panels interpreting beavers as a keystone species are in the works for 2011 to be installed at Hematite Lake and Brandon Spring Group Center.

Heritage

Heritage staff had the opportunity to enhance dispersed recreation and environmental education at LBL through their role in restoring and reopening the Hillman Heritage National Recreation Trail. For the first time, sites associated with the Star Lime Works Historic District are being interpreted through trail maps and signs along the trail. While interpretation panels need to be completed, the trail opening and heritage interpretation have been warmly received by the public. In addition to interpretation signs, a trailhead was created so that members of the public who are not registered at Hillman Campground can also access the trails. Heritage staff adopted the existing LBL Respect the Resource messaging and incorporated it into every sign.

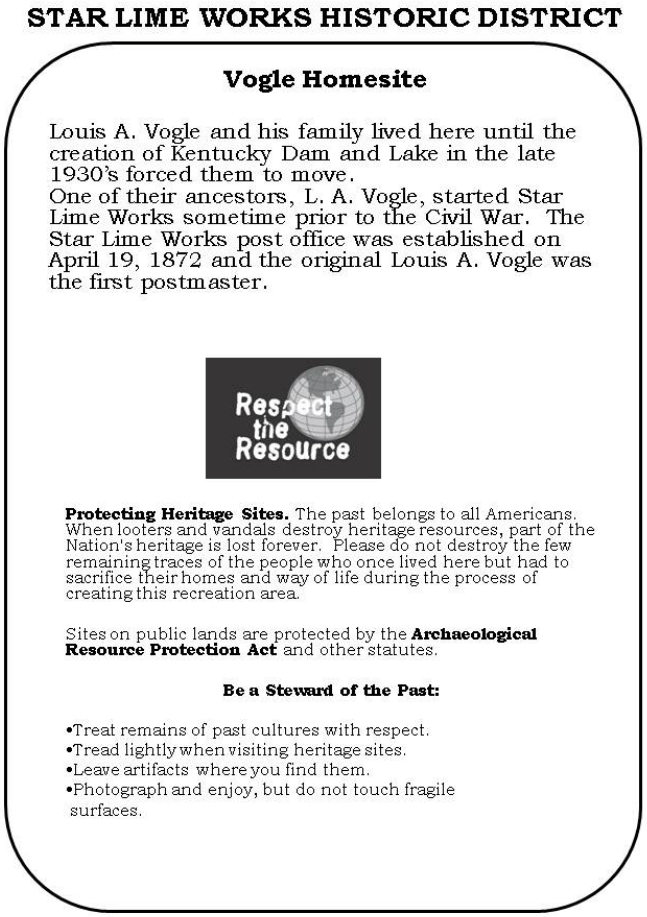


Figure 19. Heritage Trail Sign

Goal 8:	The LBL Area Plan will remain effective and usable and lead to accomplishments that support National Strategic Goals.
Sub-element NFS Generic Desired Condition	"…as a unit of the FS, LBL will actively fulfill its role in support of the FS's National Strategic Goals." [Area Plan, Mission]
Example Area Plan Desired Condition Statement	"The programs and methods used at LBL will be in a constant state of evaluation for improvement and refinement, assuring that LBL will maintain a cutting-edge management focus in all disciplines." [Area Plan, Vision]
Desired Trend Statement	"A user-friendly and informative Area Plan monitoring and evaluation report will be produced annually and include comparison of LBL accomplishments and National Strategic Goals." [Objective 8a]
Monitoring Questions	36. Are the goals of the LBL Plan leading to accomplishments that support national objectives? (Duplicate question for Measures 36-39)
Area Plan Performance Measures	36. Trends and annual summary of accomplishments and results. 37. Determine whether standards, guidelines, and management requirements are being met and are effective in achieving expected results. 38. Determine if planning information or physical conditions have changed and provisions remain scientifically valid. 39. Comparison of estimated and actual costs of plan implementation.
Data Sources Utilized	--Comparison of projects and recent accomplishments to the National Strategic Plan goals and objectives; public comments; standard tracking systems --Interdisciplinary review; sample projects to observe effectiveness of implemented standards --Interdisciplinary review of Area Plan for needed changes as new information becomes available and/or significant changes in conditions are observed --Compare trends in operating budgets to the estimated costs of implementing the Area Plan
Importance	Ensures that the Plan stays usable and is working to support not only LBL goals, but those of the agency. Aids in communication with stakeholders.
What It Tells Us	By reviewing the accomplishments, we are able to find trends that indicate if the Plan is moving towards desired conditions, and should emerging issues begin to occupy more time and resources than the objectives in the Plan, indications for a "need for change" can be identified.

Goal 8, Monitoring and Evaluation Narrative

The 2004 Area Plan remains aligned with the national strategic goals of the Forest Service (http://www.fs.fed.us/publications/strategic/fs-sp-fy07-12.pdf). The Area Plan also supports the Region 8 Strategic Framework of "Restore, Protect, and Respond." The planning information, assumptions, and provisions of the Area Plan remain scientifically valid. The only plan amendment identified has been the increase in size of the Devil's Backbone State Natural Area that is being completed with the environmental assessment for that area. Some minor corrections are needed in the Area Plan to update some values with actual on-the-ground information. These minor corrections are on file with the Area Planner and an errata is expected to be issued during FY11.

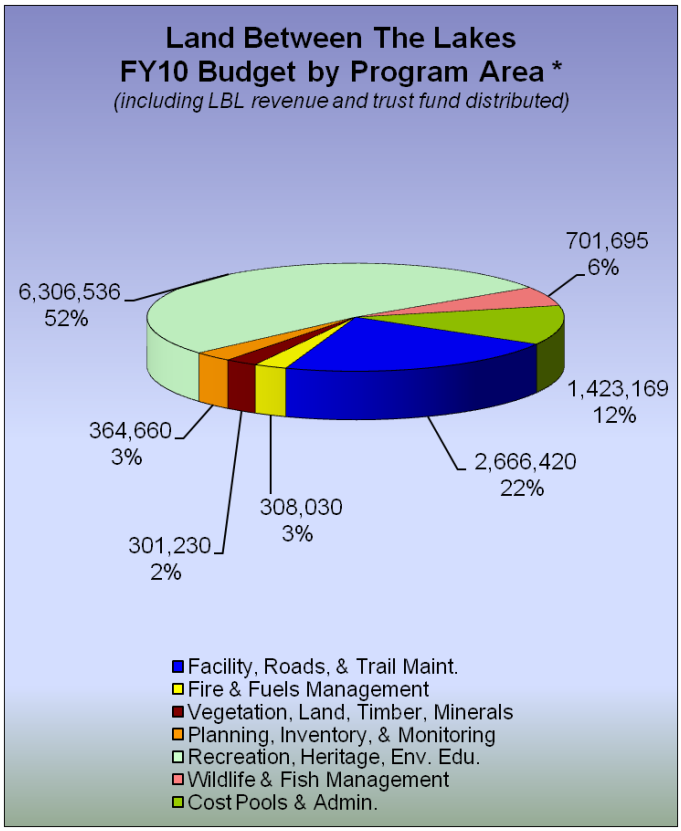
This year LBL met or exceeded assigned Performance Attainment Reporting (PAR) targets. The over-arching strategic goals of the FS are achieved through attainment of these targets by each National Forest System unit each year. Table 13 displays key accomplishments for the first five full fiscal years of the 2004 Area Plan implementation. Each year during the first five full fiscal years of the Area Plan, the following are being maintained to standard:

- approximately 290 miles of roads;
- approximately 300 miles of trails;
- over 90% of recreation sites; and,
- all priority heritage assets.

Natural resource treatments increased initially and continue at approximately the same levels, as discussed earlier in the Goal 5 narrative. Of note are the following PAR accomplishments:

- 1,600-3,000 ccf of timber has been sold each of the last 3 years, and an annual average of 2,000 ccf during the past 5 years;
- 300-11,000 acres have been treated with fire, for an average of 5,500 acres/year during the past 5 years;
- An average of 6,500 acres/year of non-threatened/endangered terrestrial habitat has been enhanced;
- An average of 400 acres/year has been treated for noxious weeds and invasive plants.

