

PROJECT SOS: SAVE OUR SIALIA



Data compiled by volunteers Bob and Judy Peak during the 2011 nesting season for the Land Between the Lakes Association, the USDA-Forest Service, and the Kentucky Department of Parks

Description of Locations

Primary Location:

Land Between the Lakes, also known as LBL, is a 170,000-acre National Recreation Area located in western Kentucky and Tennessee. LBL is a 40-mile long peninsula that was formed when the Tennessee River and Cumberland River were impounded, creating Kentucky Lake and Lake Barkley (respectively). (On the north end of LBL, the lakes are connected by a mile-long canal.) In 1963, President John F. Kennedy designated these federal lands as **Land Between the Lakes National Recreation Area (LBLNRA)**. The project was intended to demonstrate how an area with limited timber, agricultural resources, and industrial resources could be converted into a recreation asset that would stimulate economic growth in the region. Today, LBLNRA is managed by the USDA-Forest Service, and, as the focal point of a \$600 million tourism industry, it remains one of the most visited attractions in Kentucky and Tennessee. With 300 miles of undeveloped shoreline, LBL hosts an average of two million visitors each year who come from all over the nation and more than 30 foreign countries. Land Between the Lakes National Recreation Area offers a multitude of recreational opportunities and provides unique experiences in the areas of environmental education and historic interpretation. Bluebird nest boxes are located along bluebird trails in 18 different areas of LBL, and birders and other visitors can view nearly all of the boxes. (Note: According to the North American Bluebird Society, a bluebird “trail” is simply a series of bluebird nest boxes placed along a prescribed route.)

Secondary Locations:

Consisting of 3,700 acres, **Lake Barkley State Resort Park (LBSRP)** is the largest park in the Kentucky State Park system, and it is often called the system’s flagship park. It is located on the shore of Lake Barkley in Trigg County, Kentucky, approximately 10 miles east of the center of Land Between the Lakes. The park offers a wide variety of recreational opportunities for outdoor enthusiasts, including golf, fishing, boating, swimming, tennis, hiking, camping, trap shooting, and birding. Nearly all of the bluebird nest boxes located there can be observed from the roads in the park.

John James Audubon State Park, also a part of the Kentucky State Park system, is located in Henderson County, Kentucky and is composed of 692 acres, with 325 of those acres serving as a state nature preserve. The Audubon Museum in the park houses many of Audubon’s original watercolors, oils, engravings, and personal memorabilia. The park’s Nature Center features a wildlife observatory, which serves as a reminder of Audubon’s own love for nature and the great outdoors. The park has facilities for camping, hiking, fishing, golf, tennis, and birding. Since bluebirds will tolerate humans in close proximity to their nests, the park’s nest boxes are located in areas where park visitors can easily observe them. Moreover, most of the nest boxes are close to the park’s roads, so physically challenged people can benefit from the comfort and convenience of a vehicle while viewing the birds.

Location of LBL Nest Boxes and Related Data

<u>Location</u>	<u>Number of Boxes</u>	<u>Number of Bluebirds Fledged</u>
North Information Center.....	5.....	47
Hillman Ferry Campground.....	7.....	64
Nature Station.....	34.....	290
Camp Energy.....	7.....	63
Fenton Special Events Area.....	5.....	56
Elk-Bison Prairie.....	11.....	85
Golden Pond Visitor Center.....	16.....	123
Administration Office.....	5.....	39
Hunter's Check Station.....	3.....	37
Central Maintenance.....	7.....	49
Colson Overlook.....	1.....	11
Rushing Creek Campground.....	9.....	88
The Homeplace-1850.....	4.....	25
South Bison Range.....	25.....	213
South Maintenance Area.....	6.....	28
Brandon Spring Group Center.....	9.....	75
South Information Center.....	6.....	46
Piney Campground.....	10.....	60
Total.....	170.....	1,399

