# *A Post Release Study of Barn Owl Survival and Dispersal in Northeastern Illinois*

## *Illinois Wildlife Preservation Fund Final Report*

*Grant Agreement Number:* 06-014W

Forest Preserve District of DuPage County (FPDDC)
3 S 580 Naperville Road
Wheaton, Illinois 60187

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*Project Objectives:*

1. *To determine if barn owls can survive in northeastern Illinois.*
2. *To determine dispersal of juvenile barn owls from northeastern Illinois.*
3. *To determine feeding habits of released barn owls.*
4. *To determine habitat use in a suburban landscape.*

Project Description and Comprehensive Justification:

The barn owl (*Tyto alba*) is species with a worldwide distribution whose historic range in North American encompassed all of Illinois. For various reasons, barn owl populations declined in the 20th century and their distribution in Illinois has been limited to the southern half of the state in recent decades. The focus of this project is to gather baseline data to aid future reintroduction programs and to assess the habitat needs and limitations of this species in northeastern Illinois.

A pilot study was conducted in 2004 to determine the feasibility of a reintroduction program. The pilot study was aimed at addressing many uncertainties of a barn owl population in northern Illinois such as: if released barn owls were able to avoid dangers such as cars, power lines, and great-horned owls; if captive-reared birds were able to hunt in a natural landscape; and if there was enough natural habitat within a suburban landscape to support a barn owl population.

Results from the pilot study were encouraging and warrant further investigation. Data obtained during 2004 demonstrated the ability of captive-reared barn owls to hunt on their own, avoid vehicle collisions and avoid larger avian predators in DuPage County. Unfortunately, pre-mature transmitter failure prevented long-term tracking of those owls that remained close to the release sites. At least four of nine birds were still within the county six weeks post-release, with two unconfirmed sightings two and four months post-release.

By continuing this program into 2005 and beyond we hope to develop a more thorough understanding of the degree and manner in which captive-reared barn owls utilize developed and natural areas in the region by recording locations at different hours including late evenings, collecting pellets at roost sites, and using aerial support to locate birds outside of the county.

# *A Post Release Study of Barn Owl Survival in Northeastern Illinois*

## *Forest Preserve District of DuPage County*

Department of Natural Resources

2006

## *Introduction*

Figure 1.

The barn owl (*Tyto alba*) is a species with a worldwide distribution whose historic range in North America encompassed all of Illinois (Figure 1). For various reasons, barn owl populations declined in the 20th century and their current status in Illinois is endangered. In recent decades, the species' distribution in Illinois has been limited to the southern half of the state and breeding in northeastern Illinois has not been confirmed.

Although young barn owls may disperse up to 1900 km (McCracken 1998), it is uncertain if any individuals will naturally repopulate suitable reserves in northeastern Illinois. Since this species is endangered in surrounding states (such as Indiana, Iowa, Missouri and Wisconsin), source populations may not be available to provide natural repopulation opportunities, even in areas with suitable feeding and nesting habitats.

The barn owl's preferred habitat is open grassland. Throughout its range, the barn owl specializes on voles and vole-sized small mammals (Colvin 1984). This implies that the barn owl fills a specific ecological niche in various grassland communities. The decline of the barn owl in the Midwest has been attributed mainly to a decrease in prey densities (particularly vole species) and a lack of suitable nest sites (McCracken 1998). Both of these factors are a result of changing land use practices. The historic conversion of pastures, hayfields, wetlands and native grasslands to large-scale, row crop agriculture have resulted in decreased small mammal prey densities and fewer hollow trees, wooden barns and open silos for nesting (Bunn *et al.* 1982; Colvin 1984; Colvin 1985). Additionally, continuing development of natural areas into urbanized development has also contributed heavily to the decline of the barn owl. Moreover, it is estimated that only 0.01% of the original native prairie remains in the State of Illinois
(Iverson 1988).