Figure 20. FY10 Budget



The budget for LBL in FY10 compares well with the projections in the Area Plan and indicates we remain on track with our projections. LBL's annual operating budget remains approximately $12.4 million: $8.4 million in federal appropriations and $4.0 million in revenue. Almost half of the budget was applied to the Recreation, EE, and Heritage programs at LBL. Approximately 30% was allocated to facilities, roads, and trails maintenance to support and provide the array of opportunities. (See Figure 20.) The appropriated budget for LBL has been essentially flat since 2000 (about 1% increase). Taking into account inflation and rising operational costs this has decreased LBL's ability to reduce the deferred maintenance across the property. LBL has been able to absorb these rising costs but it has not been able to substantially invest in facilities without other sources of funding. Activities at LBL were reduced in the middle of the year due to the significant floods, but by the end of the year things were appearing more traditional in use

and visitation. LBL successfully managed $6.5 million in American Recovery and Reinvestment Act spread among 6 projects throughout LBL.

In FY10, LBL volunteers contributed over 123,579 hours of volunteer service, which correlates to over 68 people-years of service, or $2,576,621 million. Partnership with the LBL Association provides an additional in-kind assistance valued at $350,000 (plus direct cash contributions of another $350,000). When volunteer hours are combined with all other in-kind assistance and cash contributions from partners, the value of total savings to the taxpayer in FY10 was over $3,276,621.

Table 13. LBL Key Accomplishments

Specific National Objective (Target)	Unit of Measure	FY06 Accomp.	FY07 Accomp.	FY08 Accomp.	FY09 Accomp.	FY10 Accomp.
Miles of high clearance system roads receiving maintenance	Mile	30	0	0	0	0
Miles of passenger car system roads receiving maintenance	Mile	210	220	231	293	0
Miles of road decommissioned	Mile	1	0	3	2.3	0.5
Total trail system miles meeting standard	Mile	60	--	--	294	329
Miles of system trail improved to standard	Mile	15	15	18	19	18
Miles of system trail receiving maintenance to standard	Mile	30	20	13	275	200
Number of recreation, interpretive, and conservation education products provided to standard	Product	535	--	--	--	--
Number of interpretive and conservation education plans implemented	Plan	--	1	1	1	1
Priority Heritage assets managed to standard	Asset	3	1	2	3	4
Recreation site capacity (number of People At One Time) operated to standard	PAOT (Core) (Integrated)	2,100,000 --	2,500,000 --	2,500,000 --	2,525,000 ---	2,525,000 3,130,661
Number of wildlife interpretation and education products	Product	42	44	44	42	42
Acres of inland lake habitat enhanced	Acre	121	86	61	112	107
Acres of inventory data collected or acquired meeting corporate standards	Acre	14,000	3,000	14,500	117,470	52,785
Acres of non-threatened/endangered terrestrial habitat enhanced	Acre	6,690	5,370	6,964	5,343	7,889
Soil and water resource acres improved	Acre	20	19	879	20	92
Volume of Regular Timber Sold	ccf	474	2,638	2,173	3,037	1,665
Number of forest special projects permits issued	Permit	9	23	21	22	15
Annual monitoring requirements completed	Number	8	12	12	12	12

Specific National Objective (Target)	Unit of Measure	FY06 Accomp.	FY07 Accomp.	FY08 Accomp.	FY09 Accomp.	FY10 Accomp.
Landscape scale or Ecosystem assessments completed	Assessment	1	0	1	1	1
Highest priority acres treated annually for noxious weeds and invasive plants on NF lands	Acre	465	264	354	494	498
Land use authorizations administered to standard	Authorization	7	29	49	22	42
Number of non-wildland/urban interface acres treated	Acre	2,625	--	--	--	--
Number of acres treated to reduce the risk of catastrophic wildland fire	Acre	3,340	--	--	--	--
Total Acres Treated with Fire	Acre		5,278	291	4,984	10,866
HF Acres Treated	Acre	--	4,858	65	64	6900
FN Other Acres Treated	Acre	--	420	226	54	3966
Number of land use proposals and applications processed	Application	3	10	12	5	16
Recreation Special use Authorizations Administered to Standard	Authorization	228	390	330	321	303
T&E and non-T&E Habitat Enhanced	Acre		1,383	65	6,539	900
Stewardship	Acre	--	--	1,310	4,427	4,402

E. Action Plan

LBL monitoring results did not establish the need for any major actions or changes at this time. There are a number of minor actions listed below to aid in implementation of several program initiatives outlined in the Area Plan, have some level of public expectation, or have had limited progress towards the desired conditions. These action items are drawn from the prior year's M&E Reports and have been updated. Two new action items have been identified from the information provided in this report. In addition, this report has not identified the need for any Area Plan amendments at this time.

Action Items and Status

1. Action: Collaborate with the public to review, identify, and determine backcountry or boat ramp facilities that are obsolete, excessively expensive to maintain, and can be consolidated to fewer but better-maintained facilities meeting today's public service needs. (FY05/06)

   Responsibility: Customer Service Department Staff
   Completion Date: September 2011 (Decision Date)
   Status: This effort will continue into 2010. Public input was gathered during FY07, crafted during FY08; a proposal was circulated to the public for comment in 2009. A second set of proposed changes were circulated to the public July – September 2010. Decisions are expected in 2011.

2. Action: Develop a Programmatic Agreement with both State SHPOs. Concurrently a Heritage Implementation Plan will be completed. (FY09)

   Responsibility: Customer Service Department Staff
   Completion Date: Ongoing
   Status: These two documents were anticipated to be complete during FY09; and will now be complete in FY11. The draft reports were made available to the public during FY10.

3. Action: Implement the Area Plan strategies associated with the State Natural Area in the Devils Backbone area in Tennessee by completing an EA to promote shortleaf pine regeneration. (FY07)

   Responsibility: Environmental Stewardship Department Staff
   Completion Date: December 31, 2011 (Decision date)
   Status: IDT began preliminary data gathering work on this project in FY08. Alternatives were developed and proposed for comment during FY09. The completion of the EA was put on hold due to FY09 priorities, but will return a priority in FY11. A prescribed fire was conducted in April 2010 under a CE decision.

4. Action: Implement the first phase of the Prior Creek project. Offer the Crockett Creek Timber Sale Unit and begin harvest on this unit. Develop EE materials to interpret the Prior Creek project. (FY07)

   Responsibility: Environmental Stewardship (timber) and EE (interpretation)
   Completion Date: September 30, 2011

Status: Timber sale (Crockett Creek) offered but did not sell in 2008. Crockett Creek timber sale was sold in FY09 and timber was harvested during FY10. EE materials will be developed from monies generated by the timber harvest. This action item will be viewed as complete when the self guided auto trail brochure is underway.

5. Action: Provide support to the Highway 68/80 improvement project. Re-route equestrian trail impacted by the new highway. Look at changing demands for Golden Pond Visitor Center (GPVC). (FY07)

   Responsibility: Customer Service (trail) and Environmental Stewardship (support)
   Completion Date: Trail re-route FY2011; Support September 2011; Golden Pond Visitor Center master plan FY 2011.
   Status: Support to highway improvement will continue into FY11. The trail re-route design and implementation has been put on hold due to ARRA work.

6. Action: Address emerging challenges of those small Core Areas adjacent to General Forest areas scheduled for management activities. (FY07)

   Responsibility: Environmental Stewardship
   Completion Date: September 30, 2013
   Status: Discussions were initiated with members of the public during FY10. This action item will be combined with the ecological landscape action item below.

7. Action: Develop and begin to implement a strategy to meet the desired annual vegetation management objectives of the Area Plan. (FY09)

   Responsibility: Environmental Stewardship
   Completion Date: September 30, 2010
   Status: Strategies were completed during FY10 with the intent to develop five year plans for timber and fire programs. This item is complete.

8. Action: Implement a strategy to supply biomass materials for Trigg and Lyon Counties projects and meet a share of projected future demands of the region. (FY09)

   Responsibility: Environmental Stewardship
   Completion Date: September 30, 2011
   Status: The strategy is being developed and the implementation will begin in FY11. We still need to determine what form and volume of biomass the counties and other projects will need. This will be largely dependent on the technology selected to convert the woody biomass to energy. Scoping for Grace Creek and Hurricane Creek salvage sale CEs was complete during FY10. These CEs will be the initial source of wood chips for the technology that will be selected for the biomass boilers.

