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The Recovery and Current Distribution of Nesting Ospreys (*Pandion haliaetus*) in Kentucky

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Abstract. *Osprey populations throughout the United States plummeted in response to the use of the pesticide DDT (dichloro-diphenyl-trichloroethane) from 1945-1971. Following the DDT ban in 1972, restoration efforts were administered range-wide during the 1980's and 1990's. The Osprey's ability to adapt to human-altered environments gave this species an advantage during a quick recovery. Kentucky's nesting population has been monitored extensively in modern times through statewide nest surveys. Counts of occupied nests have continued to show an increase in recent years. Although the Land Between the Lakes area still supports the highest density of nests, nesting activity has finally expanded into other regions of the state. An increase in Osprey nest numbers is expected to continue in future years.*

Few landbirds rival Ospreys (*Pandion haliaetus*) in geographical distribution and adaptability. Ospreys are one of only three raptor species known to breed in every biogeographical region of the world except Antarctica (Monti 2015). Ospreys are highly specialized birds of prey, hunting by diving up to a meter below the water surface to capture prey, with live fish making up 99% of their diet. Due to their piscivorous diet and hunting technique, Ospreys are concentrated in regions with shallow waters or plentiful surface-schooling fish (Poole 2002).

In Kentucky, Ospreys were historically recorded as rare summer residents, nesting mostly in the far western portion of the state and the floodplains of the lower Ohio River (Mengel 1965). Osprey populations along with many other raptor species suffered rangewide declines during the mid-1900's, largely in response to the widespread use of the pesticide DDT (dichloro-diphenyl-trichloroethane). Exposure to DDT caused eggshell thinning, resulting in decreased productivity (Ames 1966). As a result, no successful Osprey nests were documented in Kentucky between 1949 and 1985 (Ray et al. 2009).

Restoration Efforts

After the ban on DDT in 1972, nationwide restoration efforts led by both state and federal agencies began in the early 1980's. In 1981, The Tennessee Valley Authority (TVA) initiated an Osprey hacking program at Land Between the Lakes (LBL), releasing a total of 61 young Ospreys between 1981-1989. (Hacking is the gradual release of young birds into the wild.) In addition to the TVA efforts, the Kentucky Department of Fish and Wildlife Resources (KDFWR) released 36 Ospreys at 12 additional sites ranging from LBL to Laurel County in the eastern part of the state from 1982-1989 (Ray et al. 2009).

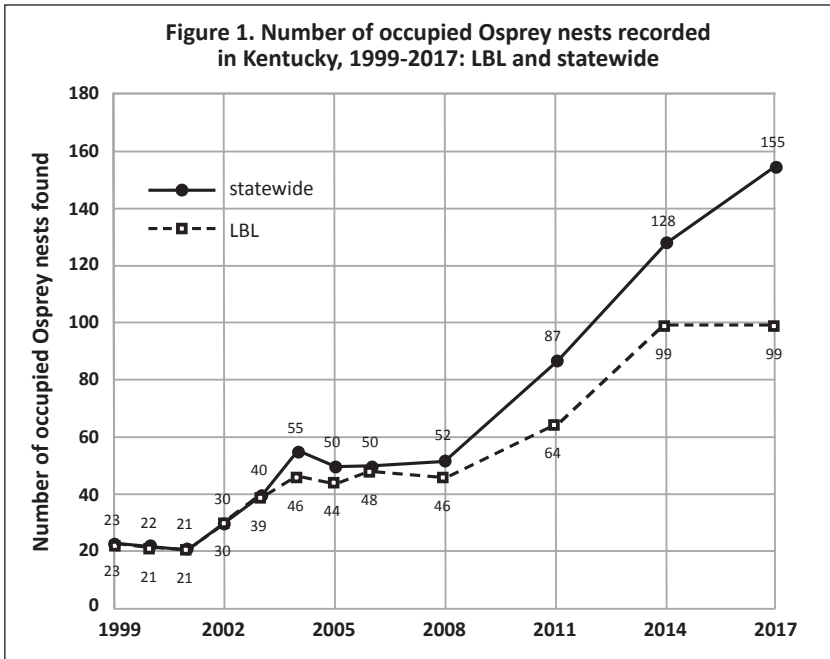
Ospreys historically nested in trees near or over water. While some Ospreys continue to use natural nest sites, many have adapted to nesting on manmade structures. Poole (2002) reported 90-95% of Osprey pairs in some regions choose to nest on artificial structures, likely due to predation, habitat loss, and development. Soon after the hacking efforts, state and federal agencies partnered with Kentucky Environment Education Projects Inc. (KEEP) to improve nesting habitat for Ospreys in Kentucky by installing safe nesting platforms. In the 1990's and 2000's, the U.S. Coast Guard (USCG), TVA, KDFWR and KEEP collaborated to install 17 free-standing platforms on Lake Barkley, and 22 platforms above channel-marker navigation lights on both Lake Barkley and Kentucky Lake. Platforms were installed on channel markers in an attempt to allow Osprey nesting without nests blocking the navigation lights and hindering boater safety (Ray et al. 2009). KEEP and KDFWR installed 14 additional

nesting platforms from 2009-2013 to provide safer nesting options for Osprey pairs nesting in precarious situations. The Kentucky Transportation Cabinet funded the installation of eight of these nesting platforms near the US 68-80 bridge over Lake Barkley and Kentucky Lake during the bridge reconstruction (KDFWR 2015).