Summary of Data

Land Between the Lakes National Recreation Area

During the 2011 nesting season, a total of 1,637 eastern bluebird (*Sialia sialis*) eggs were laid in the 170 bluebird nest boxes at Land Between the Lakes (LBL), with 1,399 bluebirds fledging, for an 85.4% fledging success rate. (Note: A young bird has “fledged” if it leaves the nest on its own.) Adult bluebirds made 376 nesting attempts in the boxes. (Note: An “attempt” is defined as a bird building a nest and laying at least one egg.) Four nest boxes had no nesting attempts by any species: Golden Pond Visitor Center-Box 4, The Homeplace-1850-Box 3, South Bison Range-Box 25, and Piney Campground-Box 6. There were 190 unhatched bluebird eggs and 48 dead bluebird nestlings discovered in the boxes.

Compared to the previous year, the most significant decreases in fledglings occurred in the following areas: South Maintenance Area (32% decrease) and the South Information Center Area (21% decrease). These declines can be attributed primarily to fewer nesting attempts and a number of nesting failures in the areas. Fortunately, the decreases were offset by fledging increases in ten other areas of LBLNRA, including a 36% increase in the Nature Station Area (290 fledglings).

The volunteers also found one dead adult female bluebird in Nest Box 3 at the Brandon Spring Group Center Area. Judging by the time of the year (March 21st) and the condition/position of the body, the bird had evidently expired during the winter months.

From nest construction to the fledging of the young birds, the eastern bluebird's reproductive cycle encompasses approximately one month. Therefore, the volunteers must follow a monthly monitoring protocol to accurately determine the outcome of each nesting attempt. The volunteers monitored all of the boxes on the following dates: March 21-22, April 18-19, May 13-14, June 14-15, July 12-13, and August 10-11-12. To update data for specific boxes, additional monitoring was done for those boxes on May 30, June 1, and September 5.

[Note: A female bluebird usually builds a nest in less than a week and lays one egg per day until the clutch is complete. Eastern bluebird clutches typically consist of three to six eggs. When the last egg (or, in some instances, the penultimate---next to last) has been laid, the female begins incubation of the eggs, which takes about 12-14 days (on average). After the eggs hatch, both bluebird parents feed the nestlings for about 16-18 days (on average). When the juveniles fledge, the bluebird parents (especially the adult male) may feed them for an additional two weeks, or until the young birds can secure food on their own. Approximately two-thirds of an eastern bluebird's diet consists of insects and other invertebrates. [During some nesting seasons, the authors have found small, dead ringneck snakes (*Diadophis punctatus*) or small, dead lizards (species unknown) in the nest material, which apparently were food offerings rejected by the bluebird nestlings.] The remainder of the bird's diet is made up of wild fruits. In Kentucky, a female bluebird will usually produce two broods during the nesting season, and a third brood is possible. Bluebirds do not reuse a nest, so the nest material may be removed as soon as the juvenile birds have fledged. Throughout the winter months, if weather conditions and temperatures become intolerable (typically, below 25° F.), wintering bluebirds may use the nest boxes as roost sites.

During the monthly monitoring process, each nest box is inspected, and the contents are recorded on field sheets and cumulative data sheets. Anecdotal information is also recorded on the field sheets. At the conclusion of the nesting season, these sheets are used to compile statistical information and determine anecdotal accounts for each area. When monitoring, the volunteers use the following criteria as indicators of fledging success for bluebirds and most cavity-nesters:

(1) nestlings have vacated the nest box and/or there are no eggs in the nest box

- (2) nest material is somewhat compressed or flattened (due to maturation of the nestlings)
- (3) there is no indication or evidence of predation by small mammals, snakes, or other birds
- (4) there is an abundance of pin feather scales in the nest, which are disintegrated remains of the keratinous sheaths that encase the nestling's flight feathers---this whitish material resembles human dandruff
- (5) there is a collection of fecal material (usually white) attached to the inside walls of the nest box---it is deposited as the mature nestlings exercise and prepare for flight.]