9. Action: Complete proposals for demonstration and restoration of the ecological landscape of approximately 340,000 acres in western Kentucky and Tennessee that is inclusive of Land Between The Lakes National Recreation area (LBL) and consistent with the Area Plan. Terrestrially, this means, restoring the canebrakes, riparian areas, warm season grasslands, oak-grasslands, oak-hickory barrens, savannahs and woodlands, oak-hickory forests, shortleaf pine forests, and mesophytic forests mosaic that once moved within this landscape.

Aquatic restoration would include wetland restoration/mitigation, addressing historic stream channelization, head cutting, aquatic organism passage and restoring historical flows to the channels by the creation of grasslands, barrens, savannahs and woodlands on a landscape scale. (FY10)

Responsibility: Environmental Stewardship Department Staff
Completion Date: September 30, 2013
Status: A proposal for the Collaborative Forest Landscape Restoration Project (CFLRP) was completed in FY10 and will be revised beginning in FY11. Assessment of watershed condition class will begin during FY11.

10. Action: Complete an Economic Impact Study to understand the economic impact specific visitor groups have on the outlying communities (Day use vs. overnight), and compare groups within uses (example: Nature Station vs. Homeplace -- Wranglers Campground vs. Hillman Ferry Campground) (FY10).

Responsibility: Business Performance Department Staff
Completion Date: September 30, 2012
Status: This evaluation is being designed during FY11.

F. Appendices

Appendix 1

The following section is excerpted directly from Section 2 of the Area Plan. It clearly articulates both the reasons to develop this report and the methodologies being employed.

Monitoring and Evaluation

Monitoring constitutes an important link between the goals of the Area Plan and annual program accomplishments. The planning process has identified key monitoring questions that address each of the priority goals and objectives; they are listed in Part 1 of the document *(2004 Area Plan)* under Area Wide Goals. The monitoring program will focus on some risks mentioned previously while addressing suitable uses, use strategies, and design criteria.

Monitoring will track the wide variety of components of the Area Plan. Roles and contributions identified include the LBL interdisciplinary program specialist who will complete data gathering and evaluation of the Area Plan's implementation. Additionally, both the general public and stakeholders will be involved to capture the perceptions of how successfully LBL achieves the area wide goals and objectives. Monitoring will track how well implementation of the Area Plan's goals and objectives is bringing the conditions of LBL to the desired conditions specified by the Area Plan.

Because this Area Plan also supports the FS National Strategic Goals, the monitoring program will also weigh the Area Plan's progress and achievements in supporting these national goals. However, as these national goals are likely to change over time as national issues and special initiatives dictate, they were not included as formal goals of the Area Plan. This monitoring program, therefore, will include a comparison of this Area Plan's goals, annual LBL program accomplishments, and current or future national goals as part of the monitoring process.

By applying the evaluation questions and measures for each area goal, results and trends will provide a clearer picture of progress toward the vision. The evaluation of monitoring information will measure how close LBL is to reaching desired conditions identified in the Area Plan, including goals, objectives, and susceptibility to emerging issues.

An important concept incorporated in this Area Plan is the continuing use of some evaluation factors used in the analyses of the Environmental Impact Statement (EIS) alternatives. This approach allows for those EIS evaluation factors to serve as benchmarks from which original assumptions can be tested, and progress toward desired conditions can be measured.

Evaluations will serve as the springboard from which the resource specialist can identify changes needed in the Area Plan or its implementation, or research needed to clarify and address management issues. Results will also be used to help set shorter-term (three-to-five-year) strategic direction, as well as annual work plans. Existing strategies will be updated as needed, based on these evaluations. Results will be in the Area Plan M&E annual report. The Monitoring Summary Table in the Appendix *(of the Area Plan)* includes a complete list of questions, measures, method of collection, frequency, and responsible staff.

Note: items in italics are clarifications to the original section in the Area Plan, intended to aid the reader.

Appendix 2

2010 Monitoring and Evaluation Report on Bats – Trends in LBL

INTRODUCTION

Area-wide surveys for bats are performed every five years at the Land Between The Lakes NRA (LBL). These surveys are targeted on detecting the presence and monitoring population trends of two federally-listed endangered species of bats likely to occur at LBL: gray bat (*Myotis grisescens*) and Indiana bat (*Myotis sodalis*). In addition, two species of bats listed as Regional Forester Sensitive Species by the USDA Forest Service have ranges that include LBL: Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) and southeastern myotis (*Myotis austroriparius*). The first bat survey performed provided an overview of bats at LBL. It occurred during the summers of 1993-1995. Later area-wide surveys were done in the summers of 2000, 2005, and 2010 (Table 1). In addition to the area-wide surveys, project-specific surveys have been conducted as needed.

In 2006, a contagious disease affecting many species of bats was discovered in New York. The disease has been named white-nose syndrome (WNS), because there is a white fungus that is often seen on the nose of bats affected by the disease. Since its discovery, the disease has spread rapidly south along the Appalachian mountain chain and north into Canada. In 2010, it began spreading further westward as well, and has been found just south of LBL in a Tennessee cave and to the west in Missouri and Oklahoma. In response to this disease, in 2009 biologists began collecting baseline data on bats in LBL by recording bat calls along a driving transect from north to south in LBL. The hope was to collect three years of data to have a good estimate of the state of bat populations before WNS hit the area; however, WNS was detected after the first year of data collection.

In 1992, a habitat and cave probability survey across LBL was conducted. Many of the suitable habitat sites identified during that effort were used during later mist-netting and Anabat ™ surveys on LBL (Table 1). Two caves and seven sinkholes were identified; the two caves were found to be unsuitable for bats (1).

Table 1. Bat survey locations and their history of prior survey activity.

Location		Prior Bat Surveys							1992 habitat survey *
		1993-95	2000	2003	2005	2007	2008	2010	
1	Demumbers Creek, KY	x	x					x	x
2	Mammoth Furnace Creek, KY	x							
3	Moss Creek, KY							x	
4	Pisgah Creek, KY				x				x
5	Curry Hollow, KY	x	x		x			x	
6	Smith Creek, KY	x							
7	Barnes Hollow, KY	x	x						
8	Duncan Creek, KY		x						x
9	FSR 322 (pond on ridge between Jake Fork and Taylor Creek)				x				

Table 1. Bat survey locations and their history of prior survey activity.

Location		Prior Bat Surveys							1992 habitat survey *
		1993-95	2000	2003	2005	2007	2008	2010	
10	Sugar Bay, KY				x				
11	Franklin Creek, KY	x							x
12	North Oak Grasslands Demo. Area (Crooked Creek), KY	x			x	x		x	
13	Elbow Creek	x		x	x			x	x
14	Fenton / Hwy. 68/80			x					
15	Downs Branch, KY	x							
17	Fords Bay / Wranglers / West Fork Laura Furnace Creek, KY	x	x		x			x	x
16	South Oak Grasslands Demonstration Area (Prior Creek)	x			x		x	x	
18	Rushing Creek, TN	x					x		x
19	FSR 376 (ridge between Clay Creek and Ginger Creek), TN		x						x
20	Bennett Ridge / Acree Creek, TN	x	x						
21	Neville Creek, TN	x	x		x			x	x
22	Byrd Creek, TN	x							
23	Hughes Bay, TN	x							x
24	Brandon Spring Branch, TN	x	x		x			x	x
25	Panther Creek, TN	x	x					x	x

* Surveyed by Gardner during preliminary bat habitat survey, to determine and recommend most suitable bat habitat on LBL.

MATERIALS AND METHODS

Bats were surveyed using two different techniques: capturing bats using fine mist nets placed over corridors that bats are most likely to fly over, and recording bat echolocation calls using an Anabat ™ acoustic identification system. Bat species, or groups of bat species, were then identified based on their recorded calls. Several locations were sampled more than once in different years, often at different sites within each general location (Table 1). Descriptions of each survey are given below.