Population Recovery

The first successful Osprey nest acknowledged in Kentucky since 1949 was built along the Ohio River in Livingston County in 1986 (Stamm 1986). By 1995, 14 active nests were established on Lake Barkley. With the support of KDFWR, Ed Ray of KEEP conducted annual Osprey nesting surveys on the Kentucky portion of Lake Barkley from 1999-2008.

Kentucky Lake was first surveyed by Ray in 2004, documenting eight active nests, all on channel markers. Outside of LBL, Osprey nesting activity began expanding eastward in the early 2000's with several nests documented in Ohio and Muhlenberg Counties, one nest in Louisville, and one nest along the Ohio River in Greenup County (Ray et al. 2009). In 2005, the species was listed as a species of greatest conservation need in KDFWR's State Wildlife Action Plan (KDFWR 2013). Since then, Kentucky's Osprey population has expanded greatly (Figures 1 and 2).



Recent Survey Efforts

Following the conclusion of Ed Ray's surveys in 2008, KDFWR conducted statewide Osprey nest surveys every three years from 2011-2017. Beginning in 2011, established nesting locations were identified from Ray's 1999-2008 surveys, Kentucky State Nature Preserves Commission (KSNPC) records, and KDFWR records. Known nesting locations were checked, where possible, by ground and boat during the nesting season (late March-July). Nests were considered occupied if one or more adults were observed at the nest during the



*Kate Slankard conducting 2014 Osprey nest survey.
Photo by Loren Taylor*

nesting season. When visible, chicks were counted and aged. Counts of young presented below should be interpreted with caution as survey timing did not always coincide with when young were old enough to be visible. KDFWR personnel surveyed the LBL area (defined as within 1 mile [1.6 km] of Lake Barkley and Kentucky Lake) and the Tennessee River between Kentucky Dam and the Ohio River by boat and by ground between 1 June and 1 July in 2011, 2014, and 2017. Between survey years, KDFWR continued to keep track of new Osprey nests through reports from the public, and these new locations were monitored in consecutive surveys.

2011. The 2011 statewide Osprey nesting inventory yielded observations of 87 occupied nests and 60 young. The majority of nests (78%) were located on manmade structures (Table 1). The bulk of nesting was observed in the LBL area and surrounding counties (Figure 1). However, nesting in central and eastern Kentucky was also observed at Cave Run Lake in Menifee County, Laurel River Lake in Laurel County, Cedar Creek Lake in Lincoln County, and near the Lexington Reservoir in Fayette County. Several new nests were also documented between 2009-2011 in the Ohio and Muhlenberg County area (KDFWR 2011).

2014. A total of 128 occupied Osprey nests and 42 young were documented in 2014. Manmade structures supported 76% of occupied nests, with nesting on bridges nearly doubling from 2011 (Table 1). Nest counts in the LBL area continued to grow, from 64 nests in 2011 to 99 in 2014, accounting for much of the statewide increase (Figure 1). Notable population expansion in the Tennessee River area north of Kentucky Dam (Marshall and Livingston Counties) prompted the survey of a portion of the Cumberland River north of Barkley Dam (Livingston County). Despite the presence of available nesting structures, no nests were found on the Cumberland River outside of the Smithland area. Nests on low-level snags were

prevalent in 2014, with 10 nests on Kentucky Lake and Lake Barkley, less than 10 feet (3 m) above water (KDFWR 2015).

2017. During the 2017 survey, 155 occupied nests were recorded and 42 young observed. As reported in previous years, the majority (80%) of nests occurred on manmade structures (Table 1). Nesting on power transmission towers greatly increased from only 12 nests in 2014, to 29 nests in 2017, with individual towers often supporting more than one nest. Nesting on bridges decreased from 17 in 2014 to 8 in 2017. This reduction was largely in response to the demolition of the Eggner's Ferry Bridge in 2016. The bulk of nesting Ospreys (88%) occurred in Calloway, Livingston, Lyon, Marshall, McCracken, and Trigg counties. The LBL area showed no signs of population growth in 2017. In fact, the same number (99) of occupied nests were observed in 2014 and 2017 (Figure 1). With the LBL area saturated with nesting pairs, the abundance of unoccupied nesting structures along the Tennessee and Cumberland Rivers north of Kentucky and Barkley Dams attracted many pairs to the area. During the 2017 survey, 16 new nests were observed on the Tennessee River and six new nests on the Cumberland River. East of LBL, notable new nesting locations were recorded at Green River Lake (Taylor County) and Taylorsville Lake (Spencer County) (Figure 2).

Patterns of Distribution

Although there were minor changes in survey area and technique starting with KDFWR's taking over the surveys from KEEP in 2011, the survey has used the same protocol since then. As mentioned above, portions of the Tennessee and Cumberland Rivers were added in 2011 and 2014, but the area surveyed in 2017 was not more than past surveys. We therefore assume the recent increase in the nest count represents a true increase in the nesting population.