However, efforts by public and private conservation agencies in northeastern Illinois to protect and restore natural habitat continue to increase. It is estimated that over 200,000 acres of natural land has been protected in the six-county Chicago Wilderness region. The combination of open space protection and active management to improve ecosystem quality that characterizes much of northeastern Illinois today may present suitable opportunities to support a breeding population of barn owls.

## *Methods*

### *Release Sites*

*Pratt's Wayne Woods* – Located in Wayne, Illinois, the preserve's 1383 hectares (3,417 acres) combine with James Pate Philip State Park to form over 1618 continuous hectares (4,000 acres) of open space including 40% wetland, 36% grassland, and 14% woodland. Pratt's Wayne Woods contains one of the highest quality wetland communities in the county which is home to numerous State E&T species. At least half of the prairie areas are reconstructed short and tall grass communities previously occupied by agriculture. The amount of land designated as agricultural has decreased from 933 hectares (2307 acres) in 1974 to 64 hectares (159 acres) in 2005 due to conversion from farmland to restored native habitat types or cool season grass meadows.

*Springbrook Prairie* – Located in Naperville, Illinois, and totaling 728 hectares (1,800 acres), Springbrook Prairie is the District's largest grassland in the county at approx 607 hectares (1,500 acres) of reconstructed short and tall grass communities previously occupied by agriculture. Springbrook Prairie's large contiguous

blocks of grassland are currently home to many conservative species of Illinois. Henslow's sparrows (*Ammodramus henslowii*), northern harrier (*Circus cyaneus*), bobolinks (*Dolichonyx oryzivorus*), and dickcissels (*Spiza americana*) are found throughout the preserve.

***Pre-release***

Ten fledgling owls were obtained from a licensed breeding facility in Kentucky. Upon possession, birds were raised at Spring Brook Nature Center in Itasca, Illinois. There they were fed dead mice daily which were supplemented by live mice when possible. Birds were housed in a flight chamber for 2 weeks prior to release to develop their flight and hunting skills.

Approximately one week prior to release the owls were fitted with 2-stage backpack mount transmitters (Figure 2), with a battery life expectancy of approx. 365 days. After transmitter attachment, the birds were returned to the flight chamber and observed for any flight impediment caused by the transmitters. Additionally, great-horned owl conditioning was performed in the flight chamber by playing a recorded great-horned owl and disturbing the barn owls with a live, resident, education bird. It is anticipated that this technique will condition the barn owls to visual and audio cues of a potential predator.

***Release***

Barn owls were released using a "soft" release method as per Ehresman 1984 and Ehresman et al. 1988. Juvenile birds were placed in barn lofts at each site within constructed "hack boxes" to simulate nest cavities (Figure 3). Owls remained in boxes for 24 hours before being allowed free flight within the interior of the barn. Hardware cloth was placed over the exit hole to maintain presence in the barn for a short period (approximately 5 days depending on weather) for acclimation to sites, sounds, smells, etc. Following this acclimation period the hardware cloth was removed allowing utilization of the barn as needed. Owls were provided dead mice while inside the barn and for an additional day once all birds have left.

Owls were tracked to daytime roosts 6 days/week until radio contact ceased or mortality occurred. Locations were recorded and plotted using ARCGIS 9 (ESRI) and ARCMAP 9.1. Upon loss of radio contact, researchers spent considerable time driving surrounding counties in search of missing birds.

Pellets were collected below daytime roost locations and dismantled. Bones discovered in the pellets were identified to genus to determine feeding habits of the released birds. In addition, small mammals were live-trapped at the release sites using Sherman traps to determine relative prey species abundance.

A Piper cub airplane was used to track birds from an elevated position in hopes of increasing the range of the transmitter signal. A relatively calm clear day is used for tracking and the plane is capable of flying at relatively slow speeds to give good coverage over a given area.

## ***Results***

Birds were tracked for 8-130 days post release (Table 1). Two birds succumbed to what appears to be great-horned owl predation. Radio contact was lost for five birds that presumably dispersed outside the study area, and 3 birds were found dead following a significant winter storm. Attempts to relocate the five dispersed owls following spring 2006 migration were futile.

