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# Management of Wintering Short-eared Owls at Airports in the Lower Great Lakes Region

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**ABSTRACT:** USDA Wildlife Services airport wildlife biologists have been tasked with reducing the hazards that raptors (including owls) pose to safe aircraft operations at airports and military airfields throughout the USA. A review of available wildlife strike information suggests short-eared owls (*Asio flammeus*) are frequently struck by aircraft during the winter months at numerous airports within the Lower Great Lakes Region of the United States. Further, this species is listed as ‘endangered’ by state fish and wildlife agencies in many states, although not at the federal level. Consequently, there is particular interest in developing non-lethal management tools for reducing the hazards posed by this species. In an effort to gain a better understanding of the efficacy of managing the hazards to aviation posed by short-eared owls, we developed methods to live-capture, mark with USGS aluminum leg bands, and translocate short-eared owls from airport environments (i.e., airfield areas) as part of the overall programs to reduce wildlife hazards to safe aircraft operations at airports. During 2012–2015, a total of 32 short-eared owls was live-captured, banded, and translocated to release sites approximately 64 to 80 km (40 to 50 miles) away from the airports. Only 1 short-eared owl (3%) was resighted and this bird was found on a different airport from where it had been translocated from. Future research is needed to evaluate the efficacy of translocating wintering short-eared owls from airport environments.

**Key Words** *Asio flammeus*, airport risk, bird strikes, raptors, short-eared owls, translocation.

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Wildlife-aircraft collisions (wildlife strikes) pose a serious safety risk to aircraft. Wildlife strikes cost civil aviation at least \$957 million annually in the United States (Dolbeer et al. 2016). Aircraft collisions with birds accounted for 97% of the reported strikes,

whereas strikes with mammals and reptiles were 3% and <1%, respectively (Dolbeer et al. 2016). Sound management techniques that reduce the presence and abundance of wildlife hazardous to aviation in and around

airports are therefore critical for safe airport operations (DeVault et al. 2013).

Raptors (i.e., hawks and owls) are one of the most frequently struck bird guilds within North America. Integrated wildlife damage management programs combine a variety of non-lethal and lethal management tools to reduce the presence of raptors on airports. Given high public interest, logistical and financial constraints, and other factors, managing raptors at airports presents unique challenges. Non-lethal tools are favored by the public, so airports with a raptor translocation program often receive strong public support.

Short-eared owls have one of the largest geographic ranges of owls in the world (Wiggins et al. 2006). This species favors grassland habitats for nesting, roosting, and foraging (Clark 1975); thus, the large expanses of such habitats at an airport can be attractive to these birds. Short-eared owls are long-distance migrants (they breed in Arctic areas and typically move south during winter months) in North America and use airports in temperate climates only during their wintering period.

Effective, publicly accepted methods to reduce the hazards posed by short-eared owls to aviation safety are needed. Here, we examine historical and current patterns of short-eared owl strikes at airports within the Lower Great Lakes Region and discuss a non-lethal management program to reduce the airfield presence of wintering short-eared owls and the frequency of owl-aircraft collisions at these airports.

## **SHORT-EARED OWL–AIRCRAFT STRIKES**

### **Methods**

We used data from the FAA National Wildlife Strike Database for a 27.5-year period (1990 – April 2016) for civilian and joint-use airports. We queried this database and selected only those strike records that

were reported to have occurred within 7 states (i.e., Illinois, Indiana, Kentucky, Michigan, Ohio, Pennsylvania, and Wisconsin) and the species struck was identified as a short-eared owl. Many owl strike reports were incomplete. Either specific fields of information were missing, unknown, or we were unable to effectively obtain the information from report narratives. Thus, sample sizes varied for individual variables and among specific analyses.

We determined the month and time of day each short-eared owl strike event occurred based on the reported local time of the event. We examined each strike event and categorized the time of day as ‘dawn’, ‘day’, ‘dusk’, or ‘night’. We used *G*-test for goodness-of-fit analyses (Zar 1996) to determine if the frequency of short-eared owl strikes varied by month or time of day.

