

Monitoring and Evaluation Report

USDA Forest Service Land Between the Lakes National Recreation Area

Western Kentucky and Middle Tennessee
Fiscal Year 2015



Mission Statement

Land Between the Lakes National Recreation Area

To protect and manage the resources of the Recreation Area for optimum yield of outdoor recreation and environmental education through multiple use management by the Forest Service; to authorize, research, test, and demonstrate innovative programs and cost-effective management of the Recreation Area; to help stimulate the development of the surrounding region; and extend the beneficial results as widely as practicable

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

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A. Forest Supervisor's Certification

This report presents the results of our Land and Resource Management Plan (Area Plan) implementation during Fiscal Year 2015, ending September 30, 2015. You can find our Area Plan on our website at www.landbetweenthelakes.us/stewardship/land-resource-management/planning/.

This report reviews the past ten full fiscal years of the Area Plan implementation. We put the highlights in this report to show the accomplishments achieved with the help of our partners.

Throughout the document, we briefly discuss the early stages of a collaborative management style at Land Between the Lakes. Through collaboration I intend to improve consideration of both social and environmental factors prior to decision making. Some small group meetings and an introduction of collaboration to the Land Between the Lakes Advisory Board were held in 2015. This valuable tool continued into 2016 with increased public involvement and information sharing.

The key finding of this evaluation demonstrates the need to begin laying the framework to move into Area Plan revision under the 2012 Planning Rule. First we will be seeking public feedback on this evaluation and identify data gaps to be filled. After we identify data gaps, we will prioritize the data collection. We will work with members of the public, partners, other government agencies, and Tribes during this process.

This report is submitted to our Regional Office and posted on our website with reports from previous years at www.landbetweenthelakes.us/stewardship/land-resource-management/planning/.

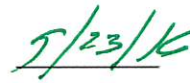
After reviewing our Monitoring and Evaluation Report for Fiscal Year 2015, I find we are in compliance with our Land and Resource Management Plan. I look forward to working with members of the public, regional leaders, and our partners on how to move forward in the future on implementing this area plan.



TINA R. TILLEY

Area Supervisor

Land Between the Lakes
National Recreation Area



Date



B. Introduction

Our annual Monitoring and Evaluation (M&E) Report summarizes the last fiscal year's efforts of implementing our Land and Resource Management Plan (Area Plan). You can find our Area Plan and other document links under the Stewardship tab on our website at www.landbetweenthelakes.us/stewardship/land-resource-management/planning/. We include the 2015 fiscal year's accomplishments and trends for the United States Department of Agriculture, Forest Service, Land Between the Lakes National Recreation Area.

This report emphasizes the findings and conclusions compiled from various monitoring activities and data sources available on Land Between the Lakes. The monitoring and evaluation program serves as an important link between Area Plan implementation and on-the-ground accomplishments. Evaluations in this report serve as a catalyst for any needed changes within the Area Plan or its implementation. The monitoring and evaluation program determines and informs the Area Supervisor about:

- Achievement of Goals and Objectives;
- Adherence to Design Criteria;
- Occurrence of Predicted implementation effects; and
- Discovery of emerging or unanticipated issues.

The heart of the report is the narrative in [Section D](#) focusing on significant items that have driven the conclusions presented. Section D is broken up into eight pieces, one for each of the Area Plan's eight goals.

Each goal includes a table combining, 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.

It is important to us that members of the public understand our efforts to achieve the vision in our Area Plan and our land and resource management outcomes.

We did not receive any comments about last year's Monitoring and Evaluation report.

Submit comments about our 2015 Fiscal Year Monitoring & Evaluation Report by mail to: 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 thoughts and comments about this report or any aspect of our management.

C. Executive Summary

This report serves as a comprehensive annual and ten year Monitoring and Evaluation Report that displays our progress toward achieving the goals and objectives in the Area Plan. The end of fiscal year 2015 completes the ten year cycle of moving toward the desired conditions in the Area Plan.

Find Monitoring and Evaluation Reports for FY2005-FY2014 on our official website at <http://www.landbetweenthelakes.us/stewardship/land-resource-management/planning/> Read our Area Plan at <http://www.landbetweenthelakes.us/wp-content/uploads/2015/05/LBLAreaPlan.pdf>.

Highlights in this report include, but are not limited to:

Goal 1 – Prioritize Projects to Provide Greatest Benefits

- Provided educational opportunities and recreational activities for over 1.5 million visitors to Land Between the Lakes in 2015.
- Completed assessments and site plans for recreation, environmental education, heritage, botany, wildlife, soil and water, timber, facilities, roads and trails projects.
- Identified 2,406 prehistoric and historic sites during archeological investigations since 2005.

Goal 2 – Emphasize Partnerships and Cooperators

- Regional tourism economic impact reached \$871.8 million in 2015.
- Partnered with non-profit, educational, governmental, and local community groups
- Developed a Programmatic Agreement in 2014 to streamline compliance with the National Historic Preservation Act so more resources can be applied to heritage stewardship, education, and outreach.

Goal 3 – Provide Environmental Education Messages

- Land Between the Lakes consistently has more dedicated volunteers than any other Forest Service unit in the Southern Region. An average of 106,282 hours were contributed since 2005.
- Integrated Respect the Resource messages in all program areas at recreation and environmental education facilities. Recycled over 93 tons of material over the past ten years.

Goal 4 – Manage Natural and Physical Resources to Improve Watershed Quality

- Upgraded one watershed from an at risk to improved classification. A second watershed will be upgraded to an improved class in the near future.

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Goal 5 – Use Collaboration Approach to Maintain and Restore Habitat to Support Wildlife Diversity and Recreation

- In 2015, shared collaboration decision making process in small group meetings and introduced the process to the Advisory Board. This process informs biological, physical and social aspects to decision making.
- Improved habitat and reduced fuels with prescribed fire on approximately 4,500 acres per year across the peninsula over the past 10 years.
- Improved wildlife habitat and forest resiliency through commercial harvests on approximately 3,800 acres, or approximately 2% of Land Between the Lakes.

Goal 6 – Demonstrate and export innovative management techniques

- Partnering with Department of Defense to identify public assistance devices to improve communications with all visitors to Land Between the Lakes.

Goal 7 – Enhance Dispersed Recreation and Environmental Education

- Reduced backlog of deferred maintenance for sites by approximately 37%, or almost 12 million dollars. Upgraded facilities across Land Between the Lakes.
- Recovered from the severe 2009 ice storm that devastated the area. Experienced four ice events starting in December 2013 and ending with the March snow storm in 2014. Restored facilities and roads after the floods of 2011 and 2015.

Goal 8 – Remain effective in supporting National Goals

- Completed one Plan Amendment in 2013.
- Updated the plan monitoring program in 2015 using an evaluation process to meet the 2012 Planning Rule requirements.

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.

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Goal 1: Prioritize projects to provide the greatest recreation, Environmental Education (EE), and resource stewardship benefits.

The end of fiscal year 2015 completes the ten year cycle of moving toward the desired conditions in the Area Plan. Recreation, Environmental Education, and resource stewardship continue to be the priorities for the work we accomplish.

Q1.1. Has the Forest Service (FS) made progress toward providing satisfactory recreational and EE experiences to visitors while providing for resource stewardship?

Land Between the Lakes and our partners made progress over ten years of Area Plan implementation. This section of the report highlights the progress made while the remaining report describes results in greater detail.

M Q1.1. Trends in segmented visitation in comparison to numbers of related resource stewardship projects completed.

We completed numerous projects in every program area during fiscal years 2005 through 2015. These projects improved facilities, roads and trails while restoring wildlife habitat. This all supported visitation to the National Recreation Area.

We present visitation trends under Goals [2.3](#), [3.4](#), and [7.32](#) of this report.

Q1.2. Have resource management projects been integrated?

All of the departments at Land Between the Lakes worked together to plan projects and activities. Interdisciplinary teams ensured projects met the Area Plan's focus of integrating Environmental Education, outdoor recreation, and natural resource management while supporting the local economy.

M Q1.2. Number of integrated projects being completed

We strive to integrate all of the resources when we operate on Land Between the Lakes. All of the environmental education and recreation opportunities at Land Between the Lakes incorporate natural resource and facilities management. Environmental assessments evaluate the site specific impacts of the natural resource accomplishments described in later goals. The assessments completed since 2007 include:

- LBL Motorcycle Event Environmental Assessment
- Continued Maintenance of Open Lands Revised Environmental Assessment
- Prior Creek Project Environmental Assessment
- Environmental Assessment for Buffalo Trail, Crooked Creek, School House, Three Ponds, & Neville Creek Prescribed Fire Projects
- Demumbers Creek Area Environmental Assessment
- Environmental Assessment for Devil's Backbone

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Some of these projects resulted from recommendations in three watershed assessments we completed:

- Panther Creek Watershed Assessment
- Prior Watershed Assessment
- Ice Storm Assessment Master Draft

Botany, wildlife, soil and water, timber, recreation and environmental education are all a part of the assessments. Facilities and roads improvements throughout the National Recreation Area occurred as a result of small assessments called categorical exclusions for maintenance and trail reroutes. Tornadoes and wind storms resulted in categorical exclusions for salvage sales. Facility master plans for campgrounds, the Golden Pond Visitor Center and Welcome Stations, Woodlands Nature Station, The Homeplace 1850s Working Farm, and Brandon Spring Group Center outline some of the improvements made to those facilities during the past ten years.

Nature watch demonstration areas identified in the Area Plan received attention by opening Empire Point and Bobcat Point off Mulberry Flat Road. We completed trail work in the south in the Devils Backbone area off Fort Henry Road.

Prescribed burns and timber sales took place in both Kentucky and Tennessee. See maps on our website at <http://www.landbetweenthelakes.us/visit/maps/>. Read discussion in [Goal 5](#) of this report.

Environmental Education is a priority at Land Between the Lakes. Over the years, featured accomplishments include Friends of Land Between the Lakes partnership for day to day operation of the environmental education facilities; the Field Trip (Transportation) Grant Program to provide funding to bring students to learn about the environment; and the creation of our Master Strategic Plan for Environmental Education.

Educational and interpretive programs at our facilities include stewardship messages such as recycling, managing your yard for native plants and wildlife and the value of public lands. Programs at Woodlands Nature Station emphasize our relationship with and the effects of our actions on nature (plants and animals). The Homeplace 1850s Farm shows how we are dependent upon the land and natural resources. The Golden Pond Planetarium broadens the message to the earth and the universe. Winter programs include viewing eagles through cruises and van tours. During the winter of 2014/15, we reached over 500 visitors and were able to show how these birds have returned to Land Between the Lakes.

Heritage

Very little in the way of archaeological investigations were conducted prior to 2005. No holistic, systematic inventory or evaluation of sites were completed. Our goal since 2005 has been to document and record prehistoric and historic sites at Land Between the Lakes in order to collect baseline data. As Figure 1.1 shows, there were only 104 documented sites on Land Between the Lakes in 2005. Since that year, the number of identified sites has steadily increased to the current total of 2,406 (see Figure 1.1). Baseline site data is critical for monitoring and assessing site

conditions in order to measure changes/impacts over time and to document the range and types of sites on the landscape.

Finding and recording sites remains a priority. In the Programmatic Agreement signed in 2014, Land Between the Lakes committed to initiating systematic site evaluations and turning our focus to making determinations of eligibility for listing on the National Register of Historic Places. We will begin the determination of eligibility when there are less than 500 sites to record.

Identified Sites	Recorded Sites	Need to Record
2,406	670	1,736

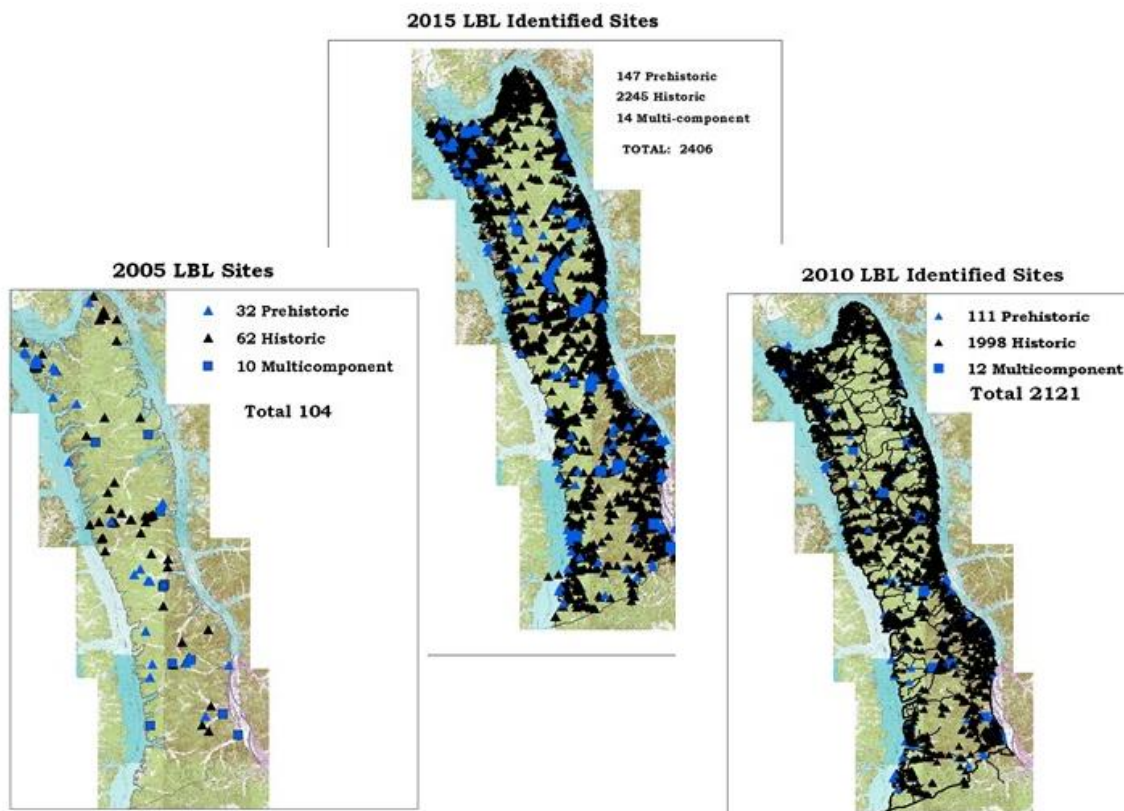


Figure 1.1: Heritage Sites

In 2008, there were 249 known cemeteries within Land Between the Lakes. That number has since increased to the current total of 266. Some new cemeteries came to light as former residents and descendants provided new information and records. Some were added by heritage staff based on our records. Some cemeteries were listed in the TVA records as relocated. When we discover one of these cemeteries was not actually relocated or underwater, we add it to our heritage geodatabase

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and mark the location as a cemetery. Staff's experience with relocated cemeteries in other parts of the country showed not all graves were moved with cemetery relocations. Land Between the Lakes treats relocated cemetery sites as cemeteries to avoid any unintentional disturbances of graves that were not actually relocated.

Around 2009, the U.S. Forest Service National Heritage Program began to institute the concept of Priority Heritage Assets as heritage assets of distinct public value that are or should be actively maintained and that meet specified criteria. Immediately, the three local sites listed on the National Register, Center Furnace, Great Western Furnace, and Ft Henry were designated as Priority Heritage Assets. Since then, each year we add to the list any cultural resources in which we invest time, money, protection, and/or stewardship effort. The Priority Heritage Assets designation is a boon to the status, visibility, and value of historic cemeteries as cultural resources since they are usually excluded from listing on the National Register of Historic Places. In addition, most National Forests do not have cemeteries within their land management base unlike Land Between the Lakes where there are 266 of them. [Appendix 3b](#) lists the Priority Heritage Assets to date at Land Between the Lakes and this list continues to grow.

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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 the public.

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Goal 2: Emphasize partnerships and cooperation with citizen groups, community businesses, private corporations, tourism organizations, and government agencies.

Q2.3. Has the Forest Service made progress toward supporting vitality of gateway communities and maintaining/enhancing relationships with its neighbors and regional organizations?

Since 1999 with the transition of management to the USDA Forest Service, the men and women of Land Between the Lakes continue to make progress toward supporting the vitality of our gateway communities.

Economic Impact

Land Between the Lakes National Recreation Area continues to serve the region as a major tourist destination with over 1.5 million visitors in 2015. Our numbers fluctuated between the high of 1.8 million visitors in Fiscal Year 2007 and a low of 1.4 million in FY2012. We experienced a down turn in FY2014 due to the two week shutdown in October at one of our busiest times of the year. Factoring out the shutdown, our numbers increased over the year before.

Land Between the Lakes remains the number one tourist attraction in Kentucky and among the top ten in Tennessee.

In Kentucky, our regional tourism economic impact reached **\$871.8 million** in 2015. According to a July 5, 2016 Lane Report:

“However, it was the Western Waterlands Region just to the west that made Kentucky tourism’s biggest financial wave, accumulating an \$871.8 million economic impact. Western Waterlands includes arguably the most state’s most popular lakes, Kentucky Lake and Lake Barkley, which are connected by a canal, making them together the largest body of manmade water east of the Mississippi River. The 170,000 acres between the two lakes is Land Between the Lakes National Recreation Area.”

In Tennessee we fall under the Middle Tennessee tourism region. Davidson County with Nashville sits in this region and is the number one destination. We decided to choose five counties where we believe the recreation area to have the most influence. These five counties account for **\$296.82 million** of Tennessee’s tourism impact in calendar year 2014, the latest Tennessee Tourism Economic Impact report as of this writing. One of our biggest blocks of visitors comes from Montgomery County.

- Benton \$24.56 Million
- Henry \$55.51 Million
- Houston \$6.14 Million

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- Montgomery \$202.43 Million
- Stewart \$8.18 Million

We contribute to a one billion dollar regional tourism industry– up from \$650 million reported in FY2005.

In 2011, the National Park Service reported a 25% decrease in overnight stays compared to their high in 1994. We have bucked this trend. Our overnight camping program has increased steadily these past few years. In FY15, both Piney and Hillman Ferry Campgrounds were financially self-sustaining with record overnight stays.

Sources

2015 Economic Impact of Kentucky's Travel and Tourism Industry

<http://www.kentuckytourism.com/industry/research.aspx>

Tourism: Cumberland's back; Kentucky's big lakes help state tourism

<http://www.lanereport.com/65102/2016/07/tourism-cumberlands-back-kentuckys-big-lakes-help-state-tourism/>

Forest Service National Visitor Use Monitoring Survey

www.fs.fed.us/recreation/programs/nvum/

Tennessee Tourism Economic Impact

https://www.tnvacation.com/industry/sites/default/files/TN_AnnualReport_2015.pdf
www.tnvacation.com/industry/sites/default/files/Economic%20Impact%20of%20Travel%20on%20Tennessee%20Counties%202014.pdf

Parks less popular as hangouts: Fewer visitors are spending the night in the biggest national parks

http://atcmarpc.org/pipermail/environment_atcmarpc.org/2012-July/000174.html

JULY 5, 2016

0 COMMENTS

Tourism: Cumberland's back; Kentucky's big lakes help state tourism

Print

By Abby Laub



Figure 2.1: State tourism headline from the Lane Report

Community Outreach and Professional Memberships

Some of our surrounding communities have struggled over the past ten years with the loss of key automobile, energy and timber product industries. Some small community businesses closed because of interstate reroutes around their towns. These communities, more than ever, depend on tourism as a primary industry to fuel the economy.

The region looks to the Forest Service and Land Between the Lakes National Recreation Area as the centerpiece of a billion dollar annual tourism industry. We recognize the importance of tourism partnerships in order to remain a destination of choice for visitors throughout the region and the nation. We know that working together with our communities makes us all stronger.

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Chamber of Commerce – 10 counties

In the last five years, we joined two additional chamber organizations, Hopkinsville-Christian County and Clarksville Area.

- Cadiz-Trigg County, KY
- Grand Rivers, KY
- Hopkinsville-Christian County, KY
- Lake Barkley-Lyon County, KY
- Marshall County, KY
- Murray-Calloway County, KY
- Paducah Area, KY
- Clarksville Area, TN
- Paris-Henry County, TN
- Stewart County, TN

Tourism Organizations – 5 regional organizations

- Kentucky's Western Waterland www.kentuckylakebarkley.org
- Kentucky Travel Industry Association www.KTIA.com
- Land Between the Lakes Region Tourism Coalition www.visitlbl.com
- Middle Tennessee Tourism www.middletennesseetourism.com

Environmental Education and Interpretation – 4 professional organizations

- Kentucky Environmental Education Association <http://kaee.org>
- Tennessee Association for Environmental Education <http://eeintennessee.org>
- North American Association for Environmental Education www.naace.net
- National Association for Interpretation www.interpnet.com
- Association for Living History Farms and Agricultural Museums <http://www.alhfam.org/>

Our staff supports other areas of community interest on a personal level. These include youth organizations, schools, local theater, historical groups, and church activities. We also provide speakers for community groups for everything from habitat management to wildlife viewing tips.

The Executive Director and Director of Operations for the Friends of Land Between the Lakes act as our representatives at civic and tourism organizations. In this capacity the Friends Group represented us at over 50 meetings of civic organizations such as Chambers of Commerce, Rotary Clubs, Kiwanis Clubs, Kentucky's Western Waterland, Land Between the Lakes Region Coalition and others to present informational programs, serve on Boards of Directors or be the official representatives of Land Between the Lakes.

Familiarization Tours

In Fiscal Year 2013 we conducted our first official Familiarization Tour with one bus tour and one van tour. Prior to that point we periodically hosted tours for the two States' Visitor Centers' staff. In 2015 we started scheduling one to two tours a month in season -- April through October. We served 21 organizations and presented to 60 people on ten tours in 2015. This included the Single Soldier program at Fort Campbell. Our target audience continues to include frontline personnel, managers, and tourism groups of government, private, and nonprofit organizations. We also added a habitat management stop in FY15 and continued to highlight of our environmental education opportunities and recreation activities.

Exhibits and Conferences

Through the ten year period we supported various conferences in our region to promote tourism, environmental education, and wildlife habitat management -- these included:

- West Kentucky Boat and Outdoor Show in Murray, KY
- Health and Safety Day at Ft. Campbell, KY
- University of Scouting in Hopkinsville, KY
- Environmental education programs at our four gateway State Parks
- The National Wild Turkey Federation Convention and Sports Show Nashville, TN
- Kentucky State Fair through Kentucky's Western Waterland each August
- Tourism Day events at Kentucky I-24 Visitor Centers first week in May
- Travel South Showcase with the Land Between the Lakes Region Tourism Coalition each February reaching out to tour bus operators
- American Bus Association Marketplace with the Land Between the Lakes Region Coalition
- Opportunities to attend national conferences held close to us like the 2012 Southeastern Equestrian Trails Conference held in Lexington, KY
- Hopkinsville Home Builders Association Home and Garden Show

Improving Customer Service Through Technology

Every year we work to improve our connection with visitors. In 2010 we introduced our new online campground reservation system. This success led us to move our hunt applications online, including our quota hunts. We completed this in FY14.

In 2014 we offered our free Christmas Cedar Tree program online. This trial run enabled our guests to complete the permit online at their convenience. Prior to this people had to come into our administrative office to obtain their free permits.

We continue to offer vacation planning online through our website and now provide an interactive calendar and responsiveness that works on all screens from desktop to smartphones.

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Sources

Social Times: The Evolution of Social Media Infographic

<http://www.adweek.com/socialtimes/the-evolution-of-social-media-infographic/620911>

TripAdvisor Study Reveals 42% of Travelers Worldwide Use Smartphones to Plan or Book Their Trips

<http://ir.tripadvisor.com/releasedetail.cfm?ReleaseID=919990>

Here Are 6 New Snapchat Stats That Show Why Marketers Want Inside That Walled Garden

<http://www.adweek.com/news/technology/here-are-6-new-snapchat-stats-show-why-marketers-want-inside-walled-garden-167629>

Pew Research Center: Older Adults and Technology Use

<http://www.pewinternet.org/2014/04/03/older-adults-and-technology-use/>

Partnerships, Agreements and Memoranda of Understanding

Partnerships, agreements, and Memoranda of Understandings provide critical resources that augment facilities and services provided to visitors and our communities for recreation activities, habitat management, economic development and environmental education at Land Between the Lakes. While partnerships have always been a part of how we operate, our Area Plan places added emphasis on the value of working together with outside organizations and communities. We continue to look for opportunities to work together.

Our partnerships have grown throughout the years. In 2015 we collaborated with:

- Central Hardwoods Joint Venture to restore grassland birds' habitats <http://www.chjv.org/>
- Western Kentucky Amateur Astronomers who work with Friends of Land Between the Lakes on Star Parties at our observatory in the summer and our annual National Astronomy Day free event in the spring www.wkaa.net
- National Wild Turkey Federation to enhance habitat management <http://www.nwtf.org/>
- Kentucky Interagency Coordination Center to mobilize resources provided by cooperating federal and state agencies in the state of Kentucky to respond to incident needs throughout the United States. Cooperating agencies included National Park Service, USDA Forest Service, US Fish & Wildlife Service, National Weather Service, and State Division of Forestry units <http://gacc.nifc.gov/sacc/dc/kykic/>
- Land Between the Lakes Sportsman's Club to maintain our Kuttawa Landing lake access area. We work together on improvements while their volunteers mow and pick up trash regularly. A new sign was installed in 2015 recognizing our partnership.
- Fort Campbell on shared resources <http://www.campbell.army.mil>
- Local counties in demonstrating biomass heating for the Lyon County School and Trigg County Hospital
- USDA Animal and Plant Health Inspection Service to help us with feral swine control
- Fort Donelson National Battlefield to share resources <https://www.nps.gov>
- The States of Kentucky and Tennessee tourism departments on promotional efforts

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- Regional Universities include multiple disciplines like biology, forestry, engineering, Geographic Information Systems and other departments in their curriculum:
 - Alabama Agricultural and Mechanical University, Huntsville, AL
 - Southern Illinois University in Carbondale, IL
 - Murray State University in Murray, KY
 - Austin Peay State University in Clarksville, TN
 - Tennessee Tech University in Cookeville, TN
 - University of Tennessee at Knoxville, TN

Many of the following organizations have agreements with us. We worked with them over these past ten years and continue to partner on various programs.

- Conservation organizations include:
 - Cumberland River Compact
 - Ducks Unlimited
 - Frogwatch AZA
 - Kentucky Waterwatch
 - Kentucky Bowfishermen
 - Living Lands & Waters
 - Monarch Watch
 - Monitoring Avian Productivity and Survivorship MAPS
 - National Audubon Society
 - National Wild Turkey Federation
 - National Wildlife Federation
 - North American Butterfly Association
 - North American Bluebird Society
 - Purple Martin Conservation Association
 - Operation Rubythroat
 - Red Wolf Coalition
 - The Nature Conservancy
- Children's Organizations
 - Boy Scouts of America
 - Girl Scouts of America
 - Joshua Tree Home Educators Association
 - Trigg County High School Environment Club
 - West Kentucky 4-H
- State and Local Organizations
 - Caldwell County Conservation District
 - Chattanooga Nature Center
 - Kentucky Department of Fish & Wildlife Resources
 - Nashville Zoo

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- Public and Private Schools
- Public Libraries
 - Logan County
 - McCracken County
 - Marshall County
- Tennessee Wildlife Resources Agency
- Tennessee Aquarium; Louisville Zoo
- WKDZ and WKMS radio stations

Environmental Education

Partnerships continue to enhance our Conservation and Environmental Education programs. We rely on our partners for delivery of our educational and interpretive programs. We also support our communities in many ways through partnerships and agreements to bring environmental education to all our region.

- Our biggest partner is the Friends of Land Between the Lakes group. They provide staff at our facilities, and interpreters to reach visiting children and adults. Our Friends Group raises additional funds for our interpretive programs through managing our gift shops and the Golden Pond Planetarium. They also manage and distribute grant funds in our School Field Trip Grant Program which helps children within 100 miles experience outdoor classroom learning and unstructured play. Find more information following this section.
- Through the More Kids in the Woods initiative we funded some cost sharing partnership projects. These include funding for our Field Trip Grant Program, grants designed to reach the local organized sports community and programs on water to second grade students in the area.
- Stewart County Unified School District partnered with us through a Partnership Agreement. This included field trips and monitoring the Devils Backbone area.
- We signed a Memorandum of Understanding with Girl Scouts of Middle Tennessee and another with Head Start at Highland Rim in middle Tennessee to bring training in environmental education to leaders and teachers.
- Other teachers were trained at Land Between the Lakes during Educator weekends at Brandon Spring and Problem Based Learning training with Stewart County and Trigg County.
- In 2010 in cooperation with the Kentucky State Parks, we developed the seasonal Nature Watch Series. These programs brought our guests to one of the gateway parks for the weekend. The day of viewing wildlife began in the morning, often with sunrise tours of the Elk & Bison Prairie, special events at the end of the day, and breakfast or lunch.
- A pragmatic partnership with the Western Kentucky Recycling Corporation helps our Respect the Resource Program. Western Kentucky Recycling processes our recyclables. In return they provide grant monies to purchase on-site containers and design educational materials for us to use. In 2015 through our Friends Group, we received a donated trailer for

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storage from Paschall Truck Lines. When full, Trigg County Road Department transports the trailer to and from West Kentucky Regional Recycling Corporation.

- We help other organizations with off-site annual events and one-time celebrations. In Stewart County, TN we assist with the annual Earth Camp at the U.S. Fish and Wildlife Service Cross Creeks National Wildlife Refuge. We served on the core planning team for Tennessee National Wildlife Refuge's new Land Management Plan. In 2015 we participated with the refuge team to develop the Interpretive Plan for their new Visitor Center. In 2014 we served on the National Park Service Fort Donelson National Historic Battlefield planning team developing their new Interpretive Plan.

- Through the years, our Environmental Education staff and volunteers supported the National Wild Turkey Federation's annual convention. We encourage kids to get outside, into outdoor activities and recreation with hands on activities at our Forest Service booth. This conference continues to grow. In 2015 we reached 6,000 members of the public, 2,000 students, and 50 teachers.



Figure 2.2: 2015 National Wild Turkey Federation Conference

- We continue to strengthen our working relationship with Paducah's River Discovery Center. Over the last fiscal year, we presented a total of seven programs, reaching a total of 341 participants. A Paducah business funded six of these programs as part of the special Animal Habitats field trips for 2nd graders. One program included a summer camp for kindergarten and 1st grade students.
- Trigg County High School used Land Between the Lakes as an outdoor classroom for their Problem Based Learning curriculum. In FY15, their 10th grade students studied water quality issues. A field trip rotated students to four locations where subject matter experts answered their questions and reviewed the ecosystems. The principal, a teacher and four students presented their projects to our Advisory Board members. Forest Service employees served as judges for these student presentations as part of their final grade. Prior to this we hosted a training for their teachers, giving them an introduction to multiple issues we face at Land Between the Lakes. Teachers and 120 students experienced this Problem Based Learning that year.

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- Every year we host college classes to review habitat management.
 - Southern Illinois University brought their forestry students annually. Our recreation area was one of the stops.
 - Professors from Tennessee Technical University brought their summer Wildlife Techniques class in 2015. They toured the Elk & Bison Prairie, Turkey Bay OHV Area, Woodlands Nature Station, and Jenny Ridge to discuss and learn about various land management techniques.
 - Brown Fellows College Enrichment Trip brought 60 students and 10 advisers to meet with six Forest Service staff to learn more about public land management and Kentucky habitats.
- The Woodlands Nature Station partners with Tennessee National Wildlife Resources, Fort Donnellson National Battlefield, Kentucky state parks, Kentucky Fish and Wildlife Resources and the National Wild Turkey Federation to provide a variety of programs.

Friends of Land Between the Lakes

In 1983, Land Between the Lakes Association formed to support the national recreation area programs and activities through serving as a membership 501 (c) (3) nonprofit organization, obtaining private gifts and managing our volunteer program. Since management changed in 1999, we expanded the areas of responsibility for the Association now operating as Friends of Land Between the Lakes. Our Friends Group now functions as a vital cooperative partner managing over 50 employees in service to the USDA Forest Service at Land Between the Lakes National Recreation Area. They maintain a website at www.friendsoflbl.org.

In several areas, such as the educational programs and information services, employees of our Friends Group serve as the primary contact for our visitors. In 2015, volunteers other than Resident Attendants and the Public Land Corps, contributed the equivalent of 7.2 full time positions at Land Between the Lakes.

The cooperative partnership between the Forest Service and Friends of Land Between the Lakes provides critical support in accomplishing our mission by:

- Providing educational programming at three visitor facilities
- Providing information services at five locations
- Developing and conducting volunteer activities
- Managing the Friends of Land Between the Lakes Facebook page
- Engaging in funds development activities for specific programs and projects
- Providing administrative support enabling our intern, apprentice, resident attendant and school grant programs
- Providing a variety of other administrative, public relations and staffing services that include food service and housekeeping at Brandon Spring Group Center
- Maintaining working relationships with other government agencies and non-government organizations in support of our environmental education mission

Some of our Friends Group Accomplishments over the last ten years include:

- Managing Golden Pond Planetarium and Observatory as a fundraiser for our Friends Group. They replaced theater seats in 2007, the telescope in 2010, added laser shows in 2010, and a Konica-Minolta Mediaglobe II digital projection system and purchased additional shows in 2012
- Raising funds, submitting grant proposals and securing in kind donations for a variety of programs including our school Field Trip Grant Program, Golden Pond Target Range, trail rehabilitation, talent funding and visitor enhancements at special events, and benches for our Central Hardwoods Scenic Trail
- Organizing cleanups of our shoreline and undeveloped areas with hundreds of volunteers that included Boy Scouts, Girl Scouts, the U.S. Coast Guard, churches and other organized groups in addition to individual volunteers
- Identifying and developing opportunities for young people to get involved in their public lands through third-party volunteer programs like alternative break programs for college students and Eagle Scout projects
- Disbursing over \$135,000 in grant funds for wildlife habitat improvement with the U.S. Fish and Wildlife Service at Clarks River
- Managing our volunteer program that consistently provides around 100,000 hours of service and touches all our programs from habitat management to environmental education and camping in addition to trash pickup and trail repairs. In 2015 volunteer activities produced 14,997 hours of volunteer service. When we add the hours of Resident Attendants, apprentices and student interns, the total volunteer service time comes to 126,073 hours. Based on figures provided by the Independent Sector website at <https://www.independentsector.org/> the value of the contributed hours is \$2,908,501.
- Providing volunteers through our Bugle Corp program. These volunteers work with our Environmental Stewardship Department on observing and managing the Elk & Bison Prairie herds. Additionally they help visitors in the prairie to assure they have a safe visit and enjoy this prairie ecosystem experience. The Elk & Bison Prairie had 108,085 visitors in 2015
- Assisting our visitors with timely and accurate information about Land Between the Lakes and the surrounding region. In FY15 our Friends Group information clerks and receptionists assisted 123,521 visitors
- Presenting educational programs at
 - Golden Pond Planetarium and Observatory which now operates all year because of the new Mediaglobe projector added in 2012. The old projector regularly required a 30-day shutdown for maintenance. In 2015 the planetarium offered seven different shows to 22,507 guests. Laser light shows and star parties help enhance the programming for our visitors between Memorial and Labor Day holiday weekends.

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- Woodlands Nature Station naturalists develop original programming offering over 1,000 daily programs. They also hosted multiple special events for 39,511 visitors in 2015
- Homeplace 1850s Working Farm whose interpreters also develop original programming offering over 500 educational programs. They hosted multiple special events for 32,675 visitors in 2015
- Local schools, state parks, U.S. Fish and Wildlife refuges, and civic organizations to broaden the reach of our educational programs and promote us as a destination for educational experiences in wildlife and habitats, history, and ecosystems

Heritage

Looking back over the past 10 years, there is so much we learned along the way. The most important lesson is that we can manage heritage better by building relationships. We realize considering everyone's needs is crucial to success in any of our heritage endeavors. The Forest Service now works with many interested individuals including Between the Rivers, Inc. and Tribes.

Heritage Programmatic Agreement

One of the great strides we made over the last 10 years was to develop a Programmatic Agreement to streamline compliance with Section 106 requirements of the National Historic Preservation Act of 1966, as amended (NHPA). The goal of streamlined compliance is to apply more agency funding and staff time toward heritage resource stewardship, public education, and outreach. This is critical for us because Land Between the Lakes lacks a comprehensive history of compliance with NHPA and we are working hard to catch up. The Programmatic Agreement requires an Annual Report summarizing compliance and program work. The Heritage Annual Report can be found at the following link:

<https://drive.google.com/file/d/0BzSMivZ7G2AkV3A4WGFONE4yWUU/view?pref=2&pli=1>

Heritage Resource Management Plan

The Forest Service will reach out and meet with local and regional community members and groups, former residents and descendants, and Programmatic Agreement consulting parties to develop an updated and viable Heritage Resource Management Plan for Land Between the Lakes. Our goal is to create the plan together. The plan will address Forest Service Region 8 direction and keep our commitment to the consulting parties on the Programmatic Agreement. We will address cultural setting and context, identify themes for site evaluation, address knowledge gaps, and synthesize known site types and completed investigations. At a minimum, the result will be a 5-year plan for site management, stewardship, heritage programs and interpretation, public outreach, and education.