*Movements and dispersal of specific interest include:*

Bird 319 was released on 7/25/05 and spent approximately 14 days utilizing Kenyon Woods, a small 28.3 hectare (70 acre) savanna/grassland area managed by the Forest Preserve District of Kane County, until spending the next 90 days (approx.) in a private dairy barn adjacent to the savanna (Figure 4). 319 left the barn around 10/10/05 after windows in the barn were closed by the owners. Shortly thereafter, he was found 17.5 km SSE at Herrick Lake Forest Preserve which encompasses 350 hectares (865 acres) in central DuPage County. Within one day of being discovered at Herrick Lake, the bird was rediscovered 16 km north of that preserve utilizing two large forest preserves in DuPage County: Hawk Hollow, 467.5 hectares (1155 acres) and Mallard Lake, 382 hectares (945 acres), both of which contain relatively large grassland communities with abundant roost sites. Ultimately, the remains of 319 were found at Hawk Hollow Forest Preserve 128 days post release, apparently succumbing to a great-horned owl.

Bird 720 immediately upon release chose a grove of Douglas fir (*Pseudotsuga menziesii*) trees as its roost site approximately 0.8 km from the release site where he remained for nearly 30 days. Following departure from the forest preserve, 720 almost exclusively used conifer trees throughout multiple locations until found deceased 130 days post release.

Bird 508 immediately upon release chose a large Black willow (*Salix nigra*) tree on a public golf course, 243 meters from the release where she remained for nearly 30 days. 508 almost exclusively used willow trees at Nelson Lake Marsh, a large forest preserve managed by Kane County, 408.7 hectares (1010 acres), until she was found deceased 130 days post release.

Bird 400 dispersed from the study area quicker than any other bird. Within 3 days of release she was 3 km WNW from the release site. Three days later she was an additional 7 km west where she roosted for an additional 3 days until August 4th. After that time, radio contact was lost.

The other 4 birds where radio contact was lost appeared to disperse between August 30th and September 30th which coincides with autumn migration. Two birds, 358 and 380 were slowly heading in a WSW direction when contact was lost, bird 448 was last known to Cook County, approximately 12 km NE of the release site and bird 468 remained in Springbrook Prairie until radio contact was lost.

Aerial surveys were conducted on clear calm days. The signal range of the transmitters is extended considerably as the receiver is elevated. Signals were monitored on existing birds with known locations to judge the range. Areas of likely habitat were flown to look for missing birds and a single bird was located during this process. (Figure 9)

Pellet analysis is ongoing, though preliminary results yielded three species of small mammals: *Microtus spp.*, *Peromyscus spp.*, and *Blarina brevicada* (Figure 5). Preliminary small mammal trapping studies resulted in 76% *Microtus spp.*, 19% *Peromyscus spp.*, and 6% *Spermophilus tridecimlineatus.*

Carcasses were recovered and necropsies were performed on birds 508, 667, and 720. An example of a necropsy report is included as Appendix A. All three birds were discovered dead 4 days following a storm that blanketed the region with 6-9 inches of snow. Necropsies indicated the stomachs and gastro-intestinal tracts were empty on all three birds, though fresh rodent tracks were present on the surface of the snow on the day the birds were found deceased. Necropsy results also indicated that the primary cause of death for two of the birds was trauma. (Figure 6).

## ***Discussion***

2005 results yielded known survival of three birds into the middle of December. Sustained, below freezing temperatures and relatively large snow accumulation (6-9inches) within a 24 hour period likely aided in the

fatality of the final three birds shortly before the first of the year. It is believed that snow accumulation of that scale disrupted normal feeding patterns not allowing the birds to find adequate prey. Though two birds officially died of trauma it is likely that these birds were weakened from exposure and lack of proper nutrition, predisposing them to fatal trauma.