Phase of flight was defined as the phase of flight the aircraft was in at the time the owl strike occurred (FAA 2004). Aircraft on ‘final approach’ were in early stages of the landing process ( $\leq 30.5$  m [100 feet] AGL, typically on or over an airfield. ‘Landing’ aircraft were in the final stages of landing and had one of more wheels on the ground. Aircraft in the ‘take-off’ phase were rolling along the runway (with one or more wheels in contact with it) or were in the process of ascending upward ( $\leq 30.5$  m AGL). Aircraft in the ‘climbout’ phase were in the latter stages of taking off ( $>30.5$  m AGL), typically on or over the airfield. We used *G*-test for goodness-of-fit analyses (Zar 1996) to determine if the frequency of short-eared owl strikes varied among aircraft phases of flight.

### **Results**

During 1990 – April 2016, we found a total of 182 short-eared owl strikes that were reported to have occurred in 7 states within the Lower Great Lakes Region (Table 1). Short-eared owl-aircraft collisions had a damaging strike rate of 12.5%. Reported

damage costs ranged from \$45 to \$100,000 per strike.

**Table 1.** Conservation status of short-eared owls in states within the Lower Great Lakes Region of the United States. This information was obtained from the websites for each of the appropriate state wildlife agencies.

State	Conservation Status
Illinois	Endangered
Indiana	Endangered
Kentucky	Endangered
Michigan	Endangered
Ohio	Species of Concern
Pennsylvania	Endangered
Wisconsin	Species of Concern

Short-eared owls strikes varied ( $G = 201.4$ ,  $df = 11$ ,  $p < 0.0001$ ) among the months of the year. A clear seasonal pattern was present in short-eared owl-aircraft collisions, with 82% of these incidents occurring during months of November through March (Figure 1). This finding is not unexpected, as we believe that short-eared owl use of these airports occurs primarily during the owls' wintering periods. Short-eared owls strikes were not ( $G = 53.6$ ,  $df = 3$ ,  $p < 0.0001$ ) equally distributed among times of the day; three-quarters of the short-eared owl-aircraft collisions occurred during night-time hours (Figure 2). Likely, short-eared owls are active hunting during night-time hours (Wiggins et al. 2006) and thus the risk of owl-aircraft collisions is highest during the night.

Short-eared owl strike reports that included aircraft phase of flight information ( $n = 49$ ) showed that owl strikes occurred during the final approach (22.4%), landing roll (36.7%), take-off run (28.6%), and climbout (12.3%) phases of flight. The frequency of owl strikes was similar ( $G = 6.7$ ,  $df = 3$ ,  $p = 0.08$ ) among aircraft phases of flight. Considering the location of the

aircraft during these phases of flight relative to the airfield itself, almost all short-eared owl strikes likely occurred within the airport environment itself. Consequently, management actions to reduce the presence / airfield use of short-eared owls should be focused on the airfield.

## Discussion

This information is critical for understanding the current situation at an airport and essential for the development of effective and species-specific management plans (Cleary and Dolbeer 2005). Evaluations of the historical and current strike rates of short-eared owls, in addition to recommendations provided during Wildlife Hazard Assessments at these airports, demonstrate that this species presents a risk to safe aircraft operations and consequently management actions are needed to reduce this risk.

Habitat selection and use by short-eared owls is directly related to prey populations (Clark 1975, Wiggins et al. 2006) and therefore management actions to reduce the abundance of small mammals and other prey resources might be effective in reducing the presence of short-eared owls on airports and consequently reduce the risk of owl-aircraft strikes.

## NON-LETHAL HAZING OF SHORT-EARED OWLS

We queried Wildlife Services' Management Information System database for management events associated with the non-lethal hazing of short-eared owls that occurred during a 13-year period (i.e., 2004–2016) at airports in 7 states within the Lower Great Lakes Region. Non-lethal hazing was conducted using pyrotechnics and/or motor vehicles. On average, 59 hazing activities associated with short-eared owls were conducted at these airports each year (range 0 to 478). During 2013, 449 of the 478 (94%) hazing events occurred in