Maintenance work on the nest boxes/posts was completed on additional days in March, April, May, and October. Including preparatory work, travel time to LBL, nest box monitoring work in the field, maintenance work in the field, and bluebird presentations for groups, the two volunteers spent over 400 hours working on Project SOS and drove approximately 1,200 miles at LBL to monitor, repair, or relocate bluebird nest boxes.

(Note: The volunteers would like to thank the USDA-Forest Service for providing a vehicle for the field work at LBL. Thanks are also extended to Lake Barkley State Resort Park for permitting the volunteers to stay in the park's campground.)

There were 58 white bluebird eggs (3.54% of the total) found in the following areas: Nature Station Area, Fenton Special Events Area, South Maintenance Area, South Bison Range Area, and the South Information Center Area. Fifty-three of the white eggs produced birds that eventually fledged.

[Note: Statistically, it's estimated that less than 4% of all eastern bluebird eggs are white, with the other eggs being the more typical light blue color produced by other members of the thrush family, including the American robin (*Turdus migratorius*). The exact cause of albinistic (white) bluebird eggs is unknown, but most theories point toward a genetic link that may involve the periodic expression of a recessive gene. Accordingly, there is no absolute certainty that bluebirds fledged from a clutch of white eggs will also produce white eggs when they become sexually mature, and bluebird hatchlings from white eggs always have *blue* feathers, except in the case of an albino. (It should be noted that there is no apparent link between white egg color and albinism in bluebirds, and any such occurrence would be extremely rare and purely coincidental.) Furthermore, there is usually no mixture of white eggs and blue eggs in a bluebird clutch. On the rare occasion that a white egg is found among a clutch of blue eggs, or vice versa, a second female bluebird probably "dumped" the anomalous egg at an opportune moment, or a rare female bluebird had the ability to produce both blue and white eggs. In 22 nesting seasons and inspections of several thousand bluebird clutches, the authors of this report have never observed a mixture of egg colors in a bluebird nest. However, a few cases of suspected egg dumping have been noted and recorded (e.g., two nests in 2009---all blue eggs), but no direct observation of the birds' nesting behavior could be used to confirm the authors' suspicions. Also, it should be mentioned that some bluebird researchers have documented banded female bluebirds which laid blue eggs and white eggs in the same clutch. In these cases, it is suspected that the female bluebird was capable of producing only a limited amount of biliverdin, the pigment which causes blue hues in eggs.]

The LBL nest boxes also yielded four Carolina chickadee (*Parus carolinensis*) fledglings (out of four eggs), four prothonotary warbler (*Protonotaria citrea*) fledglings (out of four eggs), and nine tree swallow (*Iridoprocne bicolor*) fledglings (out of fifteen eggs).

[Note: The prothonotary warbler (alpha code: PROW), a neotropical migrant, is the only cavity-nesting warbler in the eastern United States. In several parts of its range, the prothonotary warbler population has been declining since 1966. On average, decreasing numbers of these warblers have been recorded on both Christmas Bird Counts and Breeding Bird Surveys, the latter indicating significant declines in Alabama, Arkansas, and Georgia between 1966 and 1996. From the late 1980s to 1996, Canada's sole breeding population dropped by at least 75% and the bird is now listed as Endangered in that country. In the United States, the National Audubon Society has placed the PROW in its WatchList "yellow" category, which includes species that are a national

conservation concern because they are either rare or declining. The group Partners in Flight has used the same designation (“Threatened and Declining”) for the PROW. (data provided by the National Audubon Society)]

The number of bluebirds fledged in 2011 was the highest total in the twenty-two years that the volunteers have managed the LBL bluebird trails. The totals for other years are enumerated in Table 1.