Bird 667 multiple days prior to mortality was documented roosting on the ground and was accidentally flushed on a few occasions. Ground roosting for barn owls is considered rare. It is believed that the bird may have been suffering from early stages of starvation at this time.

Though prey populations near the release sites is considered to be abundant, small mammals regularly construct tunnels below the snow surface to feed and will make trips above the snow less frequently, making hunting more difficult for owls and other birds of prey.

Great-horned owl predations while not a factor in 2004 did play a role in 2005 as two birds were lost to what is believed to be predation. Rudolph (1978) documented that on bluffs where barn owls and great-horned owls co-existed, both competitive interactions and predator-prey interactions occurred as remains of at least four barn owls were found under perches used by great-horned owls. In our study, bird 492 was documented roosting in a habitual great-horned owl roost area and was found deceased 8 days post release (Figure 8). However, it should be noted that bird 667 showed up in the same general area and established a roost site in the same grove and did not succumb to predation.

While specific results are still being analyzed, we have learned as anticipated, that the owls prefer large open tracts of land, such as preserves and agricultural fields. The owls primarily used forest preserves in Kane, Cook, and DuPage Counties.

Two birds consistently showed a preference for a specific tree species: bird 508 for willow trees at different locations and bird 720 for conifer trees at various locations (Figure 7). All birds being active tracked after leaf-off did switch to conifer trees to provide sufficient cover.

By continuing this program into 2006-07 and beyond we hope to develop a more thorough understanding of the degree and manner in which captive-reared barn owls utilize developed and natural areas in the region by recording locations, collecting pellets at roost sites, and using aerial support to locate birds outside of the county. Results from these pilot studies are encouraging and warrant further investigation.

As this report is submitted, ecologists from FPDDC and McHenry County Conservation District are tracking ten birds released as part of the 2006 program. Partial funding for the 2006 program was provided by the awarded Wildlife Preservation Fund grant monies.

Collaborators to this project include: Village of Itasca Springbrook Nature Center, Willowbrook Wildlife Center, Cosley Zoo, McHenry County Conservation District, Illinois Department of Natural Resources, Dan Spencer-Northeastern Illinois University, and World Bird Sanctuary.

Figure 2. Prior to release, owls were fitted with a two-stage, "backpack" mounted transmitter.

