

**PENNSYLVANIA GAME COMMISSION
BUREAU OF WILDLIFE MANAGEMENT
PROJECT ANNUAL JOB REPORT**

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TITLE: Barn Owl Conservation Initiative

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PERIOD COVERED: 1 January 2012 to 31 December 2012

WORK LOCATION(S): Statewide

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ABSTRACT: Regional wildlife diversity biologists (RWDBs) began a barn owl conservation initiative (BOCI) in spring 2005 with the goal of securing this species' future in the Commonwealth. The barn owl is considered a species of greatest conservation need (SGCN) and comparisons between the First and Second Breeding Bird Atlases suggest that barn owls have declined by at least 50 percent since the mid-1980s in Pennsylvania. In support of the BOCI, RWDBs monitored known nest sites to determine barn owl nesting activity, searched for new nest sites, conducted outreach to engage and inform landowners, and distributed and/or installed barn owl boxes to promote long-term security of nest sites. Where feasible, barn owl nestlings were banded to gather information on longevity, causes of mortality, and dispersal. RWDBs confirmed 75 active barn owl nests, of which 22 were new sites, bringing the total number of unique, confirmed nest sites to 171 since nest searches began in 2005. Among the new nests were sites in Bucks and Montgomery counties, counties that had no evidence of breeding barn owls for the past 10 and 20 years, respectively. RWDBs banded 285 barn owls at 57 sites in 2012. Clutch size at time of banding ranged from 1 to 8, with an average of 5.1 nestlings per clutch surviving to at least five weeks of age. To date, 52 banded barn owls have been recovered. Dispersal distance has ranged from 0 to 926 miles with an average of 74 miles. The furthest known dispersal was an owl from SGL 145 in Lebanon County recovered in the Bahamas three months after being banded. Of 50 recovered banded barn owls with known ages, longevity ranged from one month to five years, nine months, with an average lifespan of at least 14 months. In 2012, RWDBs also distributed, and in most cases installed, 42 barn owl nest boxes.

OBJECTIVES

1. Increase knowledge of abundance and distribution of barn owls in Pennsylvania.
2. Evaluate barn owl habitat use and prey use in Pennsylvania.
3. Increase knowledge about survival and dispersal of barn owls.

4. Improve nesting and foraging habitat, and protect existing barn owl nest sites to encourage expansion of the barn owl population in Pennsylvania.

5. Examine genetic diversity of barn owls in Pennsylvania.

METHODS

Increase Knowledge about Abundance and Distribution of Barn Owls

Regional wildlife diversity biologists (RWDBs) conducted site visits to locations where barn owls were expected to occur. During site visits, RWDBs determined presence or absence by searching for barn owls and fresh sign (e.g., pellets and “whitewash”). Locations of breeding activity were determined by the confirmation of eggs, nestlings, or recently fledged young. Global Positioning System devices were used to record location of active sites. Data related to site location, reproductive status, nest site characteristics, and adjacent land use were recorded. Data were submitted to Pennsylvania Natural Diversity Index (PNDI).

Evaluate Barn Owl Habitat Use and Prey Use

Assistance was given to Dr. Karl Kleiner of York College, who is the principal investigator of a pilot study conducted in 2011 and 2012 in which radio telemetry was used to determine home range and habitat use by adult barn owls during the breeding season.

Increase Knowledge about Survival and Dispersal of Barn Owls

Barn owls were banded following standard protocol of the Patuxent Wildlife Research Center Breeding Bird Lab to provide information on longevity, dispersal, and causes of mortality. Regional wildlife diversity biologists collected feathers for the sixth year from all banded barn owls. Dr. Kleiner and his students have begun analyzing feathers to determine whether sex ratios of nestlings vary from year to year in relation to abundance of food resources.

Improve Nesting and Foraging Habitat, and Protect Existing Barn Owl Nest Sites to Encourage Expansion of the Barn Owl Population

Regional wildlife diversity biologists provided recommendations on grassland management to landowners with nesting barn owls, to those who receive nest boxes, and to landowners wishing to provide habitat for barn owls and other grassland associated species. Regional wildlife diversity biologists also gave numerous presentations on barn owl conservation.