TABLE 1

Land Between the Lakes National Recreation Area

Year	Number of Nest Boxes	Bluebirds Fledged
1990	108	544
1991	153	720
1992	159	727
1993	155	820
1994	159	898
1995	157	872
1996	156	754
1997	162	599
1998	149	774
1999	152	719
2000	153	871
2001	154	964
2002	158	1,086
2003	161	978
2004	164	1,129
2005	164	976
2006	165	1,092
2007	165	1,050
2008	165	991
2009	165	1,184
2010	170	1,195
2011	170	1,399
Total 22 years		20,342

Some biologists consider the number of bluebirds produced per nest box as the most accurate measure of trail success. If that ratio is utilized, the 2011 nesting season ranks as the best year, with 8.22 bluebirds fledged per box.

During the volunteers’ tenure, 1,246 additional juvenile birds---representing six species [Carolina chickadee, tufted titmouse (*Baeolophus bicolor*), prothonotary warbler, Carolina wren (*Thryothorus ludovicianus*), tree swallow, and white-breasted nuthatch (*Sitta carolinensis*)]---have fledged from the LBL bluebird nest boxes. In 2001, a seventh species, a great crested flycatcher (*Myiarchus crinitus*), had an unsuccessful nesting attempt.

Anecdotal remarks

On April 19th, the volunteers observed a black rat snake (*Elaphe obsoleta*) curled around Nest Box 21 at the South Bison Area. The bluebird parents were dive-bombing the snake in a futile attempt to drive it away. The volunteers had monitored the nest box the previous day, and it had contained five bluebird nestlings. After the live snake was relocated, the nest box was examined, and the volunteers determined that the snake apparently had consumed two of the nestlings. Fortunately, the three remaining nestlings fledged at a late date.

In late April/early May, record-setting rainfall was recorded in western Tennessee and western Kentucky, and the subsequent flooding of Kentucky Lake and Lake Barkley encroached on several bluebird nest boxes at LBL. (It was the second consecutive year of record flooding---the 2010 Flood had been described as a once-in-500 years flood. However, no posts or bluebird nest boxes were lost in that flood.)

At Kentucky Dam, the 2011 Flood crested at a new all-time record of 372.5 feet--the top of the dam's flood gates is 375 feet. Three posts/bluebird nest boxes washed completely away in the 2011 Flood and were not recovered, and one post/nest box was swept approximately one hundred yards from its original site. Two additional posts/nest boxes remained in place, but the flood waters rose above the nest boxes, and the bluebird eggs and/or nestlings perished. Altogether, 37 bluebird eggs and/or babies were lost in the 2011 Flood at LBL. In late May, after the floodwaters had receded, all displaced or missing posts/nest boxes were replaced and sited at locations above the *new* high water mark.

In 2011, no dwarf bluebird eggs were found in the LBL nest boxes. In addition to being significantly smaller than a normal egg, dwarf eggs are usually more spherical, frequently have a thick, rough shell, and lack a yolk. In 22 nesting seasons, it is estimated that the authors of this report have found fewer than ten dwarf eggs (out of 24,366 eggs = <0.041%).

At 7:45 A.M on May 14th, the volunteers discovered a dead (road kill) armadillo on The Trace (Highway 453) at the entrance to the Hillman Ferry Campground.

On September 5th, at approximately 8:30 A.M., the volunteers discovered a dead barred owl (*Tyto alba*)---sex unknown---in the middle of The Trace at the eighteen mile marker. The owl had a severe head trauma---as it swooped across the road, it had apparently collided with a car.

While monitoring the bluebird nest boxes in 2011, the volunteers found that some of the boxes were used at various times by ants, wasps, and a variety of other insects. As previously mentioned, small ringneck snakes (*Diadophis punctatus*) and small lizards (species unknown) were found in a few bluebird nests. Apparently, the dead snakes and lizards were rejected by the bluebird nestlings because the reptiles were too large to swallow. Small snail shells (species unknown) were also found in a few nests, suggesting that the snail shells were inedible, or perhaps only the soft snail body parts were fed to the nestlings. The volunteers also spotted numerous species of birds (including many wild turkeys (*Meleagris gallopavo*) and ospreys (*Pandion haliaetus*), as well as many fallow deer (*Cervus dama*) and white-tailed deer (*Odocoileus virginianus*).