Artifact and Records Management

Most of the cultural resource materials found during archaeological investigations prior to 2005 were catalogued and housed at Murray State University. Murray State became the repository for Land Between the Lakes artifacts as a result of a long term partnership between the university and the Tennessee Valley Authority. With Murray State's help, we pulled the Land Between the Lakes collections from the Murray State repository in order to photograph, record each item and connect it either to a location on the landscape or a recorded site. Our apprentices continue to make progress with this task as well as record and catalogue cultural materials recovered during current investigations. Land Between the Lakes and Murray State have since developed an agreement that includes provisions for long-term storage of the artifact collections at the university.

The Forest Service inherited many records, documents, oral histories, photographs, maps, and reports from the Tennessee Valley Authority. We are organizing the data however most of it remains uncatalogued and needs to be inventoried. We constantly add new information. We continue to spend time completing this important work because these records contain much needed information to draft the cultural setting and context in the updated Heritage Resource Management Plan.

Heritage Volunteers

Some of our greatest achievements over the past 10 years have been in stewardship, public outreach, and volunteer opportunity arenas. We started a heritage apprentice program, have graduated eight apprentices, and are currently mentoring our ninth. Annual college Alternative Spring Break students help us complete important heritage projects, as well as enrich our own experiences through theirs. In October 2011 we held our first Passport In Time Project. We had nine volunteer archaeologists help excavate the old Golden Pond School site within the proposed Central Hardwoods Bike and Hike trail that was part of the ongoing upgrades and modifications to Highway 68/80. We completed an interpretive project for the former community of Fenton and are very close to completing the interpretive project for the former community of Golden Pond with former residents of the community. Both of these landscapes were heavily impacted by the highway project.

The project most requested by all former residents was finding a way to mark the locations of the former churches and schools. We worked with members of the communities to install 90 church and school marker posts and have nine posts left to install.

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Land and Natural Resources

In FY2015, Special Use Permits with individual farmers and a Challenge Cost Share Stewardship Agreement with the National Wild Turkey Federation (NWTf) enabled us to restore, enhance, and maintain wildlife habitats on 4,713 acres. The work benefits outdoor recreation activities and environmental education opportunities throughout the National Recreation Area.

We completed habitat improvement and species monitoring as described under [Goal 5](#) in partnership with non-profit groups, governmental organizations, and local universities, including:

- Austin Peay State University
- Friends of Land Between the Lakes
- Kentucky Department of Fish and Wildlife
- Kentucky State Nature Preserves Commission
- Murray State University
- National Wild Turkey Federation
- Tennessee Wildlife Resources Agency
- Tennessee Department of Environment and Conservation
- University of Tennessee at Knoxville
- U.S. Fish and Wildlife Service

We continue to serve on the Kentucky Prescribed Fire Council, which includes state, federal, non-profit, and private sector partners. These resource management partnerships help us share expertise, resources, and information on how to manage land and natural resources as effectively and efficiently as possible while working together with others.

Collaborative Working Groups

In order to successfully meet our mission we work formally and informally in collaborative groups. Sometimes they are topic specific, others are long term support teams. Over the years these included:

- **2007-2015** The Highway 68/80 improvement project impacted our east/west corridor during its construction. This project became a critical priority to ensure it met future needs of regional commerce and tourism while protecting resources and blending with our natural environment. Our collaborative group submitted a design alternative that addressed these concerns and was accepted by the Kentucky Transportation Cabinet and Federal Highway Administration. Others that contributed to this successful project include USDA Natural Resources Conservation Service, Kentucky Division of Fish and Wildlife Resources, Kentucky Division of Water, contractors, Kenlake and Lake Barkley Kentucky State Resort Parks, Trails Unlimited, private individuals and interest groups like Kentucky Back Country Horsemen <http://www.kybch.com/links.htm>

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- **2009** working group led by our Environmental Education staff helped draft a Corridor Management Plan which resulted in the successful nomination of Kentucky Highway 453/Forest Service Road 100 being designated the Woodlands Trace National Scenic Byway
- **2010** jointly promoted the USDA Forest Service at Paducah Regional Airport with Shawnee National Forest
- **2010** jointly promoted public lands at the Stewart County Visitor Center with Fort Donelson National Battlefield, Cross Creek National Wildlife Refuge and Stewart County Chamber
- **2014** Our Golden Pond Planetarium began working with NASA as their official Educational Resource Center for the State of Kentucky
- **2015** Partner group of Habitat Managers: this group was formed to coordinate our land and natural resource management intentions using plain language in explanations, key messages, and more. This group meets quarterly and includes Murray State University, National Bobwhite Conservation Initiative, University of Tennessee Knoxville, U.S. Army Corp of Engineers, U.S. Army Fort Campbell, Fort Donelson National Battlefield, U.S. Fish and Wildlife Services National Wildlife Refuges – Clarks River, Cross Creeks, and Tennessee National Wildlife Refuge, Kentucky Department of Fish and Wildlife Resources, Tennessee Wildlife Resources Agency, Tennessee Division of Forestry, Central Hardwoods Joint Venture, The Nature Conservancy, Friends of Land Between the Lakes, Land Between the Lakes Sportsman Club and National Wild Turkey Federation

Community Involvement

We continue to host a significant number of “regional events” and weekend programs that contribute greatly to visitation to the region. Some examples include weekend drag boat races, our Hummingbird Festival, Pickin’ Party Old-time Music Festival, mountain bike races, equestrian events, civil war re-enactments, Snap Apple Night, Piney Campground Campers Fair, eagle viewing weekends and more.

We participate in safety days throughout the region. In 2014 our trails staff hosted a learning station at the Marshall County safety day on off-highway riding and helmet safety. Over 400 students participated in the safety day event. Since 2013 we promoted our recreational activities and environmental education opportunities to military families at the June *Ft. Campbell Passport to Safety* event. We also distribute military passes and explain how they can be used to participate in our environmental education activities at no charge on weekdays.

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Natural and Unnatural Events

Some of our strengthening ties to our communities came from working together in times of natural and unnatural events, often disrupting normal operations.

- **2006 November:** Tornado damaged Hillman Ferry and Eddyville Ferry Lake Access Area; salvage sale used to remove damaged trees and thin forested areas
- **2007:** Construction on US Highway 68 and Kentucky Highway 80 across the peninsula began; Visitors issued permits to take daffodils with request to replant after construction completed; replanting occurred in 2014
- **2008 May:** Flooding washed out roads and deposited trash along our shoreline; **September** Hurricane Ike flooded the region resulting in power and water outages
- **2009 January 26:** Major ice storm hit western Kentucky with power restored on February 5; We helped Lyon and Trigg counties recover from storm damage by removing tree hazards and more; We used our agreement with the National Wild Turkey Federation to help us with our damage so we could assist our neighboring counties
- **May 8-9:** Severe rains caused road damage through and especially on road 214 and Wranglers Campground trails and camping sites
- **2010 May:** For the third year in a row, damaging floods occurred. This incident caught national attention due to severe flooding in Nashville and the Grand Ole Opry; our staff provided community assistance after the flood that greatly aided local emergency response to the flood in western Tennessee
- **2011 April/May:** Tennessee Valley Authority and the Army Corps of Engineers kept lake levels at historic highs to prevent flooding along the Mississippi and Ohio Rivers
- **2012 January 26:** Eggners Ferry Bridge over Kentucky Lake connecting the national recreation area to our western neighbors collapsed due to ship collision; replacement section completed in time for Memorial Day Weekend
- **2013 October 1-16:** Government shutdown occurred which substantially reduced our visitation for the first quarter. We felt some repercussions into opening season
- **2013** A wet spring closed Turkey Bay Off Highway Vehicle Area which allowed a pair of eagles to nest in one of the trees; working with U.S. Fish and Wildlife we opened the area after 6 weeks of closure following building of a safety zone around the nesting birds
- **2015:** Flooding occurred in the fall and required cleanup

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M Q2.3 Trends in visitation, levels of community participation***Visitation***

Land Between the Lakes hosts a significant number of regional events and weekend programs that continue to draw people to our region. Over the last ten years, overall visitation fluctuated up and down. Site and facility visits remained strong and continued to grow in the developed recreation areas. In 2015 two developed campgrounds became fiscally self-sustaining – Hillman Ferry and Piney Campgrounds.

Several factors likely contributed to these trends over the last ten years. These included young people moving over to digital media and games, a declining middle class, consistent unemployment, high gas prices, and economic uncertainty.

These factors may explain why overall visitation decreased while site and facility visits remained strong. It shows that individuals and families participate in direct activities, while driving, sightseeing viewing wildlife less frequently.

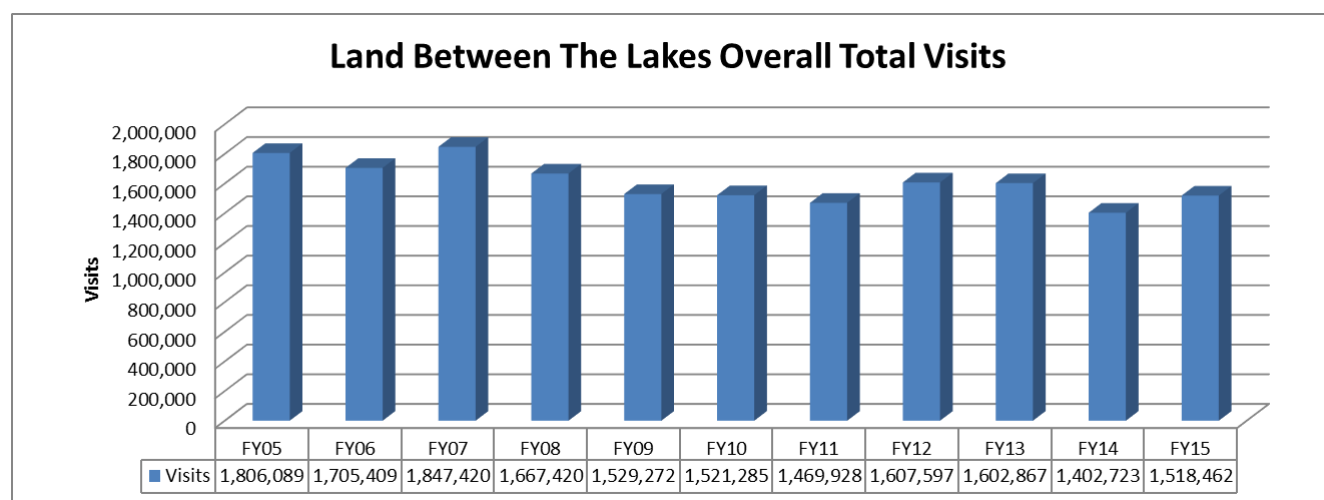


Figure 2.3: Visitation at Land Between the Lakes: Overall visitation derived from traffic counts

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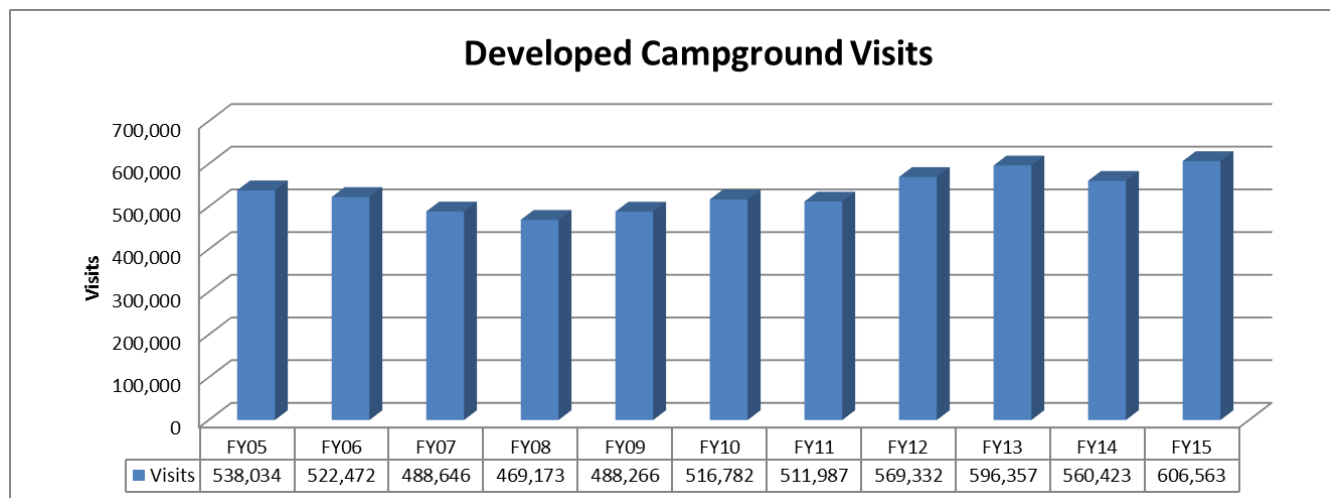


Figure 2.4: Recreation Dynamics (Source: Land Between the Lakes Reservation/POS system)

Visitation at Land Between the Lakes remained higher than most regional destinations in the last four years. See figures 2.5 and 2.6.

Location [Calendar Year]	2012	2013	2014	2015	4 Year Avg.
Hillman Ferry	263,132	233,410	253,624	258,046	252,053
Energy Lake	23,653	19,722	21,452	21,245	21,518
Wranglers	69,080	51,171	60,190	63,169	60,903
Piney	215,669	252,620	266,477	271,156	251,481
Lake Access Campgrounds	54,220	48,983	55,768	56,124	53,774
Land Between the Lakes	625,754	605,906	657,511	671,755	640,232
Great Smoky Mountains	294,000	253,000	288,000	290,161	281,290

Figure 2.5: Developed camping overnight usage comparison

Sources:

Recreation Dynamics (Land Between the Lakes Reservation/POS system)

Land Between the Lakes Traffic Counters

National Park Service Visitor Use Statistics <https://irma.nps.gov/Stats/>

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Visitors at Tennessee and Kentucky National Park Service facilities

Abraham Lincoln Birthplace National Historic Park		Mammoth Cave National Park		Cumberland Gap National Historic Park		USDA FS Land Between the Lakes National Recreation Area [Fiscal Year]	
2012	169,515	2012	508,054	2012	853,998	2012	1,607,597
2013	163,928	2013	494,541	2013	768,363	2013	1,602,867
2014	241,264	2014	522,628	2014	879,934	2014	1,402,723
2015	148,605	2015	643,135	2015	840,601	2015	1,518,462

Stones River National Battlefield		Obed Wild & Scenic River		Great Smokey Mountain National Park		Shiloh National Historic Park	
2012	260,537	2012	212,446	2012	9,685,829	2012	587,620
2013	258,242	2013	198,367	2013	9,354,695	2013	536,206
2014	272,499	2014	215,767	2014	10,099,276	2014	409,086
2015	264,925	2015	214,441	2015	10,712,674	2015	356,535

Fort Donelson National Battlefield*		Big South Fork National River & Recreation Area		Andrew Jackson National Historic Site			
2012	284,762	2012	600,161	2012	51,261		
2013	247,734	2013	565,063	2013	42,929		
2014	262,317	2014	599,906	2014	42,863		
2015	260,744	2015	643,135	2015	43,357		

Figure 2.6: Area National Park visitation comparison

Source: <https://irma.nps.gov/Stats/>

* Fort Donelson began major renovations on their visitor center in 2015

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Environmental Education Participation

We specifically examined facilities where Environmental Education is deeply rooted at Land Between the Lakes. Visitation numbers for The Homeplace 1850s Working Farm and Living History Museum and Woodlands Nature Station fluctuated each fiscal year since our Area Plan-inspired focus.

Brandon Springs Group Center continues to struggle with outside variances that dramatically influences visitation. Challenges include school budgets and policies, rise in transportation costs, no internet connection to user groups who grew up on digital interactions and other similar factors. These outside variances also have an adverse effect on The Homeplace and Nature Station.

	% Change from Previous Year										
	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Participation/Visitation											
The Homeplace (% Change Admissions)		7	9	-2	4	-3	-8	9.5	-5.6	-16.9	14
The Homeplace (Admissions)	33,661	36,195	39,775	38,995	37,495	36,403	33,368	36,542	34,481	28,668	32,675
Woodlands Nature Station (% Change Admissions)		8	10	0	10	2	-7	7	-1	-7.9	9.3
Woodlands Nature Station (Admissions)	29,909	32,510	36,121	35,738	38,179	39,533	36,854	39,309	39,261	36,163	39,511
Brandon Spring Group Camp (% Change Overnights)		9	2	-6	-4	-9	6	0	-6	-10	-4
Brandon Spring Group Camp (Overnights)	16,444	17,950	18,343	17,281	16,624	15,182	16,084	16,078	15,064	13,576	13,043
Total	80,014	86,655	94,239	92,014	92,298	91,118	86,306	91,929	88,806	78,407	85,229

Figure 2.7: Environmental Education Facility Participation in Programs

Source: Visitation for The Homeplace and Nature Station are based on the point-of-sale or retail management system. Brandon Spring Group Center visitation is provided by the center's housing reports.

Backcountry Permits Sold	
FY11	7049
FY12	7718
FY13	7518
FY14	7574
FY15	8135

Backcountry Permits

Over the last five years, Land Between the Lakes increased dispersed use by providing opportunities to purchase backcountry permits. Toward the end of FY14 we began offering permits online through the reservation website.

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Goal 3:	Utilize a variety of methods and opportunities to provide an Environmental Education 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	<p>“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.”</p> <p>“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]</p>
Desired Trend Statement	<p>“Ensure that 80% of LBL communications, programs, and activities have an interwoven EE message.” [Objective 3a]</p> <p>“An average of one to two user impact challenges will be addressed annually through EE.” [Objective 3b]</p>
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: Utilize a variety of methods and opportunities to provide an Environmental Education message to every visitor.

In 2007, our Master Plan for Environmental Education was completed and signed. It has influenced our efforts since then, guiding us through goals, objectives, and action items.

The overarching environmental education program for incorporating environmental educational messages into visitor experiences, called “Respect the Resource,” originated from the advice of the Advisory Board. This thematic campaign offers visitors the chance to make a connection to the opportunity for their choices and actions to protect the resources here. Projects include fishing line collection tubes at boat ramps, labeling restored areas at Turkey Bay, the “Ride 4 Keeps” message of sustainability, the Turkey Trot Trail at Turkey Bay, a glass pulverizing and reusing project, and an ever increasing collection of materials to be recycled from more and more locations. The accumulated amount of “waste” collected for re-use is significant and evident in Figures 3.19 and 3.20. 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 Land Between the Lakes to their homes and communities.

Q3.4 Has the Forest Service made progress toward successfully changing behaviors as a result of Environmental Education experiences to visitors?

Land Between the Lakes incorporates environmental education messages throughout the national recreation area to impact visitors’ behaviors. Individual visitors and groups receive messages at facility based and non-facility based programs, campgrounds, trails, interpretive panels, and field trips. We provide ample opportunities for our visitors to enjoy nature and our natural environment through regular environmental education programs, educator support services, dispersed educational activities, and outreach into our surrounding communities.

Our customers’ unsolicited ratings continue to reflect their high level of satisfaction.

Environmental Education

We designated the Woodlands Nature Station as a Mission Site for Discovery Agents, which is an electronic game for young visitors. We also designed and installed roadside signs along Highway 68/80 that encourage visitors to stop and explore nature. We were recognized by the Kentucky Association for Environmental Education for the Woodlands Nature Station’s excellent contribution to Environmental Education in Kentucky.

Other messages and opportunities include our Environmental Education Facilities: Brandon Spring, The Homeplace 1850s Working Farm, Golden Pond Planetarium, Woodlands Nature Station, the Elk & Bison Prairie, North & South Welcome Stations and Golden Pond Visitor Center. The visitation for these facilities is shown in Figure 3.12. Student and other groups can schedule visits and programs here. Our day use facilities are open to the public with The Homeplace 1850s Farm and Woodlands Nature Station offering special events on one weekend each month from March

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through November. We combine events with special theme months such as Homeschoolers' Month and Hummingbird Month. We also outreach to libraries, pre-schools, and senior centers.

Volunteers:



Figure 3.1: volunteers picked up trash during Public Lands Day



Volunteers demonstrate their enthusiasm for Land Between the Lakes year round by supporting Forest Service staff at the campgrounds, Brandon Spring Group Center, Homeplace 1850s Working Farm, and Woodlands Nature Station. Some volunteers participate by pulling weeds, picking up trash, rebuilding trails, building bird and bathhouses, conducting wildlife surveys and habitat improvement, helping with communications, and supporting business operations. Volunteers absorb and experience environmental messages first hand throughout their time at Land Between the Lakes performing all of these activities. They contributed over 100,000 hours of time most years, totaling over 1 million hours over 10 years.

<u>Year</u>	<u>Volunteer Hours</u>
2015	97,113
2014	115,027
2013	112,447
2012	108,346
2011	103,189
2010	123,579
2009	106,824
2008	112,827
2007	92,014
2006	93,047
2005	104,686

Figure 3.2: Volunteer Activities

Woodlands Nature Station

The [Woodlands Nature Station](#) provides an ongoing menu of activities and special events throughout the year from March through November. The emphasis is on our relationship with nature and how our actions impact the environment upon which we depend. This facility interprets the native plants and animals that make Land Between the Lakes unique and helps positively shape visitors' behaviors.



Figure 3.3: Hummingbirds on Feeder, Staff Photo

To draw over 45,000 visitors per year back into the woods, the Nature Station hosts forty native wildlife exhibits. The wildlife are all rescued and we incorporate their conservation story into every program. Unique elements of the backyard wildlife demonstrations include 200 hummingbirds a day during the summer, an active maternity colony of little brown bats, monarch way station, and 170 documented birds. Native plants thrive in gardens among the exhibits.

In July of 2015 we provided an up-close look at birds, bugs, snakes, turtles, and more during [Cool Critters Day](#) at [Woodlands Nature Station](#). Visitors experienced live tropical birds up-close, posed for pictures with a snake, touched a tarantula, and stared down a snapping turtle. A variety of live animal programs and exhibits, as well as kids' games, crafts, visits from Smokey Bear, and other animal-inspired activities were available throughout the day.

[Woodlands Nature Station](#) hosted their annual [Hummingbird Festival](#) in August 2015. Ruby-throated Hummingbird migration peaks for Land Between the Lakes National Recreation Area in August. Up to 200 hummingbirds visit our feeders in a single day. This festival provides a fun atmosphere for people to see and learn about these powerful birds. Highlights include hummingbird banding demonstrations, a wildlife art show, staff-led programs, a native plant sale, live animal encounters, local wildlife experts, and activities for kids.

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Figure 3.4: Get up close and personal with some cool critters at Woodlands Nature Station



Figure 3.5: Natural History Educational Company of the Midsouth with Black-headed Python

Homeplace 1850s Working Farm and Living History Museum

The [Homeplace 1850s Farm](#) offers more than a glimpse into the past. It transports visitors through time to compare life today with that in the 1850s. Heritage crops and domesticated animals are used to demonstrate the seasonal chores and celebrations that were commonplace in the past in this region.

[Children's Day on the Farm at the Homeplace](#) program in May allows children to step back-in-time and try farm chores and play in typical fashion for children in the 1850s. This day contains programs representative of the daily programs offered at the Homeplace.



Figure 3.6: Homeplace 1850s offers fun for all ages.

Children learned the importance of chores on an 1850s farm. These chores include making a bed, weaving, and attending an 1850s school. They also learned how to work mules and oxen at teamster training. Children earned credits for their hard work that were used at the Children's Day General Store for 1850s-style goodies or to play with 1850s-style games and toys.

Golden Pond Planetarium and Observatory



Figure 3.7: Planetarium show poster

The [Golden Pond Visitor Center](http://wkaa.net/) provides information and orientation for all of Land Between the Lakes National Recreation Area, contains the Planetarium & Observatory and sells passes, back country permits and gift shop items. Interpretive exhibits explain the human history of this area and our interaction with nature. The planetarium offers shows multiple times during the day. Special observatory programs occur seasonally. During the summer, astronomers from the West Kentucky Amateur Astronomers, <http://wkaa.net/>, volunteer and host night sky viewing using their telescopes. The public provided input in 2012 for future planning at the Golden Pond Visitor Center, such as developing a short loop trail for children.

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Elk & Bison Prairie



Figure 3.8: Bugling elk; photo by Sherry Bailey

The [Elk & Bison Prairie](#) provides native grassland habitat common in Kentucky more than a century ago. Elk and bison roam freely within this 700-acre enclosure. Visitors travel in their enclosed vehicle via a 3.5-mile paved loop road. Numerous other wildlife species such as wild turkeys, a variety of birds, small game, butterflies, and prairie mammals also find sanctuary in the Elk & Bison Prairie. This exhibit offers different experiences each season. In the spring visitors may see newborn calves and in the fall visitors may hear the elk bugling.

Brandon Spring Group Center



Figure 3.9: Exploring a stream ecosystem

[Brandon Spring Group Center](#) provides the opportunity for more immersion into nature by eliminating the need to rush away. Students stay in the dormitories, and have time to visit our day use facilities, take a night hike, have a campfire program, and navigate a trail with compass or GPS. Other opportunities include a pond prowl or stream stroll, pontoon boat rides, canoe excursions, swimming, field sports, and outside study. The staff at Brandon facilitated 534 programs for 8,150 students in FY 2015.

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Figure 3.10: Brandon Spring Programs and Visitation		
Fiscal Year	Number of Programs	Number of Students
2010	482	6744
2011	461	6853
2012	585	8527
2013	570	8726
2014	585	8529
2015	534	8150

Programs Highlights and Messages for our general visitors

Land Between the Lakes staff offer interpretive programs tied to academic standards for school groups that align with their respective state requirements. The following tables depict our general programming. This may include some school topics.

Nature Station Program/Activity	Frequency	Environmental Education Message/Take-a-way
Parade of Raptors	Daily	Owls and Hawks Increase knowledge of species Habitat needs Highlight endangered species
Cool Critters Day	Annual	Bats, reptiles, and insects Community information booths, tours, and special programs Increase appreciation for these species and the role they play in our environment – pest control, pollinators, etc.
Wolf Week	Annual	Centered on our pair of red wolves in the Red Wolf Recovery Project and their new pup born in May of 2014 Focus around habitats and causes for declining species
Howl-O-Ween	Annual	Focuses on various native animals found in the forests in a fun learning atmosphere catering to young children focuses on friendly forest attitudes and introduction to wildlife
Scout, Homeschool, and Jr. Forest Ranger Days	Multiple	Multiple events designed to encourage adult mentors (parents/teachers/leaders) to work with youth on various environmental topics April is Homeschool Month
Hummingbird	Annual	Weekend celebration of humming birds and pollinators Multiple partners help with bird banding, demonstrations

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Festival and Month		and other activities Focus on migratory birds, habitat needs, preparation, etc.
Eagle Tours	Annual	Two-month window for viewing eagle nesting Conduct van and boat tours
Wildlife tours	Multiple	Focus on plants and animals along water and hiking trails in certain areas
Nature and Wildlife special events	Multiple	Special events often introduce visitors to our forests and wildlife Fall Frolic, Spring Break Week, Wildflower Celebration, Summer Finale, Birding Bonanza, and more
Backyard plants and animals	Daily	Focus on native wildlife, their habitats, eating habits, and needs teaches backyard gardening for pollinators and native plants

The Homeplace Program/Activity	Frequency	Environmental Education Message/Take-a-way
Period Celebrations and Demonstrations	Multiple, Annually and Daily	Includes various celebrations and demonstrations that teach about life in the 1850s including handcrafts, stove cooking, music, quilt making, agriculture, woodworking, etc. These historic and cultural demonstrations tie people to the land; linking the past to the present. Visitors compare and contrast the use of the land and natural resources in the 1850s with modern times.
Civil War Program	Annual	Ties into the Civil War heritage of the area provide historical presentations around Ft. Henry work with Fort Donelson National Battlefield
Old-time Music Festival	Annual	Focus on music of the area including blue grass encourages people to bring instruments for jam sessions
Independence Day Celebration	Annual	Focus on historical times through an entertaining Chautauqua sponsored by the Kentucky Humanities Council and the National Endowment for Humanities
Children's Day	Annual	Helps children experience childhood in the 1850s through interactive play and chores washing, sewing, gardening, and ball games
Sheep Shearing	Annual	Conservation; all about use of wool, from sheep to shawl
Cooking and gardening	Multiple	Garden to table demonstrations; conservation measures and heirloom plants
Scout/Homeschool	Multiple	Multiple events designed to encourage adult mentors (parents/teachers/leaders) to work with youth on various historical activities April is Homeschool Month

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Period Programs	Multiple	Various events like Sundays in the parlor, blacksmithing, and Arts & Crafts Fairs focus on historic people, families, and economics of the times
Heritage Breeds	Daily	Focus on the breeds of then to now care and feeding daily program animals as workers
Farm Activities	Daily	Farm techniques and original organic living off the land

Planetarium & Observatory Program/Activity	Frequency	Environmental Education Message/Take-a-way
Planetarium Shows	Daily	Various 45-minute shows about the moon, sun, planets, stars, basic science, earth sciences, and space exploration. These full motion videos show the connection to space, weather, and our daily lives
Star Parties	Multiple	Night sky Allow visitors to look through powerful telescopes and interact with astronomers from West Kentucky Amateur Astronomers www.wkaa.net
National Astronomy Day	Annual	Sun Teach visitors about telescopes and binoculars for looking into space Talk to astronomers Family activities Powerful telescopes to view the sun
Night Sky	Daily	Help visitors recognize star patterns, planet positions, etc.

Elk & Bison Prairie Program/Activity	Frequency	Environmental Education Message/Take-a-way
Self-guided Tour and Displays	Daily	Focuses on wildlife and natural resource management in a prairie environment Focuses on songbirds, turkeys, prairie birds, reptiles, pollinators, wildflowers, and native grasses in addition to elk and bison
Celebration	Annual	Offers free access and interpretive stations and community wildlife booths Prairie ecosystem
Brandon Spring Group Center Program/Activity	Frequency	Environmental Education Message/Take-a-way
	Overnight Groups Only	
Water Activities	As requested	Provide various water activities centered around safety, habitats, watersheds, and water quality Lake and stream
Land Activities	As	Focus on habitats, wildlife, plant/tree identifications,

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	requested	prescribed fire, ecosystems, and natural resources using activities like orienteering, survival skills, night hikes, beaver programs, and animal adaptations
Team Building	As requested	Activities built to strengthen team productivity in an environmental framework with certified instructors

Figure 3.11: Table of educational programs and activities at environmental education facilities

Program Participation

Environmental Education Facilities are the heart of our environmental education efforts to reach students and families. Brandon Spring, The Homeplace 1850s Working Farm, Golden Pond Planetarium, Woodlands Nature Station, the Elk & Bison Prairie, North & South Welcome Stations and Golden Pond Visitor Center's visitation is shown in Figures 3.12 and 3.13. Student and other groups can schedule visits and programs at the first four.

Many visitors get their message at one of our three visitor centers: (North or South Welcome Station, and Golden Pond Visitor Center) where they can get back country or OHV passes and information about all of the facilities and opportunities here at Land Between the Lakes.

Figure 3.12: Visitation at Facilities for FY10 through FY15

Facilities	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15
<u>Brandon Spring Group Center</u>						
# attended	6,644	6,958	7,157	6,450	5,880	5,416
# overnight stays	15,200	16,084	16,078	15,064	13,576	13,053
Groups	87	108	109	106	89	76
Programs	482	461	585	570	580	534
<u>Woodlands Nature Station</u>						
# attended	40,135	41,526	44,764	37,537	35,718	35,813
# off site	3,491	1,278	511	128	624	1,612
Students	5,312	6,294	6,561	5,568	5,325	3,698
Facility and Contacts	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15
<u>Golden Pond Planetarium & Visitor Center</u>						
Visitors	78,415	94,381	71,258	70,098	70,219	71,551
# attended shows	15,545	9,127	19,034	20,321	17,453	17,742
Students	2,640	2,695	2,909	3,487	2,680	1,093

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<u>Homeplace 1850s Working Farm</u>						
# attended	34,645	34,436	37,791	30,999	26,938	30,735
# off site	425	400	782	120	60	0
Students	4,015	5,354	5,901	4,863	3,656	1,940
<u>Elk & Bison Prairie</u>						
# of visitors	80,798	63,839	84,415	83,115	77,010	108,085

Figure 3.13: Visitation at Facilities FY06 through FY10

Facility and Contacts	FY06	FY 07	FY 08	FY 09	FY 10
<u>Brandon Spring Group Center</u>					
# attended	7,266	7,972	7,683	6,820	6,644
Groups	118	124	113	104	87
Programs	695	470	508	474	482
<u>Woodlands Nature Station</u>					
# 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
<u>Golden Pond Planetarium and Visitor Center</u>					
Visitors		114,613	94,975	84,586	78,415
# attended shows			15,117	19,388	15,545
Students			5,376	2,904	2,640
<u>Homeplace 1850 Farm</u>					
# 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
<u>Elk & Bison Prairie</u>					
# visitors		123,129	93,026	93,750	80,798

Teacher Appreciation Weekend

Teachers received free general admission to the [Homeplace 1850s Working Farm and Living History Museum](#), [Golden Pond Planetarium](#), and [Woodlands Nature Station](#) on Saturday, September 19 and Sunday, September 20, 2015. Current and retired teachers, home educators, and their immediate families qualified for free entry. We invited teachers and their families to visit our day-use facilities, see what we have to offer, and pick up an educator resource packet. Our environmental education programs encourage critical thinking and hands-on learning about nature, history, and space.

Fee Free Days and Free Pass Entries

Many sectors of society are encouraged to come to our facilities with special passes. These include Military, Golden Age, Golden Access, and 4th Grade passes. We offer fee free days throughout the year, including special days for veterans and educators. We tracked free admissions in Figure 3.14 for FY14 and FY15. These days included Veterans Day, National Public Lands Day, Get Outdoors Day, Martin Luther King, Jr. Day, and Presidents' Day. We also offer free entry to the Nature Station, the Homeplace 1850s Farm, and the Golden Pond Planetarium for military families and their guests. Over 10,000 visitors took advantage of the programs described here.

Land Between the lakes implemented two new initiatives in FY 15: Agents of Discovery and Every Kid in a Park. In Agents of Discovery, the public downloads a mobile game to become a Discovery Agent and visits our unique Mission Site at Woodlands Nature Station. They then play the game as they explore the back yard and the Woodlands Walk. The electronic scavenger hunt contains challenges throughout the one mile Woodlands Walk path. They must move and get outside to find and solve these fun challenges.

Land Between the Lakes participated in the [Every Kid in a Park](http://everykidinapark.gov/) initiative that started in September of 2015. Fourth graders earn a special 4th Grade Pass by completing activities on-line or with their class. They print the paper passes and to gain free admittance to Woodlands Nature Station and/or The Homeplace 1850s Farm. They can get their whole family in for free through the August following their 4th grade year. Also, all National Parks, and other federally managed public lands offer this program. Visit <http://everykidinapark.gov/>. Nine 4th graders and their families used this free pass at Land Between the Lakes in September, 2015 and we expect more to use it in the future.

**Figure 3.14: Free Admissions
Fiscal Year 2014**

Free Admission	Nature Station	Homeplace	Planetarium
Adults	1,301	800	NA
Children	2,906	1,745	NA
Military Adults	308	447	NA
Military Children	148	140	NA
TOTAL: 4,663	3,132	1,933	

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Free Admission	Nature Station	Homeplace	Planetarium
Adults	1,297	877	1,795 (incl. children)
Children	3,454	1,745	NA
Military Adults	387 (Children 180)	247 (Children 103)	332
4th Graders	9	10	NA
Adults with 4 th Grader	16	15	NA
Other children with 4 th Grader	14	11	NA
Educators - Teachers Appreciation Day	32	34	NA
TOTAL	5,389	3,042	2,127

Campground Programs

Piney and Hillman Ferry Campgrounds offer educational programming during the summer months. The Homeplace and Heritage staff provide programs at Piney Campground's Campers Fair. Our Junior Forest Ranger program is well received in the campgrounds, particularly at Piney and Energy Lake. Children can learn about Land Between the Lakes' natural and cultural history to become a Junior Forest Ranger and earn a patch.

Field Trip Grants

The Field Trip Grant Program for Title I schools was managed by our friends group, Friends of Land Between the Lakes. Monies from the Trust Fund, from national initiatives such as More Kids in the Woods, and grants and donations brought over 19,000 students to our facilities over the past ten years. See Figure 3.15. This program brings the underserved to our recreation area to experience nature through hands on programs designed to enhance classroom teaching, giving them new experiences they will always remember.

Fiscal Year	Schools/Groups	Students	Total \$ allocated
2006	16/19	1,249	\$13,078
2007	17/21	1,444	\$13,078
2008	21/32	2,493	\$12,580
2009	20/25	1,983	\$16,123
2010	22/24	1,771	\$17,271
2011	22/24	2,121	\$18,124

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2012	26/29	2,380	\$19,846
2013	15/15	1,388	\$16,124
2014	19/26	2,062	\$14,129
2015	16/19	2,125	\$10,262

Figure 3.15: School grant program funding table

Heritage Education

Another successful outreach program was a 3-day archaeology field school we held in 2014 for 12 kids between the ages of 9-12. Within 1 ½ hours of posting the event to the Land Between the Lakes Facebook page, the field school was full. We were overwhelmed by parent support for this opportunity and look forward to holding another one in fall 2016.



