

PROJECT SOS: SAVE OUR SIALIA



Data compiled by volunteers Bob and Judy Peak during the 2009 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 isthmus that was formed when the Tennessee River and Cumberland River were impounded, creating Kentucky Lake and Lake Barkley (respectively). In 1963, President John F. Kennedy designated these federal lands as **Land Between the Lakes National Recreation Area**. 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, LBL 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 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** 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. Most importantly, the nest boxes are close to the park's roads, so physically challenged people can view the birds from the comfort and convenience of a vehicle.

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.....	26
Hillman Ferry Campground.....	7.....	54
Nature Station.....	34.....	217
Camp Energy.....	7.....	63
Fenton Special Events Area.....	3.....	25
Elk-Bison Prairie.....	10.....	76
Golden Pond Visitor Center.....	15.....	109*
Administration Office.....	5.....	31
Hunter's Check Station.....	3.....	21
Central Maintenance.....	8.....	36
Colson Overlook.....	1.....	9
Rushing Creek Campground.....	8.....	85
The Homeplace-1850.....	4.....	11
South Bison Range.....	24.....	206
South Maintenance Area.....	6.....	29
Brandon Spring Group Camp.....	9.....	71
South Information Center.....	6.....	60
Piney Campground.....	10.....	55
Total.....	165.....	1,184

*At the conclusion of the 2008 nesting season, the volunteers covered all nest box posts in the Golden Pond Visitors Center Area with aluminum sheet metal, and, as a result, the raccoons had limited success in climbing the posts and preying on bluebird nestlings. The dramatic improvement in fledging success (nearly 80%) seems to confirm that the sheet metal serves as an effective deterrent.

Summary of Data

During the 2009 nesting season, a total of 1,429 eastern bluebird (*Sialia sialis*) eggs were laid in the 165 bluebird nest boxes at Land Between the Lakes (LBL), with 1,184 bluebirds fledging, for an 82.8% fledging success rate. (Note: A young bird has “fledged” if it leaves the nest on its own.) Adult bluebirds made 339 nesting attempts in the boxes. (Note: An “attempt” is defined as a bird building a nest and laying at least one egg.) There were 211 unhatched bluebird eggs and 34 dead bluebird nestlings discovered in the boxes. The volunteers also found six dead adult bluebirds (three males and three females) in six different LBL nest boxes. Judging by the time of the year (March) and the condition/position of the bodies, four of the birds (two males, two females) had evidently expired during the winter months. The other dead adult bluebirds were discovered in April/May and died from unknown causes.

From nest construction to the fledging of the young birds, the eastern bluebird’s reproductive cycle encompasses approximately one month. Therefore, the volunteers must monitor the nest boxes on a monthly basis to accurately determine the outcome of each nesting attempt. The volunteers monitored the boxes on the following dates: March 27-28, April 17-18, May 15-16, June 12-13, July 10-11, August 7-8 and August 28.

[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 was completed on additional days in September and October. Including preparatory work, travel time to LBL, nest box monitoring work in the field, maintenance work in the field, bluebird presentations for groups, and participation in the annual meeting of the North American Bluebird Society, the two volunteers spent over 200 hours working on Project SOS and drove approximately 1,200 miles to monitor, repair, or relocate bluebird nest boxes at LBL.

(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. The Peaks would also like to thank Phil Hazle, the Jailer for Calloway County, Kentucky, who provided replacement nest boxes through a special training program he has developed for the jail inmates.)

There were 49 white bluebird eggs (3.42% of the total) found in the following areas: Energy Campground, Golden Pond Visitor's Center, South Bison Range, and the South Information Center. Thirty-seven of the white eggs produced birds that eventually fledged. Statistically, slightly more than 4% of all 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*). Interestingly, 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 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. In 20 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), but no direct observation of the birds' nesting behavior could be used to confirm the authors' suspicions.