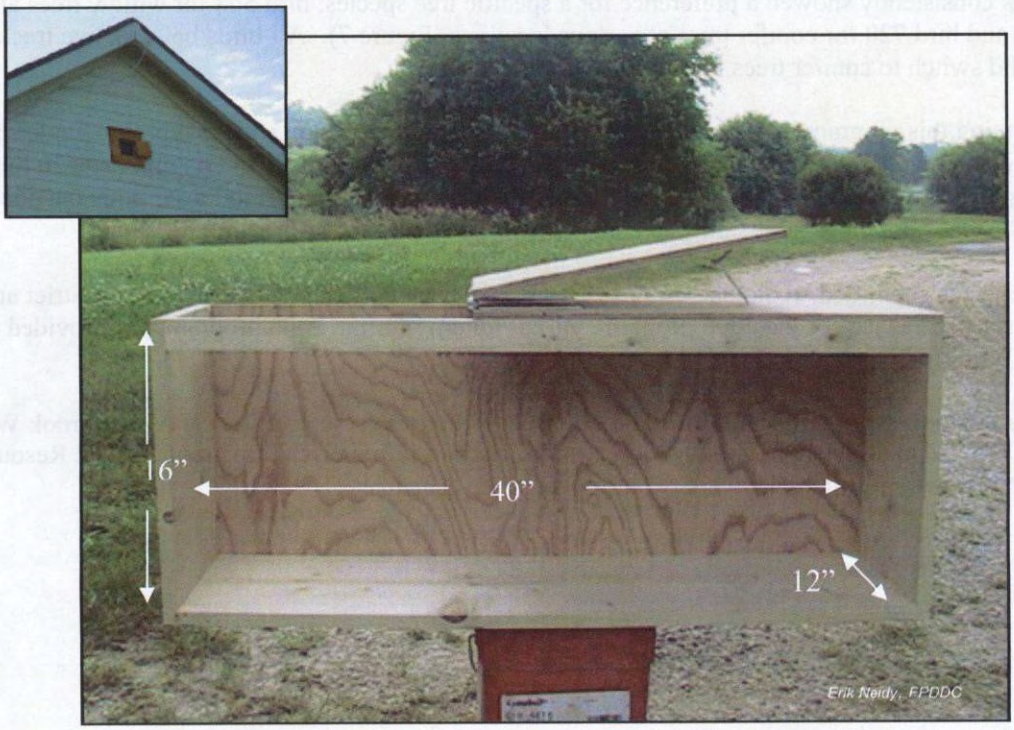


Figure 3. Hack Box placed on interior of barn and exit hole door placed on exterior of barn.

Table 1. Fate of ten barn owls released in DuPage County during summer 2005.

| Frequency ID | Sex | Release Date | Fate | Fate Date | Days Tracked |
|---|---|---|---|---|---|
| 319 | M | 7/25/2005 | Dead: GHOW predation | 11/30/2005 | 128 |
| 358 | M | 7/25/2005 | Radio contact lost | 8/30/2005 | 36 |
| 380 | M | 7/25/2005 | Radio contact lost | 9/9/2005 | 46 |
| 400 | F | 7/25/2005 | Radio contact lost | 8/4/2005 | 10 |
| 448 | F | 7/25/2005 | Radio contact lost | 9/9/2005 | 46 |
| 468 | F | 8/4/2005 | Radio contact lost | 9/30/2005 | 57 |
| 492 | M | 8/4/2005 | Dead: GHOW predation | 8/12/2005 | 8 |
| 508 | F | 8/4/2005 | Dead: starvation & exposure | 12/12/2005 | 130 |
| 667 | M | 8/4/2005 | Dead: trauma | 12/12/2005 | 130 |
| 720 | M | 8/4/2005 | Dead: trauma | 12/12/2005 | 130 |

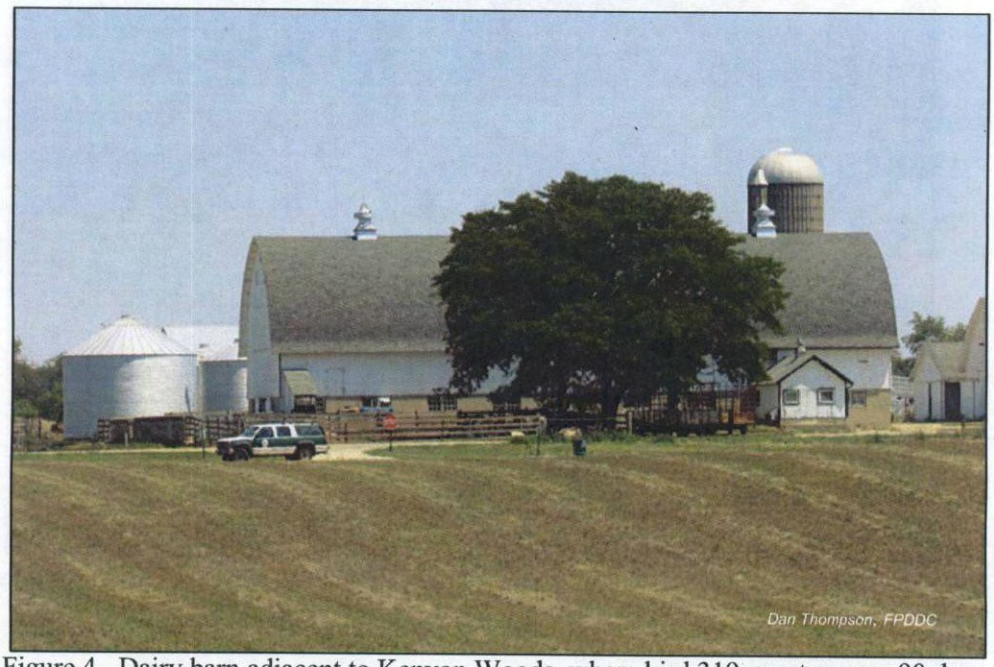


Figure 4. Dairy barn adjacent to Kenyon Woods, where bird 319 spent approx 90 days.