Lake Barkley State Resort Park

As an additional part of Project SOS, the volunteers used their own vehicle to check and maintain a bluebird trail (60 nest boxes) they have established at nearby Lake Barkley State Resort Park (LBSRP). In 2011, there were 610 bluebird eggs laid in the LBSRP boxes, with 506 birds fledging, for an 82.9% fledging success rate. There were 135 nesting attempts by bluebirds at the state park, and the ratio of bluebirds fledged per nest box was 8.43. The volunteers also found 79 unhatched bluebird eggs and 25 dead bluebird nestlings in the boxes. [Note: Two of the deceased nestlings---discovered on August 12th ---had feathers saturated with dark, greasy material that nest box monitors sometimes describe as “gunk” or “fecal glue”. According to Bet Zimmerman (Sialis.org Web site), theories on the cause include the following:

- The fecal build-up occurs when parents are under stress - e.g., a single parent frantically trying to feed a clutch (especially a large one) and/or spending so much time trying to find food that it can not attend to removing fecal sacs.
- Severe diarrhea. This may occur in bluebird babies fed earthworms and can result in dehydration and death. Earthworms may be used as a source of food by bluebird parents during inclement weather, when nothing else is available. The baby birds' undeveloped stomachs apparently can't handle earthworms due to the dirt castings in a worm's gut, and it's possible that chemicals in the earthworms break down the birds' fecal sacs. Diarrhea may also occur if nestlings ingest excessive amounts of fruit.
- A small nest box floor size may aggravate the problem, as the excrement is more concentrated. (e.g., a Gilwood box, which seems to be preferred by some bluebirds, only has a 3.5" x 4.25" floor.)
- Some people report that the “gunk” phenomenon is more common in second or third broods.]

The nest boxes at LBSRP were also affected by the 2011 Flood. In the park's Beach Area, three posts/nest boxes were washed out of their locations, but they were eventually recovered and placed in sites above the highest level of the debris field deposited by the flood waters. Altogether, 14 bluebird eggs and/or nestlings were lost in the flood at the state park.

During the 2011 nesting season, none of the LBSRP bluebird eggs were white. The volunteers monitored all of the LBSRP nest boxes on the following dates: March 20, April 17, May 12, June 13, July 11, and August 12. To update data for specific boxes, additional monitoring was done for those boxes on April 15, May 15, May 30, May 31, July 1, July 4, July 10, August 9, August 10, September 1, September 2, and September 5. Maintenance work on the nest boxes/posts in the park was completed on additional days in March, April, and October.

The total bluebird fledglings at LBSRP for previous years are noted in Table 2.

TABLE 2

Lake Barkley State Resort Park

Year	Number of Nest Boxes	Bluebirds Fledged
1990	10	23
1991	10	27
1992	27	91
1993	30	103
1994	31	85
1995	29	87
1996	29	67
1997	28	99
1998	28	93
1999	29	118
2000	29	128
2001	36	116
2002	37	148
2003	37	302
2004	41	296
2005	41	316
2006	41	350
2007	50	405
2008	53	405
2009	56	511
2010	60	472
2011	60	506
TOTAL 22 years		4,748

In 2011, a total of six Carolina chickadees (out of six eggs) and four prothonotary warblers (out of four eggs) also fledged from the LBSRP nest boxes. Since 1990, in addition to bluebirds, the LBSRP bluebird trail has yielded 302 fledglings that were produced by five species (Carolina chickadee, tufted titmouse, prothonotary warbler, Carolina wren, and tree swallow).

On March 20th, the volunteers found a dead male bluebird in Nest Box 1 of the Lodge Area. The bird appeared to be a winterkill.

In May, 2007, the volunteers helped set up a bluebird nest box that contains a camera. The camera is connected to an indoor monitor located in the main lodge, and lodge guests can view the live activities of nesting birds.