The LBL nest boxes also yielded 12 Carolina chickadee (*Parus carolinensis*) fledglings, 18 prothonotary warbler (*Protonotaria citrea*) fledglings, three tree swallow (*Iridoprocne bicolor*) fledglings, and 15 Carolina wren (*Thryothorus ludovicianus*) fledglings. A tufted titmouse (*Parus bicolor*) had an unsuccessful nesting attempt (seven eggs) in the Central Maintenance Area.

[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 Canada. 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 2009 was the highest total in the twenty years that the volunteers have managed the LBL bluebird trails. The totals for other years were:

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
Total 20 years		17,748

If one uses a ratio of bluebirds fledged per nest box, the 2009 nesting season also ranks as the best year, with a ratio of 7.17 bluebirds fledged per box. During the volunteers' tenure, 1,199 additional juvenile birds---representing six species [Carolina chickadee, tufted titmouse, prothonotary warbler, Carolina wren, 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.

Effects of the 2009 Ice Storm

Although the January 26-28 Ice Storm of 2009 did not precisely follow the state line that separates the Kentucky portion of LBL from the Tennessee section, the most significant damage to the flora occurred primarily north of that line. Due to the rarity of such an event (once-in-a-century) and the size of the area affected, this phenomenon provokes a question: Did the ice storm have any major effect

on the bluebird population at LBL, particularly in the heavily-damaged Kentucky section?

A comparative analysis reveals the fact that the 95 bluebird nest boxes in the Kentucky section produced 642 bluebird fledglings during the 2009 nesting season (6.75 bluebirds per nest box), while the 67 boxes in the Tennessee portion produced 517 bluebird fledglings (7.71 bluebirds per nest box).

Consequently, as previously mentioned in this report, the total number of bluebird fledglings at LBL was the highest achieved in 20 years. [Note: The Fenton Special Events Area was not included in the comparison because 2009 was the first year for the documentation of data in that area.]

During the previous five nesting seasons (2004-2008), with almost exactly the same number of nest boxes, the Kentucky portion had yielded an average of 591 bluebird fledglings (6.22 bluebirds per nest box), and the Tennessee section had produced an average of 442 fledglings (6.59 bluebirds per nest box) for the same time period. Therefore, during the 2009 nesting season, the LBL bluebirds were actually *more* productive in *both* parts of LBL than the previous five years, and it appears that the 2009 Ice Storm did not have a detrimental effect on the bluebird population in either part of the National Recreation Area. [As additional corroboration of the health of the bluebird population in that region of Kentucky, it may be noted that the bluebird trails in nearby Lake Barkley State Resort Park (56 nest boxes) yielded 511 bluebird fledglings (9.125 bluebirds per nest box), which is also the highest number in 20 years.]

Conversely, it should be noted that although the Carolina chickadee is the second-most prevalent species found in the LBL nest boxes, the number of fledglings (12) recorded in 2009 was the lowest in the 20 years that the volunteers have monitored the boxes. It might also be mentioned that the number of prothonotary warbler fledglings at LBL (18) was the highest the volunteers have ever recorded, but springtime flooding and higher than normal lake levels may have compelled the PROWs to seek out bluebird nest boxes as nest sites, particularly in the area around the Nature Station.

Anecdotal remarks

While monitoring the bluebird nest boxes in 2009, the volunteers found that some of the boxes were used at various times by bats, ants, wasps, and a variety of other insects. While working on the project, 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*). In an unrelated anecdotal incident, on May 16, 2009 (about 7:40 A.M.), the volunteers were traveling south on The Trace (Highway 453), and they spotted a dead armadillo in the road at the entrance to the Hillman Ferry Campground. Judging by its appearance, and information in a mammal field guide, it was a nine-banded armadillo (*Dasypus novemcinctus*). This incident marks the third time the volunteers have observed a road-killed armadillo on The Trace at Land Between the Lakes since 2005. An LBLNRA biologist confirmed that other armadillos have been sighted at LBL in recent years.

