Wildlife in Airport Environments: Chapter 6 Wildlife Translocation as a Management Alternative at Airports

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Wildlife in urban settings may be a welcome sight for many, but negative interactions between people and various wild species are increasing (Conover et al. 1995, Conover 2002). Wildlife populations are commonly managed in part to reduce these conflicts, particularly in high-risk areas such as roadways and airports (Conover 2002). However, the public often opposes lethal control or management methods perceived as causing harm to nuisance animals (Reiter et al. 1999, Conover 2002, Treves et al. 2006), and attitudes vary considerably depending on the particular wildlife species involved (Kretser et al. 2009). Consequently, a variety of nonlethal management approaches are typically integrated with limited lethal control (Conover 2002).

Translocation, the transport and release of wild animals from one location to another (Nielsen 1988), is an example of a fairly recent adaptation to wildlife damage management methods. Griffith et al. (1989) provided an overview of translocation as a general wildlife conservation method. Translocation has been demonstrated as an important technique for stocking game species and furbearers, reintroducing extirpated species, and enhancing threatened or endangered species. The black bear (*Ursus americanus*) is probably the carnivore most frequently translocated to re-establish extirpated populations (Smith and Clark 1994, Linnell et al. 1997). Based on a survey of 81 wildlife agencies and organizations (1973–1986), Griffith et al. (1989) determined that 90% of all translocations were of native game species and were deemed successful 86% of the time. In contrast, translocations of threatened species were successful only 46% of the time.

Translocation also has been used to remove problem carnivores in the hope that the negative experience will prevent the animal from returning to the conflict site, or that the individual will stay near the release area, where the potential for future conflicts is low (Rogers 1988, Gunther 1994, Linnell et al. 1997). The translocation of felids has been a common management method to reduce livestock depredations, especially in Africa (Linnell et al. 1997). Holevinski et al. (2006) reported that few (seven of 80, or 8.8%) Canada geese (*Branta canadensis*) translocated ~150 km (93 miles) from urban areas returned to their original capture site during the six months following banding. Most geese were harvested <50 km from their release site during the fall hunting season following summer banding. In contrast, hazed Canada geese repeatedly returned to airport environments because they were apparently habituated to nonlethal control methods (York et al. 2000).

Translocation is a viable management tool to re-establish raptor breeding populations, including Seychelles kestrel (*Falco araea*; Watson 1989) and osprey (*Pandion haliaetus*; Martell et al. 2000; see additional references in Cade and Temple 1994), but it has generally received equivocal reviews when applied to damage management scenarios (Linnell et al. 1997, Thirgood et al. 2000, Watson and Thirgood 2001). Vacant territories of golden eagles (*Aquila chrysaetos*) translocated to reduce predation on livestock were quickly taken over by other eagles, and 14 of 16 eagles eventually returned

to their capture sites (Phillips et al. 1991). Despite a paucity of data, translocation of raptors is deemed an effective and socially acceptable management tool to reduce the abundance of these birds at airports as well as the frequency of bird–aircraft collisions (i.e., bird strikes; see Schafer et al. 2002).

Because both airport biologists and the public seem to support raptor translocation despite a lack of data, there is a need to realistically assess the effectiveness of this method. We first briefly review the legal and ecological concerns (across wildlife species) associated with animal translocation and the reasons why this management tool is used at airports. We then discuss management data on raptor translocations from airports and how these data can be used to assess relative costs and benefits versus alternative management options.

Legal Concerns

In their national survey examining translocation of nuisance wildlife, Craven and Nosek (1992) reported that 47 states allowed the translocation of animals from the site of capture. Some states had species-specific restrictions, often against species identified as carriers of rabies. Most states reported that euthanasia was the preferred management alternative for handling urban nuisance animals, although 41 states reported that euthanasia was not mandatory for any species. Twenty-eight states required a state-issued permit, license, or permission from the appropriate wildlife agency to translocate wildlife. Fourteen states allowed anyone with nuisance wildlife to capture and remove the problem animals. Similarly, La Vine et al. (1996) found that fish and wildlife agencies in 33 states allowed property owners to translocate animals causing damage or conflicts, and eight states allowed any species to be translocated; 13 states had regulations prohibiting translocation of threatened or endangered species. Wildlife agencies in 45 states allowed property owners to euthanize animals causing damage or conflicts, and 42 states restricted species that could be handled by private personnel.