To provide additional nesting sites safe from predators and hazardous ledges, RWDBs installed barn owl nest boxes at appropriate locations with the permission and cooperation of landowners. Nest boxes were monitored by RWDBs, volunteers, or landowners to determine use and nesting success. Landowners with active or potential barn owl nest sites were given information on barn owl conservation status, habitat requirements, threats, causes of decline, habitat management recommendations, and proper nest box placement.

RESULTS

Increase Knowledge about Abundance and Distribution of Barn Owls

In 2012, RWDBs confirmed 75 active barn owl nests (Table 1). This is the highest number confirmed in a single year for this study. Regional wildlife diversity biologists also reported the

highest number of new nest sites with 22 new locations where eggs or nestlings were observed. Among these new sites were active nests in Bucks and Montgomery Counties. According to these counties' bird record compilers, this is the first confirmation of breeding barn owls in these counties for at least the past 10 and 20 years, respectively. On the western edge of the barn owls' current Pennsylvania range was a confirmed nest site in Bedford County, which similarly lacked evidence of nesting barn owls since 2006. Since the barn owl conservation initiative was initiated in 2005, nesting has been confirmed at 171 different locations in 26 counties (Fig. 1).

Confirmed nests continue to be concentrated in agriculturally dominated valleys of the central and southeastern parts of the Commonwealth. Data from new nesting locations were submitted to PNDI. Though we were able to provide breeding evidence at a record number of locations, barn owls clearly declined throughout much of Pennsylvania in recent decades. During the first Pennsylvania Breeding Bird Atlas (PBBA), which was conducted between 1983-1989, the barn owl was concentrated in the southeastern third of the state, as is currently the case, but was observed in 56 of the state's 67 counties (Santner 1992). By the second PBBA, which was conducted in 2004-2009, the barn owl distribution contracted significantly, retreating from the 2 southern corners of the state, and was found in 30 counties with a 53.4 percent reduction in number of occupied blocks compared with the first PBBA (Flickinger and Mummert 2012). Regional wildlife diversity biologists provided nearly 70% of the barn owl records for the second PBBA (Flickinger and Mummert 2012). Therefore, without this targeted effort, even fewer occupied blocks would have been recorded during the second PBBA.

Though barn owls have decreased in Pennsylvania, they do have high reproductive potential, which potentially would allow their population to recover quickly. One example of their high reproductive potential, and related to how young they can reproduce, was documented this year by the Northcentral RWDB. He found that a nestling barn owl he banded in August 2011, which was 1 of 2 nestlings in this clutch, was discovered the following May at the natal site. The eight-month-old owl was incubating eggs in the same nest box in which she was banded. Though barn owls are sexually mature at one year of age (Taylor 1994), no published evidence indicates barn owls can reproduce at 8 months. Why this nestling did not disperse from the natal site, fate of her mother, and, the sire of the eggs she was incubating are unknown. DNA samples taken from her banded nestlings may enable us to determine if the mate was the father or brother of this owl.

Evaluate Barn Owl Habitat Use and Prey Use

This owl monitored with telemetry traveled up to 2 miles from her primary nesting site to roost and hunt. A future student of Dr. Kleiner's may use Geographic Information Systems (GIS) to map land use within the home range of this owl and determine habitat use.

Increase Knowledge about Survival and Movements of Barn Owls

Regional wildlife diversity biologists banded 285 barn owls at 57 different locations in 2012. Range in clutch size was 1-8 nestlings surviving to banding age (5-7 weeks), with an average of 5.1 nestlings per clutch ($n = 57$). The earliest banding occurred on 19 April. The young from this nest would have been laid in the second week of February. Seven nests produced a second clutch, which led to several nests fledging young in the late fall and early winter. Exceptionally late clutches included 1 banded on 2 November in the Northcentral Region and nests banded on 3 October, 14 November, 21 November and 19 December in the Northeast Region. The young from this last nest would have fledged in early January. Though such a large

number of exceptionally early and late nests appear to be unusually high, they do support other studies that have documented barn owls reproducing at any time of year. Extended nesting seasons are much more common in warmer, tropical climates (Taylor 1994).