1993-1995

In 1994-1995, LBL-wide mist-netting surveys were conducted between May 15-August 15. Before these, a preliminary, less extensive survey was conducted during summer of 1993. A total of 29 sites were surveyed, including streams, old roads, ponds, and a bay. Each site was sampled for three or four nights. Surveys occurred between sunset and 2 a.m. Nets were at least 4 m high. Insects were also sampled using box-style sticky insect traps at mist-net sites. Fecal pellets were collected from bats during the 1994 survey. Temperature was recorded to ensure that temperatures exceeded 50°F. Sampling only occurred on nights with no rain and calm winds (2).

2000

Bats were surveyed during June 23-27 and July 30-August 5, 2000. Ten sites throughout LBL were surveyed using mist nets for two nights each, between sunset and five hours after sunset. These included four stream sites used during previous surveys and six upland sites. Upland sites were over road ruts with water, roads, and trails. In addition to mist nets, Anabat acoustic identification systems were used at each site (3).

2003

Bats were surveyed along the Hwy 68/80 corridor during July and August 2002. Twenty sites were surveyed for two nights each using mist nets. Mist nets were set up along streams and at upland sites. Nets were 18-42 feet long and 17 feet high (4).

2005

In 2005, mist-netting for bats occurred from July 16-28. Ten sites were each sampled for one night each, from 8 p.m. to 1 a.m. Two or three mist nets were set up over streams, roads (some with water-filled ruts), and a small pond. Most mist net locations were bounded by forest on each side, but some were adjacent to fields. Mist nets were 18-42 feet long. Weather conditions were recorded every half hour, including temperature, cloud cover, and wind speed (using the Beauford wind code). The location of each site was recorded using a hand-held GPS (5).

2007

A mist net bat survey was conducted August 1-5, 2007, to determine what species were present in the Franklin Creek area of LBL, where a prescribed burn was planned. Three sites were surveyed for two nights each. Mist nets were placed over streams and roads. The location of each site was recorded using a hand-held GPS (6).

2008

A bat survey was conducted June 16-22, 2008, to determine what species were present in the Ginger Bay area that may be impacted by a proposed timber salvage sale. Three sites were mist netted between 8:30 p.m. and 2:00 a.m. Each site was surveyed for two nights. Mist nets were placed over a stream corridor. In addition, Anabat acoustic identification systems were used at each site. An Indiana bat filter provided by the US Fish and Wildlife Service (USFWS) was used to detect the presence of Indiana bats; no other species calls were analyzed with the Anabat system. The location of each site was recorded using a hand-held GPS (7).

2009

A driving transect survey for bats was conducted three times in 2009, on June 24-25, July 1-2, and July 7-8. This survey consisted of driving a preset 78.5-mile transect along LBL roads with an Anabat acoustic identification system affixed to the roof of the vehicle to record bat calls. The route was driven at 20 mph, and no stops were made to ensure continual recording for an even amount of time along the whole route. In all, bat calls were recorded from 958 acres along the transect route. Additionally, bat calls were recorded for 10 minutes at each of five fixed-plot locations along the route. The objective of this survey was to collect baseline data about bat populations in anticipation that white-nose syndrome, a contagious bat disease spreading rapidly

across the eastern US and Canada, may arrive in Kentucky. Results of this survey are not yet available, due to a delay of software development to analyze the call data recorded.

2010

In 2010, bats were surveyed throughout LBL using Anabat acoustical identification systems. It was decided not to survey bats using mist-nets during this 5-year LBL-wide survey, due to the expansion of white-nose syndrome (WNS) to caves in nearby western Tennessee, Missouri, and Oklahoma. This decision was made in an effort to reduce the risk of spread of this disease.

Ten survey areas were selected; at each area, two survey areas at least 200 m apart were selected for the Anabat recorders. Areas were selected in previously-surveyed corridors, and along streams, ponds, and in forest openings. Canopy breaks in corridors were preferentially chosen (rather than closed canopy generally preferred for mist netting) in order to have the best possible recording. In all, bat calls were recorded from an area of 4,000 acres. Surveys were conducted from June 28-August 4, 2010, from approximately sunset to sunrise. Each study area was surveyed for at least two nights. Temperature, wind speed, relative humidity, and moon phase were recorded during each survey.

Software available at the time of this report limited the identification of individual species recorded during surveys; only Indiana bat calls were able to be identified using a filter developed by Kentucky Department of Fish and Wildlife Resources. Other species were grouped by call type into low-frequency (*Eptesicus fuscus, Lasiurus cinereus, Lasionycteris noctivagans*), mid-frequency (*Lasiurus borealis, Nycticeius humeralis, Perimyotis (Pipistrellus) subflavus*), Myotis (*Myotis sodalis, M. septentrionalis, M. grisescens, M. lucifugus*), or unknown (8).

In addition to the fixed point plots where bat calls were recorded, a driving transect survey was conducted using the same protocol as the 2009 survey; however, in 2010 only two driving replicates were conducted.

RESULTS

Data recorded during each survey were summarized by year. A total of ten species were recorded (Table 2). Of the two endangered species that may occur on LBL, gray bats were the only ones noted; Indiana bats have not been detected on LBL. Gray bats were found in 1994-1995, 2000, and 2003, but have not been detected since. Neither of the Regional Forester Sensitive species (Rafinesque's big-eared bat and southeastern myotis) were documented. Red bats (*Lasiurus borealis*) made up the vast majority of individuals captured or recorded (average 62% of all bats captured or detected). Red bats were followed by eastern pipistrelles (*Perimyotis subflavus*) and evening bats (*Nycticeius humeralis*), which made up 12% and 11% of bats captured on LBL, respectively. All other bat species captured combined represented less than 10% of bats.

Table 2. Bat species documented at LBL.

Scientific name	Common name
Myotis septentrionalis	Northern long-eared Myotis
Myotis grisescens	Gray bat
Myotis lucifugus	Little brown Myotis
Lasiurus cinereus	Hoary bat

Table 2. Bat species documented at LBL.

Scientific name	Common name
Lasiurus borealis	Red bat
Lasiurus seminolus	Seminole bat
Lasionycteris noctivagans	Silver-haired bat
Perimyotis (Pipistrellus)subflavus	Eastern pipistrelle
Eptesicus fuscus	Big brown bat
Nycticeius humeralis	Evening bat

A summary of mist-net bat surveys is given in Table 3. Because survey intensity was not the same during the project-specific surveys (in 2007 and 2008) as in the area-wide surveys conducted every five years, the average of the five-year surveys is separated out at the end of each column.

Table 3. Summary of bat surveys at the Land Between The Lakes, 1993-2008.

Year	Total bats	*M. grisescens*		*L. borealis*		*P. subflavus*		*N. humeralis*		*M. lucifugus*	
		n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
1993	66	0	0.0	45	68.2	4	6.1	6	9.1	1	1.5
1994	296	8	2.7	219	74.0	19	6.4	22	7.4	7	2.4
1995	238	9	3.8	136	57.1	33	13.9	24	10.1	2	0.8
2000	200	8	4.0	117	58.5	33	16.5	32	16.0	0	0.0
2003	246	17	6.9	154	62.6	38	15.4	5	2.0	4	1.6
2005	232	0	0.0	147	63.4	30	12.9	23	9.9	5	2.2
2007	16	0	0.0	12	75.0	3	18.8	0	0.0	1	6.3
2008	7	0	0.0	3	42.9	0	0.0	2	28.6	0	0.0
average/yr	163	5	2.2%	104	62.7%	20	11.2%	14	10.4%	3	1.8%
avg. of 5-yr surveys only	242	6	2.6%	155	63.2%	29	12.4%	25	10.9%	4	1.3%

	Year	*M. septentrionalis*		*E. fuscus*		*L. cinereus*		*L. nocitavagans*		*L. seminolus*	
		n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
	1993	8	12.1	0	0.0	1	1.5	0	0.0	0	0.0
	1994	18	6.1	1	0.3	2	0.7	2	0.7	0	0.0
	1995	31	13.0	1	0.4	1	0.4	1	0.4	0	0.0
	2000	8	4.0	0	0.0	0	0.0	0	0.0	2	1.0
	2003	20	8.1	6	2.4	0	0.0	0	0.0	2	0.8
	2005	13	5.6	13	5.6	0	0.0	0	0.0	1	0.4
	2007	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	2008	2	28.6	0	0.0	0	0.0	0	0.0	0	0.0
average/yr		13	9.7%	3	1.1%	1	0.3%	0	0.1%	1	0.3%
avg. of 5-yr surveys only		18	7.2%	4	1.6%	1	0.3%	1	0.3%	1	0.4%

Of the 25 sites sampled, only four sites were surveyed during every LBL-wide survey: Curry Hollow, Fords Bay/Laura Furnace Creek, Neville Creek, and Brandon Spring Branch. Data

collected at these points is separated from the rest of the data in order to determine if there are trends in bat populations throughout LBL (Table 4). Overall, more bats were captured on LBL in 1994, 1995, and 2000. These years, there was more survey effort (i.e., each site sampled at least two nights, and often four nights); however, if survey effort is the primary reason more bats were caught, the sample size should be similar in 1993 as well. Most species had the highest numbers in 2000 (i.e., gray bats, red bats, eastern pipistrelles, big brown bats, and hoary bats), and all except evening bats and little brown bats declined in sample size in 2005.