Figure 3.16: The whole field school gang and volunteers.

Nature Watch Demonstration Areas

Woodlands Nature Watch Area received attention this year during the planning phases for Hematite Trail restoration. Proposed improvements will provide improved access to persons with disabilities, stabilize erosion, improve wildlife viewing opportunities, and most importantly replace the existing boardwalk. In November, 2015 we received public input and consulted with trail designers and engineers. Some funding was secured. See the discussion in [Goal 7](#) for details.

In 2014 we opened Empire and Bobcat Points to individual visitors and staff led groups. This area became a destination for wildlife viewing and education during all seasons.

Our easy trail system around the Woodlands Nature Station offers hiking for novices and families. Trails include Long Creek, Hematite, Woodlands Walk, and Honker. These allow visitor access into the woods without getting too far from civilization -- a benefit to many people who visit the recreation area.

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Oak Grassland Restoration Demonstration Areas

We continue to demonstrate land and natural resource management practices in both our north and south Oak Grassland Restoration Demonstration Areas with 8,630 combined acreage. In both areas we seek to promote an understory of native grasses and wildflowers created by opening up the canopy in our oak/hickory forested areas. This ecosystem, with its abundant plants, seeds, and insects, heartily supports wildlife.

The two oak grasslands also support studies on forestry, natural resources, environment ecosystems, and habitat management. The southern area that surrounds the Homeplace 1850s Working Farm and operates as an oak grasslands classroom for forestry and wildlife students from the University of Tennessee at Knoxville. The students are studying land management practices on oak grasslands that include the effects of fire on native wildlife and their habitats. The northern area lies north and east of the Elk & Bison Prairie. Austin Peay State University in Clarksville, TN and Murray State University in Murray, KY use the area for various wildlife and environmental studies including the effects of fire on snakes.

Kentucky Association for Environmental Education Excellence Awards

The Kentucky Association for Environmental Education recognized the outstanding achievements of individuals, organizations, agencies, community efforts, schools and businesses in the field of environmental education. To be eligible for an award, each nominee demonstrated exemplary service to the field of environmental education in Kentucky.



Figure 3.17: From left to right, presenting award to Woodlands Nature Station, KAEE President Billie Hardin; accepting award, Darrin Samborski, Aviva Yasgur, and John Pollpeter

One local recipient was the Woodlands Nature Station at Land Between the Lakes. The Nature Station transformed itself over the past decade from a natural history museum to a center for

community and regional environmental education. Woodlands Nature Station serves as a hub for nature viewing at Land Between the Lakes.

M Q3.4. Trends in on-site visitor behaviors and visitor comment surveys.

Respect the Resource

A success story surrounds our Respect the Resource program. On the advice of our Advisory Board in 2003, we established this environmental message and used it throughout many campaigns. As a result we continue to observe changing behaviors.

- **Turkey Bay off-highway vehicle area:** We used the Respect the Resource message to trigger a positive change in our riders while we completed restoration in Turkey Bay Off-Highway Vehicle Area. We successfully moved from an open riding concept to one of sustainable designated trails. We continue to message this environmental responsibility initiative on different occasions. For example, in FY14 mating eagles built their nest in Turkey Bay. Riders respected the secured area by keeping out and in turn, we opened the trails back up shortly after the eggs hatched. The eagles became accustomed to the noise and nested in the same spot the following year. Off-highway vehicle riders are learning to respect trail boundaries in support of site restoration. Young riders use a designated area to allow them to practice safe riding techniques and learn sustainable riding practices.



Figure 3.18: Eagle nest in Turkey Bay in winter FY14

- **Recycling Program:** Respect the Resource also reinforces our recycling program at campgrounds and day-use facilities. Our recycling message kept over 93 tons of recyclables out of landfills since 2009. Some visitors use re-usable water containers instead of disposable water bottles. The bar chart in Figure 3.19 illustrates the amount of plastic, aluminum, glass, and batteries accounted since FY2009. Figure 3.20 shows all of the material recycled in FY2015.

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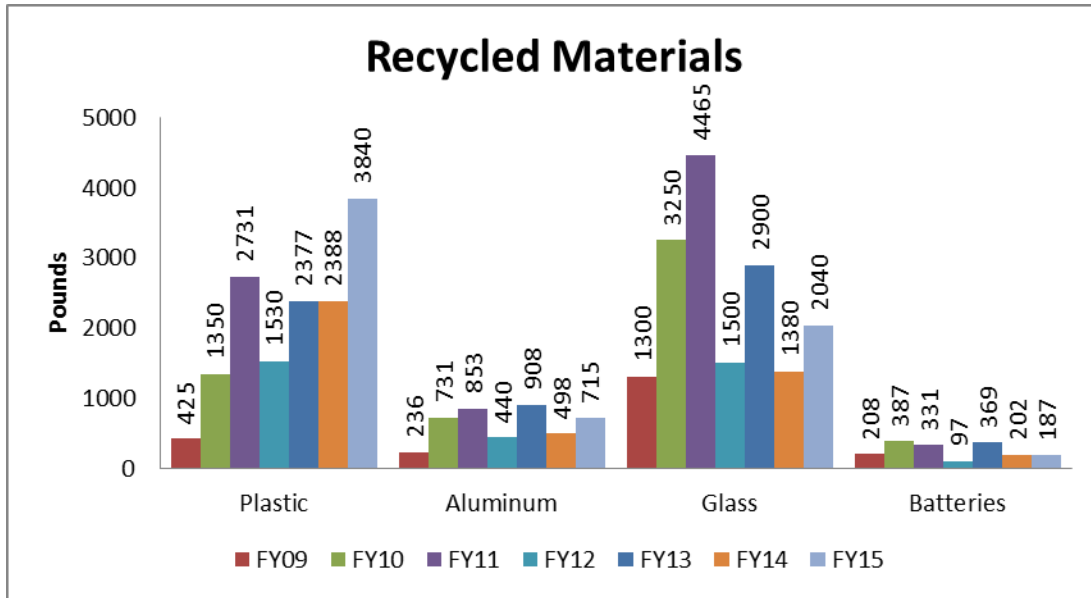


Figure 3.19: Recycled materials from Land Between the Lakes

Figure 3.20: Recycled Material in FY15	
Type	Pounds
Plastic Bottles	3840
Aluminum Cans	715
Glass	2,040
Scrap Metal	Holding for shipment
Batteries	187
Fishing Line	Holding for recycling
Cardboard	3,953
Paper	3,179
Electronics	Holding for shipment

- **Fishing Line Collection Tubes:** In fiscal year 2005 our Youth Conservation Corps student enrollees and other volunteers installed fishing line collection tubes to protect wildlife in popular fishing areas. These tubes continue to collect unwanted fishing line in 2015. In addition, area state parks also installed their own tubes modelled after our conservation efforts to respect the resource.

Ride 4 Keeps

Turkey Bay Off-Highway Vehicle Area: We use the Ride 4 Keeps regional initiative to help to reinforce that rider behavior serves as the key to keeping the area available for motorized recreation. Staff observed this helped our riders to be safer out on the trail. Our four key points include:

1. Keep it Safe.
2. Keep it Legal.
3. Keep on Trails.
4. Keep the Privilege.

Backyard Habitat

Other environmental education programs continue to encourage 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. Native plant sales were held at several events this year. We have partnered with a small local nursery that grows native plants from seed or cuttings taken from the native gardens at the Nature Station. Our programs are designed so that visitors can apply what they learn at Land Between the Lakes to their homes and communities. Several more bat roosting boxes were installed by Eagle Scouts working with Nature Station staff. This ongoing opportunity provides roosting habitat for several bat species and encourages more natural insect control in several recreation areas.

Recognition and Awards

- USDA Forest Service
 - Business Operations Award to Respect the Resource program for Sustainable Operations, Closing the Circle Recycling Practices, and Waste Prevention 2009
 - Chiefs Honor Award for leading in Business Environment 2013
 - Chiefs Honor Award for excellence in budget and financial accountability support by an individual 2006
 - Regional Forester



Figure 3.21: Youth Conservation Corps students installed fishing line collection tubes in FY05

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- Honor Award to Land Between the Lakes Association for excellence in partnership and public minded service 2006
- Honor Award to Oak Grassland Restoration Team for Natural Resources Leadership 2008
- Leading in the Business Environment Group Award to Business Performance Department for new maintenance contract 2014
- Recognition for 50 years of service 2013
- Honor Award for responding to two major incidents in professional manner with a customer service focus – ice storm and flooding 2009
- Regional Interpretive Program of the year awarded to Homeplace 1850s Working Farm in 2007
 - Wings Across the Americas award 2008
- Kentucky Association for Environmental Education Outstanding Achievement Award to the Woodlands Nature Station for serving as a center for community and regional environmental education, as well as a hub for nature viewing 2015
- Kentucky Living Magazine Best of Awards multiple topics and years 2005 →2015
- Kentucky Tourism Traverse Award to Communications Department for www.lbl.org website 2010
- Kentucky Western Waterlands Organization of the Year award 2015
- National Scenic Byway for the Woodlands Trace 2010
- National Wild Turkey Federation Making Tracks Award Partnership Achievement Award 2015
- Rocky Mountain Elk Foundation and for excellence demonstrating native habitat and wildlife restoration through the Elk & Bison Prairie interpretive displays 2004
- TripAdvisor's Certificate of Excellence 2013, 2014, and 2015

Online Reviews and Comments

Trip Advisor – as of 2013

Certificate of Excellence 2014 and 2015

In 2015 we noted 82 total reviews, 48 5-star, 22 4-star, 9 3-star, 1 2-star, and 2 1-star. 85.37% of the reviews were 4 stars or above. Comments from some 5 star ratings include:

- "This area holds so much natural beauty and local history. One of my all-time favorite weekend locations for family and friends!" CDE2014., Visited November, 2014. Reviewed November 13, 2014.
- "Spent our day in the Land Between the Lakes. We took the motor tour of the Bison and Elk Prairie. After paying \$5 to enter we viewed Elk and wild turkey right away. After meandering through the park, we finally were able to spot a herd of buffalo in a distant field. We continued south from there, crossed into Tennessee and stopped at the Homeplace, a

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working 1850's farm. The workers were very helpful and knowledgeable about working the farm. I would recommend a return trip!" Jana B., Visited April, 2015. Reviewed April 3, 2015.

- "Large area, no overly packed. Many things for the kids to do and visit-bison/elk. Nature center. Many hiking trails, camp sites, and a large beautiful lake! Love this area...can see so many stars at night!" 391nicoles., Visited April, 2015. Reviewed June 12, 2015.
- "Plenty to do in the area. Lots of neat little towns around the lake to visit. Grand Rivers is a pretty town with great shops and nice park." jtrailgirl., Visited May 2015. Reviewed June 4, 2015.

Source: https://www.tripadvisor.com/Attraction_Review-g3450976-d253284-Reviews-Land_Between_the_Lakes_National_Recreation_Area-Golden_Pond_Kentucky.html

Google Reviews – Since FY15

In 2015 we received a total of 17 ratings. Separate ratings remain available for individual facilities. 88% of our reviews were four star or greater. The scale goes from no stars, to five stars. Comments were generally positive.

- “Love it there, love the camping and the waters” Fay B., August 22, 2015.
- “Awesome place with lots to do. Went to the bison auction, an enjoyable experience, definitely different than livestock auction. Also ride in the OHV area every fall/winter. Home away from home. I recommend everyone go check LBL out. There's something for everyone!!” Jenn B., July 11, 2015.
- “Beautiful, peaceful, Majestic. God's fingerprints all over that place!” Tony H., June 6, 2015.

Source: <https://business.google.com/b/108392081213394407301/reviews/l/15397295711260595331/?hl=en>

Yelp -- Since FY15

Communications staff also claimed some Yelp locations in 2015. This allowed us to update information, and directly respond to reviews.

We received one notable five star review in 2015.

- “Such a beautiful area. It feels so pristine and loved, and the terrain and nature is so unique. What a pleasant surprise! The area is gorgeous if you want to hike, just drive, camp, whatever. They have a lovely Buffalo and Elk preserve that you can drive through. That was so lovely to see these animals in natural habitat, living their lives as they would have centuries ago. The planetarium is a nice touch, and the staff at the visitor's center was friendly and helpful. The little museum they have there doesn't pull any punches and tells the whole truth of the area. More than that though, for nature lovers, it just *feels* wonderful, in that way that can't be expressed in words, but you know it instantly when you arrive.” Christiana S. Review date January 23, 2015.

Source: http://www.yelp.com/biz/land-between-the-lakes-golden-pond?page_src=related_bizes

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National Visitor Use Monitoring Program

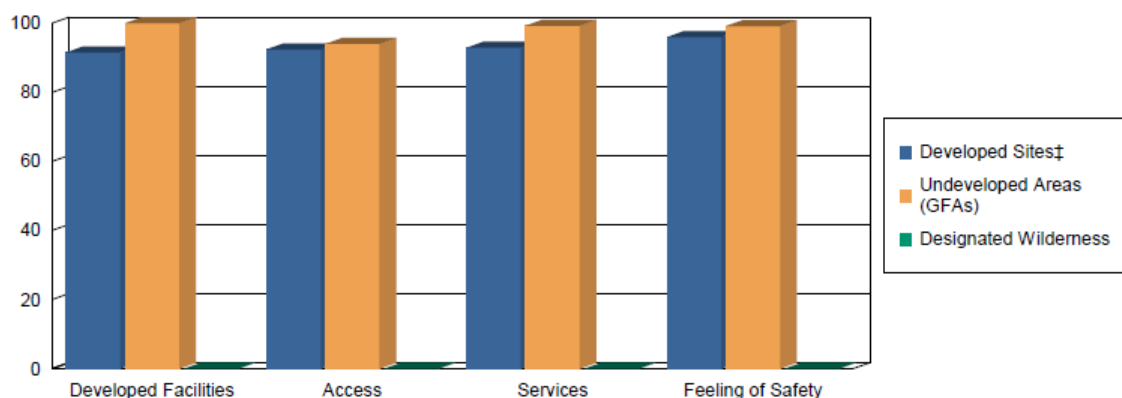
The National Visitor Use Monitoring (NVUM) program provides science-based estimates of the volume and characteristics of recreation visitation to the National Forest System, as well as the benefits recreation brings to the American public. Visitors to Land Between the Lakes consistently rate Land Between the Lakes high, as shown in Figure 3.22.

Figure 3.22: Ratings from Land Between the Lakes visitors -- graph from Round 3 2012

<http://apps.fs.fed.us/nfs/nrm/nvum/results/A08060.aspx/Round3>

http://apps.fs.fed.us/nfs/nrm/nvum/results/ReportCache/Rnd2_A08060_Master_Report.pdf

Satisfaction Element	Percent Meets Expectations Score (%)		
	Developed Sites‡	Undeveloped Areas (GFAs)	Designated Wilderness
Developed Facilities	91.6	100.0	0.0
Access	92.5	94.0	0.0
Services	92.9	99.3	0.0
Feeling of Safety	96.0	99.2	0.0



Selected Forests:	Round 3
Land Between The Lakes NRA (FY 2012)	

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: Manage natural and physical resources, and authorized Forest Service activities, to reduce erosion or deterioration of riparian areas and watershed conditions.

Properly functioning streams, lakes, riparian areas, and wetlands are critical in maintaining water quality, water quantity, riparian habitat, aquatic fauna populations and diversity, and downstream beneficial uses. Riparian areas are the interface between land and streams or rivers. We understand the need to direct resources and policies to sustain critical soil and water resources to support our multiple use mission. In doing so we follow the design criteria in the Area Plan and USDA Forest Service policy such as the *Forest Service National Best Management Practices for Water Quality Management on National Forest System Lands* found at:

www.fs.fed.us/biology/resources/pubs/watershed/FS_National_Core_BMPs_April2012.pdf

Q4.5 Has the Forest Service made progress in reducing erosion and improving watershed conditions and how was this accomplished?

In the past 10 years we made progress in reducing erosion and improving watershed conditions. This section describes how Land Between the Lakes applies many approaches to monitor and improve watershed quality.

MQ4.5 Sediment transport, stream bank stability, water quality parameters, properly functioning riparian areas, watershed condition class.

Monitoring of watershed improvement projects using Best Management Practices (BMPs) and Design Criteria ensures that sediment transport and water quality objectives were met.

Watershed Improvement

We chose two watersheds from the 2011 watershed analysis for improvement. Both watersheds were rated *Functioning at Risk* and *Watershed Condition Class 2*.

- Dry Creek/Cumberland River in the Prior Creek Project Area
- Ledbetter Creek/Kentucky Lake, the Turkey Bay Off Highway Vehicle (OHV) area

Dry Creek/Cumberland River watershed received an *Improved Watershed Condition Class* rating in 2015. This was accomplished by restoration on 46 acres of trail/hillside erosion, installing 7 hardened stream crossings, 5 miles of large woody debris in streams, establishing 32 acres of permanent vegetation, 1.7 acres of streambank armoring, 170 acres of non-native invasive species control, and 38 miles of roads maintained to standard. Prescribed burns were designed to create a mosaic of organic matter on the forest floor. Burning 2,636 acres under controlled conditions reduces overland flow erosion and non-native invasive species. This benefits soil and vegetation by returning nutrients back to the soil.

Ledbetter Creek/Kentucky Lake watershed is on track to receive an *Improved Condition Class* in the near future. The Forest Service is making steady progress in reducing erosion and sediment transport to improve watershed conditions. The Turkey Bay OHV Area lies within Ledbetter Creek/Kentucky Lake Watershed, therefore restoration work that is completed by the trails program leads to improvement of the watershed. This OHV area was developed by Tennessee Valley Authority and allowed unrestricted use until USDA Forest Service assumed management of Land Between the Lakes. The unrestricted use led to user made trails in extremely erosion prone areas. Under Forest Service management, Turkey Bay OHV adopted a designated trail system that led to a more controlled management of the resources. We accomplished this by repairing and restoring trails, repairing hillside erosion, installing and replacing culverts, and installing hardened stream crossings. In 2015, the Forest Service repaired 21 acres of hillside/trail erosion. We used a designated trail system, prescribed burns and vegetation treatments to accomplish these overall improvements. Since 2005, we reclaimed 348 acres of hillside and trail erosion and restored 300 yards of stream in the Ledbetter Creek/Kentucky Lake Watershed. The practices contributed to reduced soil erosion and sedimentation and improved water quality.



Figure 4.1: Pre-Treatment of Trail

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Figure 4.2: Treatment of Trail in Progress



Figure 4.3: Trail/Gully Erosion Pre-treatment in Dry Creek/Cumberland River Watershed

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Figure 4.4: Trail/Gully Erosion Post treatment in Dry Creek/Cumberland River Watershed

Best Management Practices Monitoring

We conduct best management practices (BMP) monitoring to check for water quality management. This includes monitoring soil erosion and sediment runoff into our streams and lakes plus monitoring chemical use near streams. The number of sites and BMPs to be monitored is determined by the Regional office.

Two sites in 2013, seven sites in 2014, and six sites in 2015 were selected for monitoring. The USDA Forest Service conducts BMP monitoring to determine if best management practices being used were effective. Find specific objectives and monitoring protocols for each BMP in USDA Forest Service publications FS-990a, National Core BMP Technical Guide, Volume 1, April 2012 and FS-990b, National Core BMP Monitoring Technical Guide, Volume 2, in prep.

We monitored the following BMPs during 2013-14. All sites had ratings for overall effectiveness of “excellent” per the Forest Service protocols.

Demumbers Creek/Cumberland River Watershed

- Ground Based Skidding (moving logs) and Harvesting

Crooked Creek/Cumberland River Watershed

- Chemical Use Near Water Bodies
- Prescribed Fire and Aquatic Management Zone
- Active Construction of Non-Corridor Facilities (facilities not located within riparian corridors) or for Non-Recreation Special Uses
- Ground Based Skidding and Harvesting

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Turkey Creek/Kentucky Lake Watershed

- Active Construction of Non-Corridor Facilities (facilities not located within riparian corridors) or for Non-Recreation Special Uses.

In 2015 we monitored the BMPs at the six sites listed below. All sites had overall effectiveness ratings of “excellent” per the Forest Service protocols.

Demumbers Creek/Cumberland River Watershed

- Chemical Use Near Water Bodies

Crooked Creek/Cumberland River Watershed

- Ground Based Skidding and Harvesting (2 sites)

Dry Creek/Cumberland River Watershed

- 2,462 Prescribed Fire

Turkey Creek/Kentucky Lake Watershed

- Completed Facility Reclamation

Panther Creek/Kentucky Lake Watershed

- Active Construction of Non-Corridor Facilities or Non-Recreation Special Use



Figure 4.5: BMP practice of mulched and seeded skid trail

Potable Water Monitoring

McCoy and McCoy laboratories regularly analyze water samples from 18 potable water wells. The onsite contractor samples the drinking water daily and sends in monthly reports to the State of Tennessee and twice monthly reports for Kentucky sites. All sites undergo more extensive testing for drinking water once a year. These records are on file with the onsite contractor.

In 2015, as in past years, all potable water for public consumption in the national recreation area met state regulations and requirements. This indicates our ground water is of good quality.

Watershed Watch

Watershed Watch volunteers monitor two sites on tributaries draining into Lake Barkley, Crooked Creek and Demumbers Creek. <http://kgs.uky.edu/wwky/main.htm>. We currently work with the Four Rivers Basin Team to identify additional volunteers needed to monitor other streams and Hematite Lake.

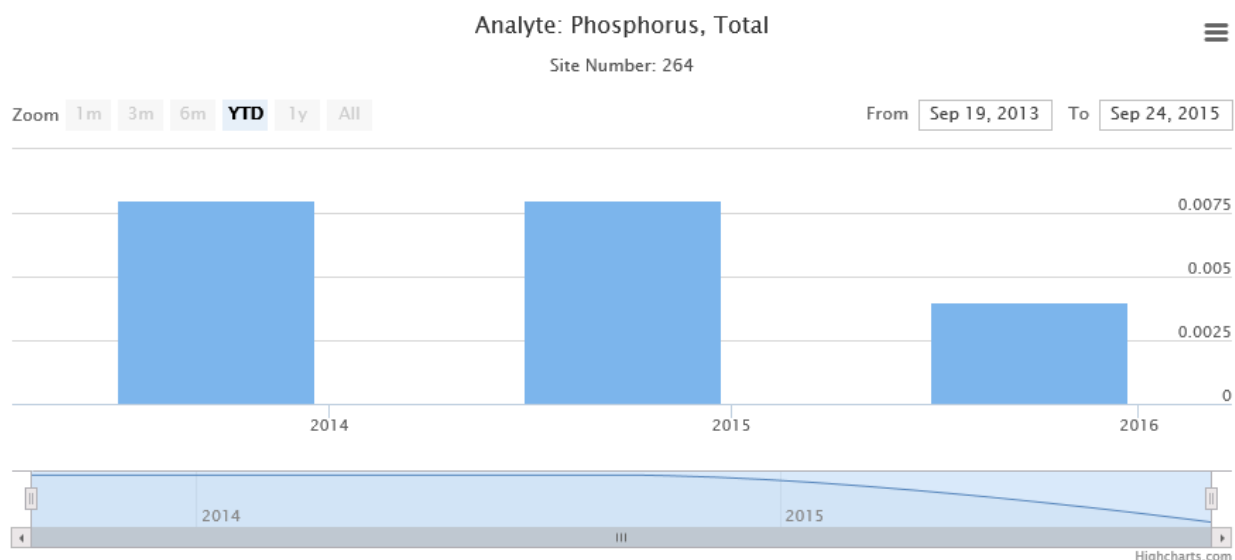


Figure 4.6: Crooked Creek Water Sample Phosphorus Concentrations

Samples taken from Crooked Creek contained less than 0.01 mg/L of total phosphorus. See the graph in Figure 4.6. The drop in the Phosphorus level in Crooked Creek between years 2015 and 2016 could be attributed to the widening of our field borders in open lands.

Samples taken from Demumbers Creek on 2010 resulted in phosphorus concentrations less than 0.2 mg/L. Demumbers Creek was not sampled for phosphorus since then.

Sites with average total phosphorus concentrations of 0.3 mg/L can be noted as potentially problematic. The informal total phosphorus standard of 0.3 mg/L has been adopted by the Kentucky River Watershed Watch Scientific Advisory Committee as an appropriate level of concern for water quality sampling. This value has also been recommended for use by the Kentucky Division of Water.

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Kentucky Lake Monitoring Program

Murray State Hancock Biological Station monitors 12 sites on Kentucky Lake and its tributaries. (http://www.murraystate.edu/wsi/wsi_database.html) The bays bordering Land Between the Lakes monitored by Murray State are Ginger Bay, Turkey Bay, Vickers Bay, and Duncan Creek. Panther Creek in the Panther Creek-Kentucky Lake watershed, a pristine/forested watershed, and its embayment, is considered the baseline for watershed monitoring by Murray State Hancock Biological Station. Over the years, results from all of the sites indicate good water quality.

Physicochemical parameters in the database include Specific Conductance, Total Nitrogen, Oxidation/Reduction Potential, Hydrolab/Grant YSI Profiles, pH Dissolved Oxygen, Phytoplankton, Alkalinity, Orthophosphate, Light and Euphotic Depth, Turbidity, Total Phosphorus, Primary Production (14C), Chloride, Silica, Chlorophyll, Lake Elevation and Discharge, Ammonia, Sulfate, Nitrate, Conductivity, and Secchi depth.

In addition to the physicochemical parameters listed under the Kentucky Lake monitoring program, additional data on discharge, water chemistry, benthos, and algae can be found at <http://www.murraystate.edu/qacd/cos/hbs/hbs.htm>

Murray State University Biology Department monitored water quality in Long Creek Wildlife Refuge in 2014 and stated the water quality for Long Creek is good. Their findings have not yet been published.

Hematite Lake Water Quality

In 2010 The Clean Water act 303(d) list included Hematite Lake due to “Impaired use(s): Warm Water Aquatic Habitat (Nonsupport) and Pollutant(s): Nutrient/Eutrophication Biological Indicators; Dissolved Oxygen. Suspected Sources: Agriculture; Source Unknown.” This designation requires the Kentucky Department of Environmental Protection Division of Water to develop a monitoring plan. Due to lack of resources, a plan has not been developed by the state.

We are working with the Water Watch Program to have volunteers do water testing at Hematite Lake. We requested funding to contract the Forest Service Center for Aquatic Technology Transfer to do testing for Hematite Lake as well as some streams located on the national recreation area.

The Forest Service Center for Aquatic Technology Transfer performed a survey for aquatic passage on road/stream intersections in Land Between the Lakes. The final report for the survey work completed by the FS Center for Aquatic Technology Transfer was issued in March 2002. This report provides useful data about fish passages in Land Between the Lakes’ streams. We will use the data at the project level.

Vegetation Management

Vegetation management treatments should improve watershed conditions across the recreation area. These treatments improve watershed conditions by allowing new tree and herbaceous vegetation (plants and wildflowers) regeneration to improve watershed conditions and water quality. In 2013, 5 acres and in 2014, 14 acres of river cane were planted in the Crooked Creek-Cumberland River watershed. In 2015 we contracted 5 acres of river cane to be planted in the Demumbers Creek Watershed. In 2014 the National Wild Turkey Federation and Forest Service staff planted 20 acres

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of shortleaf pine in the Elk & Bison Prairie. In 2015, 42 acres of shortleaf pine were planted in the Willow Bay area to replace loblolly pine. Over the past 10 years, 44,900 trees were planted in the Ledbetter Creek/Kentucky Lake Watershed. We also planted 10 acres of native warm and cool season grasses. In the Demumbers Creek-Cumberland River Watershed 42 acres of chestnut were planted. We established 304 acres of wildlife food plantings, of which 242 acres were clover.

The 242 acres of clover serve as a soil builder due to nitrogen fixing. Nitrogen is "fixed" in clovers through a symbiotic relationship with rhizobium bacteria that infect roots. The plant provides energy for the bacteria, and bacteria provide the "machinery" necessary to convert atmospheric nitrogen to a form available to plants. Nitrogen fixation is one of many economically important features of clover. This contributes to the overall nutrients available to other plants.

In 2015, permit farmers planted 427 acres of cover crops. These cover crops provide vegetative ground cover for crop fields over the winter months when no crop is planted. Establishing cover crops reduces soil erosion, sedimentation and improves water quality. They also provide organic matter when they are plowed under during row crop planting.

Since 2005, we established 425 acres of field borders. These field borders reduce soil erosion, sedimentation and nutrient runoff improving water quality.

For more detailed information about vegetation management projects, refer to the [Goal 5 and Goal 7](#) section of this report.



Figure 4.7: New growth in field border by open land on Fort Henry Road, 2015

Timber Treatments

In 2015, we treated no acres with commercial timber sales or timber stand improvement (TSI). Instead, we focused our efforts on collaboration to better understand public concerns about timber sales. Listening sessions reinforced the importance of social, cultural, and historical values as they

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relate to timber management at Land Between the Lakes. This led to development of a case study in the Fox Hollow area in FY2016 to involve the public very early in project development.

Over 10 years we treated 3,779 acres using commercial timber sales. To date, the Forest Service treated 1,447 acres with TSI through cut and leave and hack-n-squirt methods. TSI improves site conditions for the development of natural shortleaf pine and oak regeneration. These treatments will improve watershed conditions by allowing new woody and herbaceous vegetation regeneration.

In 2014, the Forest Service treated over 626 acres general forest with timber harvest or mechanical cut and leave treatments. These treatments were conducted in the Crooked Creek-Cumberland River and Demumbers Creek-Cumberland River watersheds.

See a comprehensive discussion of timber treatment in [Goal 5](#).

Non-native Invasive Species Treatments

In 2015, we treated 748 acres of non-native invasive species (NNIS) in various watersheds. Since 2005, we used mechanical or chemical treatments to treat 5,288 acres of NNIS. This action will reduce the spread of NNIS and contribute to an improved watershed condition by promoting native vegetation. We work with the USDA Animal and Plant Health Inspection Service to eradicate feral hogs to prevent watershed damage.

Prescribed Fire

In 2015, we conducted prescribed fires on 2,917 acres in seven locations in Level 6 watersheds. This improved watershed conditions by controlling fuel loads and non-native invasive species, and releasing native species. Since 2005 we conducted prescribed burns on 48,961 acres. Some of these acres are second burns on areas burned in previous years.

The timing of the burns allowed for vegetation to establish or leaves to fall for ground cover protection. Observations and monitoring showed the low intensity of these prescribed burns caused minimal damage to the duff/organic forest floor layer.

For more information on our prescribed fire program go to the prescribed fire section in [Goal 5](#) of this report.

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Figure 4.8: Cemetery Ridge Prescribed Fire, 2015

Trails

Trail maintenance and improvements, closure of user made trails, and weather related closures contributed to reduced soil erosion and sediment movement, which also helped improve water quality and watershed condition.

Since 2005 our trails staff maintained an average of 107 miles per year of trails to standard and 12 miles per year of trails improved to standard. We repaired, replaced, or decommissioned 24 culverts and installed eight hardened stream crossings. We improved 31.5 miles of shared surface roads to standard in the Dry Creek-Cumberland River watershed. We closed and rehabilitated three user-made equestrian trails and another user-made road with about one-half acre of an eroded area in the Dry Creek-Cumberland River watershed. Staff closed user made trails and improved and maintained a designated trail system in the Turkey Bay Off-Highway Vehicle Area.

See [Goal 7](#) for more detailed information and photographs on trails.

Roads

We manage approximately 465 miles of Forest System roads. Public roads include 148 miles of paved roads, 180 miles of gravel roads and 113 miles of natural surface roads on Land Between the Lakes. Of those, 344 miles are considered passenger car roads. Improving, maintaining, and reconstructing roads reduce erosion and sediment runoff, improve water quality and improve the condition class of watersheds.

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Total road miles improved, maintained, or reconstructed averaged 232 miles per year since 2005. In 2015, 243 miles of roads received maintenance. Funding for roads is a shared responsibility between the Forest Service, the Federal Highways Administration, the State of Tennessee, and the Commonwealth of Kentucky.

Since 2005 30 road culverts were repaired or replaced. In 2015 seven road culverts were repaired or replaced on Road 141. Undersized and deteriorating culverts caused upstream and downstream erosion in the form of head cutting and gully erosion. Replacement with correct size culverts and using best management practices during and after construction reduced erosion and sediment runoff to improve water quality.

Storm events each year damaged several roads creating a need for temporary repairs until Emergency Relief for Federally Owned Roads Program projects could be approved. In FY14 alone, we completed temporary repairs on Roads 144, 153, 112, and Grays Landing Road 79-A, 79-A2, 79-A3, and 79-A31 which helped to reduce any erosion caused by storm damage.

In 2014 Trigg County Fiscal Court and Trigg County Roads Department assisted with repairs at a low water crossing on road 145 that became a safety issue.

Federal Highways' funds provided mowing of our paved road right-of-ways, including such roads as The Trace (100), Mulberry Flat Road (135), and Silver Trail Road (133) in addition to roads 117, 118, 134, 165, 206 and Road 230. Mowing occurs throughout the growing season. Maintaining vegetation growth along roads provides for better plant growth which reduces erosion and improved water quality.

Every year we conduct maintenance on cemetery access roads at Land Between the Lakes. The work includes tree/debris removal, some spot graveling, creek crossing repair (which can be annual for some locations), and tree trimming along access corridors, and mowing some portions. In 2015 Catholic 1, Catholic 2, Higgins, Outland, and Futrell 2 Cemetery access roads received heavy maintenance to reduce erosion and improve access. These areas had excessive downward erosion in the drains crossing the access roads. As part of this effort, the Forest Service rehabilitated and closed a user made road for cemetery access.

Atmospheric Monitoring

We host a National Atmospheric Deposition Program site in the Nature Watch Demonstration Area. Site KY99 site is jointly operated by Murray State University, Hancock Biological Station/Watershed Studies Institute and the Forest Service. The site is a member of the National Atmospheric Deposition Program/National Trends Network administered by the Illinois State Water Survey. The National Trends Network is the only network providing a long-term record of precipitation chemistry across the United States. In addition to raw data, the National Atmospheric Deposition Program provides many data products such as maps of annual precipitation-weighted mean concentrations and deposition to scientists, decision makers, and the public. Parameters measured include free acidity, conductance, calcium, magnesium, sodium, potassium, sulfate, nitrate, chloride, and ammonium. Data exists for site KY99 from December, 1994 to present. Information

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and data from the National Atmospheric Deposition Program/National Trends Network program will be used for assessing climate change during plan revision and are located at:

- <http://nadp.sws.uiuc.edu>
- <http://nadp.sws.uiuc.edu/data/ntn/>

Q4.6 Has the Forest Service established baseline data for channel classification of its major intermittent and perennial streams?

Panther Creek in the Panther Creek-Kentucky Lake watershed and its embayment provides the baseline information for watershed monitoring. The Panther Creek monitoring is described in the Watershed Watch section above.

M Q4.6 Completion of stream classification and determination of channel function process

See the list in [Goal 1](#) for the environmental assessments we completed for Land Between the Lakes since the Area Plan. We average one project area per year. Stream classification and channel function are documented in these assessments.

The Rosgen stream classification system categorizes stream channels based on measurable form and structure features. According to the 2001 United States Department of Agriculture Forest Service Center for Aquatic Technology Transfer, [Rosgen “C” type channels](#) are the dominant channel type in the Land Between the Lakes. Many reaches of the upper watersheds are incised with active headcuts retreating up-channel. Deposition of bedload and sediments loads is highest at the lower reaches of the channels. Changing lake levels, controlled by the Army Corp of Engineers, re-deposits the load and repositions the channel on an annual basis making the lowest reaches unstable multiple-thread channels.

In 2005 and 2006 eight miles of streams were classified, using [Rosgen Level 1 and 2 methodologies](#), within Crockett and Prior Creek watersheds. These streams, as with most streams in the Land Between the Lakes, are showing some recovery within the middle reaches of streams. In 2014 portions of the Pisgah Creek-Kentucky Lake watershed were evaluated.