To date, 52 banded barn owls have been recovered (Table 2). These owls were banded in Pennsylvania or banded in another state and recovered in Pennsylvania. Dispersal distance is not approximate, because the U.S. Geological Survey (USGS) Bird Banding Lab provides recovery data precise only to the 10-minute block; this can cause error of up to approximately 10 miles. Using these data, banded barn owls were recovered between 0 and 926 miles from their natal site, with an average recovery distance of 74 miles for the 48 birds recaptured at least 3 months after being banded. The furthest recovery was 926 miles. This owl was banded as a 6.5-week-old nestling at State Game Land 145 in Lebanon County. It was recovered in the Bahamas 3 months later (Fig. 2). Because barn owls fledge at 8 weeks of age, this owl flew for about 6 weeks before it was recovered in the Bahamas. We do not know if the owl was recovered dead or alive, or if it dispersed the entire distance on its own or landed on a boat that transported the bird to the island. Investigations are underway to try to answer these questions. Similar long-distance dispersals to oceanic islands have been known to occur with barn owls. One record involves a barn owl banded in New Jersey later recovered in Bermuda (Taylor 1994).

Using the recovery data from 36 owls that dispersed at least 10 miles, 61% moved in an easterly direction (East, Southeast, or Northeast), 47% flew in a northerly direction, 36% flew south, and 19% flew westward.

Of 50 recovered owls that had known ages at time of banding and approximate date of death, 44 were recovered dead and 6 were found living. Longevity for these owls ranged from 1 month to 5 years 9 months, with an average lifespan of 14 months.

Improve Nesting and Foraging Habitat and Protect Existing Barn Owl Nest Sites to Encourage Expansion of the Barn Owl Population

Barn owls are closely associated with humans in that they primarily use barns, silos, and other artificial structures for nesting (Taylor 1994). Efforts to offset population declines by providing nest boxes in appropriate locations have been successful in several areas (Marti 1992). Since the inception of this program, RWDBs have distributed and installed barn owl nest boxes in locations grassland fields are abundant. In 2012, RWDBs provided, and in most cases installed, 42 nest boxes. Landowners with active or potential barn owl nest sites also were given information on barn owls (e.g., status, identification, reproduction, habitat, threats and reasons for decline, management recommendations, nest box placement, etc.). When appropriate, RWDBs provided recommendations on grassland management, specifically to landowners with barn owl nests. In addition to landowner consultations, RWDBs delivered 10 public presentations to approximately 369 people about barn owl conservation and habitat requirements.

In 2012, we learned actively nesting pairs can successfully raise clutches very close to one another. In April, the Northcentral RWDB observed a female incubating in a box he installed the previous year. He simultaneously observed a second female incubating in a second nest box also installed the previous year in a silo 20 yards away. Both sites fledged 6 young during the summer. Though it was confirmed to be 2 different females incubating the eggs, the males were never observed, so it is unknown if 2 different males or 1 male sired both clutches. This question may be answered when Dr. Kleiner analyzes DNA samples collected from the nestlings at both nest

sites. These 2 nests suggest that barn owls may not be very territorial and can tolerate 1 another when an adequate supply of prey is available.

Examine Genetic Diversity of Barn Owls

Preliminary results from 60 nestlings from 5 nest sites have yielded no trend in sex ratios of nestlings in relation to food resources, but analyses will continue. Analyses also will be conducted to learn more about the genetic diversity of barn owls in Pennsylvania.

RECOMMENDATIONS

Regional wildlife diversity biologists should continue to monitor active barn owl nest sites, search for new active sites and confirm breeding when found, conduct outreach, determine suitability for barn owl box placement, distribute barn owl boxes, install barn owl boxes, collect pellets, band nestlings, and collect genetic samples to expand our knowledge of and work to conserve this declining species.