Figure 5. Documentation of owl regurgitating pellet and example of pellet showing long bones from recent prey.

Figure 6. Necropsy photo depicting a normal skull (left) and head trauma (right) of released owls

Figure 7. Bird 508 using Willow trees for roosting (left) and bird 720 using fir trees for roosting

Figure 8. Remains of released barn owl, apparently from GHOW predation

Figure 9. Photo taken of Springbrook Prairie during aerial survey of released barn owls.

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# *Appendix A*

Dr. Debra Teachout, DVM
February 1, 2006

**Gross Necropsy Report**

**Background**

An adult male barn owl (*Tyto alba*) was discovered by E. Neidy on December 12, 2005 near the base of a conifer tree on the N side of Rickert Drive in residential Naperville, Illinois. During the third week of August, 2005 this bird was released approximately 1.5 miles to the S in the nearby Spring Brook Prairie Forest Preserve as part of a research study. The bird's wings were folded at its sides when it was discovered. The bird was marked with a USFWS band # 1687-00087.

Temperatures during the first half of December 2005 were extremely cold, and on December 8, 2005, 6-9' of snow blanketed the region.

External

Weight:

- 482.5 g

Body orifices:

- acute hemorrhage in back of oral cavity; no bloody fluid present
- ears and vent normal

Limbs:

- (approximately 5-6) primary feathers missing on left wing
- dried blood and small wound on ventral surface of wrist joint on right wing
- talon sheath missing on digit 1 (hind) of right foot; feet otherwise normal
- minor trauma on skin of right leg near ankle joint, no puncture
- minor abrasion dorsal aspect of right pelvic region

Outer surfaces:

- no ectoparasites detected
- keel prominent, body condition assessed at 2
- circular abrasion/pressure sore on lower portion of keel (in location of transmitter harness strap)
- abrasion/pressure sore over spinal column near sacral joint (in location of transmitter)
- acute hemorrhage on right dorsal surface of neck; red colored
- 5 tail feathers broken on right side

**Internal**

X-ray:

- performed on insert date here
- no bone fractures, no sign of trauma

General:

- air sacs intact
- liver in good condition
- lungs in good condition
- no internal or external fat stores evident
- evidence of mild internal hemorrhaging at base of heart
- mild, subepicardial hemorrhage in atrium region; blood clot in heart (atrial bilateral congestion)

Musculature:

- subacute hemorrhage on right leg near knee joint
- minor hemorrhage on subcutaneous tissue over spinal column (below abrasion on skin)
- subcutaneous hemorrhage dorsal aspect of neck

Cranium:

- multiple areas of significant intracranial hemorrhage on dorsal and anterior aspects of skull, right side;
- multiple, small (2 to 4 mm diameter) indentations on dorsal and anterior aspect of skull

Stomach:

- gastro-intestinal tract empty
- vascular congestion in intestinal serosal membrane

Brain:

- marked post mortem autolysis
- severe, subdural hemorrhage on occipital portion of brain below skull hemorrhages

**Findings**

Based on gross necropsy findings, it appears that this bird died from head trauma. There is also evidence for emaciation secondary to starvation. It is likely that emaciation, weakness, dehydration and possibly hypoglycemia predisposed this bird to becoming involved in a traumatic incident causing the severe head trauma. The sub pericardial hemorrhaging may have been agonal (occurring at the time of death). The subcutaneous hemorrhage in the neck likely occurred at the time of impact.

It should also be noted that the lesions caused by the transmitters were significant; and over time would likely have caused a portal of entry for bacteria possibly leading to a localized or generalized sepsis.