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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	<p>“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.”</p> <p>“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.”</p> <p>“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.”</p> <p>“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]</p>
Desired Trend Statement	<p>“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]</p> <p>“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]</p> <p>“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]</p> <p>“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]</p> <p>“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]</p> <p>“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</p>

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	decade with a long-term objective of 450 total acres of shortleaf pine forest.” [Objective 5f]
	<p>“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]</p> <p>“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]</p> <p>“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]</p> <p>“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]</p>
Monitoring Questions	<p>7. How well are species of viability concern being maintained on LBL?</p> <p>8. Are non-native invasives an increasing threat to LBL?</p> <p>9. How is management of LBL affecting recovery of threatened and endangered species? (Duplicate questions for Measures 9-10)</p> <p>11. How is management of LBL affecting demand for wildlife-related recreation? (Duplicate questions for Measures 11-14)</p> <p>15. How is management of LBL affecting special habitats and major biological communities? (Duplicate questions for Measures 15-25)</p> <p>26. Is the forest less likely to be affected by insects, disease, and wildfire? (Duplicate questions for Measures 26-28)</p> <p>29. Has the FS made progress towards identifying old growth stands on the ground?</p>
Area Plan Performance Measures	<p>7. Trends in key habitats and/or populations of viability concern species.</p> <p>8. Trends in highest risk species.</p> <p>9. Trends in Price’s potato bean populations in relationship to Threatened & Endangered (T&E) Recovery.</p> <p>10. Trends in bald eagle populations in relationship to T&E Recovery.</p> <p>11. Trends in Eastern bluebird populations as a Non-game Demand species.</p> <p>12. Trends in white-tailed deer populations as a Demand Game species.</p> <p>13. Trends in Eastern wild turkey populations as a Demand Game species.</p> <p>14. Trends in Northern bobwhite quail populations as a Demand Game species.</p> <p>15. Trends in pileated woodpecker populations in relationship to Snags in Forested Situations.</p> <p>16. Trends in Eastern bluebird populations in relationship to Snags in Open Forested Situations.</p> <p>17. Trends in Acadian flycatcher populations in relationship to Mature Riparian Forests.</p> <p>18. Trends in Northern bobwhite quail populations in relationship to Grasslands.</p>

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	19. Trends in prairie warbler populations in relationship to Oak Woodlands.
	<p>20. Trends in Great-crested Flycatcher populations in relationship to Mature Open Oak Forest.</p> <p>21. Trends in wood thrush populations in relationship to Mesophytic and Riparian Forests with Canopy Gaps and Mature Forest Interior.</p> <p>22. Trends in Eastern meadowlark populations in relationship to Grassland.</p> <p>23. Trends in Yellow-breasted chat populations in relationship to All Forest Type Regeneration.</p> <p>24. Trends in composition of aquatic communities dependent on clear water and stable channels.</p> <p>25. Trends in bat population levels.</p> <p>26. Trends in early, mid-, and late-successional forests by prescription group.</p> <p>27. Trends in species diversity, structural diversity, age class, and stocking levels.</p> <p>28. Trends in native insect and disease effects.</p> <p>29. Completed inventory of old growth stands.</p>
Data Sources Utilized	<p>--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</p> <p>--Periodic survey and assessment of highest risk species occurrences; project level survey information and accomplishments</p> <p>--Periodic assessment of status of known occurrences; new occurrence inventory</p> <p>--Breeding Bird Survey/Point counts occurrence trends for the bird communities</p> <p>--Summary of data received in deer surveys, harvest statistics; summary of comments related to recreational uses of white-tailed deer</p> <p>--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</p> <p>--Surveys similar to those done by the CATT</p> <p>--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</p> <p>--Acres of hazardous fuels treated through wildland fire use, prescribed fire, and mechanical treatments</p> <p>--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</p> <p>--Collection and analysis of old growth characteristics data, locations, and patch size</p>
Importance	<p>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.</p>

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.
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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.

We continue to manage our natural resources to improve sustainability, wildlife diversity, and forest health as a multi-use national recreation area. This year we tracked treatments and discussed ten year trends for habitat conditions for species of viability concern and demand species.

Open Lands



Figure 5.1: Open Lands reclamation with Browns Tree Mower in Stewart County, Tennessee, 2015

In 2015 we completed open lands management on a total of 7,290 acres to enhance wildlife habitat diversity through partnership agreements, cooperative farming special use permits, and local contracts (Figures 5.1 through 5.4). Open land management activities within General Forest and Facility Prescription areas across Land Between the Lakes included: field road access maintenance, cropland and hayfield cooperative management, mowing; reclamation/restoration; herbicide applications; disking, liming; fertilizing, and plantings of clover, wheat, and cane. These activities provide green forage, flowers, and seeds throughout the year for a variety of mammals, birds, and pollinator species.

Of the 7,290 acres, our partners and special use permit holders for cropland and hayfield management accomplished 4,713 acres of habitat improvement, restoration, and maintenance. Approximately 3,655 of these acres were considered “In-Kind”, with 112 acres of mowing, 2,350 acres of crop fields and associated field borders, 25 acres of access management, and 1,168 acres of hayfield management. We accomplished the remaining 2,577

acres through local contracts for recreation and wildlife resource benefits.

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Figure 5.2: Clover and wheat planting in open lands



Figure 5.3: Wildlife planting treated with herbicide followed by wheat planting

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In 2014 and 2015 we established river cane, a native warm season grass and rare community type on 20 acres -- 6 acres in 2014 and 14 acres in 2015, of former cropland located in the median of State Routes 68 and 80 east of the Woodlands Trace. Five acres of cane were planned in 2015 for establishment in the Demumbers Creek project area. The five acres were established in 2016.

In 2015 we also maintained/restored 361 acres of existing native warm season grass open lands and implemented 425 acres of field borders as part of cropland managed fields.



Figure 5.4: Border of native warm season grasses and goldenrod along cropfield, Stewart County, 2015

Field borders enhance soil and watershed health; benefit wildlife with forage, cover, and nesting; and promote native plant species growth. Field borders are primarily located on the stream side of a field and adjacent to riparian corridors that were implemented in 2007. Field border sizes range from a minimum of 30 feet wide from the field edge to an entire field taken out of cultivation. Field borders are primarily located in areas with poor soil and site conditions. Upwards of 20 percent of cropland acres within an area was taken out of cultivation and put into field borders.

Some portions of the field borders include acres that are projected to be planted to native warm season grasses (i.e. Barnes Hollow, Prior Creek, and South Welcome Station).

Between 2014 and 2015 we assessed open land types in Land Between the Lakes with a special emphasis on the cooperative farming program acres for cropland and hayfield management. We mapped streams in association with cooperative farming acres and along some wildlife plantings. As a result of this geographic information system (GIS) assessment we currently have approximately 2,870 acres in cultivation in cropland production acres and wildlife plantings). This is down by about 30 percent from 4,124 acres existing in 2004. This is a result of fields and portions there-of growing up, better GIS imagery, and field acreage taken out of cultivation. There is currently about 1,715 acres identified for hayfield management.

In 2015 successful bidders were awarded new ten year cropland and hayfield special use permits. As part of the requirements of these permits, the holders are required to implement field borders on cropland managed areas and ten percent of their cropland production acres are to be planted in a Forest Service approved cover crop, approximately 190 acres annually. Cover crops were implemented on 230 acres during fall, 2015. Wheat was the primary smother cover crop planted to help control invasive species between crop seasons. Cover crops also provide wildlife benefits, and enhance soil and watershed health conditions in the Barnes Hollow, Elbow Creek, Prior Creek, and South Welcome Station areas. Per the hayfield permits, the Holders are required to convert ten

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percent of their non-native cool season grass field acres into native warm season grasses within the first five years of their permit, approximately 160 acres.

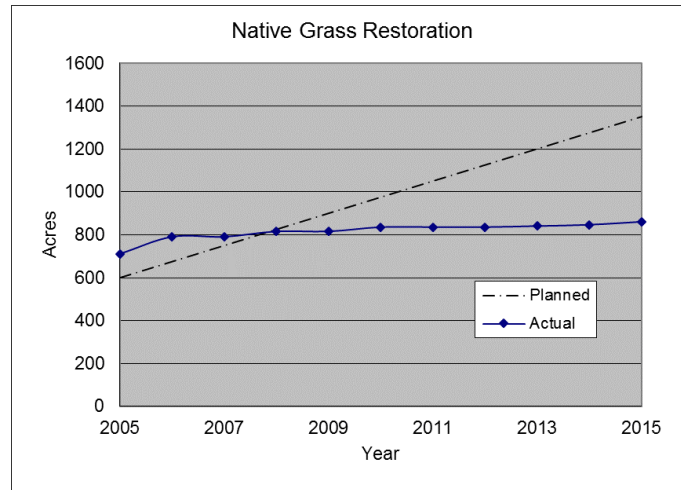


Figure 5.5: Native Grass Restoration chart

Prescribed Fire

Prescribed fire has been a contributing factor in improving wildlife habitats, increasing biodiversity and adding resilience to the landscape. Specifically, fire at Land Between the Lakes has served as a select agent in several differing roles such as invasive species control, nutrient recycling, thermal thinning, regeneration stimulation, and tall grass ecosystem maintenance. Fire was re-introduced to the native short-leaf pine stand for regeneration in the Devil's Backbone project area. It also helped improve stand conditions for shortleaf in Willow Bay, and maintain the ecosystem in the Elk & Bison Prairie. Prescribed fire has been used within normal return intervals to sustain fire dependent communities in other forested areas throughout Land Between the Lakes. Long term post burn monitoring continues to be a valuable tool in validating parameters to ensure successful accomplishment of prescribed burning.

Prescribed burning has also contributed to improving visual characteristics adjacent to developed sites and reduced soil erosion. Clearing of debris with fire in culverts and ditches reduces road damage. Fire has successfully been utilized in maintaining and enhancing trail experience, and improving cemetery access in areas such as Hillman Ferry Heritage Trail.

Over the previous ten years fire has been used to treat 48,961 acres. See the map of prescribed burns on the internet at http://www.landbetweenthelakes.us/wp-content/uploads/2014/04/HistoricLBL_PrescribedBurnsMap.pdf. Almost 10,000 acres were within the southern Oak-grassland Restoration Demonstration Area since 2006. Some acres were burned more than one time. In 2008, Land Between the Lakes received abundant rainfall during its prescribed burning season resulting in reduced accomplishments. In 2009 an increase in total acres resulted from debris piles generated from a significant ice event. In 2010 favorable conditions

supported an increase in alignment with desired goals of the Area Plan resulting in 14,866 acres of treatment.

From 2011 to 2014, acres treated with prescribed burning were within a 5,000 acre annual average, due primarily to unfavorable environmental conditions that were prohibitive in meeting desired objectives. These conditions included weather, moisture of the vegetation, and wind speed and direction for smoke dispersal.

In 2015, collaboration work between The Daniel Boone National Forest, The Nature Conservancy, Augusta Hotshots, and Land Between the Lakes helped accomplish 2,401 acres of prescribed burning in the Cemetery Ridge unit. This unit supports research being conducted on woodland bird populations by the University of Tennessee. Austin Peay State University assisted us with preparation work for prescribed burning completed in the Franklin Creek unit. Austin Peay State University has ongoing research for the copperhead snake in the project area. Franklin Creek is part of Land Between the Lakes' Oak Grassland Demonstration Area.

See the map of prescribed burns on the internet at http://www.landbetweenthelakes.us/wp-content/uploads/2014/04/HistoricLBL_PrescribedBurnsMap.pdf.

We continued to notify cemetery contacts prior to prescribed burns and addressed their concerns. We developed the framework in FY 2016 to give the public opportunities to assist with preparation around cemeteries and church/school markers. We also made plans for interested people to help us monitor air and fuels layer of prescribed burns in FY2106.

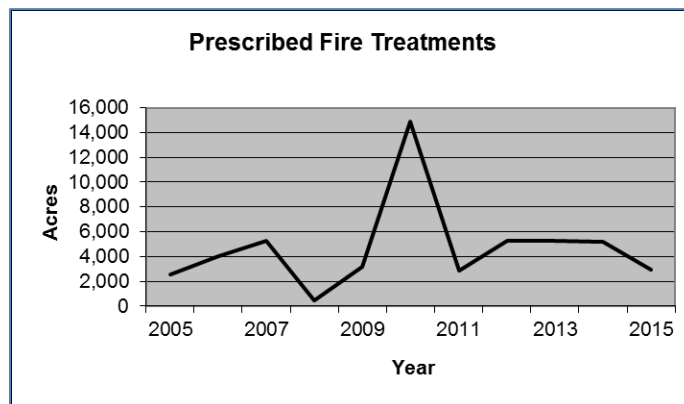


Figure 5.6: Prescribed Fire Treatments

Wildlife and Forest Management

Goal 5 of the Area Plan includes objectives for the forest structure on Land Between the Lakes. See the sections below for monitoring questions 5.7 through 5.29 for trends relative to wildlife diversity and habitat objectives in Goal 5. The current acreage in each forest structure type, and the 10 and 50 year goals are shown in Figures 5.7 and 5.8. The following table represents the changes in forest structure types that have occurred by using active timber management. Percentages are discussed under Monitoring Question 5.26.

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Figure 5.7 Forest Structure

<i>Forest Structure</i>	<i>Total acreage from 2004 FEIS</i>	<i>2010 Total Acreage</i>	<i>2015 Total Acreage</i>	<i>10 Year Goal Acres</i>	<i>50 Year Goal Acres</i>
Mature Closed Forest	90,316	89,278	84,628	79,000	53,000
Mature Open Forest	16,253	17,195	17,648	19,000	31,000
Mature Woodland	0	794	4,136	6,000	30,000
Canopy Gaps	120	474	822	1,600	9,000
Subtotal Mature Forest	106,689	107,741	107,317	105,600	123,000
Mid-Aged Forest	14,817	16,620	16,620	24,000	14,000
Young Forest	28,549	26,962	27,026	17,000	11,000
Regenerating Forest	2,536	1,268	1,559	5,400	5,400
Shortleaf Pine	130	130	283	1,000	1,600

The Forest Service reevaluated the prescribed fire changes in the forest structure and no longer included fire acres in the forest structure changes over time. The table of forest structure acres now only contains changes from timber treatments. This is in part due to implementing less intense fires on the landscape hence reducing canopy gaps and limiting mortality in the mid-story. Therefore, the acres represented in this ten year Monitoring and Evaluation report for year 2010 are different than the acres that the 5 year M&E reported.

The acres moving from the different age classes and forest structure classes are based on assumptions. We made an assumption that approximately 20% of the regeneration forest structure type and young forest class moved to mid-aged forest class; and, approximately 15% of the mid-aged class moved to mature open canopy and mature closed canopy forest structure. While calculating these acres forest inventory data gaps at Land Between the Lakes became apparent.

Insignificant anomalies are attributed to differing database standards and collection protocols throughout the 10 year span of plan implementation.

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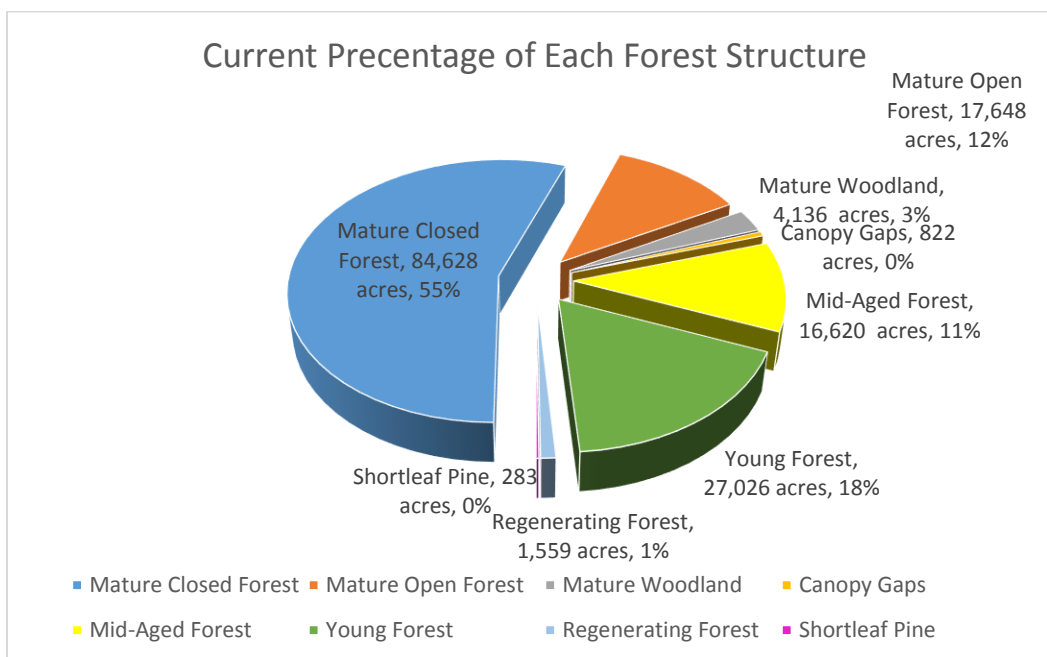


Figure 5.8: Current Percentage of Each Forest Structure

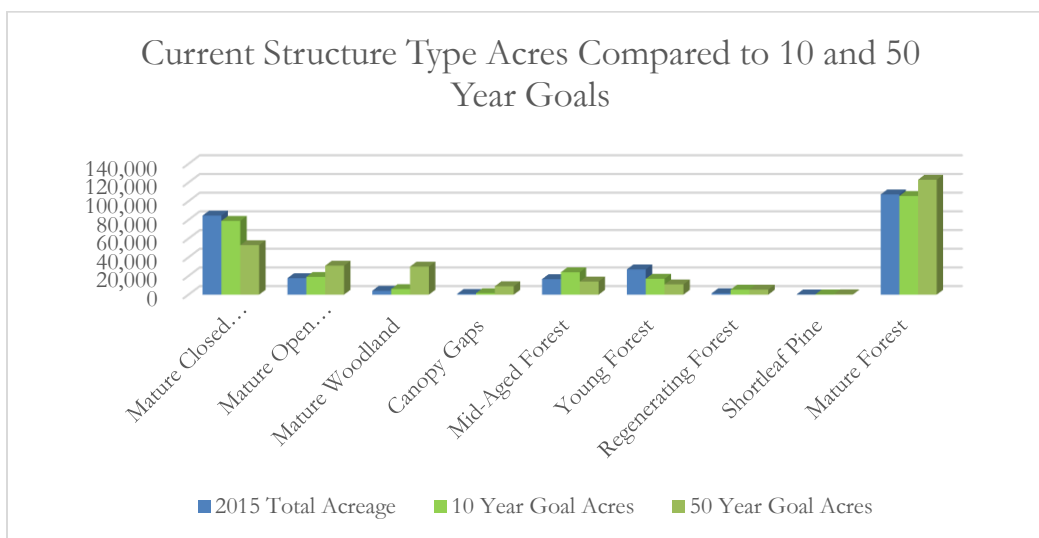


Figure 5.9: Current Structure Type Acres Compared to 10 and 50 Year Goals

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Figure 5.10: South Oak Grassland Demonstration Area Thinning Commercial Harvest

Figure 5.9 illustrates the 2015 acres compared to the objectives in the Area Plan. In general, the distribution of mature forest types remains predominantly closed forest. Timber harvesters created approximately 4,100 acres mature woodland, or 3% of all mature structure types.

Q5.7. How well are species of viability concern being maintained on Land Between the Lakes?

We report on species of viability concern annually, every 2 or 3 years, and every 5 years. Species' reports that follow are on the annual cycle.

MQ5.7 Trends in key habitats and/or populations of viability concern species.

We discuss the trends for populations and key habitats of Price's potato bean and bald eagles in Monitoring Question 5.9, and for bats in Monitoring Question 5.25.

In the Area Plan we listed 65 plant; 19 bird; 6 mammal; 8 amphibian and reptile; and 3 fish species that are of viability concern. Populations for these species of viability concern are primarily assessed through field inventories and the need to survey project areas based upon known occupancy and/or potential habitat. In addition to these surveys, we gain information about species trends from research and special use permits along with information provided to us by our partners and the public.

Since implementation of the Area Plan we have observed the following changes in trends and/or have new occurrence reports:

In 2006 we found approximately 40 individual plants of Barbed rattlesnake-root (*Prenanthes barbata*) in six different locations as part of open lands vegetation inventory. As a result, this species went from a Forest Rank F1, meaning the species is extremely rare with 1-5 occurrences, to an F2, meaning this species is considered very rare within its range of 6-20 occurrences.

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In 2009 we assessed plant species of concern per the following:

- We listed Big-tooth aspen (*Populus grandidentata*) as a sensitive S2 species by the state of Tennessee at the time of the Area Plan. It has since been delisted due to its wide distribution in Tennessee and its proclivity to colonize recently disturbed areas.
- We added Big-leaf snowbell (*Styrax grandifolius*) to the Kentucky list of species of viability concern as a threatened S2S3 species since the implementation of the Area Plan. The only known population in western Kentucky is found at Land Between the Lakes.
- We listed Rose mock vervain in the Area Plan as *Glandularia canadensis*, and it was considered a threatened S2S3 species by the state of Kentucky at the time. The state is now tracking the species as *Verbena canadensis*, and it is considered a historic species. No known occurrences have been relocated, and there are concerns about confusion with possible escapes from cultivation, as the plant is widely sold.

In August and September 2010 in the Demumbers Creek project area, we found 32 new locations of Crème false indigo (*Baptisia bracteata* var. *leucophaea*) and three new locations of prairie dock (*Silphium pinnatifidum*). The Crème false indigo occurrences continue to be found through field work, and project level surveys. This species has only been found to occur in the Kentucky portion of Land Between the Lakes and not in the Tennessee portion. The prairie dock findings on Land Between the Lakes cause this species to be moved from an F1 to an F2 rank. During field inspections in 2011, Prairie dock (*Silphium pinnatifidum*) was reported in a native warm season grass restoration area in Tennessee and another in two locations in Kentucky. As a result of these findings the forest rank has not changed.

In 2010 we observed two pairs of Henslow's sparrow 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, we observed two Henslow's sparrows that had successfully fledged from the two pairs observed during the breeding season. The Henslow's sparrow continues to be observed in this area; however nesting success has not been monitored closely since 2012. Where possible we are maintaining potential nesting habitat for this species in known locations such as in Woodlands Nature Watch Area - Barnes Hollow; native warm season grass complex in Crossroads area of Forest Service Roads 117, 123, and 124; the Elk & Bison Prairie; and Brandon Spring Group Center native warm season grass fields.

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Forest ranks indicate the population of species of viability concern on Land Between the Lakes: F1, extremely rare with 1-5 occurrences; F2, very rare with 6-20 occurrences; F3, rare and uncommon with 21-100 occurrences. During botany surveys in 2013 through 2015, we have observed the following new occurrences and ranks:

Species	Rank and Status
Golden seal (<i>Hydrastis canadensis</i>)	watch-list due to illegal collection
Butternut (<i>Juglans cinerea</i>)	F2; found a new site; however older populations not doing well, no change overall
Soft-hair marbleseed (<i>Lithospermum bejariense</i>)	new found species associated with limestone ledges on Land Between the Lakes and that is currently known in Kentucky as <i>Onosmodium molle</i> ssp. <i>Occidentale</i> ; (F) rank to be assessed
Southern crabapple (<i>Malus angustifolia</i>)	F2; no change
Carolina anglepod (<i>Matelea caroliniensis</i>)	F1; no change
Ginseng (<i>Panax quinquefolius</i>)	watch-list due to illegal collection
Blue sage (<i>Salvia azurea</i> var. <i>grandiflora</i>)	F3; no change
Buckley's goldenrod (<i>Solidago buckleyi</i>)	F1; no change
Trepocarpus (<i>Trepocarpus aethusae</i>)	F3; no change
Buffalo clover (<i>Trifolium reflexum</i>)	F1; no change
September elm (<i>Ulmus serotina</i>)	F1; no change

Figure 5.11: Species of Viability Concern New Occurrences, 2013-2015

Since prescribed fire and timber management activities have occurred within the Franklin Creek and Prior Creek Oak Grassland Restoration Demonstration areas, red-headed woodpeckers have been observed (Elizabeth Raikes, personal observations). Osprey populations, rank F2, very rare with 6-20 occurrences in 2004, continue to increase and their forest rank likely changed to rank F3, rare and uncommon with 21-100 occurrences on Land Between the Lakes.

The occurrences of other species of viability concern are largely unchanged same since 2004. The species associated with open forest canopy conditions and grassland habitat may be at risk because this habitat type has not reached the ten year Area Plan Goals in Goal 5. See Forest Management Section for discussion.

Q5.8. Are non-native invasives an increasing threat to Land Between the Lakes?

Yes, non-native invasive species (NNIS) continue to threaten the flora and fauna of Land Between the Lakes. NNIS are one of the Forest Service's four threats to the health of forests ecosystems. Information on the four threats can be found at <http://www.fs.fed.us/projects/four-threats/>.

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MQ5.8. Trends in highest risk species.***Non-native Invasive Plants (NNIS)***

In 2015, we treated 748 acres within open land areas across Land Between the Lakes to control non-native invasive species vegetation with a combination of fire, mowing, and approved herbicides; Figure 5.10. The overall success rate for the control of NNIS in 2015 ranged from 76% to 100%. Over half of the areas treated had an efficacy rate for targeted species of 91-100% success within the same season of application.

In 2006 we controlled most of our invasive species through mowing. We applied herbicide to hayfields in preparation for conversion from non-native cool season grasses to native warm season grasses. In 2007 we used herbicides to control undesirable vegetation within three facility areas: Woodlands Nature Station, Elk & Bison Prairie, and South Bison Range.

In September 2007 we signed a Decision Notice for the Revised Environmental Assessment for the Continued Maintenance of Open Lands in Land Between the Lakes National Recreation Area, or the Open Lands Environmental Assessment. This decision allows herbicide applications to be used in open lands across Land Between the Lakes in addition to cropland, hayfields, and facility areas formerly covered. The acres that are shown in the bar chart for herbicide treatments 2008 through 2015 include open land areas throughout the national recreation area. See Figure 5.12.

Since our 2007 decision; the forest service applied most of the herbicide treatments within open lands established in native warm season grasses 2003-2006, wildlife plantings, fields that have been reclaimed of woody vegetation/NNIS, and within facility areas. Mowing alone is not effective in eradicating NNIS. It is now used in combination with herbicide treatments and/or considered a last resort for seasonal control of undesirable/NNIS vegetation growth.

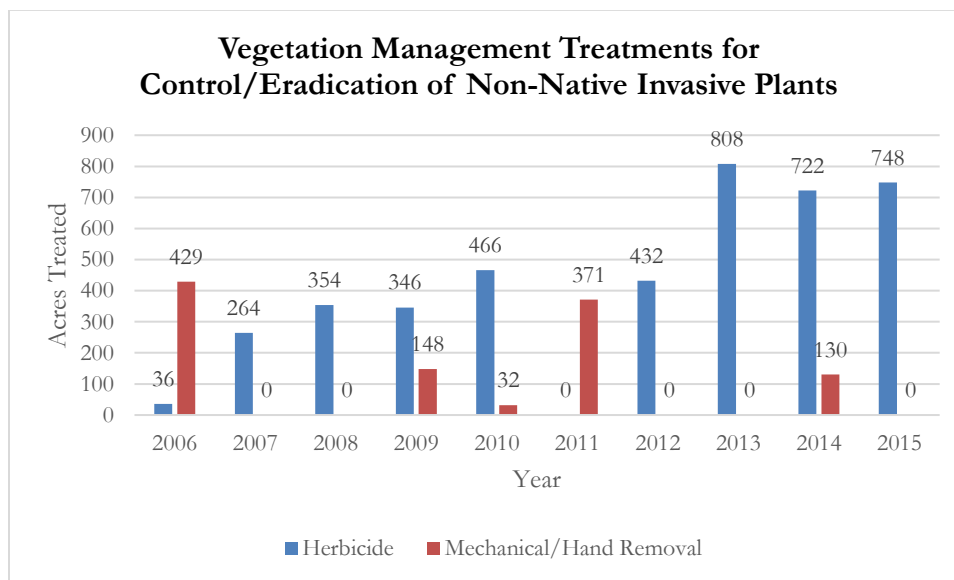


Figure 5.12: Non-native invasive species treatments 2006-2015

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The primary NNIS that we have targeted within the open land areas include:

- Autumn Olive (*Elaeagnus Umbellata*)
- Chinese Privet (*Ligustrum Sinense*)
- Japanese Privet (*Ligustrum Japonicum*)
- Loblolly Pine (*Pinus Taeda*)
- Sericea Lespedeza (*Lespedeza Cuneata*)
- Fescue (*Schedonorus Phoenix*)
- Johnson Grass (*Sorghum Halepense*)
- Pigweed (*Amaranthus Hybridus*)
- Cocklebur (*Xanthium Spinosum.*)
- Foxtail (*Setaria Sphacelata*)

In 2009 we assessed non-native species on Land Between the Lakes and completed a strategy plan that identifies risks/threats at the Forest Service Region 8 and Kentucky and Tennessee state levels for aquatic and terrestrial flora and fauna. Within this strategy, we prioritized areas for NNIS-free or controlled conditions. We completed an extensive review and analysis of pesticide use as part of the Open Lands Environmental Assessment which has resulted in lower risk and more effective use of pesticides in Land Between the Lakes for treatments such as those for NNIS. We have also implemented clean equipment clauses into our open lands contracts and requests for our agreement work to help prevent the spread of NNIS, especially in open lands where restoration has occurred.

The highest-priority areas in the 2009 Strategy for NNIS-free or controlled conditions include:

1. Threatened, Endangered and Sensitive Species locations and habitat
2. Registered State Natural Areas
3. Oak-Grassland Demonstration Areas
4. Nature Watch/Environmental Education Areas
5. Major Land Between the Lakes Road Rights-of-Way (The Trace, State Routes 68/80, Mulberry Flat, Silver Trail, and Fort Henry)
6. Energy Lake, Hillman, Piney, and Wranglers Campgrounds
7. Turkey Bay Off Highway Vehicle Area
8. Open Lands – NNIS priority as discussed and listed in the “Revised Environmental Assessment for Continued Maintenance of Open Lands”
9. Wetlands and Inland Lakes

Since implementation of our 2009 strategy, the area where we implemented the most control of NNIS remained within open land areas and facilities. This accounts for less than 0.5 percent of the total acres in Land Between the Lakes that control/eradication has been implemented Figure 5.10. Non-native plant species are a continual threat on the landscape in Land Between the Lakes. As funding and collaboration for treatment of priority areas occurs, more areas will be treated on Land Between the Lakes.

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Per our 2015 FWS 2009-B-0084 Addendum to the Biological Assessment for Wildfire and Forest Vegetation Management; Land Between the Lakes National Recreation Area, no more than 1,000 acres of herbicide treatment can occur within forested areas annually.

The Decision Notices for the Demumbers Creek (2011) and the Devils Backbone (2013) environmental assessments approved the use of herbicides for control of NNIS within forested and open forest conditions, roadsides, and edges of open lands. Within Core Areas and along the outer edge of roads that form the perimeter of the project areas, herbicides are applied along the road right-of-way where NNIS populations are located. Refer to the specific environmental assessments for a list of the NNIS found to be present in the project areas:

<http://www.landbetweenthelakes.us/stewardship/land-resource-management/projects/?forest=110860&archive=1>

As of 2015 we have not applied herbicides within the above project areas specifically for the control of NNIS. Some NNIS species such as Mimosa (*Albizia julibrissin*), Tree of Heaven (*Ailanthus altissima*), olive shrub species (*Eleagnus sp.*), privet species (*Ligustrum sp.*), and loblolly pine (*Pinus taeda*) have been treated through timber stand improvement projects, with the use of prescribed fire, mowing, and/or hack-n-squirt treatment with Imazapyr herbicide. See Forest Management and Fire Management sections for discussion on Vegetation Treatments. We have also treated loblolly pine as part of implementing Decision Memos for the Hurricane Creek, Jenny Ridge, and John Wayne Salvage sale areas. We identified kudzu populations on the borders of open lands that are not covered by environmental documentation and that require eradication. These and other high priority areas need our attention to help promote protection and enhancement of wildlife and vegetation species diversity.

Fire Ants

We began receiving reports of fire ants on Land Between the Lakes in mid-2013. We collected samples and positively identified these ants as imported fire ants, species *Solenopsis invicta* Buren, *S. richteri* Forel, or their hybrids. Imported fire ants are an invasive species that spread across the southeastern United States and can be damaging to people, pets, livestock, and native wildlife. In 2014 we increased imported fire ant monitoring efforts and collaboration with Tennessee and Kentucky State Entomology Offices. In September 2014, USDA Animal and Plant Health Inspection Service expanded the national imported fire ant quarantine area to include the Stewart County, Tennessee portion of Land Between the Lakes in an effort to slow the spread of imported fire ants.

We completed a Categorical Exclusion for the treatment of imported fire ants at designated recreation and administrative areas on May 4, 2015. We initiated an Environmental Assessment to treat imported fire ants in general forest and open lands. The Environmental Assessment is currently on hold, but is planned to be re-initiated, pending completion of other priority projects.

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Feral Hogs

The Forest Service strategy is to eradicate feral hogs wherever found. This management directive reflects the hog policies of the state wildlife agencies in Tennessee and Kentucky. Feral hogs pose a risk for spreading disease. The hogs also threaten desirable vegetation, native species habitat and forages.

Around 2004, we received our first reports of feral hog sightings on the northeastern end of Land Between the Lakes. Most reports for the next 5-6 years were from areas north of the Woodlands Nature Watch Area. Gradually we began receiving occurrence reports along the southern property boundary of Land Between the Lakes, in Tennessee. Employees and volunteers pursued most reports trying to locate hogs to capture, but with little success. The hog population on Land Between the Lakes has remained small since 2004; however, they appear to be expanding their range on the south end of the property over the past 2 years.

Hunters reported two feral hog harvests on Land Between the Lakes from Hunt Area 16 in Tennessee during 2015. There were no other reports of feral hog harvests during the last 10 years.

During 2014, the Forest Service partnered with USDA Animal and Plant Health Inspection Service, Wildlife Services (APHIS) employees to help control the feral hog population on Land Between the Lakes. During January and February of 2016, they captured and removed 10 feral hogs in the Tennessee portion of Land Between the Lakes.

The Forest Service plans to maintain an ongoing agreement with USDA Animal and Health Inspection Service for the management of feral hogs on Land Between the Lakes.

Q5.9. How is management of Land Between the Lakes affecting recovery of threatened and endangered species?

(Duplicate questions for Measures 9-10)

We continue to manage our natural resources to help provide habitats for native wildlife and for the recovery of threatened and endangered native species.

MQ5.9 Trends in Price's potato bean populations in relationship to Threatened & Endangered (T&E) Recovery.

Price's Potato Bean

The Price's potato bean (*Apios priceana*) is a federally threatened perennial vine that has been selected as a management indicator species for the recovery of this species, Figure 5.13. This species is known to occur in Kentucky on four sites, two in Lyon County and two in Trigg County, and one in Stewart County, Tennessee. The Price's potato bean is an inhabitant of open, mixed-oak forests, forest edges, and clearings on river bottoms, and ravines. The plant is unable to tolerate deep shade. On Land Between the Lakes the Price's potato bean grows in mesic (moist) to dry site types and is associated with Mississippian and Warsaw limestone outcrops. This species is also associated with calcareous boulders and several populations within its range are known to extend onto road and utility rights-of-way.



Figure 5.13: Price's Potato Bean (*Apios priceana*), federally threatened; a perennial herbaceous vine in the pea family. Shown above in foreground are the seven leaflet divided leaves and vine twining around an aster species with its very noteworthy flower clusters that bloomed on a site in Land Between the Lakes in July 2015.

Conservation measures for natural regeneration of existing populations and propagation of additional populations follow the 1993 U.S. Fish and Wildlife Service Price's Potato Bean Recovery Plan. All the populations on Land Between the Lakes are managed in coordination with the Kentucky and Tennessee U.S. Fish and Wildlife Service field offices with assistance from the Kentucky State Nature Preserves Commission, Tennessee Department of Environment and Conservation, Austin Peay State University, Murray State University, and Land Between the Lakes Association.

Permanent monitoring plots were established in 2005 and 2006 and baseline survey data was collected at all the five known locations of the Price's potato bean in Land Between the Lakes. Species found to occur at all five sites either in the canopy and/or in the shrub and herbaceous layers are listed in Figure 5.14. At the time of the surveys, the sites were in fair condition with flowering plants at two of the five sites. In 2008, in coordination with the U.S. Fish and Wildlife Service, Kentucky State Nature Preserves Commission, and the Tennessee Department of Environment and Conservation, we drafted a recovery plan for this species that included canopy

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removal. Up until 2009, the populations had become stagnant and non-flourishing due to over-story canopy shading and shrub and cane canopy competition.

Figure 5.14: Species Found to Occur at all five Price's Potato Bean Sites	
Common Name	Scientific Name
Sugar maple	<i>Acer saccharum</i>
Soft Harvest lice	<i>Agrimonia pubescens</i>
Sedge	<i>Carex sp.</i>
Shagbark hickory	<i>Carya ovata</i>
Eastern redbud	<i>Cercis canadensis</i>
Licorice bedstraw	<i>Galium circaeazans</i>
Hophornbeam or Ironwood	<i>Ostrya virginiana</i>
Virginia creeper	<i>Parthenocissus quinquefolia</i>
Grass species	<i>Poaceae family</i>
Chinquapin oak	<i>Quercus muehlenbergii</i>
Black oak	<i>Quercus velutina</i>
Coralberry	<i>Symphoricarpos orbiculatus</i>
Red or Slippery elm	<i>Ulmus rubra</i>
Violet species	<i>Viola sp.</i>
Muscadine grape	<i>Vitis rotundifolia</i>

In early spring 2009 we removed canopy trees and cut cane canopy back where it occurred on one Lyon County site and the two Trigg County sites. The shade tree removal and cane cutting was a success with flowering clusters and bean pods produced at all the Kentucky treated sites. In 2009 we collected vegetation data from all three sites where canopy removal occurred to assess vegetation changes in the forest understory. This year we counted 50 vines; 306 flowers; and 215 bean pods. Seeds from the 2009 bean pod production were planted on the sites where they were collected and again in 2011.