Recommendations for expanding the project, based on the barn owl species account in the PGC's Wildlife Action Plan, are to evaluate habitat use and prey availability within the species' core range by 1) using radio telemetry to evaluate foraging habitat use by adult barn owls throughout the breeding season and 2) conducting live-trapping studies of small mammals within the farmland landscape to provide information on prey densities in key foraging habitats. These studies could then be used to devise models of landscape use by this species, which may shed light on local causes of the decline in numbers witnessed in recent decades. Volunteers, professors, and students should continue to be sourced when available.

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Table 1. Summary of statewide Barn Owl Conservation Initiative activities conducted by PGC Regional Wildlife Diversity Biologists, 2012.

Region	Active Nest Sites	New Nest Sites	Nests Banded	Owls Banded
NW	0	0	0	0
SW	0	0	0	0
NC	8	2	7	47
SC	24	8	17	87
NE	13	5	10	42
SE	30	7	23	109
Statewide	75	22	57	285

Table 2. Summary of barn owl band recoveries, 2005-2012.

Label	Band Location	Recovery Location	Age (months)	Distance (miles)	Direction
1	Brentsville, VA	South Mountain, PA	4	105	N
2	Bristersburg, VA	East Berlin, PA	Unknown	120	N
3	Marlboro, NJ	Malta, PA	69	160	NW
4	Lewisburg, PA	New Berlin, PA	8	10	S
5	McConnellsburg, PA	McConnellsburg, PA	8	10	N
6	Kleinfeltersville, PA	Douglassville, PA	10	35	E
7	East Berlin, PA	Knotts Island, NC	16	325	S
8	Elizabethville, PA	Dalmatia, PA	8	15	NW
9	Berrysburg, PA	Greenwich, NJ	12	170	SE
10	Lewisburg, PA	Mifflinburg, PA	19	10	SW
11	Elizabethville, PA	Freeburg, PA	20	12	NW
12	Hartleton, PA	Watsonstown, PA	9	20	NE
13	Thomasville, PA	Cedarville, NJ	34 (alive)	99	SE
14	Newburg, PA	New Berlin, PA	11	56	NE
15	Mercersburg, PA	Chambersburg, PA	4	16	NE
16	East Berlin, PA	East Berlin, PA	18	1	N
17	Rehrersburg, PA	Ephrata, PA	3	14	S
18	Franklintown, PA	York Springs, PA	9	5	SW
19	Fairfield, PA	Rocky Ridge, MD	20	20	SE
20	Birdsboro, PA	New Britain, PA	5	33	E
21	Bloserville, PA	Gettysburg, PA	8	42	SE
22	Turbotville, PA	McEwensville, PA	11	5	SW
23	Kidron, OH	Mifflintown, PA	47 (alive)	236	E
24	Weavertown, PA	Laurel Hill, PA	1	5	NE
25	Grantville, PA	Temple, PA	4	38	E
26	Berrysburg, PA	Mowry, PA	21	24	NE
27	Lewisburg, PA	Turbotville, PA	14	12	NE
28	Manassas, VA	Indiantown, PA	17	130	NE
29	Matterstown, PA	Matterstown, PA	3	1	S
30	Prescott, PA	Freeport Mills, PA	1	5	NW
31	Bridgeton, NJ	Philiadelphia, PA	4	32	N
32	Killinger, PA	Thompsons town, PA	11	19	W
33	Milton, PA	Newtown, PA	6	111	SE
34	Thomasville, PA	Warrington Twp., PA	12	11	N
35	Matterstown, PA	Laurel Hill, PA	33	52	SE

Table 2. cont.