With regard to capture and translocation of raptors, the overriding legal issue is their protection under the Migratory Bird Treaty Act of 1918 (see the Digest of Federal Resource Laws of the U.S. Fish and Wildlife Service [USFWS]; http://www.fws.gov/laws/lawsdigest/migtrea.html). A USFWS migratory bird depredation permit is necessary for capture and translocation or lethal removal of protected migratory birds (http://www.fws.gov/migratorybirds/mbpermits.html), and state depredation permits might be required in addition to the federal permit. For airports dealing with management of bald eagles (*Haliaeetus leucocepalus*) to reduce strike hazards, an eagle depredation permit from the USFWS is also required. Although bald eagles were removed from the Endangered Species List in 2007, they remain protected under the Bald and Golden Eagle Protection Act of 1940 (http://www.fws.gov/laws/lawsdigest/baldegl.html).

Ecological Concerns

Survival of released animals is often lower than that for established, wild individuals. Rosatte and MacInnes (1989) reported a 50% mortality rate for translocated raccoons within three months after release. In addition to high mortality rates for translocated animals, there are long-distance movements and increased risk of disease transmission (Wright 1978). Bendel and Therres (1994) reported that only 55% of 20 translocated Delmarva fox squirrels (*Sciurus niger*) survived 90 days postrelease. Transmission of infectious disease to resident wildlife (Rosatte and MacInnes 1989) is also a risk that might not be readily noticed or discernible at the time of translocation. There is extensive literature on raptor site fidelity to breeding areas (e.g., Janes 1984, Jenkins and Jackman 1993, Rosenfield and Bielefeldt 1996; see also winter area site fidelity in Garrison and Bloom 1993, Hinnebusch et al. 2010) and homing abilities (Boshoff and Vernon 1988, Latta et al. 2005, Linthicum et al. 2007), factors that could limit successful translocation. Craven et al. (1998) suggested the following guidelines for successful wildlife translocation: (1) proper selection of a release site, including landowner permission and suitable habitat; (2) consideration of season and weather conditions, time of day, and distances from capture sites at time of release; and (3) adherence to recommendations for health certification or quarantine for certain species.

Translocation to Reduce Bird Strikes

Raptor–Aircraft Strikes

Survival of translocated animals, and risks to the wildlife community at the release site, are clearly impor-

tant. However, one must also consider the probability of death associated with the animal's use of airport habitats if not translocated, as well as hazards posed to human health and safety. Blackwell and Wright (2006) found that most aircraft strikes (63%) with red-tailed hawks (*Buteo jamaicensis*) occurred while the plane was on the ground, and 84% of strikes occurred below 30.5 m (100 feet) above ground level, all within the airport environment. In addition, from 1990 through 2009, the U.S. Department of Transportation Federal Aviation Administration (FAA) National Wildlife Strike Database (FAA 2011) showed that raptors (including vultures and owls) were responsible for 5,724 reported strikes, resulting in almost $56 million in reported economic losses (Dolbeer et al. 2011). Most strike-related damage to civil aircraft involved bald eagles ($14,402,681), vultures ($9,312,759), and red-tailed hawks ($6,709,526; Dolbeer et al. 2011). These loss estimates are likely conservative, as the reporting rate was estimated at only 20% from 1990 through 1994 and 39% from 2004 through 2008, and only 14% of these reports indicated damage (Dolbeer et al. 2011).

More recently, DeVault et al. (2011) ranked species and groups according to their relative hazard to aircraft when struck in the airport environment (i.e., 152 m [≤500 feet] above ground level). The authors used a composite rank reflecting the percentage of total strikes (for that species or species group) that caused any level of damage to the aircraft, the percentage of total strikes that caused substantial damage to the aircraft (for definitions of aircraft damage categories, see Dolbeer et al. 2000), and the percentage of total strikes that caused an effect on flight. Of the 66 bird species or groups examined, five species of raptors and turkey vultures (*Cathartes aura*) ranked among the top 20 for relative hazard score. The management of raptors and vultures is a high priority for biologists charged with reducing wildlife hazards at airports.