Table 4. Summary of results from sites surveyed during every LBL-wide survey.

Year	Total	*M. grisescens*		*L. borealis*		*P. subflavus*		*N. humeralis*	
		n	%	n	%	n	%	n	%
1993	42	1	2.4	30	71.4	2	4.8	3	7.1
1994	124	3	2.4	89	71.8	6	4.8	11	8.9
1995	123	2	1.6	77	62.6	19	15.4	16	13.0
2000	159	8	5.0	99	62.3	30	18.9	6	3.8
2005	87	0	0.0	53	60.9	9	10.3	17	19.5
Avg.	107	2.8	2.3%	70	66.8%	13.2	10.9%	11	10.5%

Year	*M. lucifugus*		*M. septentrionalis*		*E. fuscus*		*L. cinereus*		*L. seminolus*	
	n	%	n	%	n	%	n	%	n	%
1993	0	0.0	6	14.3	0	0.0	0	0.0	0	0.0
1994	3	2.4	10	8.1	1	0.8	1	0.8	0	0.0
1995	2	1.6	6	4.9	1	0.8	0	0.0	0	0.0
2000	1	0.6	7	4.4	4	2.5	3	1.9	1	0.6
2005	2	2.3	5	5.7	0	0.0	0	0.0	1	1.1
Avg.	1.6	1.4%	6.8	7.5%	1.2	0.8%	0.8	0.5%	0.4	0.4%

Results from the 2009 and 2010 driving transects were not available at the time of this report. Software is being developed to analyze call data collected by Anabat units. When this software is available the results from these surveys will be summarized and included in future reports.

It was not possible to compare data from the 2010 area-wide Anabat survey (Table 5) with results of other area-wide surveys, because sampling techniques were so different. However, some trends can be seen. The mid-frequency group represented the largest proportion of bats detected in 2010, followed by the Myotis group. Although the Myotis group was a large proportion of bats detected, Indiana bats were not noted using the Indiana bat filter. It was not possible to single out gray bats from other Myotis species using the available software, so it is unknown if gray bats were detected on LBL in 2010.

Table 5. Summary of results from 2010 acoustic bat survey.

Species group	% of calls
Low-frequency (*Eptesicus fuscus, Lasiurus cinereus, Lasionycteris noctivagans*)	~15%
Mid-frequency (*Lasiurus borealis, Nycticeius humeralis, Perimyotis (Pipistrellus) subflavus*)	55%
Myotis (*Myotis sodalis, M. septentrionalis, M. grisescens, M. lucifugus*)	25%
Unknown	~5%

Finally, data collected at a sample of sites on LBL that are actively managed were singled out from other data to determine if there are changes in bat populations that can be correlated with management activities (Table 6). Sites were selected if they had been surveyed during more than one of the LBL-wide surveys; sites selected are not inclusive of all sites that are actively managed on LBL. To be consistent with results from 2010 surveys, species detected in earlier surveys were grouped into low-frequency, mid-frequency, and Myotis callers.

Sites selected were:

- Wranglers campground area – heavily used for horseback riding. Trails and campground area are continuously and actively maintained.
- North oak grassland demonstration area – several prescribed burns have occurred in this area since 2007; some parts are likely to be burned multiple times in future years.
- South oak grassland demonstration area – several different types of timber harvests have occurred in this area since 2007; active timber management is ongoing.
- Neville Creek maintained open lands – ongoing maintenance of open lands occurs in this area, including regular use of prescribed fire, mowing, disking, herbicide use, and other actions called for in the 2007 Open Lands Revised Environmental Assessment.

Results from surveys in these areas indicate that the mid-frequency group (including red bats, evening bats, and pipistrelles) make up a majority of species detected, an even larger proportion than average throughout all of LBL. Gray bats were captured at the Wranglers campground and in the Neville Creek area; the number captured was low (<2) in each year captured, and did not significantly fluctuate over time. Gray bats have never been captured in either of the oak grassland demonstration areas. Management of these two areas is relatively recent (since 2007) and it may be early to perceive trends in bat populations related to active management.

Table 6. Summary of results of bat surveys at managed sites in LBL.

Wranglers campground and surrounding area

Year	% Low-frequency	% Mid-frequency	% Myotis
1993	0.0%	44.4%	55.6%
1994	1.9%	86.8%	11.3%
1995	0.0%	100.0%	0.0%
2000	3.3%	80.0%	16.7%
2005	0.0%	93.8%	6.3%
2010			
Average	1.0%	81.0%	18.0%

North oak grassland demonstration area (Crooked and Franklin Creeks)

Year	% Low-frequency	% Mid-frequency	% Myotis
1993	20.0%	60.0%	20.0%
1994	0.0%	84.0%	16.0%
1995	7.7%	69.2%	23.1%
2000	not surveyed		
2005	4.4%	91.1%	4.4%
2007	0.0%	93.8%	1.0%
2010			
Average	6.4%	79.6%	12.9%

South oak grassland demonstration area (Prior Creek)

Year	% Low-frequency	% Mid-frequency	% Myotis
1993	not surveyed		
1994	0.0%	100.0%	0.0%
1995	not surveyed		
2000	not surveyed		
2005	3.0%	97.0%	0.0%
2008	0.0%	71.4%	28.6%
2010			
Average	1.0%	89.5%	9.5%

Neville Creek open lands maintenance

Year	% Low-frequency	% Mid-frequency	% Myotis
1993	0.0%	97.0%	3.0%
1994	0.0%	78.1%	21.9%
1995	0.0%	81.8%	18.2%
2000	6.0%	86.0%	8.0%
2005	0.0%	93.8%	6.3%
2010			
Average	1.2%	87.3%	11.5%

TRENDS and DISCUSSION

Overall Trends

Survey results from 1993-2010 indicate that several bat species increased their use of LBL, and others decreased. There were few notable changes in endangered (E) or Regional Forester Sensitive (RFS) species of bats. Indiana bats (E), Rafinesque's big-eared bats (RFS), and southeastern myotis (RFS) have still not been detected on LBL. Gray bats (E), evening bats, and northern long-eared Myotis appear to have decreased in their use of habitat at LBL. Gray bats have not been captured on LBL since 2003 (Tables 4 and 7), although regional populations of this species are increasing (Table 8). Evening bats are ranked S3 in Kentucky, which means that they are considered vulnerable to being listed for protection (9). All other species detected either increased or remained the same during the survey period. It is important to note that while there appear to be these trends, variations between years may not indicate variations in bat populations. Two factors may influence the numbers of bats detected: survey time of year and amount of survey effort.

Survey time of year may result in different species being captured; for example, Moyer found that *P. subflavus* were captured in higher numbers in late summer (July 1-August 15) than in early summer (May 15-June 30). Later surveys (in 2000 and 2005) only sampled one period of bats' active season, and may have missed seasonal variation in bat activity.