In early spring 2010 we removed shade trees and girdled trees greater than nine inches diameter at breast height the Lyon County, Kentucky site not treated in 2009 as well as on two Trigg County sites that were treated in 2009. The additional removal of trees on those sites treated in 2009 was as a result of the positive response of vine, flower, and bean production and per comments and coordination with U.S. Fish and Wildlife Service. Vine production, flower, and bean pod production was about the same as in 2009.

In 2011, portions of one of our Lyon County sites was under water and the other Lyon County site was very nearly so as a result of severe flooding on Land Between the Lakes. The success of the populations was poor, similar to 2010.

In early spring 2012 we removed small trees less than five inches diameter at breast height and girdled trees greater than nine inches diameter at breast height on the Tennessee site in coordination

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with the Tennessee U.S. Fish and Wildlife Service and Tennessee Department of Environment and Conservation, Division of Natural Areas staff. A severe drought occurred during the summer months and as a result of the heat stress, the vine production of the Price's potato bean was poor.

The 2013 and 2014 growing seasons were good overall, with vine, flower, and bean pod production rebounding back toward and past those observed in 2009 for vine production. Price's potato bean seeds planted in 2011 on one of the Trigg County sites were stable in 2013 and 2014.

In early spring 2014 and 2015 brush removal, cane cutting, and bucking up of downed woody trees was completed on a Trigg County, Kentucky site and the Tennessee site.

In July 2015, the Kentucky and Tennessee U.S. Fish and Wildlife Service; Tennessee Department of Environment and Conservation staff; Austin Peay State University graduate student; and a volunteer; helped us survey Price's potato bean vine and flower production. They collected vegetation data from permanent macro-plots at all known Land Between the Lakes sites. Bean pod production was assessed in August, 2015.

The 2015 growing season provided for the best production results since 2009 as vine, flower, and bean pod counts increased overall for Land Between the Lakes sites. In 2015 we counted 224 vines; 1,288 flowers, and 451 bean pods for all the known sites. One of the seeds planted in 2011 produced flower and bean pods at one of the Trigg County, Kentucky sites.

Monitoring of populations and habitat conditions will continue for all sites with implementation of the Price's Potato Bean Recovery Plan. The recovery plan for the Price's potato bean populations will be revised as needed in cooperation with our partners and based on results obtained through management, monitoring, and research.

MQ5.10. Trends in bald eagle populations in relationship to Threatened & Endangered (T&E) Recovery.

Bald Eagle

We continue to monitor winter occurrences, nesting sites, and nesting success for the bald eagle. We monitor bald eagle occurrences in partnership and coordination with the following agencies and organization: Kentucky Department of Fish and Wildlife Resources, Tennessee Wildlife Resources Agency, U.S. Fish and Wildlife Services and Friends of Land Between the Lakes.

Winter occurrences are observed through midwinter eagle surveys. These surveys are coordinated at the national level by the U.S. Army Corps of Engineers and at the state level by Kentucky Division of Fish and Wildlife Resources. During the January 2015 midwinter survey, 97 bald eagles, 75 adults and 22 immature, were counted along the shorelines of Land Between the Lakes National Recreation Area. Of these 97 eagles, 88 were observed in Kentucky and 9 in Tennessee. The ten year trend in Midwinter bald eagle populations surveyed along our shoreline is shown in Figure 5.15.

In the July 10, 2015, Kentucky Midwinter Eagle Survey Report, the Kentucky Division of Fish and Wildlife Resources avian biologist stated that early winter weather conditions in the Great Lakes region likely led to the moderate numbers of eagles recorded for the 2015 midwinter eagle survey count. Additionally, the winter weather throughout the Midwest fluctuated significantly over the

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season. The weather in December 2014 and January 2015 was quite mild with relatively low ice coverage in the Great Lakes region and in the Commonwealth of Kentucky.

Midwinter Bald Eagle Counts through aerial surveys on our shoreline									
2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
45	64	87	77	118	27	28	48	88	97

Figure 5.15: Midwinter Bald Eagle Survey Counts

Bald eagle fledgling success in Land Between the Lakes has been monitored since 1984 when the first successful nesting of bald eagles occurred in Tennessee, Figure 5.14. Since this time the number of eaglets fledged generally increased over time to the extent that in 2007 the bald eagle was federally delisted. In 1989 two eaglets were successfully fledged in Kentucky and two in Tennessee. In 2009 the number of eaglets successfully fledged was unknown due the inability to access nest sites as a result of the ice storm in January and recurring inclement weather through spring 2009. In 2010 weather related nest accessibility conditions affected monitoring of nests and the fledgling success count. In 2011, the Tennessee fledgling success count was affected by weather related nest accessibility field conditions. We suspect more eaglets are likely to have successfully fledged than were actually counted. Over the past ten years (2006-2015), the trend for the number of eaglets fledged from Land Between the Lakes nests is increasing. See Figures 5.16 and 5.17.

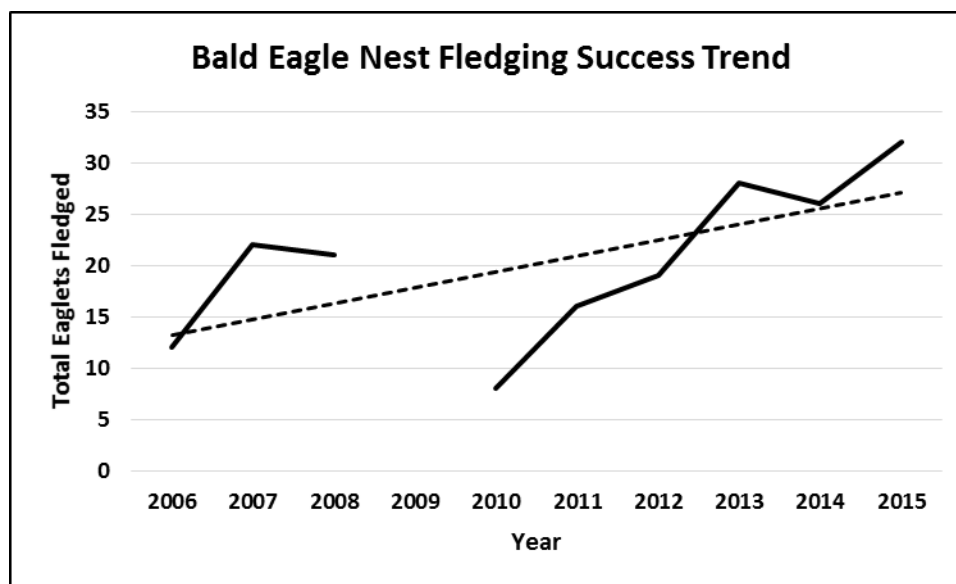


Figure 5.16: Trend in eaglets fledged 2006 to 2015.

Fiscal Year 2015

Eaglets Fledged from nests on Land Between the Lakes Monitoring began in Tennessee in 1984 and Kentucky in 1989					
Year	Totals	Year	Totals	Year	Totals
1984	1	1998	5	2012	19
1985	1	1999	14	2013	28
1986	0	2000	18	2014	26
1987	2	2001*	7	2015	32
1988	2	2002	15		
1989	4	2003	20		
1990	4	2004	14		
1991	4	2005	16		
1992	2	2006	12		
1993	4	2007	22		
		Species Delisted			
1994	6	2008	21		
1995	4	2009**	Unknown		
1996	6	2010**	8		
1997	4	2011***	16		
Total Eaglets Fledged:					337
* 2001: Transfer to Forest Service; insufficient staff to monitor nests					
** 2009 and 2010: weather related events diminished ability to monitor nest sites and assess fledging success					
*** 2011: LBL TN only one nest monitored for fledgling success					

Figure 5.17: Table of eaglets fledged since 1984

Q5.11. How is management of LBL affecting demand for wildlife-related recreation?

Land Between the Lakes remains a destination for wildlife-related recreation. See the tracking in Goal 7 for participation in hunting activities on Land Between the Lakes. To answer this question, we use Management Indicator Species as the measure and various sources such as breeding bird surveys, nest box surveys, spot light surveys, and deer and turkey hunt data.

Land Between the Lakes has monitored breeding bird populations since 1993 under the Tennessee Valley Authority and transitioning in 2000 under the Forest Service. A total of 13 transects, sample areas, are monitored with a total of 16 points per transect. Data from the transects are compiled in the following sections to represent trends in breeding bird populations for Management Indicator Species across Land Between the Lakes.

(Duplicate questions for Measures 11-14)

Fiscal Year 2015

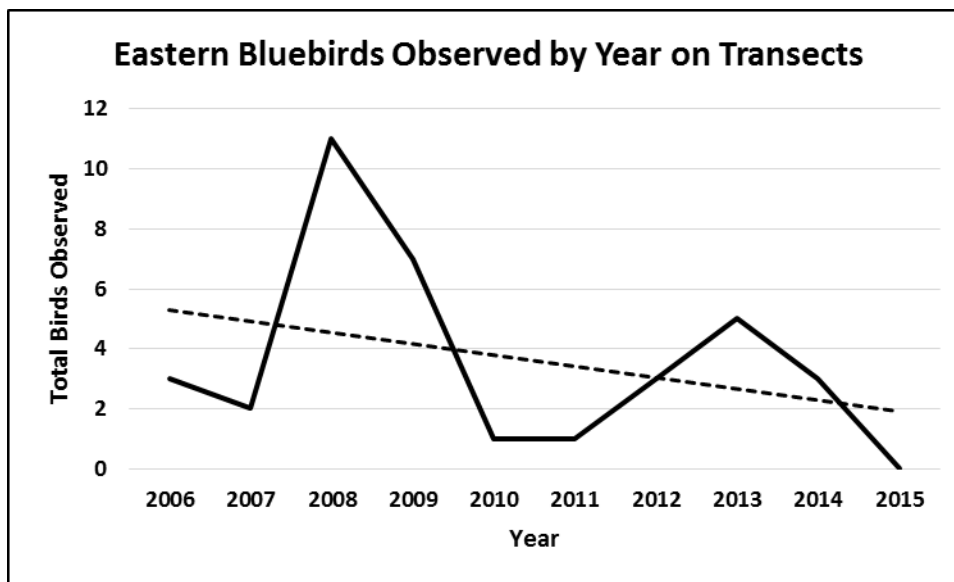
MQ5.11. Trends in Eastern bluebird populations as a Non-game Demand species.

Figure 5.18: Eastern bluebird 10 year management indicator species trend.

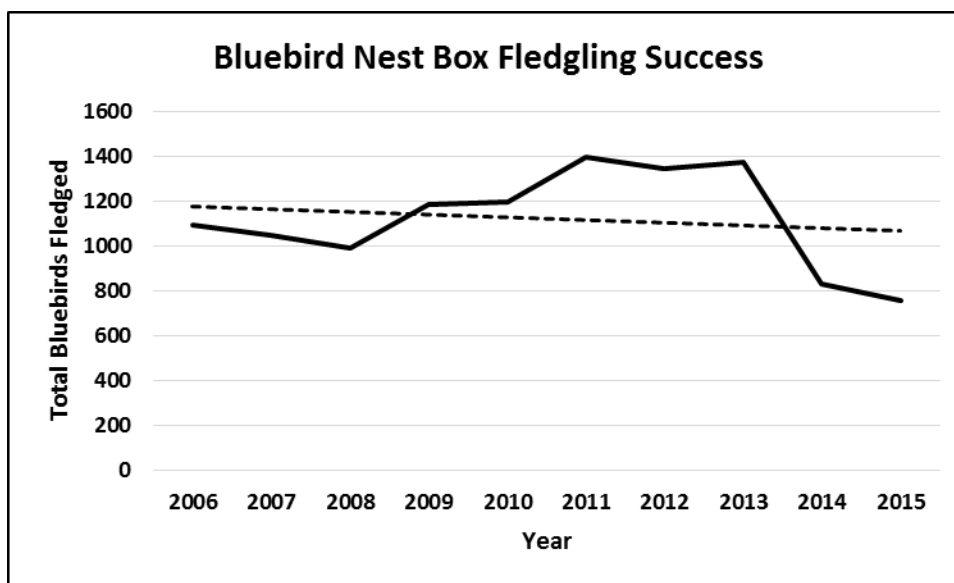


Figure 5.19: Eastern bluebird 10 year nest box fledgling success trend.

The Eastern bluebird nests in natural cavities and man-made nest boxes in open or semi open country such as in woodlands (open woods), forest edges, roadsides, and partly open forest environments with few scattered trees. We chose this Management Indicator Species to represent a watchable wildlife demand species (MQ5.11) and a species associated with snags in open forest situations (MQ5.16).

Since implementation of the Area Plan, we created habitat for the Eastern bluebird within the Franklin Creek (North) and Prior Creek (South) Oak Grassland Restoration Demonstration Areas;

within timber salvage sale areas; Demumbers Creek project area; and within open lands scattered across Land Between the Lakes. We also maintained bluebird nest boxes across Land Between the Lakes to support breeding bird populations of this species.

Bluebird habitat is poorly represented over most of the breeding bird transect areas surveyed and therefore are not the best reflection of bluebird populations across Land Between the Lakes at this time, Figure 18. Therefore to supplement this monitoring effort we consider the fledgling success from the bluebird nest boxes, Figure 19. In 2006 to 2009 we monitored 165 nest boxes, in 2010 to 2014, 170 nest boxes, and in 2015, 171 nest boxes. Overall, over the past 10 years there was a nine percent trend decline observed for the breeding bird survey transects, Figure 18 and a trend decline of less than one percent in bluebird box fledged populations, Figure 19. Since the 2009 ice storm event that hit the Land Between the Lakes area, early spring flooding occurred in 2010 and 2011 and late cold winters occurred in 2014 and 2015. This weather likely effected some of the bluebird populations along the breeding bird transects and at the nest box.

Habitat conditions for this species will continue to be monitored with both survey types. There is a need to have survey points in suitable habitat for more bluebirds to be observed on breeding bird survey transect routes.

MQ5.12. Trends in white-tailed deer populations as a Demand Game species.

White-tailed deer is a species of particular interest to hunters and wildlife watchers. They use a variety of habitats ranging from closed canopy forest to croplands. White-tailed deer are primarily browsers and eat a tremendous variety of plants throughout their range.

Limited data is currently available for monitoring deer population trends on Land Between the Lakes. Trends in white-tailed deer populations are monitored primarily through harvest data. Harvest data is obtained at Land Between the Lakes hunter check stations during quota hunts, including date, hunt area, numbers, age, sex, weight, and antler measurements. When Land Between the Lakes check stations are closed, deer can be checked through state check stations or state online/telephone game checking systems. During archery seasons, deer can be checked in at Land Between the Lakes welcome stations when open, or through state online/telephone game checking systems. Data collected through these systems include date, county, and sex of harvest, but not other biological information.

In addition to a state hunting license and deer permit, archers need only to purchase an over-the-counter Land Between the Lakes hunter use permit. Currently there are no procedures in place to monitor the number of archery hunters or hunting effort. The number of quota hunt permits issued and number of permitted hunters who actually show up for the hunt (not measured as no check-in is required) influence harvest on quota hunts. A number of factors may be involved in the deer harvest trends including number of hunters and hunting effort, weather, food availability, fluctuations in deer populations, individual hunter preferences, and harvest reporting compliance.

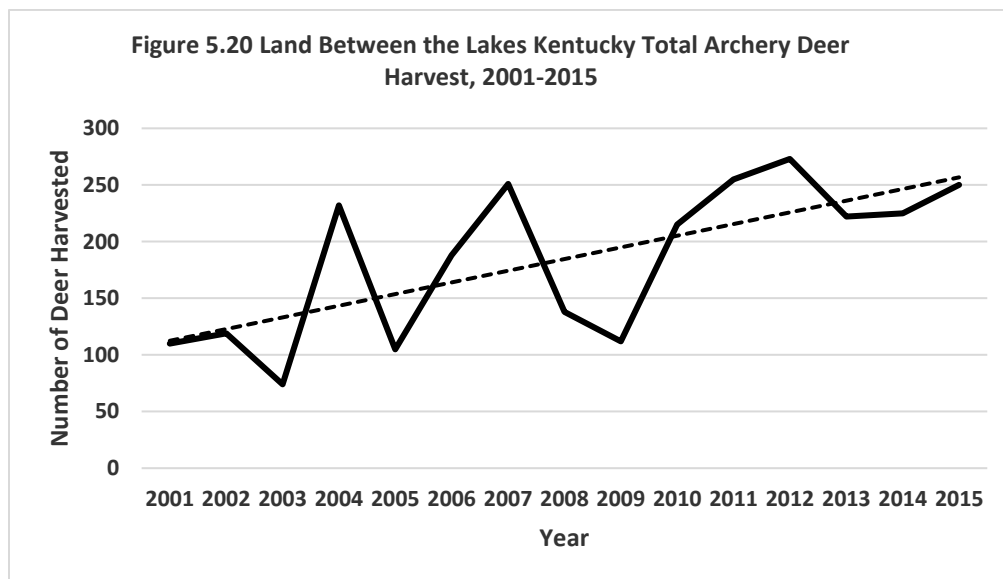
Approximately 2/3 of Land Between the Lakes is in Kentucky and 1/3 in Tennessee, with no reciprocal agreement between the two states regarding hunting on Land Between the Lakes. Therefore, the deer on Land Between the Lakes are managed as the Kentucky herd and the

Fiscal Year 2015

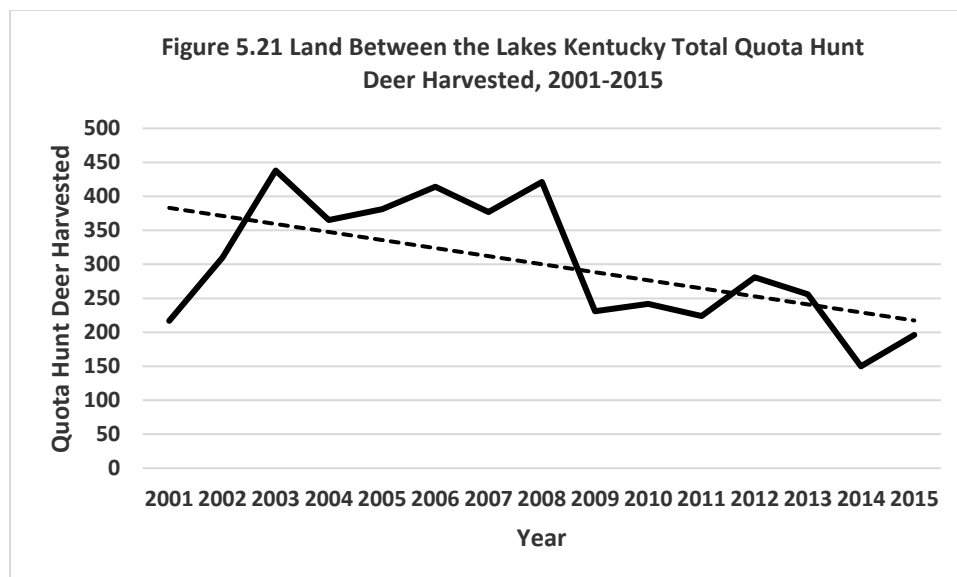
Tennessee herd, and each is subject to different regulations, pressures, and trends. Trends for deer in Kentucky and Tennessee are discussed separately below.

Trends in White-tailed deer population on the Kentucky Portion of Land Between the Lakes

From 2001 to 2015, deer harvested on the Kentucky portion of Land Between the Lakes were bonus deer, and did not count against statewide bag limits. The following graphs depict reported archery and quota hunt harvest data for the Kentucky portion of Land Between the Lakes from 2001 – 2015.



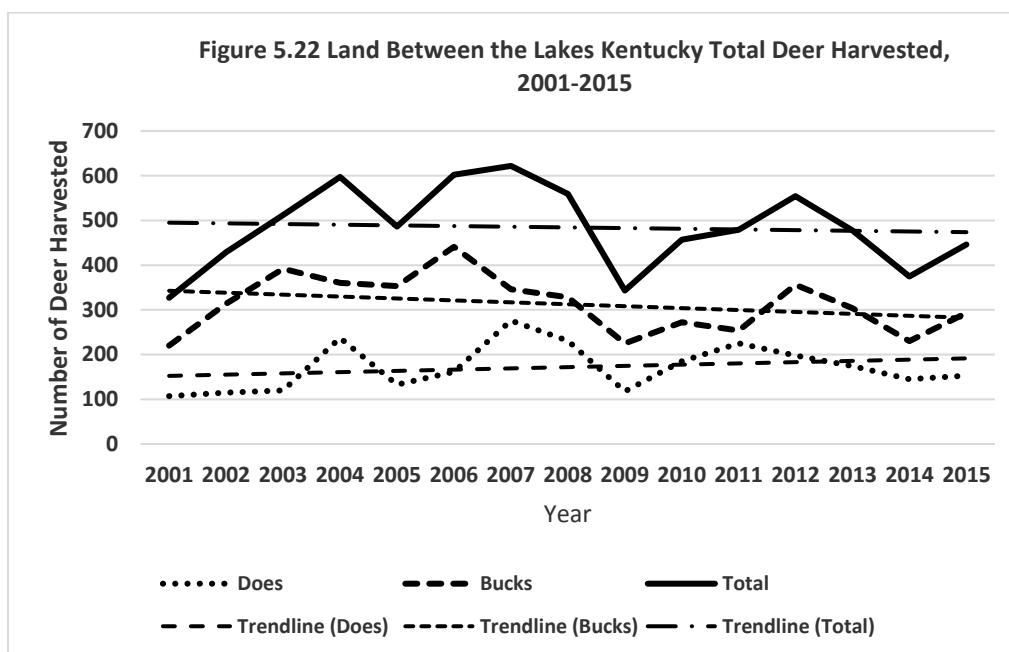
While deer harvests can vary substantially from year to year, the overall archery harvest on the Kentucky portion of Land Between the Lakes has increased during the past 15 years.



Fiscal Year 2015

While archery deer harvests have increased, there has been a corresponding decrease in the number of deer harvested on quota hunts.

In 2007 there was a large-scale outbreak of Epizootic Hemorrhagic Disease in North America including Land Between the Lakes, Kentucky and Tennessee, followed by a severe ice storm on the Kentucky portion of Land Between the Lakes in January of 2009. As a result of a downward trend in deer harvest numbers at that time, the number of quota deer hunt permits on the Kentucky portion of Land Between the Lakes was reduced beginning in fall of 2009. Additionally, there has been a steady decrease in the number of youth quota deer hunt applicants and permits issued.



The combined total reported harvest data for archery and quota hunts on the Kentucky portion of LBL shows a relatively flat trend in the number of deer harvested from 2001 to 2015. There was a small decrease in the number of bucks harvested and corresponding increase in the number of does.

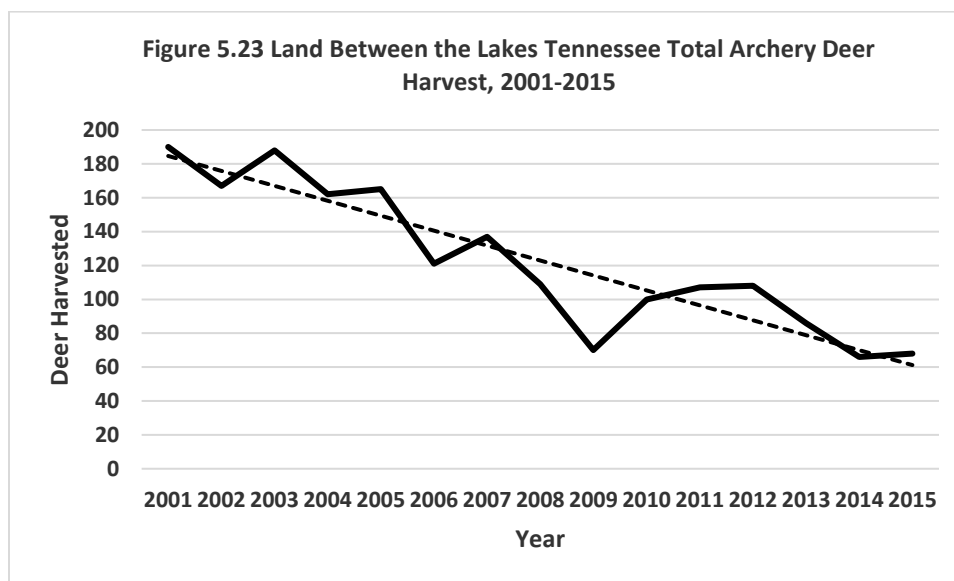
While total reported harvest data shows a level trend, incidental reports from hunters in the field and at check stations indicate growing hunter dissatisfaction with the number of deer observed and lack of deer sign they are finding on the Kentucky portion of Land Between the Lakes. We are seeing fewer deer than in the past, and deer/auto collisions are also down. Based on these factors, the deer population on the Kentucky portion of Land Between the Lakes appears to be in decline.

In addition to harvest data, Land Between the Lakes began conducting deer infrared surveys on the Kentucky portion of Land Between the Lakes in 2011 as staff time permitted. The data and methods require additional analyses and refinement to provide reliable information.

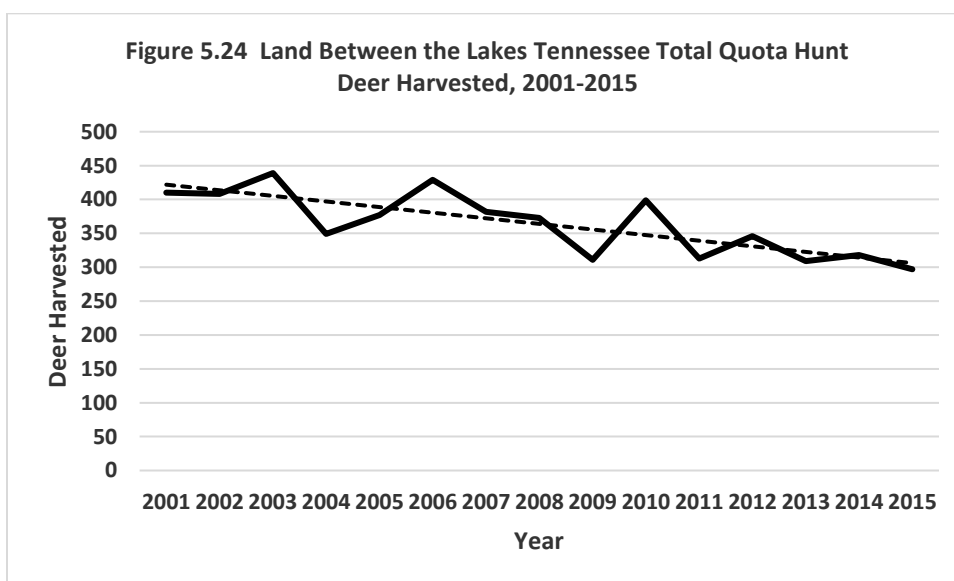
Fiscal Year 2015

Trends in White-tailed deer population on the Tennessee Portion of Land Between the Lakes

From 2001 to 2015, deer harvested on the Tennessee portion of Land Between the Lakes were bonus deer, and did not count against statewide bag limits. The following graphs depict reported archery and quota hunt harvest data for the Tennessee portion of Land Between the Lakes from 2001 – 2015.



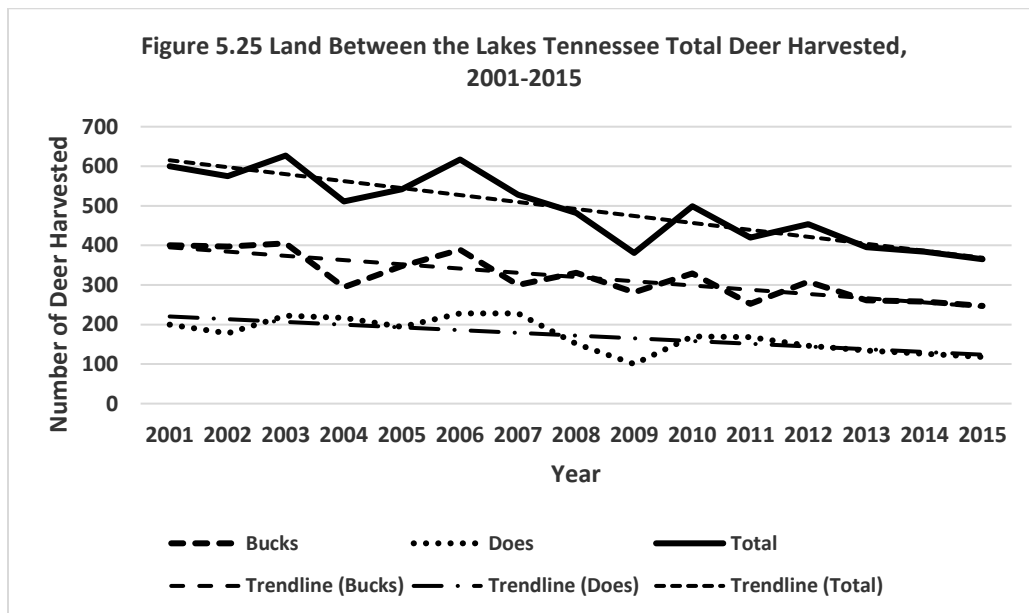
While deer harvests can vary substantially from year to year, the overall trend for archery harvest on the Tennessee portion of LBL has decreased during the past 15 years. We have observed that the amount of archery hunting pressure on the Tennessee portion of Land Between the Lakes has appeared to be relatively consistent over the past several years.



Fiscal Year 2015

The number of deer harvested on quota hunts has decreased since 2001. The number of quota deer hunt permits on the Tennessee portion of Land Between the Lakes has remained consistent during the 15 year period except for decreasing numbers of youth hunters.

While both state portions were affected by Epizootic Hemorrhagic Disease in 2007, the Tennessee portion was not affected as much as Kentucky by the ice storm, and data indicated the Land Between the Lakes Tennessee deer herd was at a higher population density, so the number of quota hunt permits was not reduced at that time as they were in the Kentucky portion.



The combined total harvest data for archery and quota hunts on the Tennessee portion of Land Between the Lakes show a declining trend in the number of deer harvested from 2001 to 2015.

Incidental reports from hunters in the field and at check stations indicate gradually growing hunter dissatisfaction with the number of deer observed and fewer mature bucks on the Tennessee portion of Land Between the Lakes. We are seeing more deer on the Tennessee portion of LBL than on the Kentucky portion, but are not seeing the number of deer as in the past, and deer/auto collisions are down. Based on all these factors combined, the deer population on the Tennessee portion of Land Between the Lakes appears to be decreasing.

In addition to harvest data, we began conducting deer infrared surveys on the Tennessee portion of Land Between the Lakes in 2010 as staff time permitted. The data and methods require additional analyses and refinement to provide reliable information.

Fiscal Year 2015

Trends in White-tailed deer population in relation to the 2004 Area Plan

The 2004 Area Plan projected increases in the Land Between the Lakes deer population over time for the adopted alternative due to higher levels of vegetation management and prescribed burning. The cumulative number of acres expected to be treated by 2015 has not been achieved. This is discussed in the timber sections of Goal 5 in this report.

In addition to not achieving the management acres, additional factors have also likely contributed to deer declines in recent years. These include outbreaks of Epizootic Hemorrhagic Disease, increased archery hunting pressure especially on the Kentucky portion, coyote predation, and decreased harvest reporting compliance. Land Between the Lakes staff in cooperation with the Kentucky Department of Fish and Wildlife Resources and Tennessee Wildlife Resources Agency plan to conduct a herd health assessment during summer of 2016, and work cooperatively to more closely monitor Land Between the Lakes' deer herd and hunting in future years.

MQ5.13. Trends in Eastern wild turkey populations as a Demand Game species

The Eastern wild turkey occupies a wide range of habitats, with diversified habitats providing optimum conditions. Mast producing stands are crucial during the fall and winter. Shrubby areas provide overhead cover and soft mast. Mixed herbaceous areas with native warm season grasses provide key nesting and brood cover. Agricultural areas can provide additional food and brood rearing habitat.

Populations of wild turkeys appear to have been relatively stable during the past 10 year period on Land Between the Lakes as shown by turkey brood survey data in Figure 5.26, and turkey harvest data in Figure 5.27. Breeding bird point counts on Land Between the Lakes are done later in the spring after turkey breeding and gobbling activity is mostly over. Therefore, data from breeding bird point counts do not provide sufficient information for turkeys and are not included here.

The Final Environmental Impact Statement for the Area Plan states that turkey populations are expected to increase moderately under selected alternative, however, an overall increase has not yet been observed. This may be due, in part, to not achieving the expected accumulated acres of habitat management.

Fiscal Year 2015

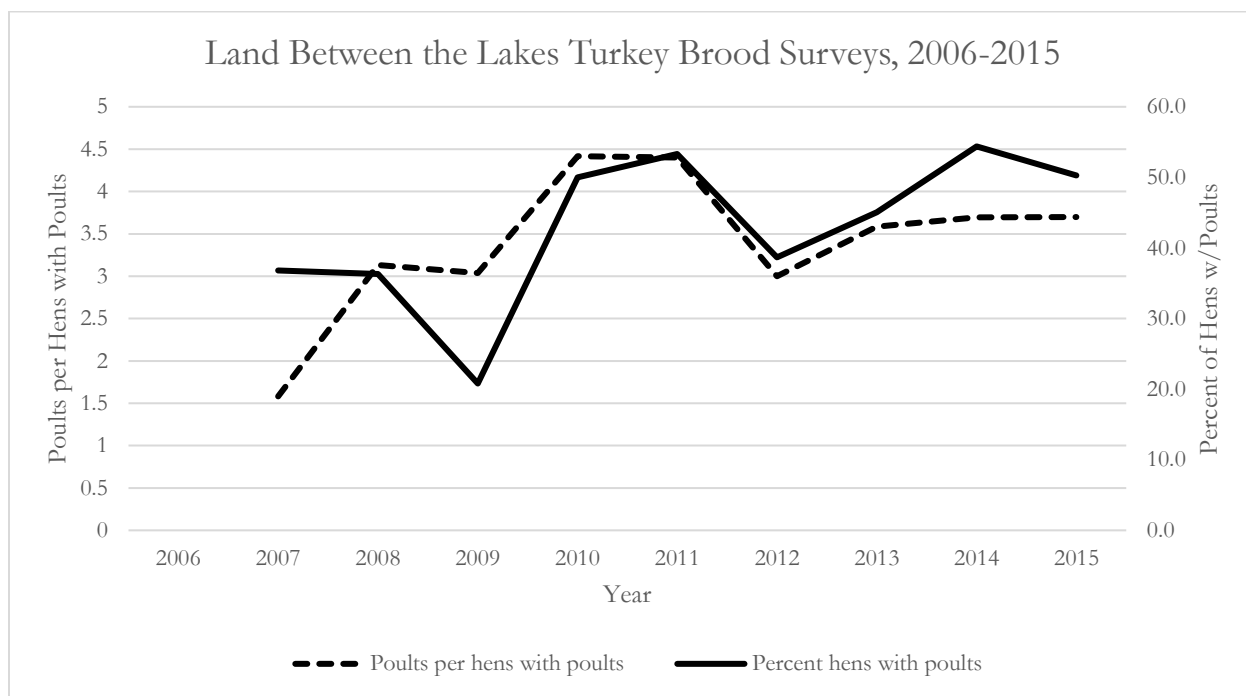


Figure 5.26: Turkey Brood Survey Data for Land Between the Lakes.

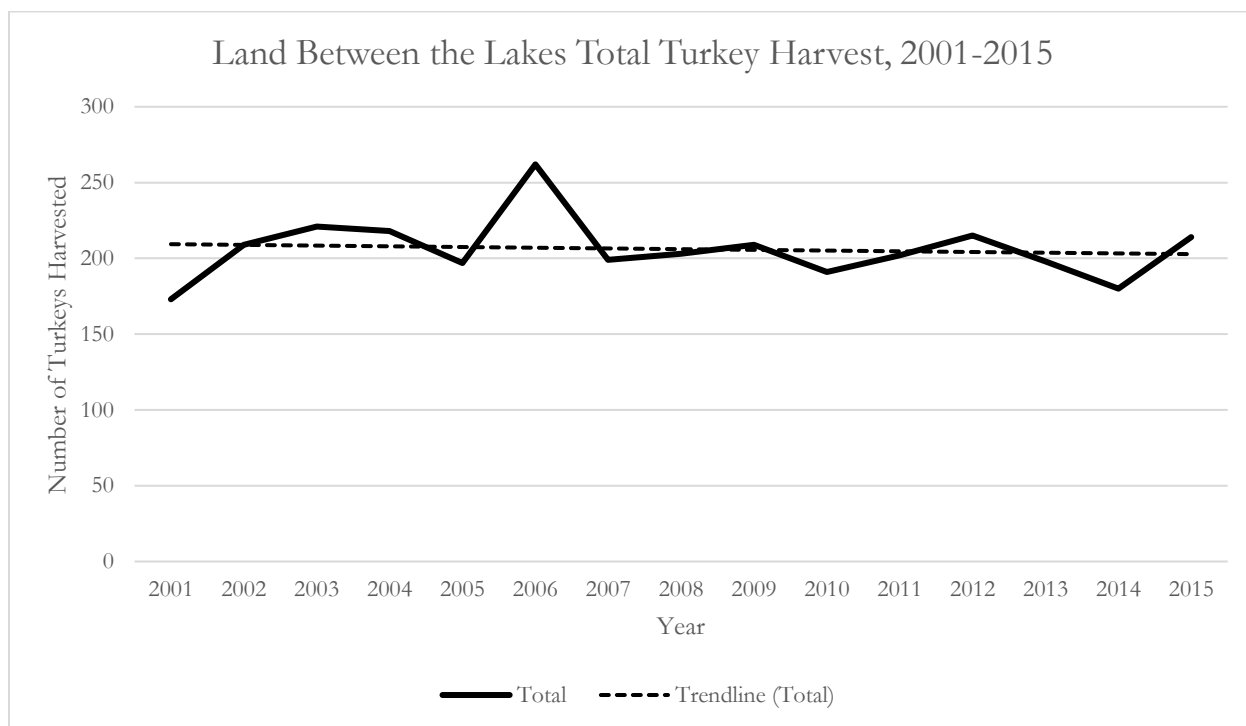


Figure 5.27: Turkey Harvest Data for Land Between the Lakes.