Label	Band Location	Recovery Location	Age (months)	Distance (miles)	Direction
36	Mt. Holly Springs, PA	Mt. Holly Springs, PA	1	5	E
37	Southampton Twp. PA	Falling Spring, PA	3	6	SW
38	Thompsontown, PA	Indiantown, PA	21	38	SE
39	Kralltown, PA	Newchester, PA	9	8	SW
40	Fredricksburg, PA	East Buffalo Twp, PA	9	43	NW
41	Watsonstown, PA	Acton, NJ	11 (alive)	129	SE
42	Northeastern Ohio	Washington, PA	unknown(alive)	unknown	SE
43	Exchange, PA	Antes Fort, PA	27 (alive)	30	W
44	Upper Lawn, PA	Shirksville, PA	47	15	NE
45	Watsonstown, PA	Turbotville, PA	19	5	E
46	Pillow, PA	Bernville, PA	23	42	SE
47	Upper Lawn, PA	Bahama Islands	3	926	S
48	Shoemakersville, PA	Maytown, PA	9	45	SW
49	Fairfield, PA	Lake Meade, PA	13 (alive)	21	NE
50	Hartleton, PA	Hartleton, PA	9 (alive)	0	N/A
51	Turbotville, PA	Turbotville, PA	3	2	S
52	Weavertown, PA	Portsmouth, RI	11	278	NE