The amount of survey effort may also produce variations in results. In 1994 and 1995, more sites were surveyed (20 and 14, respectively) than in later years. Each of those years, sampling occurred up to four nights at each site, at least twice as often as during other area-wide surveys. In 2005, each site was only surveyed one time, and surveys ended at least a half-hour earlier each night than in other years.

Changes in 2010

Changes in survey technique in 2010, from primarily mist-netting surveys in earlier years to use of Anabat acoustical identification systems in 2010, makes comparisons with other years difficult to draw. Software is being developed which will enable more specific identification of species of bats using recorded call files; this software was not available at the time of this report, so it was not possible to identify what species' calls were recorded. Species were grouped into three classes: low-frequency calls, mid-frequency calls, and Myotis species calls.

Mid-frequency bats, the group that includes red bats, evening bats, and eastern pipistrelles, continues to be the largest group of bats; however, mid-frequency bats made up 55% of all bats in the 2010 survey, where the combined average of other years of these species was 86.5%. There was no year of early survey efforts where this group made up such a small proportion of bat species as it did in 2010.

The Myotis species were second-most common in 2010, and this is similar to what was found in earlier years. However, from 1994-2005, Myotis species made up only 11% of total species composition, while in 2010 this group formed 25% of all species. There was no previous area-wide survey where Myotis made up such a large proportion of the group. Once the new software is developed (expected in fall of 2011), it may be possible to determine which Myotis species are making up this group. This group is the hardest hit by white-nosed syndrome, a disease causing widespread mortality in bats.

Trends at managed areas in LBL

Overall, the surveyed areas of LBL that are undergoing active management had similar proportions of species as the rest of LBL: at least 80% of species were mid-frequency bats, and approximately 13% of species detected were Myotis. Wranglers campground varied the most from other areas, with 18% of all species detected in the Myotis group. Bats captured varied largely from year to year at all areas. For example, in the north oak grassland area, mid-frequency bats made up between 60% and 93% of all bats, with a general trend towards a population increase in that group. Myotis species varied between 1% and 23% there, with a general decreasing trend. Myotis species also decreased in the Neville Creek and Wrangler campground area, but appear to increase in numbers at the south oak grassland area. Although data are not available on gray bats in 2010, during earlier years this species shows wide fluctuations and low capture rates in managed areas, indicating that there is not enough capture data to draw conclusions about trends for this species (Table 7).

Table 7. Summary of gray bats captured at managed sites in LBL.

Wranglers campground area

Year	Gray bats
1993	0
1994	1
1995	0
2000	2
2005	0
2007-8	not surveyed

South oak grassland demonstration area (Prior Creek)

Year	Gray bats
1993	not surveyed
1994	0
1995	not surveyed
2000	not surveyed
2005	0
2008	0

North oak grassland demonstration area (Crooked and Franklin Creeks)

Year	Gray bats
1993	0
1994	0
1995	0
2000	not surveyed
2005	0
2007	0

Neville Creek openlands maintenance

Year	Gray bats
1993	1
1994	2
1995	2
2000	2
2005	0
2007-8	not surveyed

Regional comparisons

Surveys at other locations in the region surrounding LBL show both similar and contrasting trends when compared with LBL surveys. Both Indiana bats and gray bats are found in cave surveys within 20 miles of LBL, in both Kentucky and Tennessee. Cave surveys in Montgomery County, Tennessee, indicate that gray bats counted have increased each year between 1986-2006 (10). Gray bat use at Tobaccoport Cave in Stewart County, Tennessee, has also risen since 1986 (Table 8). Tobaccoport Cave is the closest cave to LBL, at only 2 miles away. To prevent vandalism in the cave, a gate was installed in 1993; this gate was replaced in 1998 and modified in 2000 to a more bat-friendly design. In Trigg County, Kentucky, surveys show that gray bat populations have been variable between 1989-2007, fluctuating by as much as 7,300 bats between biennial surveys (10, 11). Overall, gray bat populations have risen since the 1970s at both hibernacula and summer roosting caves in Kentucky (Table 8) (11).

Table 8. Gray bat count data from caves near the Land Between The Lakes NRA. Large variations in Tennessee survey data exist because some surveys are winter and others are summer counts. Years not shown indicate years when no cave surveys were conducted.

Cave name	County, State	1986	1989	1994	1997	1999	2001	2003	2004	2005	2006	2007	2008
Big Sulphur	Trigg, KY		2,046		292	1,450	567	572		827		1,388	0[2]
Cool Springs	Trigg, KY		1,280		1,031	3,663	4,112	2,922		1,774		9,114	18[2]
Bellamy	Montgomery, TN	35,000		32,800		35,000		91,100[2]			139,364[2]; 84,650		
Coleman	Montgomery, TN										2,375		
Tobaccoport	Stewart, TN[1]	30		9,600			16,670		99		26,885	25	

[1]Tobaccoport cave is used by a large population of gray bats as a winter hibernaculum. Summer counts of gray bats are much lower. Data here indicate both summer and winter bat counts.
[2]Winter survey; all others listed are summer surveys.

Indiana bats occur in caves near LBL, though in smaller numbers than gray bats. There are no known caves on LBL that Indiana bats would use for hibernacula; however, it appears that habitat conditions are suitable for this species in many parts of the NRA. It is possible that their low population levels in the region have led to a lack of detection on LBL, even though they may still be using the forests for summer roosting and foraging.

In recent surveys, Indiana bats have been documented hibernating in Trigg County, KY, in 2008 (one in Big Sulphur Cave and 129 in Cool Springs Cave) and Montgomery and Stewart Counties, TN, in 2006 and 2007, respectively (200 in Bellamy Cave, and 55 in Tobaccoport Cave) (10, 12, 13). They have not been captured at Clarks River National Wildlife Refuge, which lies approximately 10 miles west of LBL (Michael Johnson, USFWS, pers. comm.). They have been captured during summer and fall at nearby Fort Campbell (two in fall 1998 and one in summer 2002) (14). Fort Campbell has conducted surveys for bats since 1998. Between 1999 and 2004, a total of 298 gray bats were captured on Fort Campbell, including 40 in summer and fall, 2004 (14).

RECOMMENDATIONS

In a concerted effort to find Indiana bats on LBL, and to incorporate sampling of proposed project areas, new locations were added each survey period. Because of the resulting variation in sample locations, bat population trends are more difficult to identify. While many bats have been captured, and detection of endangered and vulnerable species has been achieved, it is difficult to determine how much these populations are changing over time on LBL. Future surveys will focus on more effectively identifying bat population trends. In addition, coordination of survey efforts with regional natural resource agencies, including Kentucky Department of Fish and Wildlife Resources, Tennessee Wildlife Resources Agency, and Department of Defense at Fort Campbell may help to align data from multiple sources to better understand the nature of bat populations in the region. This has already begun in 2009 with the initiation of driving transect surveys using Anabat.

LITERATURE CITED

1. Gardner. Evaluations of habitats for threatened, endangered, and special concern bat species, Land Between The Lakes. Kentucky, USA: Tennessee Valley Authority 1992.

2. Moyer BD, Rebar CE, Derting T. Survey of bat species on TVA's Land Between The Lakes with emphasis on endangered, threatened, and special concern species. Final report submitted to Tennessee Valley Authority 1996, 15 May.

3. Harvey MJ, Britzke ER. Survey for bats at Land Between The Lakes. Final Report 2000.

4. Palmer Engineering. Biological assessment/evaluation of federal threatened and endangered species for US 68/ KY 80 Trigg and Marshall Counties, KY. KYTC Item Number 1-0180.00. Unpublished Draft Report 2003.

5. Kiser J. Bat capture data from mist net surveys on the Land Between the Lakes. 2005.

6. Derting TL. Final survey report for a summer habitat survey for the Indiana Bat (*Myotis sodalis*). 2007.

7. Ecological Specialties LLC. Indiana bat (*Myotis sodalis*) and gray bat (*Myotis grisescens*) mist-netting survey report 1785 Symsonia Rd., Symsonia, KY, USA 2008.

8. Derting TL. Bat Acoustical Survey for Long-term Monitoring at Land-Between-the-Lakes National Recreation Area: Preliminary Results. Murray, KY 2010.