Fiscal Year 2015

MQ5.14. Trends in Northern bobwhite quail populations as a Demand Game species.

We chose the Northern bobwhite as a Management Indicator Species to represent habitat conditions in the grassland and cultivated community types. These communities include brushy areas and thickets, tall herbs, grasses, and saplings (e.g. old field and hedgerows bordering cropland and woodlands). Northern Bobwhite was also selected as a Demand Management Indicator Species and is a Bird of Conservation Concern. The expected population trend of northern bobwhite is dependent upon the habitat conditions present in the grassland, cultivated community types, and woodlands. The population trend for this species is expected to increase within ten years of implementing the Area Plan (Area Plan Final Environmental Impact Statement, Table 3.2.5F).

This species has not been detected by the Forest Service during point count surveys since 1998 and therefore we are unable to show a trend for the Northern bobwhite. This may be due to the unfavorable survey locations 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.

Northern bobwhite observations are currently infrequent across Land Between the Lakes. However this species has been observed over the past ten years in the following areas: in native warm season grass open lands in the northeastern part of Land Between the Lakes off of Forest Service Roads 117, 123, and 124, Wranglers campground, Elk and Bison Prairie, South Bison Range, and the South Welcome Station. This species has not been reported to occur within either of the Oak Grassland Restoration Demonstration Areas where forest canopies have been thinned and prescribed fire implemented. Quail surveys need to be considered for these type restoration areas.

Q5.15. How is management of LBL affecting special habitats and major biological communities?

Management Indicator Species survey and treatment results provide information about habitat management at Land Between the Lakes.

Breeding bird populations for Land Between the Lakes have been monitored by Tennessee Valley Authority and the Forest Service since 1993. We compiled the data from the breeding bird surveys to represent trends in breeding bird populations for Management Indicator Species across Land Between the Lakes. Some breeding bird survey points need to be established in suitable habitat for Management Indicator Species that are under-represented in the survey results.

We discussed treatments to manage habitats associated with each Management Indicator Species at the beginning of Goal 5 and in the Forest Management sections under questions 5.26-5.28. You will notice the population trends are indicative of the amount of forest management that has and has not occurred over the past 10 years.

(Duplicate questions for Measures 15-25)

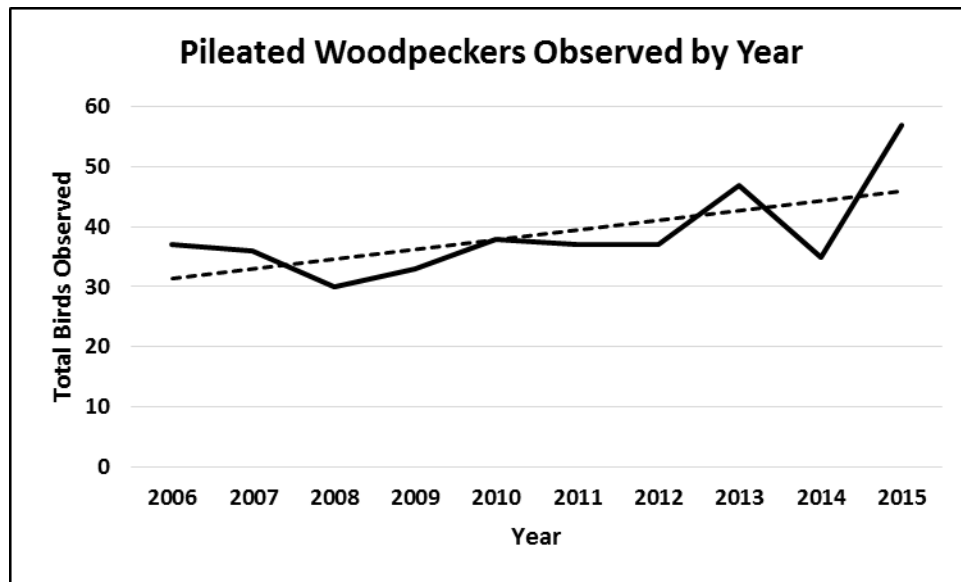
MQ5.15. Trends in pileated woodpecker populations in relationship to Snags in Forested Situations.

Figure 5.28: Pileated woodpecker 10 year management indicator species trend.

The pileated woodpecker requires large cavity trees for nesting, and forages on dead trees and downed logs across a variety of community types. The occurrence of this species may be associated with forested habitats having abundant large dead trees and fallen logs which are used by other woodpeckers, owls, and numerous other birds, mammals, and amphibians. In the Area Plan Final Environmental Impact Statement Table 3.2.7B, we predicted that populations of the pileated woodpecker would increase during the first decade of implementation. The trend for pileated woodpecker populations in Land Between the Lakes shows an increase of less than five percent over the past 10 years, Figure 5.28. In accordance with Area Plan standards, a minimum of six snags per acre were retained during timber salvage sale operations. That standard has been exceeded on timber management sale units. Heavy wind, ice storm damage, and flooding over the past 10 years may contribute to some losses of standing dead trees and creation of others. Losses and creation of snags by nature and forest management may have affected the population trend observed. We expect population trends to continue to increase or at least remain stable over the next 10 years with implementation of current Area Plan goals and standards.

MQ5.16. Trends in Eastern bluebird populations in relationship to snags in Open Forested Situations.

See discussion above under MQ5.11. Trends in Eastern bluebird populations as a Non-game Demand species.

Fiscal Year 2015

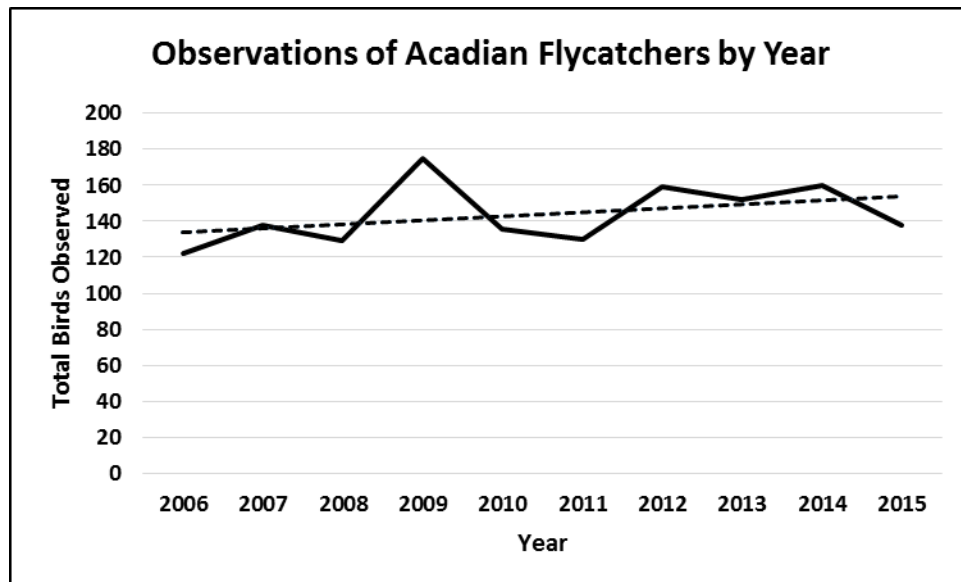
MQ5.17. Trends in Acadian flycatcher populations in relationship to Mature Riparian Forests.

Figure 5.29: Acadian flycatcher 10 year management indicator species trend.

The Acadian flycatcher favors rich deciduous forest with moderate understory. The species is also found along streams. We selected this Management Indicator Species to represent these conditions within mature riparian forest. The Area Plan Final Environmental Impact Statement Table 3.2.4U, predicted that there would be little change in Acadian flycatcher populations during the first 10 years of implementation. The trend for Acadian flycatcher populations in Land Between the Lakes shows a trend increase of less than 2 percent over the past 10 years, Figure 5.29. Since 2006, we have implemented very little forest management (i.e. tree removal acres) within mature riparian forest.

Prescribed fire has little to no effect on this species habitat due to mesic, or moist, site conditions. The growth of existing mature trees is not affected by fire. We expect population trends to continue to remain stable with little change over the next 10 years with implementation of current Area Plan goals and standards for this forest type on mesic and alluvial sites.

MQ5.18. Trends in Northern bobwhite quail populations in relationship to Grasslands.

See discussion above under MQ5.14. Trends in Northern bobwhite quail populations as a Demand Game species

Fiscal Year 2015

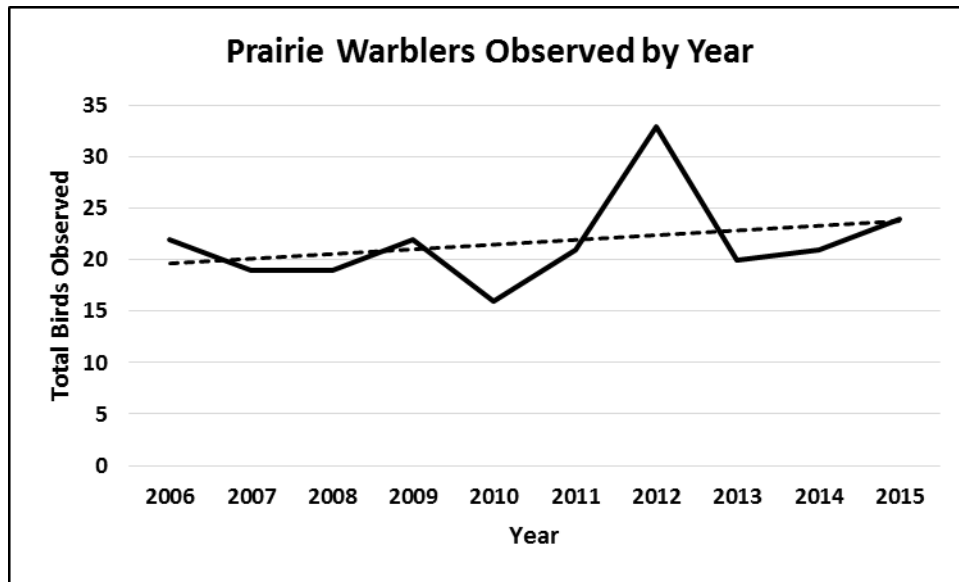
MQ5.19. Trends in prairie warbler populations in relationship to Oak Woodlands.

Figure 5.30: Prairie warbler 10 year management indicator species trend.

We selected the prairie warbler as a Management Indicator Species of oak woodlands and it is a species of conservation priority due to population declines range-wide. This range includes the Interior-Low Plateau physiographic region where Land Between the Lakes occurs. Habitat restoration efforts on Land Between the Lakes are an important contribution to increasing populations within this physiographic region. Breeding habitat requirements for the prairie warbler are saplings and shrubs, usually in open country and poor soil. Oak woodlands are considered suitable habitat for this species about five years after the area has been established. The Area Plan Final Environmental Impact Statement Table 3.2.4I, predicted that there would be small increases in prairie warbler populations during the first 10 years of implementation. The trend for prairie warbler populations in Land Between the Lakes shows a trend increase of less than 2 percent over the past 10 years, Figure 5.30.

Since implementation of the Area Plan we have created some habitat for this species within the north and south Oak Grassland Restoration Demonstration Areas; within timber salvage sale areas; Demumber's Creek project area; and through reclamation and maintenance of open lands across Land Between the Lakes. Because it can take upwards of five years after management to achieve suitable habitat conditions for prairie warbler populations, we are just now beginning to see the results of our management activities that benefit this species. The Oak Grassland Demonstration Areas and additional open forest canopy conditions created within the General Forest Prescription Area will continue to be managed for conditions that benefit the prairie warbler. We expect population trends for the prairie warbler to continue to increase with implementation of current Area Plan goals.

Fiscal Year 2015

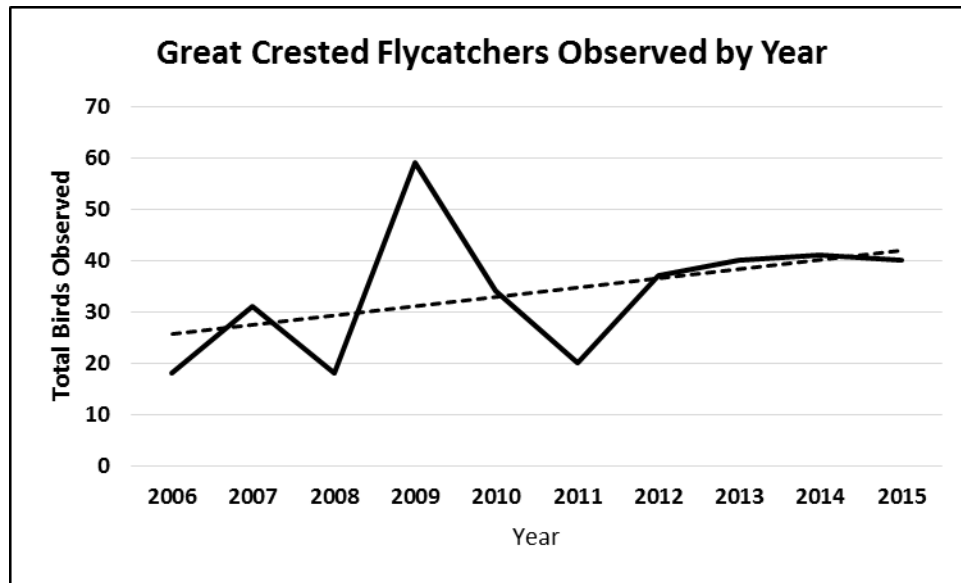
MQ5.20. Trends in Great-crested Flycatcher populations in relationship to Mature Open Oak Forest.

Figure 5.31: Great crested flycatcher 10 year management indicator species trend.

We selected the great-crested flycatcher as a Management Indicator Species of mature open oak forest conditions in oak forest types. Key breeding requirements of this species includes somewhat open forests with suitable tree cavities for nesting. The Area Plan FEIS Table 3.2.4K predicted that there would an increase in great-crested flycatcher populations during the first 10 years of implementation. The trend for great-crested flycatcher populations in Land Between the Lakes shows an increase of almost five percent over the past 10 years, Figure 5.31.

Since implementation of the Area Plan there has been an overall increase in the distribution of this species across Land Between the Lakes. Part of the increase may be attributed to creation of habitat conditions from forest management activities and natural processes. With implementation of the current Area Plan goals, we expect the great-crested flycatcher population trend to continue to increase.

Fiscal Year 2015

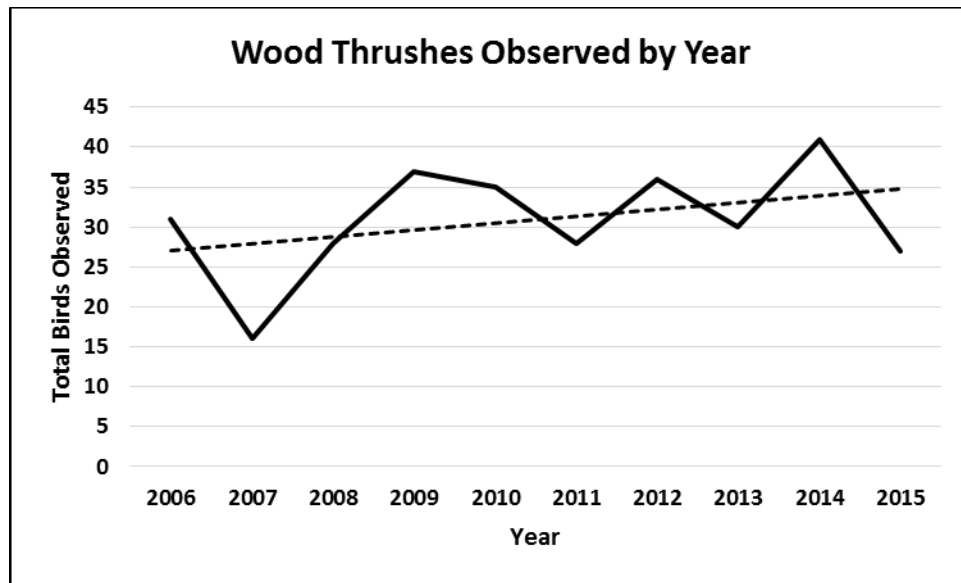
MQ5.21. Trends in wood thrush populations in relationship to Mesophytic and Riparian Forests with Canopy Gaps and Mature Forest Interior.

Figure 5.32: Wood thrush 10 year management indicator species trend.

We selected the wood thrush as a Management Indicator Species to help indicate the effects of management on mesophytic forests. The wood thrush favors deciduous or mixed forest with a fairly well-developed deciduous understory, especially where moist. In addition, this species is useful 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 parasitism.

The Area Plan Final Environmental Impact Statement Table 3.2.4P and 3.2.4.V predicted that there would be an increase in wood thrush populations during the first 10 years of implementing the Area Plan. The trend for wood thrush populations in Land Between the Lakes shows an increase of less than five percent over the past 10 years, Figure 5.32.

There has been minimal management done within mesophytic and riparian forests during the past five years. With implementation of the current Area Plan goals, we expect the wood thrush population trend to remain stable with little change.

MQ5.22. Trends in Eastern meadowlark populations in relationship to Grassland.

We selected the Eastern meadowlark as a Management Indicator Species to represent conditions associated with short to medium height grasses of the grassland community. The Eastern meadowlark favors somewhat taller grasses for nesting rather than foraging habitat. This species nests on the ground in concealing grasses; will avoid recently burned grassland habitats; is not sensitive to the density of grass cover; and will use open woodlands with grassy understory.

Fiscal Year 2015

Since implementation of the Area Plan, approximately 4,136 acres of woodland habitat has been created, none of which is currently suitable habitat for the Eastern meadowlark due to the lack of this species habitat requirements. We currently have approximately 3,000 acres in grassland habitat scattered in permanent open land types across Land Between the Lakes. This species is inadequately represented in Land Between the Lakes due to its limited distribution and low frequency of occurrence during breeding bird surveys (only observed in 1994 and 1995). In assessing the habitat conditions for the existing points, we will need to establish new breeding bird survey locations in areas such as permanent open lands to better reflect population trends for this species on Land Between the Lakes in the future.

MQ5.23. Trends in Yellow-breasted chat populations in relationship to All Forest Type Regeneration.

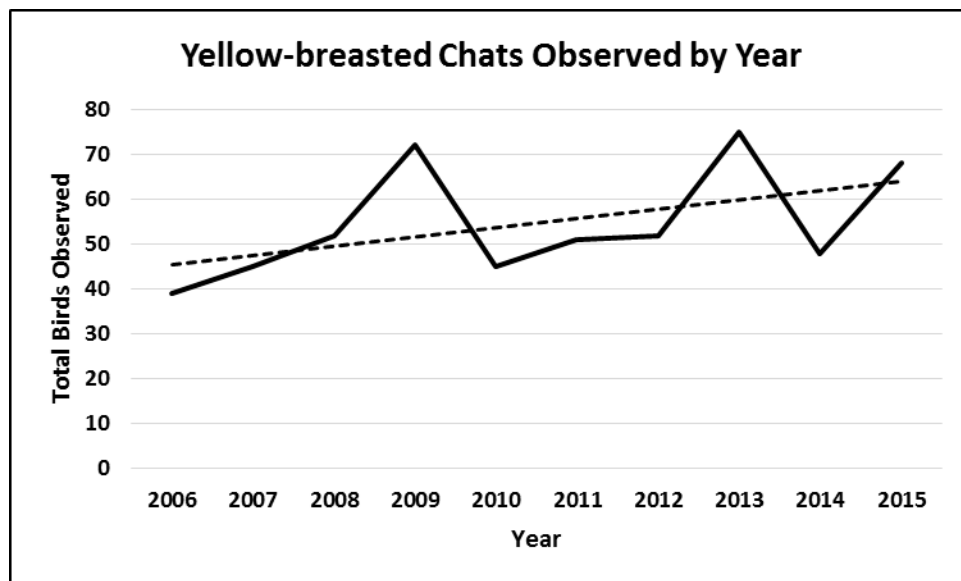


Figure 5.33: Yellow-breasted chat 10 year management indicator species trend.

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. We selected this species as a Management Indicator Species of forest regeneration. The Area Plan FEIS Table 3.2.7F predicted that there would be a large increase in yellow-breasted chat populations during the first 10 years of implementation. The trend for yellow-breasted chat populations in Land Between the Lakes shows an increase of less than five percent over the past 10 years, Figure 5.33.

Since implementation of the Area Plan, we have created 1,559 acres in forest regeneration. We have also maintained early successional old fields habitat, grass, forb, young trees/shrubs, in permanent fields and with implementation of riparian corridors. With implementation of the current Area Plan goals, we expect the yellow-breasted chat trend to continue to increase gradually or at least remain stable over the next 10 years.

MQ5.24. Trends in composition of aquatic communities dependent on clear water and stable channels.

Before the Area Plan was developed, the Forest Service Center for Aquatic Technology Transfer performed a survey of streams in Land Between the Lakes. This report, titled “Assessment of Stream Habitat, Fish, Macroinvertebrates, Sediment, and Water Chemistry for Eleven Streams in Land Between the Lakes National Recreation Area, Kentucky and Tennessee (2002)” provides useful data about aquatic species habitat quality in the streams. Find the report online at http://srs.fs.usda.gov/catt/pdf/ky/2002_ky_catt_report.pdf.

No comprehensive monitoring of streams occurred since then so ten year trends are not addressed in this monitoring and evaluation report.

MQ5.25. Trends in bat population levels.

Murray State University, under an agreement with Land Between the Lakes, conducted a bat survey in 2015. Data analysis and final results are not complete at the time of this writing. We present preliminary information here.

Area-wide surveys for bats have occurred every five years, after an initial 3-year baseline survey using mist-nets in 1993-1995. Project-specific surveys have also been conducted. The following ten species have been captured on the recreation area: gray bat, eastern red bat, tri-colored bat, formerly eastern pipistrelle, evening bat, little brown bat, northern long-eared bat, big brown bat, hoary bat, silver-haired bat, and southeastern myotis. Gray bats are the only endangered species that have been captured on Land Between the Lakes. In 2015, the first individual of the southeastern myotis, a Regional Forester’s Sensitive Species, was captured on Land Between the Lakes. The recreation area contains habitat for Indiana bats, a federally endangered species, and Rafinesque’s big-eared bats a Regional Forester Sensitive Species, but these species have not been captured.

Emerging technology for sampling bats involves the use of acoustic sensing equipment that detects and records bat calls in flight. The recordings are run through various analysis programs to identify species of bats. This technology is still being developed as some species are very difficult to identify and/or distinguish from other species with similar calls. Beginning in 2000, acoustical surveys have become part of 5-year bat surveys at Land Between the Lakes, and in 2010 were the only surveys conducted.

For 2015, Murray State University conducted mist netting and acoustical surveys on Land Between the Lakes. Species and abundance of bats were compared to historical data. 2015 mist net surveys indicated eight of the nine species of bats historically captured on the recreation area were captured in 2015. The capture rate for bats was reduced compared to 2005 mist net surveys, especially White Nose Syndrome susceptible species. The decline of these species is consistent with the decline across Kentucky since the emergence of White Nose Syndrome in Kentucky in 2011.

Three bat species were widely distributed on Land Between the Lakes, but most species occurred at relatively low abundance. Murray State University continues analyses of the 2015 data and limited bat monitoring on the recreation area in 2016. Additional information will be available when the

2015 bat survey report is completed, and will be reported in the next monitoring and evaluation report.

Q5.26. Is the forest less likely to be affected by insects, disease, and wildfire?

(Duplicate questions for Measures 26-28)

Land Between the Lakes and our partners actively manage and monitor the forest. The treatments described here in Goal 5 lead to a resilient forest to better withstand impacts from insects, disease, and wildfire. Refer to the table and pie chart at the beginning of this section for treated acres and percentages about the management over the last ten years.

MQ5.26 Trends in early, mid, and late-successional forests by prescription group.

Land Between the Lakes forest conditions are continuing to trend toward an increasingly amount of middle to late successional forest within our general forest and core area prescriptions groups. The mature closed canopy structure remains the dominate structure type despite our implementation of projects. Over the last 10 years Land Between the Lakes has treated 3% of the forested landscape. Our current trend in early successional forests is less than the Area Plan desired condition. To date we have only created 237 acres of this habitat and these acres will transition into young forest conditions in a few years. Most of our thinning efforts have been working towards the late successional forests. Timber sale activity throughout the unit is working toward the goals established in the area plan.

Overall at Land Between the Lakes, mature closed oak forest across all site types still remains the dominant structure type, at 55%. Reductions in mature closed canopy structure types on xeric, dry, dry-mesic, and mesic sites have contributed to increases in mature woodland (3%), open mature (12%), and mature forest with canopy gaps (1%) structure types. This is true for both oak and mesophytic forest communities.



Figure 5.34 Marked Unit in the South Oak Grassland Demonstration Area Before and After Harvest

Riparian and shortleaf pine forest represent a smaller percentage, roughly 15% of Land Between the Lakes and have shown little to no change. Treatments conducted in Devils Backbone and the

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Demumber's Project Areas are working toward an increase in shortleaf pine restoration. Natural and artificial regeneration are occurring and surveys show favorable seedling survival in these areas.

In summary, regenerating forests across all forest communities have decreased in acreage. This is a direct result of the forest at Land Between the Lakes aging into middle age and mature structure types. The amount of treatments implemented to create regenerating forest structure type over the past ten years has not equaled the amount of regenerating forest advancing into the young forest structure type. Land Between the Lakes did not achieve the 10-year objectives for regenerating and young forest. See Figures 5.7 and 5.8 near the beginning of the Goal 5 discussion for the amount of each structure type on Land Between the Lakes.

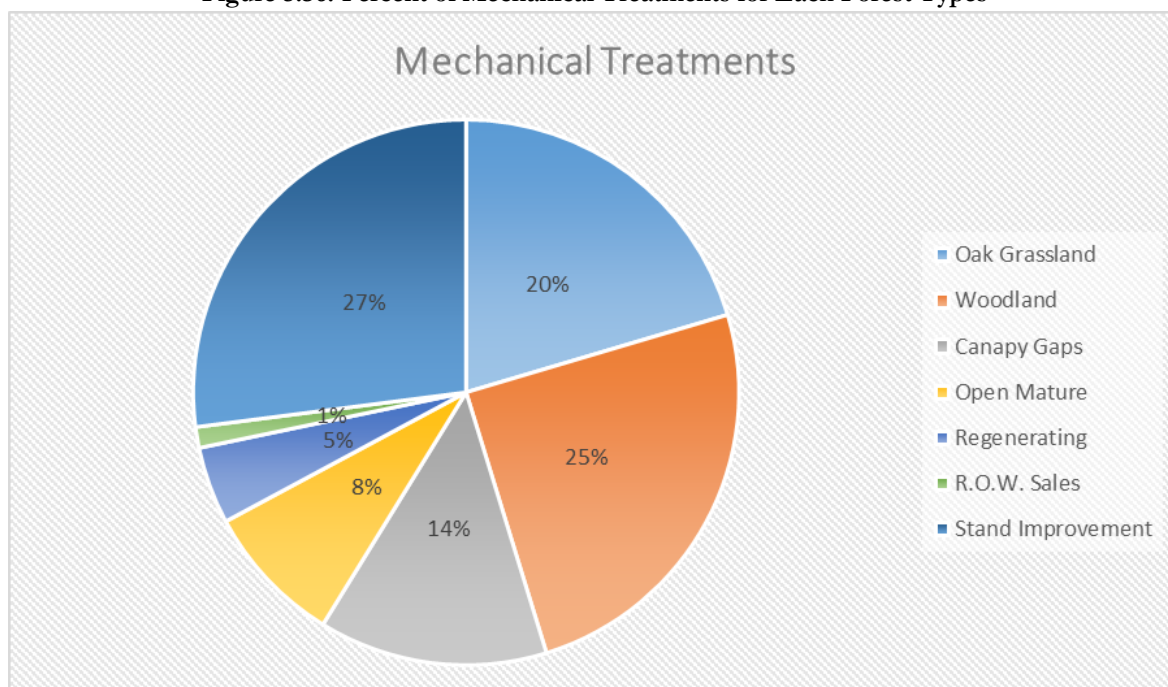
Figure 5.35: Natural Regeneration after Prescribed Burn in Devils Backbone and Shortleaf Planting in Willow Bay.



MQ5.27. Trends in species diversity, structural diversity, age class, and stocking levels.

Overall, the trend of an increase in the amount of middle to late successional forest conditions continues in the general forest and core areas. This means the predominantly oak forest will continue moving closer to maturity and will be predisposed to stresses, such as insects, and disease 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 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. Early successional forests are more able to recover from catastrophic weather events such as tornados, ice storms, and other natural events.

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Figure 5.36: Percent of Mechanical Treatments for Each Forest Types

Over the past 10 years the majority of focus on forest management projects have been on mature forest conditions. See Figures 5.7 and 5.8 at the beginning of this section and the map of timber treatments on the internet at <http://www.landbetweenthelakes.us/wp-content/uploads/2015/02/Land-Between-The-Lakes-Timber-Treatments.pdf>. Land Between the Lakes has contracted approximately 3,800 acres of commercial timber sales to meet the objectives of the Area Plan. In addition to those acres, 1,400 acres were treated with cut and leave stand improvement to meet mature forest conditions as well. The percent of acres treated for each are shown in Figure 5.36. These areas have been located throughout Land Between the Lakes depending on the resource needs. No new timber sale contracts or stand improvement contracts were awarded in FY 15 because we focused on our collaborative efforts with the public.

We treated areas within the Oak Grassland Restoration Demonstration Area, Demumbers Area and started treatments within the Devil's Backbone Area. The majority of vegetation management projects started in the Oak Grassland Restoration Demonstration Area. Over 2,000 acres have been treated to meet woodland conditions. Early, middle, and late oak woodland successional conditions benefited the most which has increased the resiliency of these areas. These forests are less likely to be affected by insect, disease, and wildfire compared to areas where little to no active management occurred on Land Between the Lakes. Resiliency has been developed through a combination of forest thinning and prescribed burning; this reduced midstory and some overstory tree density, providing more resources (water, nutrients, and light) and space available for the remaining canopy trees to expand upon. Competing, undesirable, and suppressed vegetation were decreased, while the

Fiscal Year 2015

healthiest trees are now capable to grow more freely. Trees with the largest crowns, dominant canopy position, and longer lived species for the particular site type indicate good health. 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 Land Between the Lakes can be very distinctive and complex. Although species richness can be high across a variety of sites types, much of the tree diversity in the 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.

MQ5.28. Trends in native insect and disease effects.

Insects and Disease

No insect infestations in hardwood stands have been detected over the past ten years at Land Between the Lakes. Diseases associated with old age coupled with abiotic stressors such as tornadoes and ice damage are still a concern. During the past ten 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 contribute to the potential for insect and disease outbreaks. These are influencing and inciting factors, respectively, of the primary forest health concern at Land Between the Lakes: 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 Hypoxylon canker. Hypoxylon canker can be seen on many mature red oaks, particularly scarlet and blackjack oak, throughout the recreation area.

We observed rot in the upper portion of the bole from the canopies damaged by ice in the Demumbers Bay timber sale areas. These observations indicate we can expect an increasing trend with mortality of trees in untreated areas affected by the 2009 ice storm.



Figure 5.37: Rot in upper stem of ice storm damaged tree, 2009

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. Sudden oak death is new to the forests of the eastern United States. Various locations throughout Land Between the Lakes have dying white oak, red oaks and chestnut oaks occurring. This will be monitored to determine the cause of the mortality. It is a threat given the large number of oaks and other plant species that are host to the fungus (*Phytophthora ramorum*). A national sudden oak death risk/hazard map developed by the USDA Forest Service, National Forest Health Monitoring Research Unit, has Land Between the Lakes split between the high and moderate relative risk categories.

Forest Service uses stand level inventory data and random aerial reconnaissance to monitor and collect data on insects and disease at Land Between the Lakes. Stand level data collected on 34,273 acres 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 has been captured, large-scale insect and disease outbreaks have not been detected in areas inventoried over the past ten years. Insects and disease can have an effect on oak decline. The Region 8 forest health office conducted an assessment of the effect of the ice storm in 2009. The trip report, dated April 1, 2009, 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 cause concern at Land Between the Lakes. The most well-known and previously monitored insect is the gypsy moth. Currently we put out 27 Gypsy moth traps annually as a monitoring and early detection system to the occurrence of the moth. A new exotic insect of concern is the emerald ash borer. These insects, especially emerald ash borer, are of concern to the Forest Service because they are sometimes transported by human activities such as bringing

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firewood from quarantine areas on camping trips. To date no gypsy moths or emerald ash borers have been detected at Land Between the Lakes. 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 Land Between the Lakes. Yellow pine species at the recreation area 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 Land Between the Lakes, 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 Land Between the Lakes years ago were the seedlings available at the time; and, the high planting density made them susceptible to storm damage and insect outbreaks. Land Between the Lakes 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 on the recreation area 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. Land Between the Lakes is within the natural range of shortleaf pine. This species occurs at Land Between the Lakes 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 Land Between the Lakes, is a concern for insect and disease outbreaks. It currently lacks any significant numbers of 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 infestations.

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Q5.29. Has the FS made progress towards identifying old growth stands on the ground?

The amount of forest inventoried to date is helpful in determining many forest resource needs, but it is still a small percentage (20%) of the total acreage of Land Between the Lakes. In the 34,273 acres inventoried in the past 10 years we identified no old growth stands. This does not mean there is no old growth at Land Between the Lakes because many acres still need to be inventoried.

Many current and upcoming projects propose treatments which would favor stands that could eventually transition to old growth, conditions such as oak woodlands on xeric and dry sites and shortleaf pine forest. Land Between the Lakes 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. Land Between the Lakes' 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.

We may find stands of future old-growth within the minimally disturbed Core Areas. There are shortleaf pine stands in the Devil's Backbone area that meet the minimum age and diameter at breast height for old growth; however, these same stands do not meet the minimum basal area and trees per acre criteria. Stands in the Prior Creek Oak Grassland Restoration Demonstration Area and Demumbers Creek project area meet minimum basal area, diameter at breast height, 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 Land Between the Lakes. These stands are roughly 30 to 40 years away from meeting the USDA Forest Service 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 Land Between the Lakes: settlement and farming; the large scale clearing of recreation area's forest to support the iron industry from 1820-1860; and later demand for railroad and mining timbers well into the 1930s.

MQ5.29. Completed inventory of old growth stands.

The current inventory being collected at Land Between the Lakes uses the Common Stand Exams method. This data can be used to identify any potential old growth stands that may be present in inventoried areas.

In the past 10 years we have inventoried approximately 34,273 acres of forested land and no old growth stands were identified, as described above.

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Prescription Area	Years 2004-2010	Years 2010-2015	Total Acres
General Forest	9,700	15,041	24,741
Core	2,900	1,132	4,032
Oak Grassland Restoration Demonstration Area	5,500	0	5,500
All Acres	18,100	16,173	34,273

Figure 5.38: Acres of Inventoried Prescription Areas

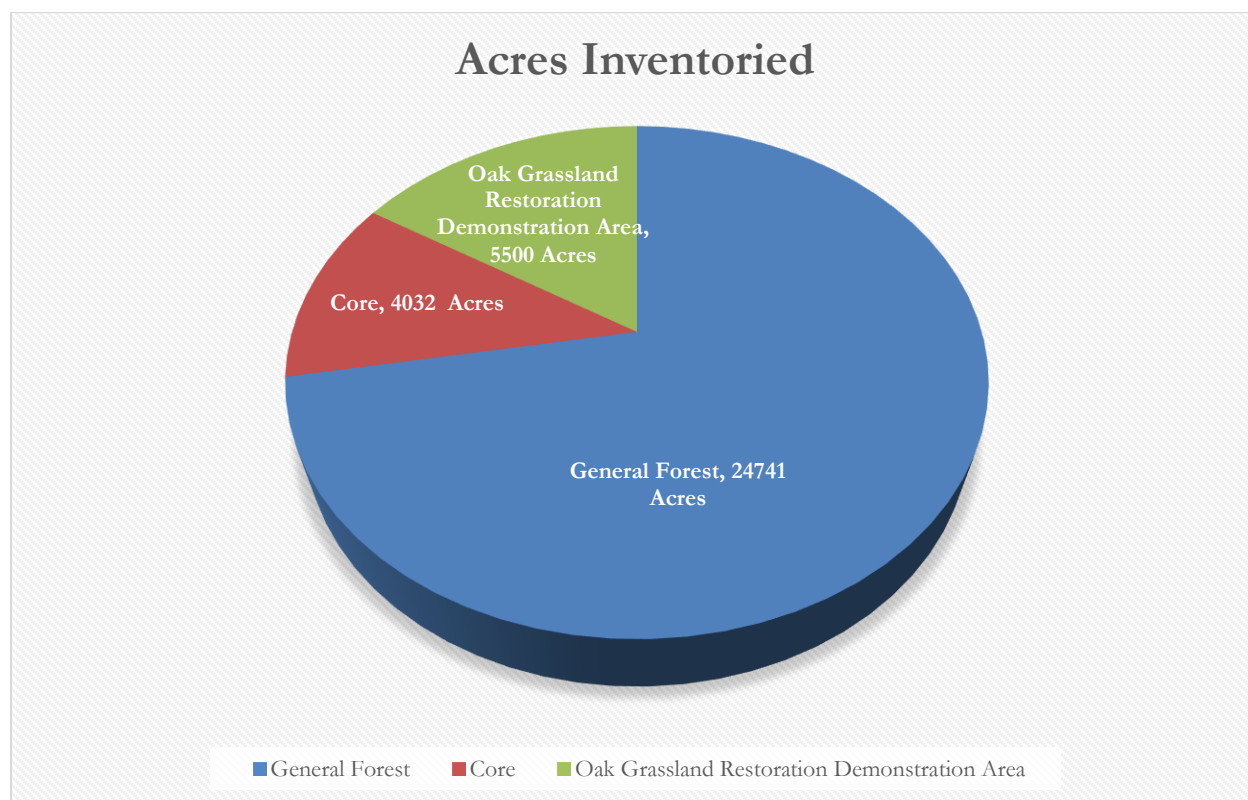


Figure 5.39: Acres Inventoried by Prescription Area

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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 led 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.