[The nest cam box had two clutches of bluebird eggs in 2011. The first clutch consisted of four eggs, and all of the babies fledged in May. The second clutch had six eggs, and all of the birds fledged in July.]

John James Audubon State Park

As a further extension of Project SOS, the volunteers monitored a 20-box bluebird trail that they established at John James Audubon State Park (JJASP) in 2005. During the 2011 nesting season, the JJASP nest boxes produced 58 bluebird fledglings. As a result of 21 nesting attempts by bluebirds, 88 bluebird eggs were discovered in the nest boxes. There were 20 unhatched bluebird eggs in the boxes, and the bluebird fledging success rate was 65.9%.

Regrettably, raccoons were successful at raiding two of the nest boxes in May and June, and eight bluebird nestlings were preyed upon. For 2012, additional predator deterrents will be considered for these nest boxes. During early May, two bluebird nestlings appeared to have succumbed to “gunk” in Nest Box 19. The ratio of bluebirds fledged per nest box at JJASP was 2.9.

Some studies seem to suggest that a significant percentage of bluebirds may exhibit nest site fidelity (returning to the general vicinity of a natal nest box, or returning to the location of a successful nesting attempt), and it is therefore hopeful that surviving adult bluebirds will return to JJASP next spring and continue replenishing the park’s population. Table 3 shows the fledging numbers for previous years.

TABLE 3

John James Audubon State Park

Year	Number of Nest Boxes	Bluebirds Fledged
2005	10	18
2006	12	37
2007	12	34
2008	15	55
2009	17	59
2010	17	47
2011	20	58
Total 7 years		308

In 2011, the JJASP bluebird nest boxes also produced six tree swallow fledglings (out of ten eggs) and thirteen Carolina chickadee fledglings (out of fifteen eggs). A raccoon depredated four tree swallow nestlings in Nest Box 2. Since 2005, in addition to bluebirds, the JJASP bluebird trail has yielded 107 fledglings, representing three species (Carolina chickadee, tree swallow, Carolina wren).

In August, 2007, the volunteers helped set up a nest cam box in the wildlife observation area behind the park’s nature center.

[In late April, 2011, a Carolina chickadee laid five eggs in the nest box, and five of the babies fledged in May.]

Prothonotary Warblers at John James Audubon State Park

In an effort to address the plight of prothonotary warblers (PROW) previously mentioned in this report, the volunteers decided to establish a trail of PROW nest boxes around the periphery of Recreation Lake in JJASP. With assistance from Wild Birds Unlimited co-owner, Tim Griffith, twelve wooden nest boxes---designed for prothonotary warblers---were placed in strategic locations at the water's edge on March 15, 2010. [Note: Funding for the prothonotary warbler nest boxes, metal poles, and predator baffles was provided by the McCutchanville Garden Club (Evansville, IN) and the Beckham Bird Club (Louisville, KY)].

Prothonotary warblers made four nesting attempts in the nest boxes in 2011, laying a total of eighteen eggs. Seventeen of the PROWs fledged, and one egg "disappeared" from Nest Box 1 in May. (It is possible that one of the adult birds may have removed an infertile or addled egg.) More specifically, Nest Box 1 had two clutches (five eggs in May and four eggs in July), Nest Box 3 had one clutch (five eggs in May), and Nest Box 10 had one clutch (four eggs in June). The adult prothonotaries---in all likelihood, a male---also built two "dummy" nests (Nest Box 2 and Nest Box 6), and some nest material was found in four other nest boxes. [Note: Frequently, the male prothonotary warbler will build one or more incomplete or "dummy" nests early in the nesting season, adding just a shallow layer of moss to one or more cavities scattered within its territory. (A territory is estimated to be about one hectare or approximately 2½ acres). These partial nests appear to serve several functions. First, the male may use them to demonstrate to a prospective mate that he has chosen a good territory with lots of nesting opportunities. He may also be trying to fool potential predators into thinking that cavities with nests do not necessarily mean prey can be found in them. He may also be informing other nest competitors that his territory is "occupied." There is also some evidence that the male may also sometimes use the "dummy" nest as a night-time roosting site. Finally, and perhaps most importantly, a "dummy" nest is quite often adopted by the female upon her arrival, and she then takes over completion of the functional nest. Because the male has already spent a day or two laying the foundation for the functional nest, it saves precious time in nest building and thus gives the female prothonotary a head-start on the brief nesting season.]