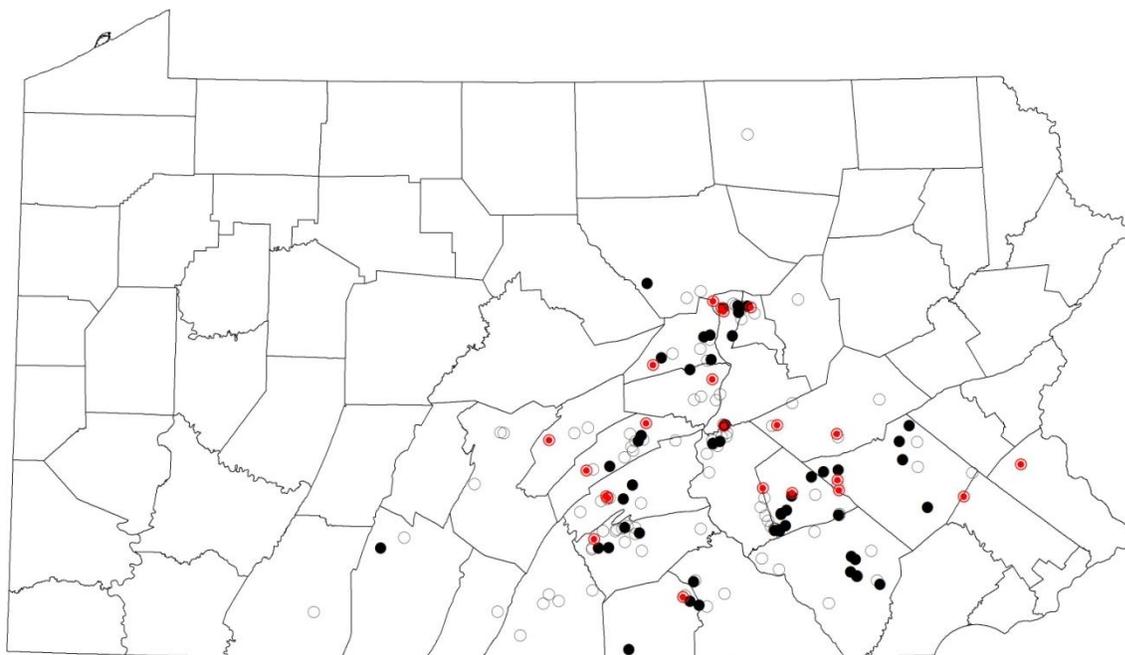
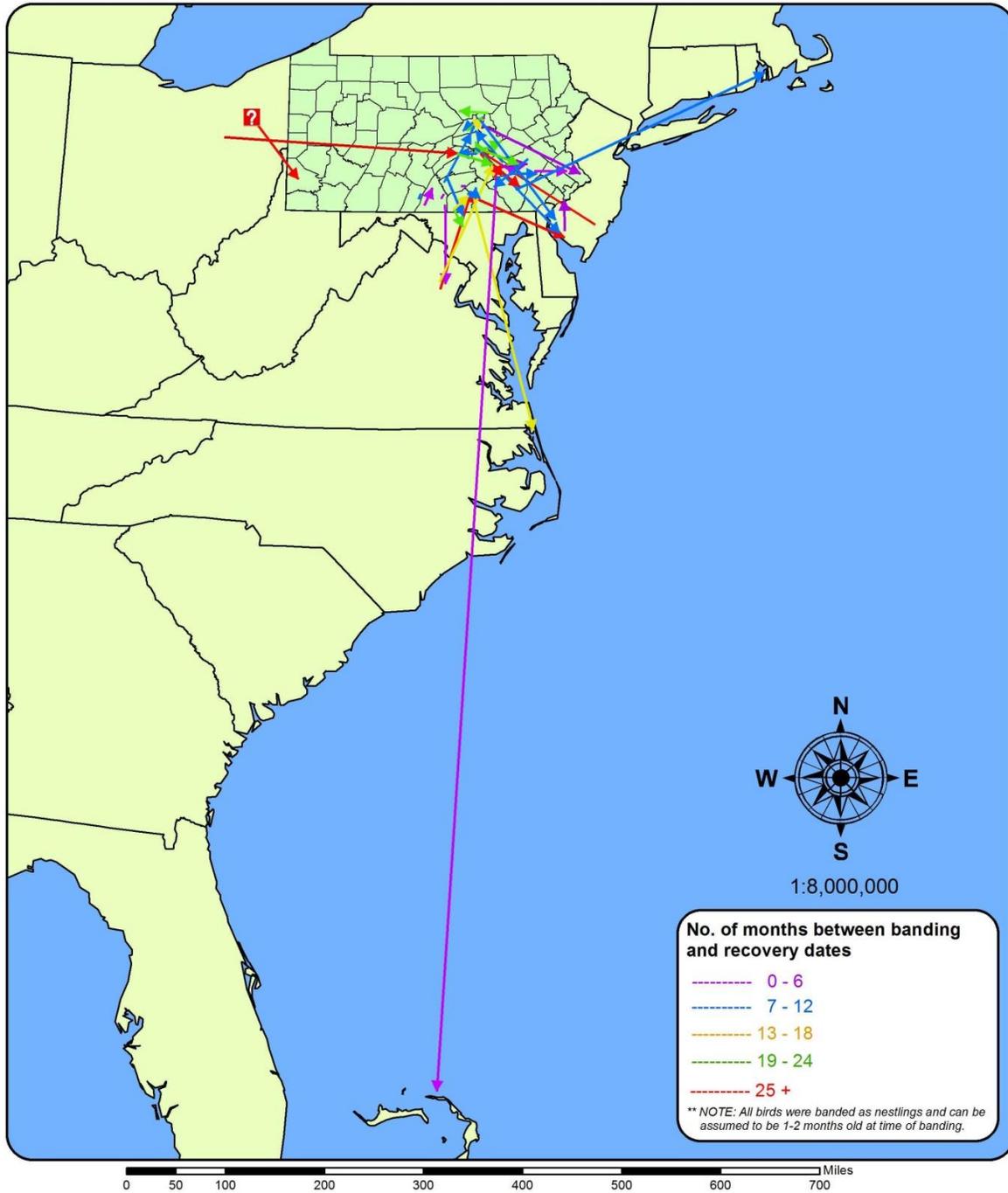


Figure 1. Barn owl nest sites, 2005-2012. Open black circles indicate a nest that was last confirmed active between 2005 and 2011 ($n = 96$). Solid black circles indicate a nest that was confirmed active in 2012 which was also active in previous years ($n = 53$). Nests newly discovered in 2012 are identified as red ringed circles ($n = 22$).

Barn Owl (*Tyto alba*) band recoveries through 2012



updated 2/21/2013
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Figure 2. Summary of barn owl dispersals, 2005-2012. Line begins at banding location and end of arrow point indicates location of band recovery.