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Goal 6: Demonstrate and widely export innovative, efficient, and effective management techniques that can benefit others.

Q6.30 Has LBL produced measurable results from demonstration projects that have led to positive changes on other units?

Short History of Land Between the Lakes Demonstration Laboratory

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. This included development of a formal charter and coordinated process for project submittals, oversight, and approval. Shrinking budgets and workforce has shifted our demonstration efforts into an internal focus. In recent years we have mostly served other forest and public land units in advisory capacities or for site visits that can be completed for zero to little costs. We continue to strive to find innovative ways to reduce costs, increase visitation and improve revenue dollars internally.

M Q6.30. Trends and annual summary of accomplishments and results

Land Between the Lakes completed demonstration projects in three areas over the last ten years: trail monitoring, recreation management, and biomass utilization.

Trail Monitoring Techniques

Land Between the Lakes exported trail monitoring techniques through participation in development with San Dimas Research and Technology Development Center. Experiments for dust monitoring and remote soil moisture monitoring were conducted at Turkey Bay Off-Highway Vehicle Area. The results of the studies at Land Between the Lakes and other USDA Forest Service units were published for use in trail monitoring across the Forest Service.

“Monitoring fugitive dust emissions from off-highway vehicles travelling on unpaved roads and trails using passive samplers” Padgett, P.E., Meadows, D., Eubanks, E. et al. Environ Monit Assess (2008) 144: 93. doi:10.1007/s10661-007-9948-z

Soil Moisture Monitoring and Weather Station development - Partnership study with Missoula Technology Development Center Land Bureau of Reclamation: <http://ohv.fleetanalytics.net/>, <http://kentuckyohv.metridyne.com/>

“Remote soil monitoring for data based road closure decisions” in publication

Recreation Management

Although no specific products were exported, Land Between the Lakes advises other units in recreation management strategies. Staff provided guidance with business strategies, feasibility studies and recreation planning. The point of sale system is used to manage admissions to facilities and to track financial and visitation trends in real time. The Friends of Land Between the Lakes group shares their experiences with other forest service units researching ways to provide customer service and interpretation through partnerships.

Woody Biomass

In FY2010 we worked with Trigg and Lyon Counties to secure American Recovery and Reinvestment Act grant monies to install biomass boiler systems in the local hospital and high school. Our project partner, the National Wild Turkey Federation, provided biomass to these facilities for heat and hot water from their new biomass boiler systems.



Figure 6.1: Lyon and Trigg County Biomass Boiler Facilities

We removed damaged timber, using several sales, chipped the wood, and sent the chips to the facilities over the course of 5 years. Approximately 40,000 cubic feet, or 400 ccf, of biomass from our timber sales were chipped and hauled to the counties to help promote sustainable forestry. December of 2016 marks the end of our agreement for providing free biomass. By working with local loggers and mills, the two counties will be able to obtain biomass at market rates.

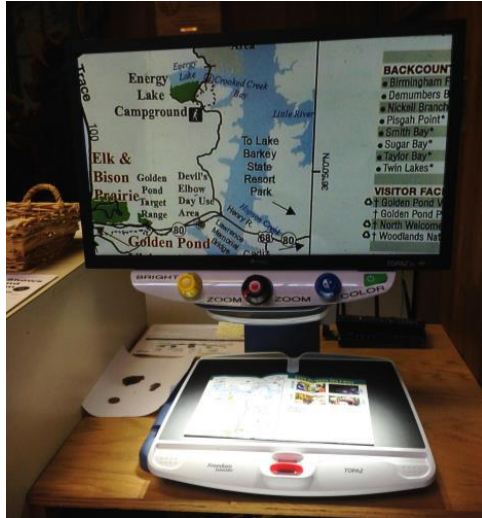


Figure 6.2: Biomass chips from vegetation management in 2009 Ice Storm affected areas

Q6.31. How many demonstration products have been exported?

Most projects completed over ten years did not yield exportable products as planned. The projects from 2015 are described followed by a list of the projects from all the fiscal years.

Fiscal Year 2015

M Q6.31. Trends and annual summary of accomplishments and results**Figure 6.3: Magnifier for Visually Impaired*****Public assistance project***

The Forest Service is participating in this pilot project with the Department of Defense. This Department of Defense public assistance funded project offers devices to improve communication between frontline staff and visitors that may have visual or hearing disabilities. Land Between the Lakes has received three different types of devices:

- Two Closed Circuit Television units that magnify literature, rocks, feathers or any object for our visually impaired guests
- Two Face-to-Face Communicators that enable better communication between individuals with hearing or speech disabilities

**Figure 6.4: Personal Listening System**

and our staff. Staff and visitors type messages to each other in real time

- Eight Personal Listening Systems that are similar to small public address systems. These devices direct sound between the speaker --wearing the transmitter and the receiver --wearing a set of headphones or neck loop wire that's capable of transmitting directly to some types of hearing aids

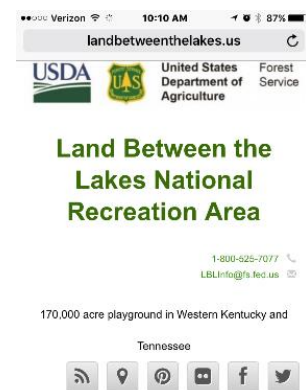
We placed the equipment at several different facilities. We monitor usage and effectiveness for our guests. We plan to request additional devices if they work well.

In the United States 54 million people have some form of disability and 85% of those disabilities are not obvious. These are just a few more ways of removing barriers allowing us to provide more “Inclusive Recreation” – where people of all abilities and ages recreate with their family and friends.

Tourism Marketing & Promotion

Over the past ten years, communicating with our visitors, stakeholders and elected officials changed dramatically. Travelers went from finding out about vacation destination sites through state travel guides and site brochures to the internet, and now to their smart phones and tablets.

Within a few short years, technology advanced exponentially. In response, we built a responsive website in 2014 that can be viewed on any platform, from anywhere, at any time. Examples of information on the website include an alerts page, online reservation system, blogs, and links to our social media sites. Our website's address repeats our name at www.landbetweenthelakes.us.

**Figure 6.5 Land Between the Lakes Website**

Fiscal Year 2015

All Demonstration Projects

Below you will see a list by fiscal year of the individual projects completed as part of this demonstration goal.

Type/Year	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	Total
Forest Service Units	2	3	3	4	6	3		1	2			3			1		1	27
Regional Office			2	3	1	2		1	1									10
Washington Office	1	1	1	4		1	2	1	2		1							14
Forest Service Training	3	2	2	4	1					1								13
Forest Service Tours and Mentor					1	1			1	1	2							6
Other Agencies	1	3		1	1	1							1	2	1	1		7
Internal									2		1		1	5		3	2	3
Totals	7	9	8	16	10	8	2	3	8	2	4	3	2	7	2	4	3	98

Figure 6.6: Number of Demonstration Projects by Year

FY2015

1. San Dimas Research and Technology Development Center – assisted with new trail monitoring publication
2. Lois Lane Project -- transitioned press releases as if written by a local news reporter; increased full coverage in traditional and digital media

FY2014

1. Demonstrated using wood pellets for biomass fuel at Trigg County Hospital and Lyon County High School
2. Introduced responsive website www.landbetweenthe lakes.us
3. Trail resurfacing – demonstrated a porous pavement system to hold aggregate in place during storm run-offs that also allows for water drainage



Fiscal Year 2015

Figure 6.7: Wrangler horse trail #4 and North/South trail with GeoPave

FY2013

1. Spring Mountains National Recreation Area – consulting and sharing of business practices
2. Valles Caldera National Preserve -- consulting and sharing of business practices; included a site visit by the Executive Director of the Friends of Land Between the Lakes to meet with management and stakeholders
3. Improved listings on third party online sites like TripAdvisor – sharing best practices in community and other forests

FY2012

1. Biomass boiler demonstration project at the Trigg County Hospital; provide wood chips for five years
2. Central Hardwoods Joint Venture -- advisor in support of helping bird populations survive and developed four general habitat types: grasslands, grass-shrublands, forest-woodlands, and wetlands
3. Differential camping fees beta test – did not adopt
4. Year round camping at Energy Lake Campground beta test – did not adopt
5. Staff electric cars in Wranglers Campground beta test – adopted
6. Golf carts usage in developed campgrounds beta test – user request -- adopted

FY2011

1. Biomass boiler demonstration project at the Lyon County High School; provide wood chips for five years
2. New Point-of-Sale system
3. Transfer of Station recommendation to Washington Office

FY 2010

1. Biomass mid-story removal contract
2. Biomass wood harvest sale
3. Outfitter/guide capacity study

FY 2009

1. Digital Radio System Test
2. Region 9: Stewardship Program Consultation
3. Washington Office: Local Unit Reservation using Point of Sale Methodology
4. Green Mountain Interpretive Association Consultation and Mentoring

FY 2008

1. San Dimas All-Terrain Vehicle Study
2. North Carolina Consultation/Mentoring Visit

FY 2007

1. Washington Office: Office of Regulatory and Management Services Test
2. Region 8: Fire Learning Network Expansion
3. Washington Office: Forest Plan Monitoring & Evaluation Prototypes
4. Dakota Prairie Grassland Marketing Plan
5. Ozark Blanchard Caves Interpretation Association and Marketing Plan

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6. Off-Highway Vehicle Dust Study
7. Joint Venture Agreements; Advance Payments to Partners
8. Friends of Cherokee Consultation

FY 2006

1. Florida Recreation Plan
2. ATV Disk/seed spreaders for food plots
3. Regional Office: ATV EcoTourism Guidebook Client/Project

FY 2005

1. Washington Office Recreation/Heritage Resources: Policy Improvement Project – Commercial Recreation Special Permit Use – Advertising/Partnership Recognition Dave Holland
2. Washington Office: Minerals & Geology Management Internal Marketing Strategic Plan

FY 2004

1. Finger Lakes National Forest Recreation/Interpretation Improvements Feasibility Study
2. Mt. Hood National Forest, Forest Management Strategic Plan
3. Washington Office: Recreation Short Course Instructor Services Utah State and Clemson
4. Region 8: 18 Month Forest Plan Revision Demonstration
5. Region 10: Accountability through Accountability consultation
6. Chugach National Forest Logan District Conservation Education Center consultation
7. Tulsa Region Corps of Engineers – Business Techniques Training
8. Brasstown Bald Consultation/Mentoring

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Goal 7:	Enhance dispersed recreational and EE opportunities throughout LBL.
Sub-element NFS Generic Desired Condition	<p>“...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.</p> <p>“Hunting and fishing will continue to be important dispersed recreation opportunities at LBL.” [Area Plan, Vision]</p>
Example Area Plan Desired Condition Statement	<p>“Dispersed activities and opportunities will become an extension of the developed Rec/EE facilities and sites that currently exist.”</p> <p>“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]</p>
Desired Trend Statement	<p>“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]</p> <p>“An average of one to two miles of trail will be constructed annually.” [Objective 7b]</p> <p>“Complete an average of one interpretive project annually within the Nature Watch Demonstration Areas and Oak-Grassland Demonstration Areas.” [Objective 7c]</p>
Monitoring Questions	32. Have dispersed recreational and EE opportunities at LBL been enhanced? (Duplicate question for Measures 32-35)
Area Plan Performance Measures	<p>32. Trends and annual summary of accomplishments and results</p> <p>33. Backlog of facility and trail maintenance needs and trends</p> <p>34. Results and trends in user satisfaction ratings</p> <p>35. Trends in financial resources needed and available to provide recreation opportunities</p>
Data Sources Utilized	<p>--Objective accomplishments, percentage of visitation utilizing dispersed Rec/EE opportunities</p> <p>--Analysis of Infra Deferred Maintenance Report and reporting of percent change in backlog</p> <p>--Summary of visitor satisfaction surveys or personal letters and notes received; objective accomplishments, integrated projects completed</p> <p>--Analysis of incoming funds-traditional budgets and fee collections-and costs of operations, in view of needs; reports using standard tracking systems</p>
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: Enhance dispersed recreational and environmental Education opportunities throughout Land Between the Lakes.

Q7.32 Have dispersed recreational and environmental education opportunities at Land Between the Lakes been enhanced?

(Duplicate question for Measures 32-35)

Over the past years we enhanced recreational and environmental education opportunities at Land Between the Lakes. We worked through the process to obtain scenic byway designation for the Woodlands Trace. We completed an inventory of over 100 user made dispersed campsites. We began using the information from the inventory to provide dispersed opportunities while protecting the natural resources that make Land Between the Lakes a special place.

We worked closely with the users of Land Between the Lakes to develop or enhance recreation programs. In 2010 we developed backpacker registration stations at North Welcome, South Welcome, and Golden Pond Visitor Center. In 2011 we completed a comprehensive long term plan for the backcountry and lake access developed recreation areas. These serve as the hub for the dispersed recreation opportunities at Land Between the Lakes. We revised the seasonal camping program in 2011. In FY 2014, we improved customer satisfaction by offering backcountry permits and equestrian day-use permits for sale online through our reservation system. This gave customers 24/7 access to purchase permits. Our new responsive website also went live in June of 2014. Now you can access our website on any device – from desktop to smartphone. You can find our website at www.landbetweenthelakes.us.

The weather created several challenges in maintaining the recreation opportunities over the 10 years. Four high lake level events occurred, the last one in 2015, at Land Between the Lakes that required a commitment of funding and teamwork to get lakeside facilities reopened. In FY 11, three separate weather events presented challenges to providing dispersed recreation opportunities to the users of Land Between the Lakes. Thanks to a community effort of federal, state, county, and private organization and individuals, we were open for business by Memorial Day weekend in 2011. An ice storm caused extensive damage in 2009 that required a community planning effort to get the developed recreation areas open, as well as services restored to the local community. Storm responses impact the amount of planned improvements (including maintenance) because we use the same funds for both.

M Q7.32 Trends and annual summary of accomplishments and results

Summaries in each program area are described throughout this section of the report.

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M Q7.33 Backlog of facility and trail maintenance needs and trends

Over the last ten years we implemented two new maintenance contracts that allowed for greater flexibility to better meet unexpected needs such as those caused by weather and on-going maintenance requirements.

We made significant inroads into lowering the amount of backlog maintenance needs at Land Between the Lakes since 2005. In 2005 the amount of backlog deferred maintenance was \$18,476,061, adjusted for inflation to 2016 dollars. The current backlog deferred maintenance amount in 2016 is \$6,899,707, or about 37% of the 2005 amount.

An example of maintenance cost reduction occurred when we phased out the portable toilets. Land Between the Lakes replaced portable toilets in campgrounds and day use areas with 30 accessible vault toilets buildings meeting the American Disability Act criteria.

We completed several replacements, improvements, and new recreation facility projects over the last ten years. These projects improved the experiences of our visitors:

- New Courtesy Dock at Nickell Branch
- Repaved access road to Moss Creek
- Tables and pedestal grills installed at Moss Creek
- Repaved Road to Demumbers Bay
- Rehabilitated road to the Twin Lakes Boat Ramp
- Replacement well house built at North Welcome
- Repaved access road and loop road at Taylor Bay
- Replacement Gatehouse, well, and well house at Hillman Ferry
- Rehabilitated bathhouse and replacement well house at Cravens Bay
- Replacement well house, pavilion, and courtesy dock at Fenton
- Rebuilt the Golden Pond Shooting Range
- Rehabilitated the Golden Pond Archery Range
- Two replacement bathhouses and one replacement gatehouse at Energy Lake
- New dump station at Energy Lake
- New sewage system at Wranglers
- Eight Replacement bathhouses at Piney
- Replacement Outpost and gatehouse at Piney
- Replacement well house at South Welcome
- Removal of closed well houses at Boswell, Twin Lakes, Nickell Branch, Sugar Bay
- Removal of closed bathhouses at Rushing Creek
- Road and parking lot rehabilitation at Grays Landing
- Rebuilt amphitheater at Brandon Spring Group Center
- Installed new accessible ramp/deck/pergola at Woodlands Nature Station
- Rebuilt backyard structures and pens at Woodlands Nature Station
- Replaced roof of Double Pen house at The Homeplace 1850s Working Farm
- Improved facilities to meet accessibility standards
- Safety improvements in all facilities and campgrounds

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Figure 7.1: Energy Lake Campground Bathhouse



Figure 7.2: New Bathhouse at Piney Campground

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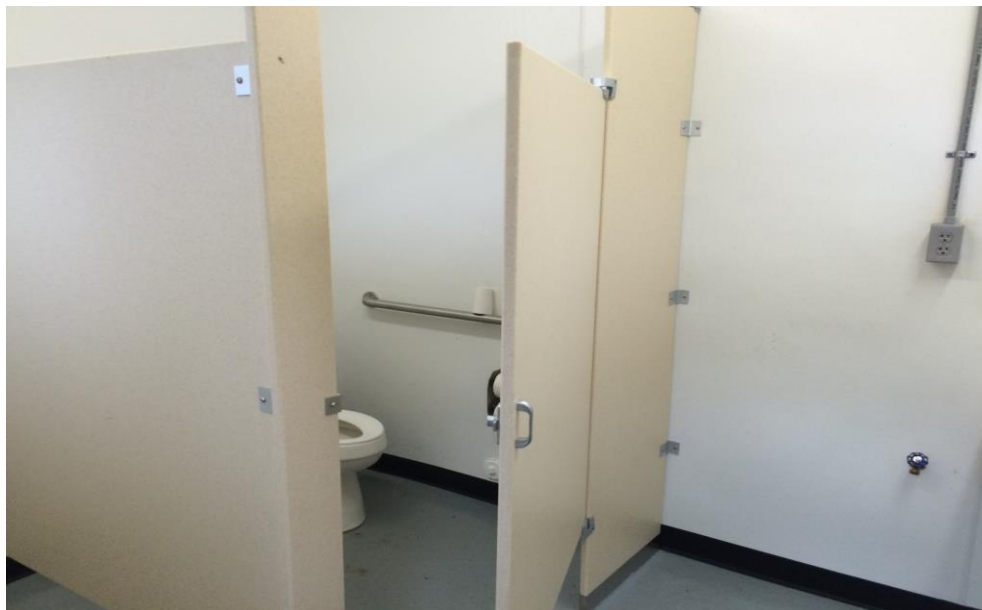


Figure 7.3: Renovations at Cravens Bay bathhouse



Figure 7.4: Grays Landing boat ramp rehabilitation

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Over the last ten years, we looked at ways to make the recreation programs more efficient and sustainable for the future. In 2012 a 32 point plan for the management of the backcountry, lake access, and day use areas was implemented. Actions that we implemented as part of this process are as follows:

- Closure of low use facilities
 - Rushing Creek Campground
 - Jones Creek Campground
 - Bacon Creek Boat Ramp
- Reduction of services
 - Removal of water system at Birmingham Ferry
- Conversion to a general forest area
 - Shaw Branch Boat Ramp
- Conversion to a developed recreation area
 - Fords Bay Lake Access Area

Kuttawa Landing was to be converted to general forest as part of the planning effort. We developed an agreement with the Land Between the Lakes Sportsman's Club to take on the maintenance of this area.

As part of enhancing the developed and dispersed recreation opportunities on Land Between the Lakes through an innovative partnership with the public, we addressed budget reductions in facilities and maintenance in 2012 year and anticipated future reductions. We identified more than \$1 million in viable ideas from the public through a combination of potential cost savings and revenue increasing opportunities. The feedback process used to finalize the immediate actions included a web based comment process. Implementation of the process began in 2013. Items implemented include:

- Fee increases on amenities such as electric, water, and sewer sites at campgrounds.
- Fee increase at Turkey Bay Off-Highway Vehicle Area
- Additional electric or electric/water amenities at four campgrounds: Hillman Ferry, Wranglers, Piney, and Energy Lake.
- Began installing camping shelters at Energy Lake



Figure 7.5: Camping shelter at Energy Lake

Trails

Over the past ten years, Land Between the Lakes made great strides in maintaining, developing, and promoting a positive trail experience for all trail users. With its unique history, varied trail opportunities, and high visitor demand, successful trail management at Land Between the Lakes has proven to be a challenging and rewarding process. Countless volunteers, organizations, businesses, and friends assisted by dedicating time, money, materials, and sweat to ensure each trail niche is operating efficiently. Ultimately, by managing current use and planning for the future, a multiple-use trail system at Land Between the Lakes can succeed.

Maintenance and Monitoring

During FY15, our staff and volunteers maintained to standard about 140 miles of trail routes.

Miles	Trails
16	Nature Station Trails - 8 miles twice Hematite, Center Furnace, Woodland Walk, and Honker Trails
58	North/South Trail
27	Fort Henry Trails Pickett Loop, Telegraph, Piney, Artillery, Devil's Backbone, Tennessee Ridge, and Peytona Trails
11	Central Hardwoods Scenic Trail
14	Canal Loop and Connectors (Volunteers)
5	Hillman Heritage Trail
9	Brandon Spring Trails Yellow, Blue, Red, White, Orange, and Paw Trails
140	Total Trail miles

Figure 7.6: Trail miles maintained in FY15

Trail maintenance requires different techniques, tools, or specializations depending on the type of trail being addressed. Land Between the Lakes offers a variety of trail options across the recreation opportunity spectrum. That variety provides the Forest Service the opportunity to demonstrate new maintenance techniques, and monitoring approaches and improve upon existing methods, often simultaneously. Over the past decade, Land Between the Lakes implemented many different trail maintenance techniques ranging from bioengineering and the use of “green” materials to experimenting with composite drainage and stream stabilization products. Most of these products were never utilized at LBL before. We even exported a few techniques to other land managing agencies across the country to address similar trail issues. Below we illustrate and describe a few of our many accomplishments.



Figure 7.7: Repairing a poorly drained section of the Central Hardwoods Scenic Trail



Figure 7.7: Repairing a poorly drained section of Wranglers Trail 6, 1997/98

While it's imperative we perform these maintenance measures regularly to preserve trail integrity, we also recognizes the need for scientific data to help quantify on-the-ground actions. Organizations listed below conducted several environmental studies in the past. Others continue to monitor the effects on soil, water, and vegetation and how certain recreational uses impact these resources. The following addresses some monitoring measures:

1. Hancock Biological Center – Monitors water quality in Turkey Bay and throughout Kentucky Lake, <http://www.murraystate.edu/qacd/cos/hbs/hbs.htm>, 2002-present
2. “Monitoring fugitive dust emissions from off-highway vehicles travelling on unpaved roads and trails using passive samplers” – Padgett, Eubanks, Meadows, Ryan – Peer-reviewed results of a study performed in Turkey Bay Off-Highway Vehicle Area to estimate airborne soil loss and its impacts on native vegetation – 2005



Figure 7.9: Dust monitoring at Turkey Bay Off-Highway Vehicle Area

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LBL 200 event monitoring – Surveys and photos at taken at predetermined trail points along a motorcycle route utilizing the North/South Trail and other roads. – 2005-present



Figure 7.10: LBL 200 pre- and post-event trail monitoring point

3. Trail-use counters on Canal Loop Trail – designed to collect passes over a certain point, specifically bicycles - 2006 (installed), 2007(maintenance)
4. Soil Moisture Monitoring and Weather Station development - Partnership study with Missoula Technology Development Center Land Bureau of Reclamation - <http://ohv.fleetanalytics.net/>, <http://kentuckyohv.metridyne.com/>, - 2010 (installed), 2013 (upgrades)



Figure 7.11: Sample picture from the soil moisture monitoring station in Turkey Bay Off-Highway Vehicle Area

Since 2005, Land Between the Lakes trails staff reported a yearly average of 107.5 miles of trail maintained to standard and 12.5 miles of trail improved to standard. Volunteers, Forest Service staff, and three separate maintenance contractors primarily performed the work. Volunteers established the Adopt-A-Trail program. This program thrives because members serve in many capacities, such as performing trail maintenance and inventory tasks, monitoring trail conditions, and reporting successes, failures, and feedback to us.

Infrastructure Development = New Experiences

Every year Land Between the Lakes maintains numerous infrastructure features such as campsites, roads, fire rings, trailhead boards, and water systems. The level of use drives the level of maintenance performed on these items. No level of maintenance may be as difficult to define,

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measure, or witness immediate results as “watershed maintenance”. Over the past 10 years, Land Between the Lakes was a focal point, garnering national attention at times, for the techniques, methods, and partnerships applied to not only improve watershed quality but also to minimize the impacts of unmanaged recreation. The following table highlights a few of those applications completed by the recreation staff:

Figure 7.12: Off-Highway Vehicle Area – Turner Hollow/Turkey Creek/KY Lake watersheds

Fiscal Year	Acres	Primary Funding	Activity
FY05	20 acres	Century of Service/Volunteers	Wildlife ponds, planted 200 trees
FY06	13 acres	National Forest Foundation/ Kentucky Recreation Trails Program	1 creek crossing installed
FY07	12 acres	National Forest Foundation/ Kentucky Recreation Trails Program	2 creek crossings
FY08	5 acres	Forest Service Watershed/ Forest Service Legacy	4 creek crossings
FY09	71 acres	National Forest Foundation/ Forest Service Legacy/ Volunteers	1 creek crossing, planted 700 trees
FY10	73 acres	Forest Service Legacy	Planted 300 trees
FY12	120 acres	Forest Service Legacy	Restoration
FY13	34 acres	National Wild Turkey Federation	Planted 44,000 shortleaf pine trees

Figure 7.13: Shared Roads/Equestrian/Hiker Trails – Dry Creek/Cumberland River Watersheds

Fiscal Year	Miles	Primary Funding	Activity
FY13	8.5 miles	Forest Service Roads and Trails Legacy	20 culverts replaced/ repaired/ decommissioned
FY14	18 miles	Forest Service Roads and Trails Legacy / Forest Service Watershed	3 culverts replaced/ decommissioned
FY15	5 miles	Forest Service Watershed	Trail improvements



Figure 7.14: Dry Creek watershed work involving shared-use Wrangler's trail #7 and Road 353.



Figure 7.15: Dry Creek watershed work on entrenched Wrangler's Trail #4, before and after.



Figure 7.16: Hillside restoration work in Turkey Bay Off-Highway Vehicle Area.

Trail maintenance tasks are often bookended by less frequent, but equally as important, measures of monitoring and evaluating trail feature status and condition. While appearing static, remote natural settings can impact bridges, culverts, signage, boardwalks, parking areas, and even the trails themselves. All are infrastructure items susceptible to weathering, over-use, vandalism, and

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deterioration resulting in public safety concerns if not addressed. Land Between the Lakes staff creatively found ways to improve the trails experiences of different user groups by being proactive with certain management strategies and funding opportunities. Over the past decade, the off-highway vehicle and trails program received over \$500,000 in state grants, \$900,000 in Forest Service Legacy Roads and Trails (CMLG), and \$700,000 in American Recovery and Reinvestment Act funds. The Forest Service also implemented approximately \$250,000 in appropriated and specially funded maintenance and/or infrastructure development projects annually. The following are just a few trail infrastructure accomplishments from the past ten years:

2005 - Completed “Gator Pit” project at Turkey Bay OHV Area, a landscape-scale restoration project intended to curtail unmanaged recreation. Constructed two wildlife ponds, planted 10 acres of native warm- and cool-season grasses and 200 trees.



Figure 7.17: Former “Gator Pit” rehabilitation project in Turkey Bay Off-Highway Vehicle Area

2006 – Installed two hardened stream crossings and developed the “Rock Garden” in Turkey Bay Off-Highway Vehicle Area, a trail opportunity for high-clearance off-highway vehicles. Added an additional 700 tons of material in 2012.



Figure 7.18: Rock Garden in Turkey Bay Off-Highway Vehicle Area

2007 – Completed LBL Motorized Vehicle Use Map (MVUM) and updated Turkey Bay Off-Highway Vehicle Area trail map, 106 trail miles inventoried, mapped using global positioning system (GPS), and signed. Two hardened creek crossings installed in Turkey Bay.

2008 – Developed a youth OHV trail, installed four hardened stream crossings, and constructed a new entrance bridge at Off-Highway Vehicle Area. Completed 1-mile North/South Trail reroute project near Moss Creek.



Figure 7.19: Turkey Trot youth learning trail

2009 – Staff and volunteers cleared and/or maintained 275 trail miles after January, 2009 ice storm. Completed numbering off-highway vehicle trails to assist/direct/orient riders and emergency personnel. One hardened creek crossing installed and 700 trees planted in Turkey Bay.



Figure 7.20: One of eight creek crossing stabilization projects in Turkey Bay OHV Area (before, during, after)

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2010 – 5-mile Hillman Heritage Trail reopened after several major weather events. Inspections completed on 56 major-class trail bridges. Eight bridges improved to standard, six were decommissioned. Planted 300 trees in Turkey Bay OHV Area.

2011 – Two interpretive panels installed on Ft. Henry Trail in partnership with National Park Service. Thirteen trail bridges replaced, eight improved to standard, eleven maintained to standard, 10 decommissioned. Three-mile paved trail constructed south of Hwy 68/80 between Lake Barkley and Forest Service Road 160.



Figure 7.21: New trail bridges

2012 – Trails Unlimited, Inc. enterprise team and detailers, Forest Service staff and apprentices, and volunteers completed 8.2 mile Central Hardwoods Scenic Trail. Four trail bridges replaced, two improved to standard, two decommissioned.



Figure 7.22: Central Hardwoods Scenic Trail construction

2013 – Staff completed surveys on 34 complex trail bridges, improved 8.5 miles of shared-use and equestrian-only trails to standard, and planted 44,000 shortleaf pine trees on 34 restored acres in Turkey Bay Off-Highway Vehicle Area.

2014 – Improved 8 miles of shared equestrian trail to standard, installed 10 donated benches on Central Hardwoods Scenic Trail. Completed construction of new entrance gatehouse at Turkey Bay Off-Highway Vehicle Area.

2015 – Improved 5 miles of shared equestrian/hiker trail. Initiated Hematite Trail infrastructure improvement planning phase.



Figure 7.23: New gatehouse at Turkey Bay

Hematite Trail Restoration

Hematite Trail, located in the Northern Nature Watch Area in Land Between the Lakes, is in need of several repairs and improvements. Hematite is the #1 hiked trail at Land Between the Lakes and is a popular destination for visitors to Woodlands Nature Station. Several features of the trail have reached their life expectancy and have begun to incur increased costs for repairs. Recent weather events in the past 5-7 years adversely affected trail infrastructure resulting in the existing boardwalk to shift/float away, and causing overlooks and trail edges to erode. Proposed improvements include replacing the existing boardwalk, improving access for persons with disabilities, stabilizing erosion, and enhancing wildlife viewing opportunities.

M Q7.34 Results and trends in user satisfaction ratings

User satisfaction can be found in [Goal 2](#) under Measurement Question 2.3, *Trends in visitation, levels of community participation*.

Promotions/Special Events

Dispersed recreational opportunities, which include all trail-related activities, are an extension of Land Between the Lakes' mission to "protect and manage the resources of the Recreation Area for optimum yield of outdoor recreation and environmental education through multiple use management." Maintaining, developing, and promoting these activities not only enhances visitors' trail experiences but also ensures these opportunities remain available for years to come. For 10 years, numerous clubs, organizations, and businesses expressed interest in coordinating trail events and activities at Land Between the Lakes. These events, some over 25 years old, resulted in positive exposure, advocacy for that trail use, and financial stimulus for the surrounding region. The following list includes some events and groups utilizing Land Between the Lakes beginning 2005:

- White Lightning mountain bike race – Wood N' Wave – Grand Rivers, KY
- 12 Hours on the Canal Loop mountain bike race – Wood N' Wave – Grand Rivers, KY
- Race to the Canal mountain bike race – Wood N' Wave – Grand Rivers, KY
- Canal Loop Trail Runs (23K, marathon, 60K, 50 mile) - Durbin Race Management – Knoxville, TN
- Run!LBL (23K, marathon) – Durbin Race Management – Knoxville, TN
- LBL Challenge Adventure Race – Bonkhard Racing, LLC – Osage Beach, MO

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- Land Between the Lakes Jeep Jamboree – Jeep Jamboree, USA - Georgetown, CA
- LBL 200 Dual Sport Ride – KT Riders – Cadiz, KY (since 1986)
- Espinazo del Diablo bicycle race – Gear Up Cycles – Murray, KY
- NorthCorps Outfitters, LLC- Paducah, KY
- ATV Safety Institute (ASI) ATV Ridercourse – Murray KY
- University of Tennessee-Martin backpacking courses
- Various U.S. military training – Ft. Campbell, KY
- Various religious and military reenactments
- Various off-highway vehicle dealer/demonstration seminars held at Turkey Bay
- Various Boy/Girl Scouts of America events and camps
- *Trucks! TV* (2008) and *RoundAbout U* (2011) episode filmed at Turkey Bay
- *Erosion Control Magazine* “The Taming of Turkey Bay” (2009)

Hunting

The Forest Service manages hunting on Land Between the Lakes National Recreation Area in cooperation with the Kentucky Department of Fish and Wildlife Resources, Tennessee Wildlife Resources Agency, U. S. Fish and Wildlife Service, and other partners. Hunting continues to be a popular activity on Land Between the Lakes, especially during fall, winter, and spring. The Forest Service continues to offer more than 230 days per year of hunting opportunities on Land Between the Lakes for big game, small game and waterfowl.

To limit harvest and provide a safer and better quality experience, we hold quota hunts on Land Between the Lakes for deer and turkeys. Through a contract, we manage an online quota hunt application system. Many hunters appreciate the online quota application system, and continual improvements are made for ease of use. Forest Service staff respond to hunters’ questions during the application process, and throughout the year.

Thousands of hunters continue to apply for deer and turkey quota hunts each year. The number of hunters that applied for quota hunts from 2006 through 2015 are provided in the table below, along with number of permits issued. Factors affecting the number of permits available each year include number of hunts available, attempts to reduce crowding and harvest, and declining number of youth applicants. All quota hunts, except youth hunts, fill. Possible reasons for the declining number of applicants include an aging hunter population, fewer youth pursuing hunting, increased archery hunting for deer which can reduce quota hunt success, the challenges of hunting on public land, and other factors.

The number of deer and turkeys harvested during quota hunts are affected by a number of factors, including number of permits issued, number of hunters receiving permits who actually show up for the hunt (not measured as no check-in is required), weather, fluctuations in game populations, and individual hunter preferences.

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In partnership with the National Wild Turkey Federation, we continue to provide turkey and deer hunting opportunities for hunters who are permanently confined to a wheelchair.

Figure 7.22: Quota Hunt Numbers		
Species And Year	Quota Hunt Applications	Quota Hunt Permits
Deer		
2006	12,312	5,791
2007	12,414	5,816
2008	11,965	5,691
2009	10,166	4,133
2010	9,307	4,187
2011	9,032	4,144
2012	8,779	4,105
2013	8,575	3,977
2014	8,209	3,885
2015	8,389	3,836
Turkey		
2006	2,724	2,084
2007	2,583	2,050
2008	2,629	2,076
2009	2,292	1,897
2010	2,407	1,917
2011	2,232	1,854
2012	2,261	1,892
2013	2,322	1,854
2014	2,425	1,839
2015	2,539	1,457

Environmental Education Program

Dispersed environmental education opportunities have increased and been enhanced. On a regular basis we offer guided canoe trips, guided yacht and van eagle tours, night hikes, Fort Henry hikes, wildflower hikes, pond prowls and stream strolls, Iron Furnace tours, the Discovery Agents game, and self-guided nature watch tours. Interpretive panels are dispersed throughout Land Between the Lakes.