Some studies indicate that prothonotary warblers exhibit strong nest site fidelity, particularly if a nesting attempt is successful. Consequently, there is a good likelihood that the successful PROW pairs (or their offspring) will return to JJASP in the future and continue "growing" the population. In 2011, the PROW nest boxes also had thirteen Carolina chickadee eggs and six tree swallow eggs deposited in them. Unfortunately, all of these nesting attempts were failures.

Conclusion

In summary, during the 2011 nesting season, the total number of eastern bluebird fledglings for Project SOS (LBL, LBSRP, and JJASP combined) was 1,963. There were also 23 Carolina chickadees, 15 tree swallows, and 25 prothonotary warblers that fledged from the combined nest boxes (including the PROW nest boxes at JJASP). Since the project was started in 1990, there have been 25,398 bluebird fledglings and 1,644 fledglings produced by seven other cavity-nesting bird species.

[Note: Due to the following factors, the fledgling totals listed in this report are conservative figures and probably do not reflect the *actual* number: (1) if any evidence exists that fledging may not have occurred, the volunteers count the entire clutch/brood as a nesting failure; (2) occasionally, female bluebirds may lay additional eggs immediately after nest box inspections have been

recorded for a given month, and the “extra” juvenile birds may fledge before the volunteers complete the next monthly inspection. Therefore, given these two factors, the exact number of fledglings may be greater than the totals in this report.]

As always, the goal of Project SOS is to maintain a core population of bluebirds to counterbalance severe seasonal conditions, particularly winter conditions comparable to the winters of 1977 and 1978, which proved to be devastating for bluebirds and many other songbirds. Furthermore, since birding is one of the most prevalent recreational activities in the United States, and eco-tourism has become a driving force in the recreational pursuits of millions of Americans, the economic benefits of Project SOS are immeasurable. For that reason, in future years, the project should continue to be a valuable enhancement for Land Between the Lakes National Recreation Area, Lake Barkley State Resort Park, and John James Audubon State Park.

As an added endorsement of the project, the eastern bluebird has been selected by the USDA-Forest Service as a management indicator species for LBL. Management indicator species are animal (or plant) species selected for use as a planning tool in accordance with the regulations of the National Forest Management Act (1982). These indicator species are used to help set management objectives, analyze effects of alternatives, and monitor plan implementation. The eastern bluebird has been chosen because its population changes are believed to indicate the effects of management on selected biological components (i.e. snags in open forest situations and non-game species of interest).

In recent years, during the nesting season, the volunteers have consistently observed increasing numbers of paired bluebirds at LBL in areas where no bluebird nest boxes exist within miles of the locations. Although it is only speculative, one may surmise from these repeated sightings that the LBL bluebird population is healthy enough that some bluebirds may possibly be seeking out natural cavities as nest sites. If so, the authors remain hopeful that these birds can overcome the nest site competition with non-native species [house sparrows (*Passer domesticus*) and European starlings (*Sturnus vulgaris*)] that has been such a highly negative factor for bluebird reproduction in other parts of North America.

The bluebird trails monitored by the volunteers at LBL and the state parks cover a four-county area (Trigg County, KY, Lyon County, KY, Henderson County, KY, and Stewart County, TN). The nesting data in this report will be shared with the USDA-Forest Service, the Kentucky Department of Parks, Lake Barkley State Resort Park, John James Audubon State Park, the Land Between the Lakes Association, the North American Bluebird Society, and other governmental or ornithological organizations.

(Questions or comments may be directed to Bob and Judy Peak at blubrds@bellsouth.net.)

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