9. NatureServe. Evening bat (*Nycticeius humeralis*). Arlington, VA2010 [cited 2010 30 September].

10. Martin CO. Assessment of the Population Status of the Gray Bat (Myotis grisescens): Status Review, Department of Defense Initiatives, and Results of a Multi-Agency Effort to Survey Wintering Populations at Major Hibernacula, 2005-2007. Vicksburg, MS: Environmental Laboratory, U.S. Army Engineer Research and Development Center 2007.

11. KY Department of Fish and Wildlife Resources. Listed Bat Monitoring. Frankfort, KY: KDFWR 2007.

12. KY Department of Fish and Wildlife Resources. Listed Bat Monitoring 2008.

13. TN Wildlife Resources Agency. Results of cave surveys done in winter 2007: TWRA 2007.

14. BHE Environmental I. Monitoring of Endangered Bats at Fort Campbell Kentucky and Tennessee, 2004. Cincinnati, OH: US Army Corps of Engineers 2004.

Appendix 3

Heritage Resources

As a result of prescribed burn projects, 16 historic resources were flagged and protected and 11 cemeteries were protected. Protection measures were reevaluated and modified to provide better protection. The new protection measures include Heritage staff flagging the TVA surveyed boundary prior to fire personnel clearing vegetation around and within cemeteries in these project areas. All flagged heritage resources and cemeteries are monitored within 60 days of the burn project.

As a consequence of the 2009 heritage survey of 10 miles of North/South trail, a portion of the trail was rerouted to avoid continuing impacts to a historic home site and without detracting from the hiker's experience.

The current United States Forest Service (USFS) national measure for determining whether a heritage program is being managed to standard is that 20% of all designated Priority Heritage Assets (PHA) must have a condition assessment on file that is no older than 5 years and no critical deferred maintenance needs.

Priority Heritage Assets (PHA). PHAs are those heritage assets of distinct public value that are or should be actively maintained and meet one or more of the following criteria:

a) the significance and management priority of the property is recognized through an **official designation**; e.g. listing on the National Register of Historic Places, State Register, etc.
b) the significance and management priority of the property is recognized through **prior investment** in preservation, interpretation, and use. Any improvement that meets real property designation criteria in which the PHA is now considered as real property.
c) the significance and management priority of the property is recognized in an agency-approved **management plan**.
d) the property exhibits **critical deferred maintenance needs**, and those needs have been documented. *Critical deferred maintenance* is defined as a potential health or safety risk, or imminent threat of loss of significant resource values.

Should an asset meet any of these criteria, it *must* be designated as a PHA.

It is expected that the Priority Heritage Assets List will include between 1% and 5% of a unit's inventoried heritage assets and will be developed in consultation with appropriate line and staff officers. As a minimum, the Priority Heritage Assets List should include:

- National Historic Landmarks
- Properties Listed on the National Register of Historic Places
- Interpreted sites not included in Recreation's INFRA list
- Sites whose special significance has been recognized by prior investments in preservation and stabilization
- Looted, damaged, and threatened properties whose maintenance needs have been documented in formal damage assessments or adverse effect determinations

- Properties whose special significance and maintenance needs have been specifically identified in management plans. Such plans include: Forest Plans, site-specific management plans, historic structures reports, stabilization plans, and interpretive plans.
- Other eligible properties whose critical deferred maintenance needs have been documented in condition surveys, and
- collections (artifact and archival) documented to have critical deferred maintenance needs

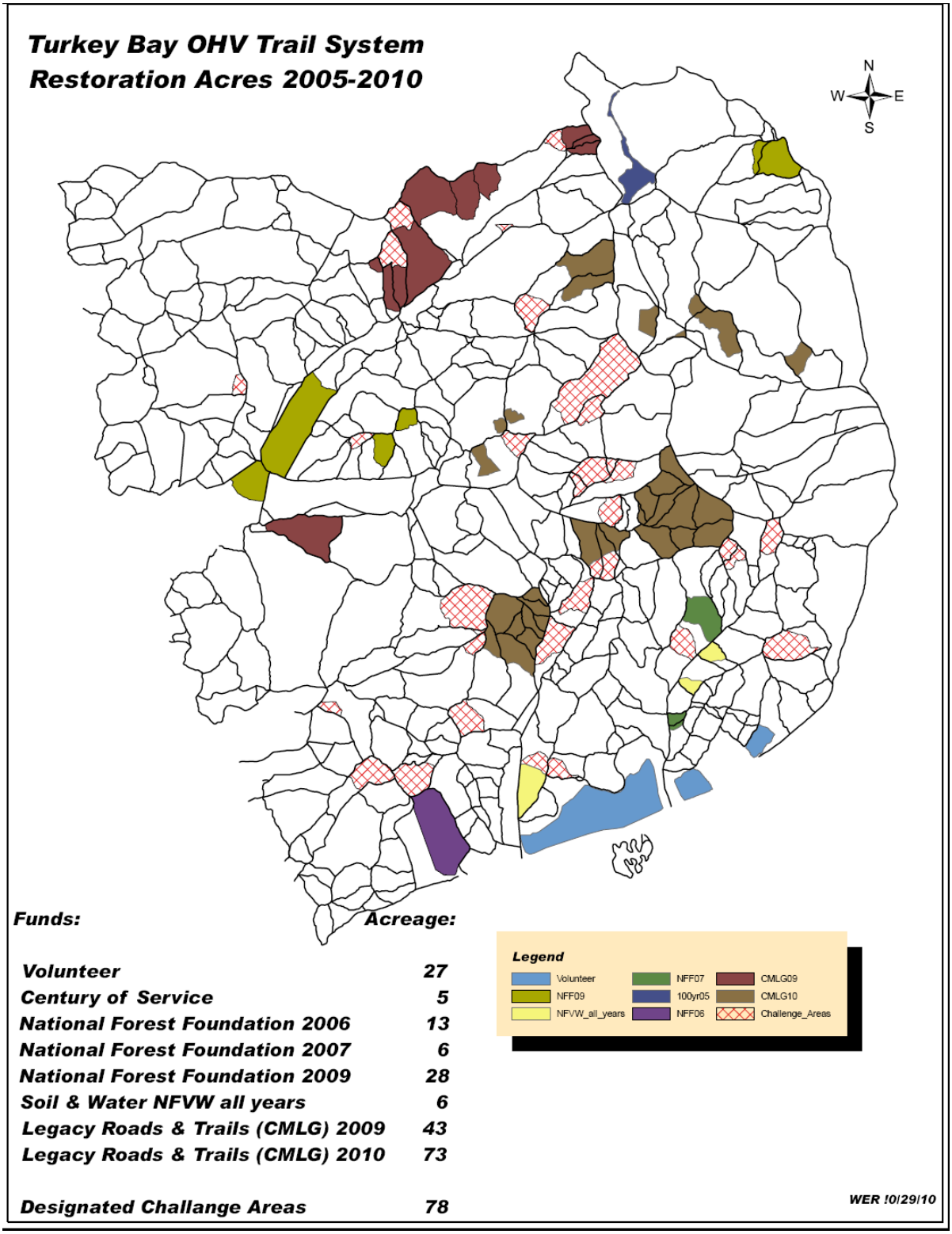
In 2005, LBL had 3 designated Priority Heritage Assets: Great Western Furnace, Center Furnace, and Ft. Henry. Since that time, two additional PHAs have been designated: Luther Shaw/Will Flora Cabin and St. Stephens Church and cemetery.

In 2010, Center Furnace was assessed since there was no current condition assessment on file and because American Recovery and Reinvestment Act funds were used to clear overgrown vegetation and repair damage that it suffered during the 2009 Ice Storm event. Center Furnace now receives annual herbicide treatment to prevent the return of damaging vegetation that also obscured it from visitors.

Since it came to light that the route of the new Kentucky State Highway 68/80 through LBL had not been adequately surveyed, LBL received funds to complete an intensive survey of the new 68/80 route to document the condition and officially record 153 sites known to be within the right of way.