Since the 1990's, the number of nests near Lake Barkley has consistently been higher than the number near Kentucky Lake. During 2017, 76 nests were located near Lake Barkley and 23 near Kentucky Lake (Figure 3). While this may be due in part to the types of manmade structures on Lake Barkley being superior to those on Kentucky Lake (there are fewer cell towers on Kentucky Lake and a different type of navigation light is in use on the north end of Kentucky Lake), water depth and prey availability may also influence nesting density. Ospreys are often found in higher numbers in areas with shallow waters or abundant surface-schooling fish, and shad are known to be a preferred prey item, when abundant (Poole 2002). Current data are lacking, but data summaries from 1978-1992 report that shad densities (pounds/acre [kg/hectare]) were on average 44% higher on Lake Barkley than on Kentucky Lake (Buynak 1993). The average water depth of Kentucky Lake is also a meter deeper overall (6 m) than that of Lake Barkley (5 m) (Lakepedia 2015). Moreover, the shoreline of Lake Barkley is considerably less steep than that of Kentucky Lake, with mud flats becoming exposed after a smaller drop in water level (P. Rister, pers. comm.).

The LBL area has long been important to the recovery of this species in the state and it continues to support the majority of the nesting population (Figure 2). The initial concentration of nesting in the area could be due to the higher number of birds hacked at LBL during the restoration efforts. Martell (2002) concluded that translocated Ospreys were more likely to return to their fledgling area to nest than wild-born birds were. However, as time passed, the density of nests at Kentucky Lake and Lake Barkley far surpassed the expectations of restoration plans. Interestingly, the number of nests in the LBL area seems to have leveled off in recent years, perhaps indicating that this population is near or at carrying capacity (Figure 1).

Despite the pause in growth at LBL, the nesting population has gradually expanded into central and eastern Kentucky. Ospreys are notoriously slow to colonize new areas. Breeding typically first occurs at the age of 3-5 yrs, and nesting more than 50 km from their natal site is rare (Poole et al. 2002). Nevertheless, manmade reservoirs have created habitat in places Ospreys historically would not have nested. Continued growth of the population is expected in coming years, where habitat availability allows, especially west of LBL and in the west-central and central part of the state.

The Future

The triannual KDFWR statewide Osprey inventory concluded in 2017. However, KDFWR will continue to add any new locations of Osprey nests to a statewide database. As expected, the growth of Kentucky's nesting Osprey population has resulted in increased utilization of manmade nest structures, and nesting on power poles and power transmission towers has doubled in the last seven years (Table 1). These situations can be problematic and will continue to increase with population growth. Some scenarios can be prevented or rectified by providing an alternative nesting structure. As Osprey nesting in Kentucky continues to expand, KDFWR will continue to advise private companies on how to manage Ospreys in problematic situations, and ensure Ospreys have safe nesting locations well into the future. A guide to the management of Ospreys is available by request from Loren Taylor, KDFWR: loren.taylor@ky.gov.

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Figure 2: Occupied Osprey nests in Kentucky during 1999, 2008, and 2017.

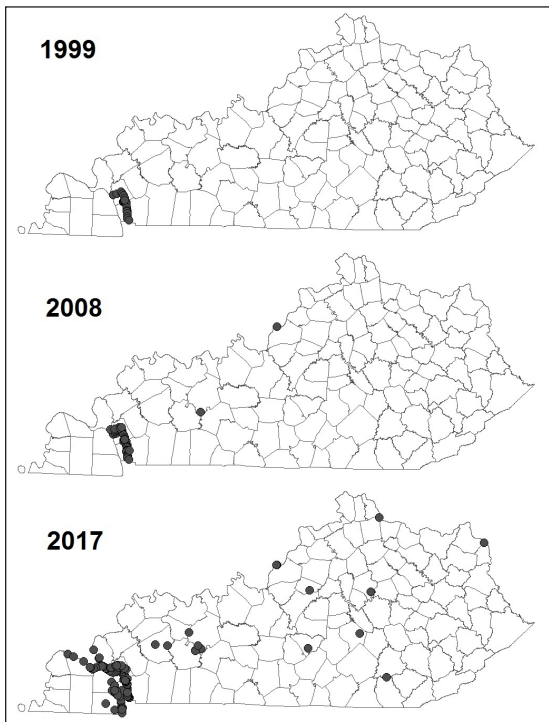


Table 1. Structure types used by nesting Osprey 2011-2017.

Nest Structure	2017	2014	2011
Bridge	8	17	8
Building	7	5	4
Cell Tower	12	9	6
Light Pole	7	1	1
Live Tree or Snag	32	31	19
Navigation Light	22	23	21
Power Pole	16	13	8
Power Transmission Tower	29	12	16
Stand-alone Platform	10	9	4
Other Manmade Structure	12	8	0
Total Nests	155	128	87

Figure 3: Occupied Osprey nests near Lake Barkley and Kentucky Lake in 2017.