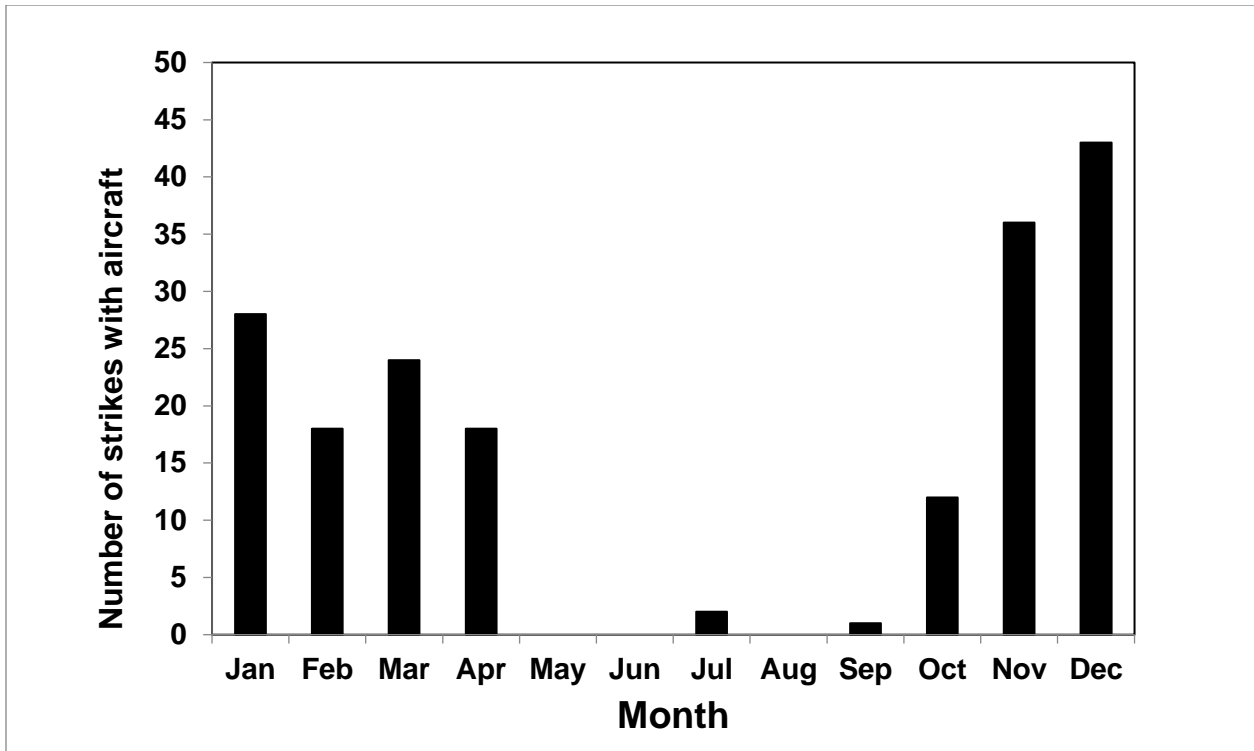


Figure 1. Monthly total number of short-eared owl-aircraft collisions ( $n = 182$ ) with U.S. civil aircraft during 1990 – April 2016 in 7 states in the Lower Great Lakes Region.