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 (56 nest boxes) they have established at nearby Lake Barkley State Resort Park (LBSRP). In 2009, there were 573 bluebird eggs laid in the LBSRP boxes, with 511 birds fledging, for an 89.1% fledging success rate. There were 129 nesting attempts by bluebirds at the state park, and the ratio of state park bluebirds fledged per nest box was 9.125. The volunteers also found 10 dead bluebird nestlings in the boxes. Thirteen of the LBSRP bluebird eggs were white (2.26% of the total), and nine of those hatchlings fledged successfully.

In previous years, the total bluebird fledglings at LBSRP were:

Lake Barkley State Resort Park

Year	Number of Nest Boxes	Bluebirds Fledged
1990	10	23
1991	11	27
1992	27	91
1993	30	97
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
Total 20 years		3,764

*At the conclusion of the 2002 nesting season, the volunteers covered all nest box posts in the state park with aluminum sheet metal, and, as a result, the raccoons had limited success in climbing the posts and preying on bluebird nestlings in 2003. The dramatic improvement in fledging success in 2003 (104%) and subsequent improvement in fledging productivity seems to confirm that the sheet metal serves as an effective deterrent.

In 2009, six Carolina chickadees also fledged from the LBSRP nest boxes. Since 1990, in addition to bluebirds, the LBSRP bluebird trail has yielded 236 fledglings that were produced by five species (Carolina chickadee, tufted titmouse, prothonotary warbler, Carolina wren, and tree swallow).

In May, 2007, the volunteers assisted the LBSRP naturalist (Jenny Howard) in setting up a bluebird nest box that contains a camera (donated by the Kentucky Bluebird Society). The camera is connected to an indoor monitor, and lodge guests can view the live activities of nesting birds.

[The nest cam box had one clutch of bluebird eggs in 2009. The clutch consisted of four eggs, and all four of those babies fledged in July.]

John James Audubon State Park

As a further extension of Project SOS, the volunteers monitored a 17-box bluebird trail that they established at John James Audubon State Park (JJASP) in 2005. During the 2009 nesting season, the JJASP nest boxes produced 59 bluebird fledglings. As a result of 21 nesting attempts by bluebirds, 82 bluebird eggs were discovered in the JJASP nest boxes. There were 19 unhatched bluebird eggs and four dead bluebird babies found in the boxes, and the bluebird fledging success rate was 71.9%. 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 boosting the park's population.

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
Total 5 years		203

The JJASP nest boxes also produced four tree swallow fledglings during the 2009 nesting season. Unfortunately, six Carolina chickadee nestlings were removed from a nest box by a house sparrow (*Passer domesticus*) and did not survive. Since 2005, in addition to bluebirds, the JJASP bluebird trail has yielded 76 fledglings, representing three species (Carolina chickadee, tree swallow, Carolina wren).

In August, 2007, the volunteers assisted the JJASP naturalist (Julie McDonald) in setting up a nest cam box (donated by the Kentucky Bluebird Society) in the wildlife observation area behind the park's nature center.

[During the 2009 nesting season, a Carolina wren built a nest in the box, but no eggs were laid.]

Conclusion

In summary, during the 2009 nesting season, the total number of eastern bluebird fledglings for Project SOS (LBL, LBSRP, and JJASP combined) was 1,754. There were also 18 Carolina chickadees, six tree swallows, 15 Carolina wrens, and 18 prothonotary warblers that fledged from the combined nest boxes. Since the project was started in 1990, there have been 21,715 bluebird fledglings and 1,511 fledglings produced by six 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. Consequently, 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 are 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 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 at Land Between the Lakes, Lake Barkley State Resort Park, and John James Audubon State Park are registered as a part of the Transcontinental Bluebird Trail (TBT). The TBT, developed by the North American Bluebird Society, is a network of bluebird trails stretching across the United States and Canada that will eventually provide thousands of nest boxes for bluebirds and other cavity-nesting species. 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.)

Cover photograph by the North American Bluebird Society

Report designed by Bob and Judy Peak

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