Management Example: Raptors at Ohio Airports

At civilian airports in Ohio, USA, 3,162 bird strikes were reported to the FAA (1990–2009), with hawks, owls, and vultures involved in 290 strikes (FAA 2011). American kestrels (*F. sparverius*) accounted for 46% of the raptor strikes, red-tailed hawks were responsible for 23%, and unknown hawks and short-eared owls (*Asio flammeus*) added 9% each. Peregrine falcons (*F. peregrinus*) and turkey vultures contributed 3% each. The remaining 7% consisted of several species of hawks and owls (FAA 2011). In 2004, the U.S. Department of Agriculture (USDA) Wildlife Services (WS) Ohio program obtained authorization from the USFWS to translocate raptors. This decision provided enhanced opportunities for nonlethal management of raptors using airports in Ohio. Lethal control of raptors was used when there were no other reasonable options, or when it was necessary to remove a bird that was an immediate and direct hazard to aircraft operations. Additionally, WS developed a peregrine falcon translocation plan because of two aircraft strikes with juvenile falcons in 2004. Because peregrines were listed as an endangered species in Ohio during 2004 (currently peregrine falcons are listed as a state-threatened species in Ohio), WS did not pursue permission to lethally remove them.

To further reduce hazards while conserving Ohio's state-listed raptors, and based on perceived public support in favor of nonlethal raptor management, WS developed a raptor and owl relocation plan in collaboration with the Ohio Department of Natural Resources Division of Wildlife (USDA 2009). Under this agreement, translocation of raptors would be used only when repeated harassment attempts failed to resolve the problem. During 2009, WS biologists captured and translocated 33 American kestrels and 31 red-tailed hawks from a single Ohio airport (USDA 2010; Fig. 6.1).

In 2010, managers translocated an additional 25 kestrels and 46 red-tailed hawks, with translocation distances ranging from 72 to 120 km (45 to 75 miles). All 135 birds captured at Ohio airports during this time period were marked with USFWS leg bands to evaluate potential recovery rates. Recovery rates were low for these banded raptors (see also McIlveen et al. 1992/93, Schafer et al. 2002). Five banded red-tailed hawks were recovered within the original airport environment in 2009 and 2010. Airport personnel shot two hawks, and three were recaptured and euthanized (one was found injured as the result of a suspected aircraft collision).

The efforts in Ohio reflect a nationwide trend for WS. From 2008 through 2010, WS biologists translocated 606 red-tailed hawks from 19 airports (313 hatching-year birds, 293 after-hatching-year birds; L. Schafer, WS, unpublished data). Overall, the confirmed

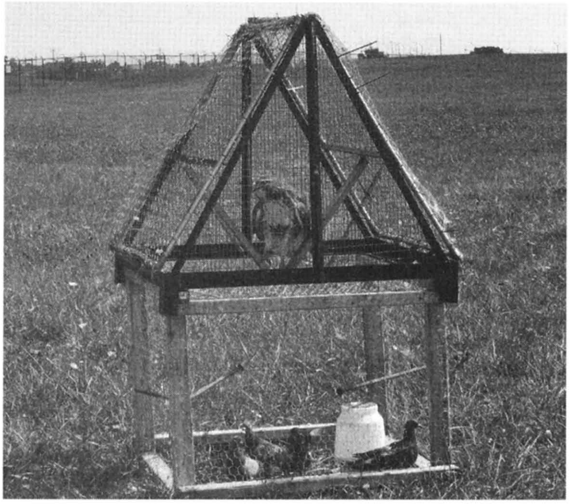

Fig. 6.1. Red-tailed hawk captured within a Swedish goshawk trap positioned near a runway at an airport in Ohio, USA. Rock pigeons (*Columba livia*), protected by the cage, served as lures. Photo credit: U.S. Department of Agriculture, Wildlife Services

return rate was 6% (39 of 606). The confirmed return rate based on distance translocated was similar for both juvenile and adult banded hawks. Peak months for capture of after-hatching-year red-tailed hawks were February and March, whereas hatching-year hawks were more likely to be caught and relocated during September and October.

Summary

Raptor translocation from airports shows promise relative to hazard reduction, but the cost-effectiveness of such programs has not been clearly demonstrated. The cost-effectiveness of this management approach should be assessed relative to continued integration of other nonlethal management strategies (e.g., reducing habitat and food resources), as well as to lethal control as a last measure. Important variables to be considered when evaluating all management approaches for raptors include (1) staff time, (2) equipment needs, (3) documentation of return rates for raptor species (including sex, age, location, season, and distance of translocation), (4) relative reduction in strike rates, and (5) estimates of survival of translocated birds versus mortality rates for individuals remaining in airport environments.

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