Appendix 4

Turkey Bay Restoration Map



Appendix 5

Eaglets Fledged at LBL

Eaglets Fledged at LBL through the 2010-nesting season. (Kentucky 1989-2010 and Tennessee 1984-2010)					
Year	**Totals**	**Year**	**Totals**	**Year**	**Totals**
1984	1	**1993**	9	**2002**	15
1985	1	**1994**	6	**2003**	20
1986	0	**1995**	4	**2004**	14
1987	2	**1996**	6	**2005**	16
1988	2	**1997**	4	**2006**	12
1989	4	**1998**	5	**2007** (Species Delisted)	22
1990	4	**1999**	14	**2008**	21
1991	4	**2000**	18	**2009***	Unknown
1992	2	**2001**	7*	**2010***	8
Total Eaglets Fledged:					**221**
* 2001, insufficient staff to monitor nests due to LBL transfer to Forest Service; 2009 and 2010, weather related events diminished ability to monitor nest sites and assess fledging success.					

Appendix 6

Breeding Bird Count Methodology

Annual breeding bird point counts are used to measure the trends of MIS populations in comparison to the provision of the habitat types identified in Table 8 under Goal 5. Thirteen breeding bird transects with 16 points each have been monitored in LBL since 1994 and ten additional points were added in 2006 for a total of 218 points. The points are surveyed in May and June each year and are primarily auditory with flyovers also recorded. From 1994 to 2006 each point was surveyed for 5 minutes; however since 2007 all the points have been monitored for 10 minutes each. Fewer points were monitored in 2010 based on the need to cut back on time spent collecting data in habitat monitoring areas that are duplicative across LBL and where management has not occurred in the past 5-10 years and isn't projected to occur within the next 2-3 years. Therefore, a total of 154 points were monitored based on past/proposed fire and/or timber management and a known Cerulean warbler occurrence area for seven transects. Almost all the points in the managed areas were surveyed, except where the point wasn't found or wasn't accessible. For the other seven transects that are not in past/proposed fire and/or timber management areas, every other point was surveyed. Data collected in 2010, was not used in this monitoring assessment as it not available yet in the R8Bird database. The points not surveyed in 2010 for the seven transects within the non-management areas are projected to be surveyed in 2011.

A regional analysis of bird population trends from 1992-2004 was conducted that included data from LBL surveys. Evidence from this analysis indicated populations increased for some species, but decreased for others on Southern Region National Forests and LBL. Many of the species that declined in LBL during this period were early succession habitat species. The effects of management on MIS since implementation of the Area Plan in 2005 will be addressed in the Goal 5 for forest and grassland habitat associated species. The source of the information provided in these sections is from the US Forest Service R8Bird monitoring database and forest and grassland management accomplishments presented in this report.

Appendix 7

Forest Structure and Site Types

Tables 1-5 give an overview of the changes in acreage over the past 5 years between the various structure types among the different forest type and site types at LBL. Progress toward the 10 and 50 year goals are shown in the last 2 columns. Negative values indicate changes have moved in the opposite direction of the goal. Table 12 under Goal 5 of this report is an aggregate of all the data reflected in tables 1-5. In xeric, dry, dry-mesic, mesic, and alluvial site types, mature open, mature woodland, mature forest with canopy gaps, and regenerating forests are about 30% or less of the 10 year goal. Regenerating forest structure in mesophytic and riparian types are less than 0% of the 10 year goals. No progress has been made toward the 10 year goal for mature riparian forest with canopy gaps. Mature open and mature woodland are less than 20% of the 10 year goal for shortleaf pine. Although it is too early to assess progress toward the 50 year goals, forest structure types are less than the goals for most site types.

The acreage in these tables is derived from vegetative management projects in which prescribed burning, mechanical thinning, or combinations of both have occurred. The project areas include Prior Creek OGRDA, the North OGRDA, Devil's Backbone and Schoolhouse prescribed burn areas, Ginger Bay and the Alley salvage sales, and the Mulberry Flat timber sale.

Table 1. Oak forest on xeric and dry site types.

Structure Type	2004 acres from FEIS	Total acreage 2010	10 Year Goal (Acres)	50 Year Goal (Acres)	Progress toward 10 Year Goal	Progress toward 50 Year Goal
Mature Closed Forest	43,617	35,161	37,117	16,856	130%	32%
Mature Open Forest	10,060	17,936	10,014	9,614	-17,122%	-1,766%
Mature Woodland	0	1,580	6,000	30,000	26%	5%
Mature Forest with Canopy Gaps	55	122	0	0	-122%	-122%
Mid-aged Forest	7,678	8,970	10,479	7,396	46%	-458%
Young Forest	10,286	8,312	6,557	6,200	53%	48%
Regenerating Forest	1,196	811	3,100	3,100	-20%	-20%

Table 2. Oak forest on dry-mesic, mesic, and alluvial site types.

Structure Type	2004 acres from FEIS	Total acreage 2010	10 Year Goal (Acres)	50 Year Goal (Acres)	Progress toward 10 Year Goal	Progress toward 50 Year Goal
Mature Closed Forest	40,877	36,368	36,443	28,210	102%	36%
Mature Open Forest	5,788	10,848	8,968	21,368	159%	32%
Mature Woodland	0	409	0	0	NA	NA
Mature Forest with Canopy Gaps	65	118	1,184	5,984	5%	1%
Mid-aged Forest	6,076	8,419	10,759	5,599	50%	-491%
Young Forest	13,417	10,688	7,957	4,200	50%	30%
Regenerating Forest	1,249	625	2,100	2,100	-73%	-73%

*NA – Goal is 0 acres, therefore mathematically cannot calculate percentage.

Table 3. Mesophytic forest

Structure Type	2004 acres from FEIS	Total acreage 2010	10 Year Goal (Acres)	50 Year Goal (Acres)	Progress toward 10 Year Goal	Progress toward 50 Year Goal
Mature Closed Forest	3,781	3,220	3,633	5,015	379%	-45%
Mature Open Forest	306	784	306	0	NA	-156%
Mature Woodland	0	0	0	0	NA	NA
Mature Forest with Canopy Gaps	0	160	200	1,000	80%	16%
Mid-aged Forest	458	874	1,291	265	50%	-216%
Young Forest	1,971	1,510	1,050	200	50%	26%
Regenerating Forest	65	33	100	100	-91%	-91%

*NA – Goal is 0 acres, therefore mathematically cannot calculate percentage.

Table 4. Oak forest on riparian site type.

Structure Type	2004 acres from FEIS	Total acreage 2010	10 Year Goal (Acres)	50 Year Goal (Acres)	Progress toward 10 Year Goal	Progress toward 50 Year Goal
Mature Closed Forest	1,913	2,014	1,814	2,989	-102%	9%
Mature Open Forest	97	97	97	0	NA	0%
Mature Woodland	0	0	0	0	NA	NA
Mature Forest with Canopy Gaps	0	0	200	2000	0%	0%
Mid-aged Forest	604	1,216	1,840	676	50%	850%
Young Forest	2,875	2,169	1,463	200	50%	26%
Regenerating Forest	26	13	100	100	-18%	-18%

*NA – Goal is 0 acres, therefore mathematically cannot calculate percentage.

Table 5. Shortleaf pine forest.

Structure Type	2004 acres from FEIS	Total acreage 2010	10 Year Goal (Acres)	50 Year Goal (Acres)	Progress toward 10 Year Goal	Progress toward 50 Year Goal
Mature Closed Forest	128	100	0	0	22	22
Mature Open Forest	2	22	130	130	16	16
Mature Woodland	0	0	120	120	0	0
Mature Forest with Canopy Gaps	0	8	0	0	NA	NA
Mid-aged Forest	0	1	0	50	NA	2
Young Forest	0	0	0	100	NA	0
Regenerating Forest	0	0	0	50	NA	0

*NA – Goal is 0 acres, therefore mathematically cannot calculate percentage.

The tables above were compiled from GIS data. Thinning operations and prescribed burn boundaries were overlapped with forest structure types; this was the first step in determining any changes in structural acreages. The second step was addition of the flux in growth that occurs naturally over time between the different structure types. For example, regenerating forest is

defined as a forest between 0 to 10 years old. Without any disturbances over a five year period half of the original regenerating forest would now be older than 10 years (11 to 15 years old). This change in acreage would then be added towards the amount of forest in the young forest category and so forth. These two steps were used to determine any changes in acreage between the seven different structure types.