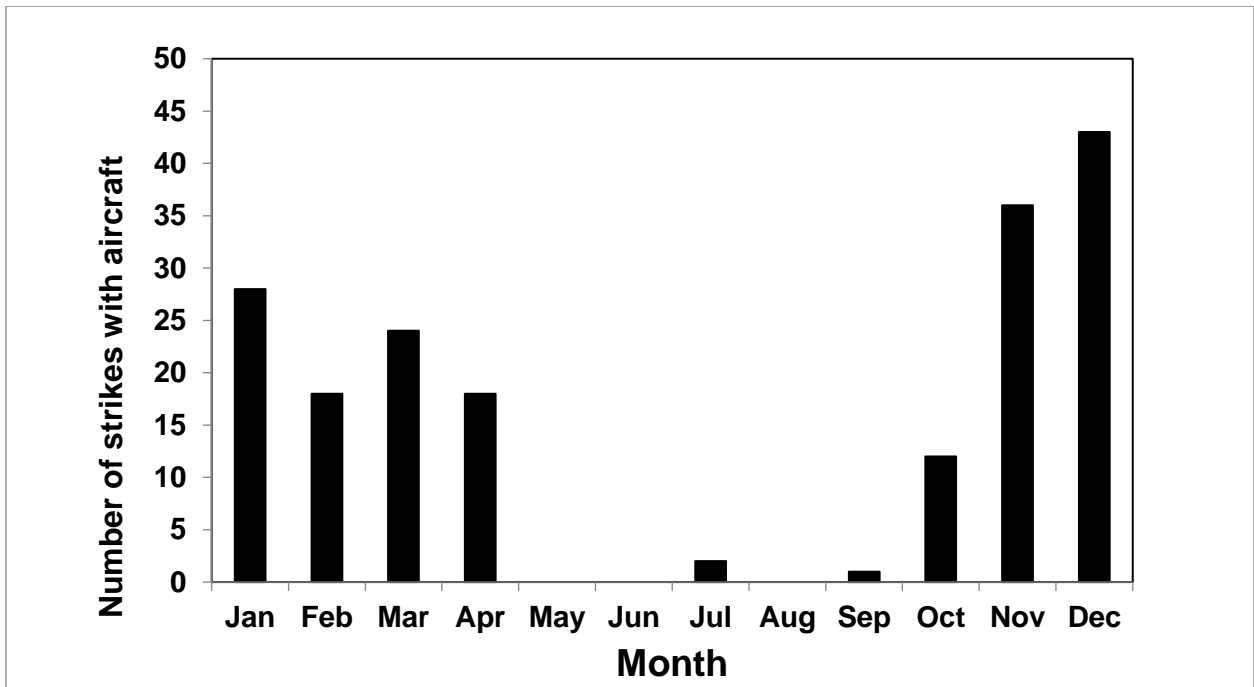


Figure 2. Distribution of the time of day for short-eared owl-aircraft collisions ( $n = 44$ ) with U.S. civil aircraft during 1990 – April 2016 in 7 states in the Lower Great Lakes Region.

Indiana. This heightened level of non-lethal management coincided with a time period when more than 30 short-eared owls spent several months at one particular airport. Although non-lethal hazing is not very effective at deterring wildlife use of an airfield in the long-term, it represents an important component of an integrated wildlife damage management program, especially when state-listed threatened and endangered species are involved.

### SHORT-EARED OWL TRANSLOCATION

Live-capture and translocation of problematic individuals is a common practice used in the management of human-wildlife conflict situations (Fisher and Lindenmayer 2000, Sullivan et al. 2015). Translocation of raptors from airport environments is a non-lethal method with the goal of reducing raptor abundance within airport environments (Guerrant et al. 2013, Schafer and Washburn 2016). At 5 airports in the Lower Great Lakes Region, we conducted live-capture (Bub 1991, Bloom et al. 2007) and translocation activities involving short-eared owls (to reduce the airfield presence and frequency of bird strikes involving this species) as part of the integrated wildlife damage management programs at these airports. Owl translocations were conducted under the authority of all necessary permits and National Environmental Policy Act considerations. To better understand whether or not translocated short-eared owls return to airport environments, birds that were translocated were marked with a USGS federal bird band. During 2012–2015, 32 short-eared owls were live-captured, banded, and translocated to release sites approximately 64 to 80 km (40 to 50 miles) away from the airports. Several live-capture methods were used to catch these owls; however, pole traps with padded foot-hold traps was the most effective (Table 2). All of

these translocation events occurred from November to March. During 2013–2016, only 1 short-eared owl (3%) was resighted and this bird was found on a different airport from where it had been translocated from. These findings suggest that live-capture and translocation of wintering short-eared owls from airports may be an important non-lethal component of an integrated wildlife damage mitigation program, but further research is necessary to determine the fate of translocated individuals.

**Table 2.** Methods used to live-capture 32 short-eared owls from 5 airports within the Lower Great Lakes Region of the United States during 2012–2015.

Live-Capture Method	Number of Owls Captured
Pole Trap with padded foot-hold	25
Net gun or air cannon	3
Carpet noose (in roosting location)	3
Swedish goshawk trap	1

### SUMMARY

Wintering short-eared owls pose a long-term risk to aviation safety at airports within the Lower Great Lakes Region of the United States. Consistent reporting of short-eared owl strikes, monitoring of the airfield for the presence/abundance of short-eared owls and other hazardous wildlife, and the use of primarily non-lethal methods are essential components of an integrated wildlife mitigation program conducted by airport biologists. Live-capture, banding, and translocation of short-eared owls (and other raptors) should be continued into the future to allow for the evaluation of this non-lethal program and to help increase our understanding of this method to reduce the presence of wintering short-eared owls within airport environments. Additional management actions to reduce the

availability of roosting habitat and food resources (e.g., small mammals) for wintering short-eared owls within airport environments should be investigated and evaluated.

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