Land Between the Lakes provides the Nature Watch Series for serious wildlife watchers. This series includes such opportunities as:

- “Pelicans and Prairies”
- “Winter Wanderers”
- “Wildflowers & Warblers Weekend”
- “Stiltwalkers of Land Between the Lakes”
- “Hidden Treasures of Land Between the Lakes”

These in-depth offerings are for a smaller, more serious about-nature watching niche. The trips include lunch and often necessitate staying in the recreation area. Sometimes we go off-site to a nearby state park.

Nature enthusiasts now enjoy exploration of the demonstration area called The Woodlands Nature Watch Area. The hub is located at the Nature Station, but developments away from the facility opened Bobcat and Empire Points to the public which provided non-motorized beach access and a canoe/kayak looping route. Informational panels were installed at each point and some guided tours take place. Other projects include the Hematite Trail renovation and plans to replace the viewing blind in a more safely sustainable location; and develop an accessible path to a renovated viewing point. The Discovery Agent mobile game is played primarily outside of the Nature Station.

Regionally, we provide field trip grants to public school classes within 100 miles, have partnered with Stewart County Independent School District for field trips to Devils Backbone, Earth Camp, and educator workshops. Locals are invited to come out, spread out and join in the Christmas Bird Count.

Heritage Program

During the last 10 years we worked to provide cemetery access on roads that were never designed to be driven by today's cars. The Land Between the Lakes Protection Act legally obligates the Forest Service to maintain an inventory of and ensure access to cemeteries for burial, visitation, and maintenance. Furthermore, a design criteria in the 2004 Area Plan went beyond the original Tennessee Valley Authority standard for cemetery access. The Tennessee Valley Authority standard stated that they would provide access to cemeteries to the same level as existed at the time Tennessee Valley Authority created the Recreation Area. The Area Plan design criteria stated that the Forest Service would provide access to cemeteries that meets or exceeds the type that existed when it became federal property. No one documented the access at time of creation of Land Between the Lakes National Recreation Area. It is important we work together with former residents, their families, and their descendants to provide access when and where it is needed.

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M Q7.35 Trends in financial resources needed and available to provide recreation opportunities

Management of financial resources has always been an important piece of the recreation program at Land Between the Lakes National Recreation Area. We have been very proactive with the users of Land Between the Lakes dialoguing about the best use of the financial resources.

In 2007, we discussed with the users a fee increase at the recreation facilities with the caveat that a portion of this increase would be set aside for future investment into reducing the backlog of maintenance items in the facilities or much needed improvements. The collection of these set aside funds began in 2008. A few of the projects we completed using the funds were replacement of portable toilets with American Disabilities Act accessible vault toilets, installation of a courtesy dock at Nickell Branch, repair of a courtesy dock at Fenton Area, and construction of a gatehouse at Turkey Bay Off-Highway Vehicle Area.

In 2011, we completed a several year process to gather comments from the public on the future management of the backcountry and self-service campgrounds, as well as the day-use boat ramps and picnic areas. From this analysis, we developed an action plan. Using this action plan we improved some facilities and closed some based on low use and maintenance costs. We began maintaining the Fords Bay Boat Launch Area instead of the Bacon Creek Boat Ramp which was more difficult to maintain. We also closed Rushing Creek Campground due its lack of use compared to many of the campgrounds nearby that had lower operating costs.

In 2012, we engaged the public in a series of meetings with the objective of developing recommendations to reduce our operating costs by \$1,000,000. As a result of these meetings we developed an action plan to reach this goal using a combination of fee structure changes, increased electric and water hook ups at some campgrounds, a revision of the maintenance contract specifications, and changes in the services at some lesser used campgrounds.

The end result is we used all of these efforts to reduce the backlog of maintenance needs from \$18,476,061 in 2005, after adjusting for inflation to 2016 dollars, to less than \$6,899,707 in 2016. This work also positioned us to be more responsive to recreation opportunities as appropriations decline.

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.

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Goal 8: The Land Between the Lakes Area Plan will remain effective and usable and lead to accomplishments that support National Strategic Goals

Q8.36 Are the goals of the Land Between the Lakes Plan leading to accomplishments that support national objectives?

(Duplicate question for Measures 36-39)

The 2004 Area Plan remains aligned with the goals of the USDA Forest Service and Region 8. The planning information, assumptions, and provisions of the Area Plan remain scientifically valid.

M Q8.36 Trends and annual summary of accomplishments and results.

We continue to contribute to the achievement of the National Forest Service strategic goals by completing the assigned Performance Attainment Reporting targets. The table below displays key accomplishments for the last five full fiscal years of the 2004 Area Plan implementation. The first five full fiscal years accomplishments were reported in the 2010 Monitoring and Evaluation Report.

The narratives written for the first seven goals earlier in this report provide the best explanation of the progress made since 2004 in recreation, environmental education, heritage, and natural resource management. We provide a visual of the acres treated with fire and timber harvests over the past ten years on the internet at: <http://www.landbetweenthelakes.us/visit/maps/>

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Figure 8.1: Fiscal Year Accomplishments

Specific National Objective (Target)	Unit of Measure	FY11 Accompl.	FY12 Accompl.	FY13 Accompl.	FY14 Accompl.	FY15 Accompl.
Miles of high clearance system roads receiving maintenance	Mile	14	0	25	13	21
Miles of passenger car system roads receiving maintenance	Mile	147	108	234	241	104
Miles of road decommissioned	Mile	0	0	0	0	0
Total trail system miles meeting standard	Mile	179	97.4	92	132	268
Miles of system trail improved to standard	Mile	17	11	3	8	38
Miles of system trail receiving maintenance to standard	Mile	183	98.7	89	124	130
Number of interpretive and conservation education plans implemented	Plan	1	1	1	1	1
Priority Heritage assets managed to standard	Asset	5	6	N/A	N/A	41

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Specific National Objective (Target)	Unit of Measure	FY11 Accomp.	FY12 Accomp.	FY13 Accomp.	FY14 Accomp.	FY15 Accomp.
Heritage program managed to standard	Program	N/A	N/A	N/A	1	0
Recreation site capacity (number of People At One Time) operated to standard	PAOT (Core) (Integrated)	2,600,000	1,482,105	1,300,449	1,240,613	1,232,991
		3,288,379	3,288,379	3,075,212	5,863,009	5,863,009
Number of wildlife interpretation and education products	Product	42	128	---	---	---
Acres of inland lake habitat enhanced	Acre	266	1843	2,371	1,385	1,111
Acres of inventory data collected or acquired meeting corporate standards	Acre	9,878	7,850	6,000	15,260	6,750
Acres of non-threatened/endangered terrestrial habitat enhanced	Acre	4,443	17,811	14,688	13,742	11,061
Soil and water resource acres improved	Acre	37	6,592	6,593	802	581
Volume of Regular Timber Sold	ccf	6,513	7,615	2,949 plus 3,829*	9,853*	37
Number of forest special products permits issued	Permit	44	31	33	na	na
Annual monitoring requirements completed	Number	13	13	10	10	10
Landscape scale or Ecosystem assessments completed	Assessment	1	1	1	0	0

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Specific National Objective (Target)	Unit of Measure	FY11 Accompl.	FY12 Accompl.	FY13 Accompl.	FY14 Accompl.	FY15 Accompl.
Highest priority acres treated annually for noxious weeds and invasive plants on NF lands	Acre	771	432	808	851	748
Land use authorizations administered to standard	Authorization	32	43	38	27	24
Total Acres Treated For Haz. And Secondary Fuels	Acre	4,681	8,097	5,793	11,083	5,536
Haz. Fuels Acres Treated with Prescribed Fire	Acre	2,600	5,172	5,698	5,154	2,917
Secondary Fuels (FN Other Acres Treated)	Acre	2,081	3,125	---	5,929	2,619
Number of land use proposals and applications processed	Application	12	10	9	8	14
Recreation Special use Authorizations Administered to Standard	Authorization	259	250	200	208	250
Threatened & Endangered (T&E) and non-T&E Habitat Enhanced	Acre	9,848	17,806	14,688	13,741	11,061
Stewardship	Acre	4,984	3,783	5,010	5,380	4,713

*Due to accounting system, 3,829 ccf sold in FY13 was accounted in FY14.

In FY13 the Forest Service began tracking the heritage program as a whole, instead of tracking priority assets. The large increases between FY11 and FY12/13 in the number of acres of natural resource improvements came from a change in reporting to use of integrated accomplishments. These habitats include inland lake habitat enhanced, soil and water resource acres improved, threat and endangered (T&E) and non-T&E habitat enhanced. The actual acres treated are approximately the same numbers as FY11 and earlier. The value for timber volume sold in the table has approximately 3,800 ccf from FY13 accounted for in FY14 in addition to the FY14 volume target.

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M Q8.37 Determine whether standards, guidelines, and management requirements are being met and are effective in achieving expected results.

Design criteria, including standards, are applied during project implementation. We monitor individual projects upon implementation to meet the plan direction.

We continue to contribute to the achievement of the National Forest Service strategic goals by completing the assigned Performance Attainment Reporting targets. The table above displays key accomplishments for the last five full fiscal years of the 2004 Area Plan implementation.

Some anomalies in the table are explained by changes to accomplishment tracking procedures. In FY13 the Forest Service began tracking the heritage program as a whole, instead of tracking priority assets individually, so the amount changed from 6 to 41. The large increases between FY11 and FY12/13 in the number of acres of natural resource improvements came from a change in reporting to use of integrated accomplishments for target reporting; therefore acres of inland lake enhanced, terrestrial habitat enhanced and soil and water resources improved increased dramatically. The actual acres treated are approximately the same amount as FY11 and earlier.

M Q8.38 Determine if planning information or physical conditions have changed and provisions remain scientifically valid.

The leadership and interdisciplinary team who developed this report determined no changes are needed in the Area Plan at this time. The Area Plan is based on best available science and this is reviewed periodically during analysis of projects.

Land Between the Lakes issued one plan amendment in September 2013 to increase the acres by 1,150 of shortleaf pine-oak forest in Goal 5 and to change the boundary of the Devil's Backbone State Natural Area. The plan amendment is included in Appendix 4 of this report.

We obtained more inventory data in all resource areas since 2004 and the results are noted in the annual Monitoring and Evaluation reports. The natural resources inventories need review and updates before we can revise the Area Plan. This is not due to physical conditions changing as much as to the need to prioritize data collection. Geographical information systems and imaging progressed since 2004 and can now provide more types of assessments. We will soon begin the 15 part assessment to meet the requirements of the 2012 Planning Rule. We will involve the public, including stakeholders, during the assessment phase and determination of possible changes in the Area Plan. See Figure 8.2 for a description of the planning process under the 2012 Planning Rule.

Land Between the Lakes approved changes to the plan monitoring program to meet the 2012 Planning Rule requirements. The administrative change in Appendix 5 of this report is a modification to monitoring elements found in Part 3 and Appendix 5 of the Area Plan. We retained those elements of the original monitoring program that address the eight requirements in the 2012 rule and developed new elements when needed. The review and changes can be found on the website at <http://www.landbetweenthelakes.us/monitoring-program/>. The 2012 Planning Rule requires biennial evaluation reports so the next monitoring and evaluation report will be complete by September 30, 2018.

Fiscal Year 2015

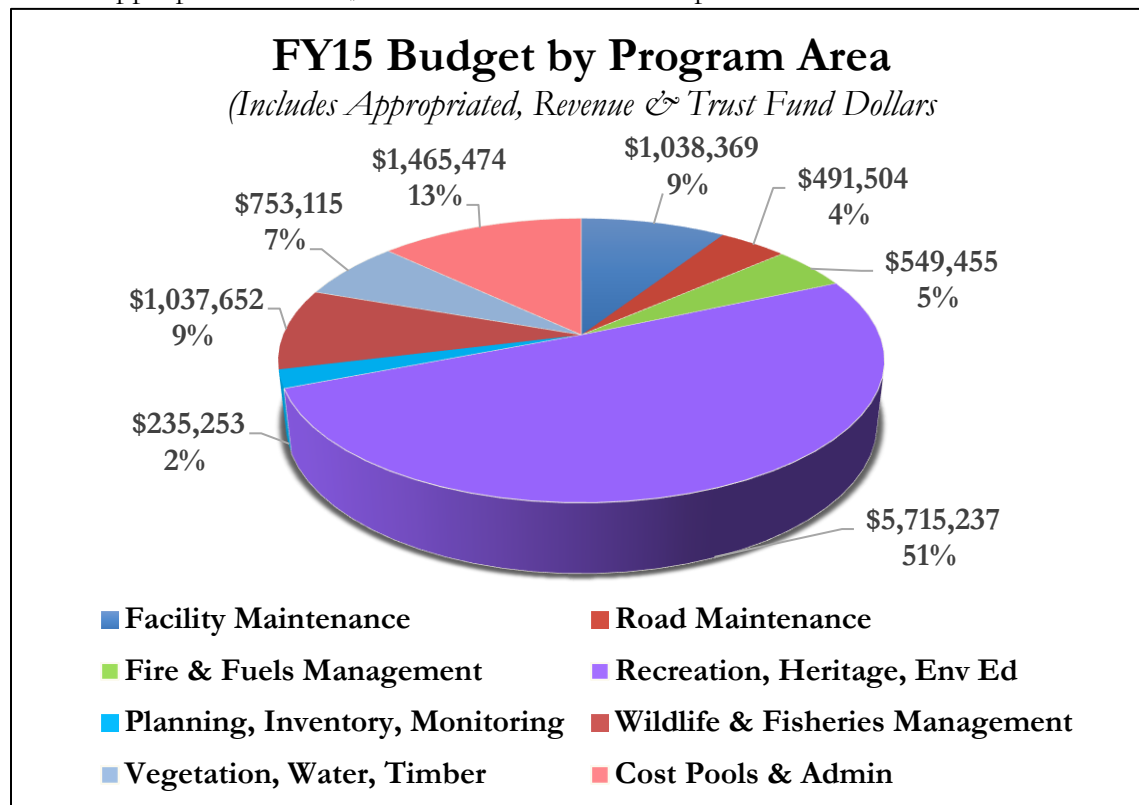
Figure 8.2: Planning Process under the 2012 Planning Rule

New 2012 Planning Rule Monitoring Program Transition	Adapt and adjust current monitoring program to meet new requirements in 2016.
10 year Monitoring and Evaluation	Assess and report on the progress of the 2004 Plan in 2016. Review 8 Goals and 39 Monitoring Questions. Engage the public in this evaluation.
Data Collection	Identification of data gaps followed by data collection.
Assessment	Following the 2012 Planning Rule, evaluate existing information about ecological, economic, and social conditions, trends, and sustainability and their relationship to the land management plan within the context of the broader land-scape. Fifteen topics must be addressed. Utilize governmental or non-governmental assessments, plans, monitoring reports, studies, and other sources. Public engagement occurs throughout the assessment process.
Assessment Review	Final review of assessment by the public and stakeholders
Need to Change Plan	Highlight areas of the 2004 Area Plan to be updated based on the 10-year monitoring and evaluation report, and the assessment.
Public Engagement	Work with the public during development of the need for change.
Proposed Plan Revision and Draft Environ-mental Impact Statement	Develop the proposed plan based on the need for change and evaluate the alternatives and affected environment.
Public Comment	Public feedback on Proposed Plan and draft Environmental Impact Statement
Finish Plan, EIS, and Draft Decision	Consider comments and develop final plan and draft decision. Address desired conditions, management objectives, and other plan components.
Objection Process	Public may raise issues about draft decision related to plan revision.
Plan Approval (Record of Decision)	Decision made by Area Supervisor
Implementation and Monitoring	Forest Service implements Plan Revision and continues monitoring.

Fiscal Year 2015

M Q8.39 Comparison of estimated and actual costs of plan implementation.**Funding – Budget**

Our annual operating budget in fiscal year 2015 was approximately \$11.3 million: \$7.6 million in federal appropriations and \$3.7 million in revenue receipts.



Program Area	Amount	%
Facility Maintenance*	\$ 1,038,369	9%
Road Maintenance	\$491,504	4%
Fire & Fuels Management	\$549,455	5%
Recreation, Heritage, Env Education	\$5,715,237	51%
Planning, Inventory, Monitoring	\$235,253	2%
Wildlife & Fisheries Management	\$1,037,652	9%
Vegetation, Water, Timber	\$753,115	7%
Cost Pools & Admin	\$1,465,474	13%
TOTAL	12,309,273	100%

Figure 8.3: Budgeted dollars for FY15 with pie chart

Fiscal Year 2015

Volunteer Support

Volunteers provided 97,113 hours of service in FY2015 while our Public Land Corps Program for our apprentice and intern program provided 28,960 hours of service. The total of 126,073 hours, or 70 people-years, provided a \$2,908,501 value to Land Between the Lakes.

Partnership with the Friends of Land Between the Lakes provided an additional, in-kind assistance valued at around \$1,014,550 in addition to direct cash contributions of \$350,000.

When we combine volunteer hours with all other in-kind assistance and cash contributions from partners, the value of total savings to the taxpayer in FY2015 reached over \$4.2 million.



Figure 8.4: Volunteers, like these trail workers, serve as an integral part of our overall success in visitors enjoying the region.

E. Action Plan

We need to prepare for potential plan revision under the 2012 Planning Rule. Initially we will collaborate with the public to identify data gaps in our natural resources, heritage, recreation, environmental education, and social and economic program areas. The USDA Forest Service and the public will then need to prioritize filling of the gaps in preparation for the assessment phase of the 2012 Planning Rule. See the process in Figure 8.2.

We now have ten years of plan implementation behind us and the results are visible on the landscape. This ten year report indicates we are not achieving all of the objectives in the 2004 Area Plan. Strengths and weaknesses of implementing the 2004 Area Plan arose during the past ten years. Climate change issues emerged since then and budgets remain flat or will decrease in the near future. These factors, along with the social aspect of the vision for Land Between the Lakes, will be addressed in the assessment phase of plan revision.

F. Appendices

Appendix 1: Monitoring and Evaluation

The following section is a direct excerpt 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. Much of what we monitor includes species' trends. For trends, we usually address every five years.

Our monitoring will track the wide variety of components of the Area Plan. Roles and contributions identified include our 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 we achieve our area wide goals and objectives. Monitoring will track how well implementation of the Area Plan's goals and objectives is bringing the conditions of Land Between the Lakes to the desired conditions specified by the Area Plan.

Because this Area Plan also supports the Forest Service 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 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 Land Between the Lakes 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."

Fiscal Year 2015

Appendix 2: Friends Group Partners

Partners of Friends of Land Between the Lakes

Support our environmental education mission

State Parks:

- Kentucky Dam Village State Resort Park
- Lake Barkley State Resort Park
- Paris Landing State Park
- 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
- Kentucky Bowfishermen

Universities & Colleges

- Murray State University
- University of Kentucky Extension
- Purdue University
- Austin Peay State University
- Southern Illinois University
- 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
- 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
- Western Kentucky Amateur Astronomers

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Children's Organizations:

- West Kentucky 4-H
- Boy Scouts of America
- Trigg County High School
Environmental Science Club
- Girl Scouts of America
- Joshua Tree Home Educators
Association
- Highland Rim (middle TN) Headstart
- Futskilz Soccer Training

Professional Organizations:

- National Association for
Interpretation
- Region 3 of National Association for
Interpretation
- Kentucky Association of
Environmental Education
- Tennessee Environmental Education
Association
- North American Association for
Environmental Education

Appendix 3a: Annual Heritage Report

Available on the Internet at: www.landbetweenthelakes.us/stewardship/heritage/



Model Tennessee Post Office, 1964

Fiscal Year 2015

Appendix 3b: Current List of Priority Heritage Assets

	Name	Management Category	Last Cond Svy	Due Cond Svy
1	Center Furnace	Interp/Science	2015	2020
2	St. Stephen Church and Cemetery	Traditional/Sacred/Adaptive	2014	2019
3	Chinese Cemetery	Traditional/Sacred	2011	2016
4	Ft. Henry	Interp/Science	2013	2018
5	Great Western	Interp/Science	2013	2018
6	Henry Lady Cemetery	Traditional/Sacred	2013	2018
7	Jacob Lady Cemetery	Traditional/Sacred	2013	2018
8	Will Flora Historic Cabin	Interp/Adaptive Sustainable	2013	2018
9	Paradise Cemetery	Traditional/Sacred	2013	2018
10	Pegrim 1	Traditional/Sacred	2013	2018
11	Pegrim 2	Traditional/Sacred	2013	2018
12	Hildreth 2	Traditional/Sacred	2013	2018
13	Pisgah Stone Box Grave	Traditional/Sacred	2014	2019
14	Sills Farm	Traditional/Sacred	2014	2019
15	Luton	Traditional/Sacred	2014	2019
16	Williams 1	Traditional/Sacred	2014	2019
17	St Marys 1	Traditional/Sacred	2014	2019
18	Jenny Ridge Cemetery	Traditional/Sacred	2014	2019
19	Serpent Bluff	Traditional/Sacred	2014	2019
20	Nevils Creek Cemetery	Traditional/Sacred	2014	2019

Land Between the Lakes National Recreation Area Monitoring and Evaluation Report

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21	Watkins Infant Cemetery	Traditional/Sacred	2014	2019
22	Shaw 1 Cemetery	Traditional/Sacred	2014	2019
23	Hicks 2 Cemetery	Traditional/Sacred	2014	2019
24	Catholic 1 Cemetery	Traditional/Sacred	2015	2020
25	Catholic 2 Cemetery	Traditional/Sacred	2015	2020
26	Futrell 2 Cemetery	Traditional/Sacred	2015	2020
27	Reynolds Cemetery	Traditional/Sacred	2015	2020
28	Savels Cemetery	Traditional/Sacred	2015	2020
29	Turkey Creek Cemetery	Traditional/Sacred	2015	2020
30	Higgins 1 Cemetery	Traditional/Sacred	2015	2020
31	George Higgins Cemetery	Traditional/Sacred	2015	2020
32	Mitchell Cemetery	Traditional/Sacred	2015	2020
33	Rhoades Cemetery	Traditional/Sacred	2015	2020
34	Hamilton 1 Cemetery	Traditional/Sacred	2015	2020
35	Nunn Cemetery	Traditional/Sacred	2015	2020
36	Hamilton 2 Cemetery	Traditional/Sacred	2015	2020
37	Champion 2 Cemetery	Traditional/Sacred	2015	2020
38	Outland Cemetery	Traditional/Sacred	2015	2020
39	Cherry Cemetery	Traditional/Sacred	2015	2020
40	Jones Cemetery	Traditional/Sacred	2015	2020
41	Spiceland Cemetery	Traditional/Sacred	2015	2020

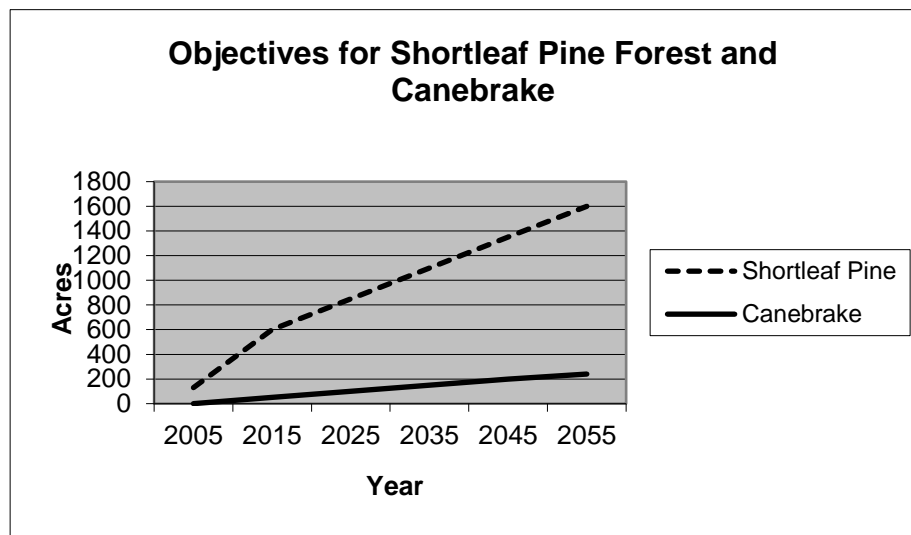
Fiscal Year 2015

Appendix 4: Plan Amendment**Land Between the Lakes National Recreation Area
Land and Resource Management Plan****Amendment # 1****September 2013**

Part 1 of this amendment increases the acres by 1,150 acres of shortleaf pine and shortleaf pine-oak forest in Goal 5, Objective 5f of the Area Plan. The benchmark for these forest types would improve to an optimum rating as analyzed in the Area Plan FEIS.

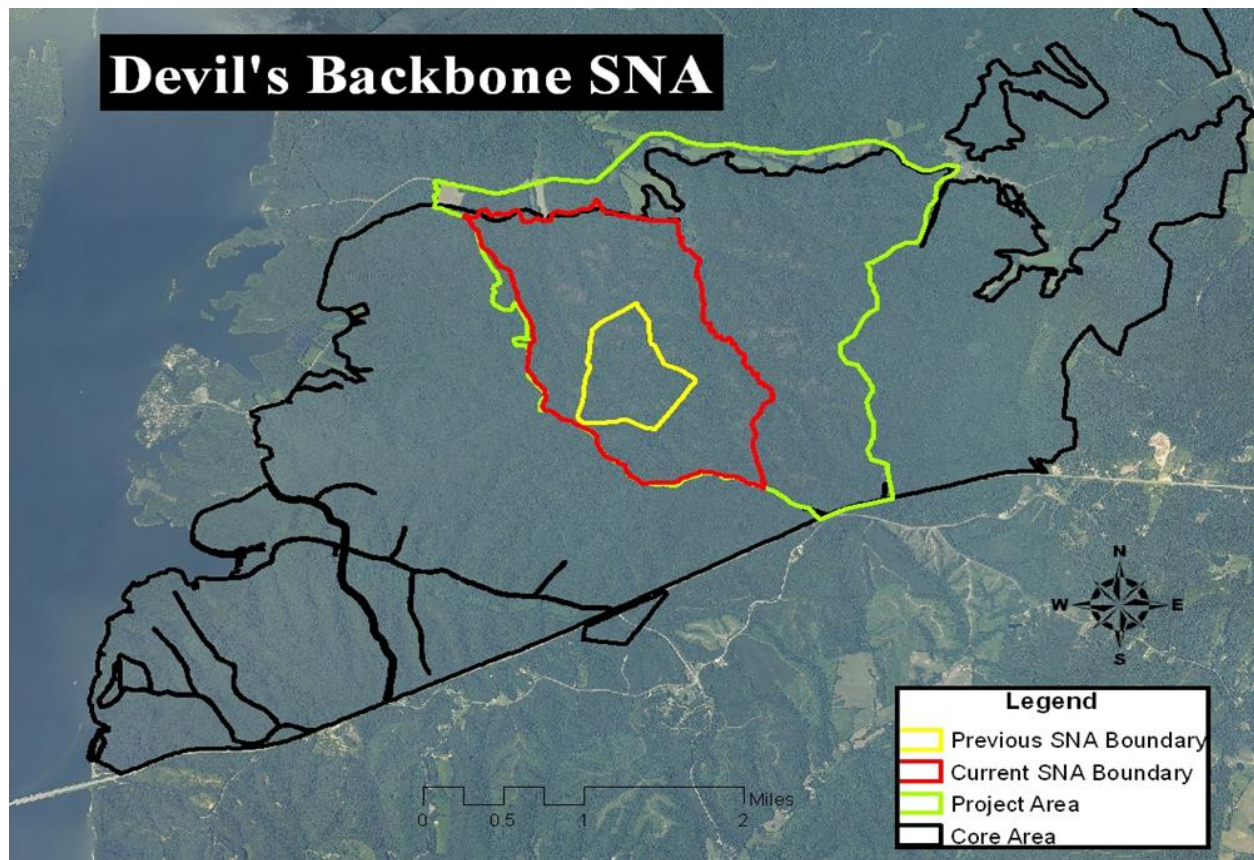
The following changes will be made to the Land and Resource Management Plan, Land Between the Lakes National Recreation Area:

- **Page 53.** Change OBJ5f to “Create and maintain a sustained supply of at least 600 acres of combined shortleaf pine and shortleaf pine-oak forest in the vicinity of the Devil’s Backbone Area of LBL over the first decade. In addition, provide up to 1,000 acres of combined shortleaf pine or shortleaf pine-oak regenerating forest conditions throughout LBL over the first decade, with a long-term objective (over 50 years) of 1,600 acres of mature shortleaf pine and shortleaf pine-oak forest throughout LBL.
- **Page 53.** Change the graph to:



Part 2 of this amendment changes the boundary of the Devils Backbone State Natural Area (SNA) from 160 acres to 1,386 acres. The map for Prescription Areas South in Appendix 7 of the Area Plan will be changed to incorporate this decision. See the map at the end of this Attachment for the change in the boundary.

This amendment is not a significant change in the Land Between the Lakes Area Plan. The determination that this is a non-significant amendment is made in accordance with the regulations in 16 USC 1604(f)(4), 36 CFR 219.10(f) of the 1982 planning regulations (as authorized by 36 CFR 219.17(b) of the current planning regulations, dated April 9, 2012), and Forest Service Manual 1926.5, Land Management Planning, Amendments. This plan amendment meets the criteria for a non-significant amendment because these changes will not “significantly alter the long-term relationship between levels of multiple-use goals and objectives originally projected . . . [or] have an important effect on the entire forest plan or affect resources throughout a large portion of the planning area during the planning period” (FSM 1926.52). The NEPA analysis for this change is documented in a Decision Notice and Environmental Assessment.



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Appendix 4: Monitoring Changes

Land Between The Lakes National Recreation Area
Land and Resource Management Plan
Administrative Change
2012 Planning Rule Monitoring Program Transition
May 2016

This Administrative Change – the 2012 Planning Rule Monitoring Program Transition – to the 2004 Land and Resource Management Plan (Area Plan) for the Land Between The Lakes National Recreation Area, brings the plan monitoring program into conformance with the requirements of the 2012 Planning Rule. The 2012 Planning Rule allows for corrections or adjustments to the Forest Plan using a process called “Administrative Changes.” “Administrative changes” as defined by 36 CFR 219.13(c) in the 2012 Planning Rule is “... any change to a plan that is not a plan amendment or revision. Administrative changes include corrections of clerical errors to any part of the plan, conformance of the plan to new statutory or regulatory requirements, or other content in the plan (219.7(f)).”

Administrative Change

The administrative changes to the plan monitoring program are as follows:

Evaluation Reports

Monitoring Evaluation Reports changes will be produced on a biennial schedule. It is anticipated that the next Monitoring Evaluation Report containing these changes will be available by September 30, 2018.

Monitoring Questions and Indicators for Requirements in 2012 Planning Rule

The monitoring questions and indicators for the eight requirements in the 2012 Planning Rule are listed in the table below. Monitoring questions in the 2004 Area Plan address requirements 1 through 4 of the 2012 Planning Rule. Requirements 5 through 8 are met with a combination of existing and new questions. The technical background documents in the project record describe the scientific rationale.

Broad Scale Monitoring

Questions 45, 46, 47, and 48 will be addressed and evaluated through the Region 8 BroaderScale Monitoring Strategy. Land Between The Lakes will incorporate the broader-scale monitoring into the Forest Evaluation Reports. To see the indicators and procedures that will be used at the broader-scale for these monitoring questions, see the Region 8’s BroaderScale Monitoring Strategy at www.fs.usda.gov/main/r8/landmanagement/planning.

Approval and Effective Date

This Administrative Change becomes effective upon signature below, and being posted online at the Forest’s website. Administrative changes are not subject to the objection process (36 CFR 219.50). This Administrative Change and the monitoring Tasks (or Questions) in Appendix 5 of the 2004 Area Plan will continue to be addressed in the Monitoring and Evaluation Reports until they are reviewed during plan revision.

/s/ Tina R. Tilley
Tina R. Tilley
Area Supervisor

May 11, 2016
Date

Fiscal Year 2015

Transition Monitoring for Land Between The Lakes Area Plan <i>Tasks (or questions) in 2004 Area Plan Monitoring Table in Appendix 5 of the plan document will not change.)</i>		
Requirement (36 CFR 219.12(a)(5))	Question	Indicator
(i) Status of select watershed conditions.	5. Has the Forest Service made progress in reducing erosion and improving watershed conditions in 6 th level watersheds and how was this accomplished? <i>(Same as Task 5, Goal 4 in 2004 Area Plan)</i>	Number of acres reported as being treated for watershed improvements.
	4. Has the Forest Service established baseline data for channel classification of its major intermittent and perennial streams? <i>(Same as Task 4, Goal 4 in 2004 Area Plan)</i>	Completion of two stream classifications and determinations of channel function process every five years.
(ii) Status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems	15. How is management of LBL affecting special habitats and major biological communities? <i>(Same as Task 15, Goal 5 in 2004 Area Plan)</i>	Trends in bald eagle populations dependent upon tall trees in all forest types and associated with aquatic ecosystems.
		Trends in Prairie warbler populations in relationship to Oak Woodland Restoration.
		Inventory of snags and den trees within the General Forest of LBL.
(iii) The status of focal species to assess the ecological conditions.	15. How is management of LBL affecting special habitats and major biological communities? <i>(Same as Task 15, Goal 5 in 2004 Area Plan)</i>	Trends in Yellow-breasted chat populations in relationship to All Forest Type Regeneration

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Transition Monitoring for Land Between The Lakes Area Plan <i>Tasks (or questions) in 2004 Area Plan Monitoring Table in Appendix 5 of the plan document will not change.)</i>		
Requirement (36 CFR 219.12(a)(5))	Question	Indicator
(iv) The status of a select set of the ecological conditions to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.	9. How is management of LBL affecting recovery of threatened and endangered species? <i>(Same as Task 9, Goal 5 in 2004 Area Plan)</i>	Trends in Price's potato bean populations in relationship to T&E Recovery.
(v) The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.	40. What does visitation look like at Land Between The Lakes and its facilities? <i>(Similar to Task 3, Goal 2 and Task 32, Goal 7 in 2004 Area Plan)</i>	Annual visitation trends collected by campground registrations, back country and backpacking permits, traffic counters, and admissions to Environmental Education facilities.
	41. What progress has been made toward becoming sustainable in LBL's Recreation and Environmental Education operations? <i>(Similar to Task 33, Goal 7 in 2004 Area Plan)</i>	Deferred Maintenance, Cost Recovery (including cost of operations trends), and Miles of trails maintained or improved to standard
	42. Does LBL have the ability to meet present and future user demands for recreation and environmental education activities, programs, and facilities? <i>(Similar to Task 35, Goal 7 in 2004 Area Plan)</i>	Satisfaction from NVUM, Financial Resource Trends, Cost of operations Trends, Facility improvements

Fiscal Year 2015

Transition Monitoring for Land Between The Lakes Area Plan <i>Tasks (or questions) in 2004 Area Plan Monitoring Table in Appendix 5 of the plan document will not change.)</i>		
Requirement (36 CFR 219.12(a)(5))	Question	Indicator
	43. How has Environmental Education (EE) become an integrated program targeted at helping individuals become aware of their relationship with natural and cultural resources while supporting stewardship of these resources through individual visitor action? (Similar to Task 37, Goal 7 in 2004 Area Plan)	The amount of interpretation and environmental education opportunities provided through Schools, Special Events, Outreach, Volunteer Activities, Facilities
	44. How is LBL making progress towards creating and implementing a Heritage Program? (New question for heritage monitoring already being reported)	LBL Heritage Annual Report containing Programmatic Agreement Implementation and Heritage Program Update
(vi) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.	45. How has climate variability changed and how is it projected to change across the region? (New question)	Climate extremes, precipitation, temperature, water balance, trends in land cover changes
	46. How is climate variability and change influencing the ecological, social, and economic conditions and contributions provided by plan areas in the region? (New question)	Jobs and income, recreation use and satisfaction, non-native invasive plant species, phenology, wildfire and prescribed fire, and forest health status
	47. What effects do national forests in the region have on a changing climate? (New question)	Carbon stocks and trends and greenhouse gas emissions

Fiscal Year 2015

Transition Monitoring for Land Between The Lakes Area Plan <i>Tasks (or questions) in 2004 Area Plan Monitoring Table in Appendix 5 of the plan document will not change.)</i>		
Requirement (36 CFR 219.12(a)(5))	Question	Indicator
	28. Is LBL less likely to be affected by insects, disease, and wildfire? <i>(Same as Task 28, Goal 5 in 2004 Area Plan)</i>	Acres of insect infestations and disease and number of acres treated through wildland fire use, prescribed fire, and mechanical treatments
(vii) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	48. What changes are occurring in the social, cultural, and economic conditions in the areas influenced by national forests in the region? <i>(New question)</i>	Jobs and income, employment and specialization, forest expenditures and employment, personal income; population change, growth and density; poverty, racial and ethnic composition
		Local Economic Trends (inflation, unemployment, current economic conditions)
	See questions under requirement (v)	See indicators under requirement (v)
(viii) The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land.	49. Will regeneration treatments on the landscape impair soil quality to inhibit natural or artificial regeneration to occur on the treated landscape? <i>(New question)</i>	Stocking surveys completed within 5 years after the final treatment.
	5. Has the Forest Service made progress in reducing erosion and improving watershed conditions and how was this accomplished? <i>(Same as Task 5, Goal 4 in 2004 Area Plan)</i>	Annual field observations of BMP effectiveness