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MANAGING COMMON NIGHTHAWKS AT McCONNELL AIR FORCE BASE, KANSAS, TO REDUCE AIRCRAFT STRIKES

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***Abstract*:** McConnell Air Force Base (AFB) experiences a unique bird/aircraft hazard problem with migrating common nighthawks from August to October. Nighthawks are the most commonly struck species at McConnell AFB, representing about 38% of reported bird/aircraft strikes. During August and September, nighthawks represented 82% of the bird strikes found on the airfield. Approaches for managing nighthawks on and around airfields are limited because of the night environment, logistics and an incomplete understanding of nighthawk behavior. We determined the number of nighthawks using McConnell AFB and associated foraging, loafing and roosting areas, analyzed their food habits, and developed a translocation management strategy to reduce hazards to aircraft. During 1998, 1999 and 2000, we observed 600, 540 and 920 nighthawks, respectively, on the airfield. The greatest activity on the airfield occurred from September 27-30 in 1998, September 9-14 in 1999, and September 6-8 in 2000. The peak number of nighthawks observed using the airfield during these periods was 142, 90 and 118, respectively. Nighthawks foraged around the airfield mainly between 1800 and 2200 and usually roosted on the airfield about 1800 with a peak between 2200 and 0200. During one 2-hour survey period in 1999 and 2000, 37 and 59 nighthawks, respectively, were flushed from the airfield. Thirty-seven nighthawks collected during the study consumed mostly corn earworm moths (Noctuidae) and beetles (Scarabaeidae). Management of nighthawks on McConnell AFB has been difficult because commonly used hazing techniques seem to be ineffective; these birds usually return to the same roosting location after being flushed, which can present an even greater risk to aircraft. We developed and evaluated a unique technique for capturing and translocating nighthawks from the airfield. Only 1 of 214 nighthawks translocated 88 km from McConnell AFB returned. Nighthawk/aircraft strikes at McConnell AFB declined from 9 in 1998, when no translocation was conducted, to 0 in 1999 and 3 in 2000.

Key Words: aircraft strikes, *Chordeiles minor*, common nighthawk, drop net, McConnell Air Force Base, translocation

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INTRODUCTION

Bird strikes to aircraft are a serious safety and economic problem in the United States, annually causing millions of dollars in damage to civilian and military aircraft and occasionally loss of human life (Cleary and Dolbeer. 1999). Military aircraft are especially susceptible because many exercises involve high speeds at low altitudes, where birds are commonly present. Losses of military aircraft have been numerous and costly (Blokpoel 1976). The United States Air Force reported 13,427 bird/wildlife strikes to aircraft world-wide from 1989 through 1993 (Arrington 1994). The most significant military aircraft disaster caused by birds in the United States occurred at Elmendorf Air Force Base, Anchorage, Alaska, on September 22, 1995, when an E-3 Sentry Airborne Warning and Control System aircraft ingested several Canada geese on take-off and crashed, killing 24 people.

At McConnell Air Force Base (AFB), Kansas, several bird strikes to aircraft have been reported since 1994. On April 28, 1997 a KC-135 on final approach at 2100 struck a northern pintail (*Anas acuta*), causing $202,000 in damage. Nighthawks (*Chordeiles minor*) represent about 38% of reported bird strikes at McConnell AFB. These strikes occurred during nightly operations. Indications are that nighthawks pose a real threat to aircraft safety.

Factors that contribute to over abundance of common nighthawks on McConnell AFB are: 1) abundant foraging opportunities near the airfield, 2) available habitat for nighthawks to forage and roost on and around the airfield, 3) a lack of a Bird Aircraft Strike Hazard Program to address nighthawks, and 4) that McConnell AFB is located in the migratory path of nighthawks.

Approaches to manage nighthawk activity on and around airfields are limited because of the night environment, logistics and an incomplete understanding of the bird's behavior. In addition, there are growing concerns about nighthawk breeding populations, which have decreased about 30% in the last 30 years. These concerns have stimulated the development of non-lethal techniques to resolve potential bird/aircraft hazards. Our objectives in this multi-year study, 1998-2000 were to: 1) determine the number of common nighthawks using McConnell AFB, 2) determine foraging, loafing and roosting areas of common nighthawks, 3) determine food habits of common nighthawks using McConnell AFB, 4) evaluate a new capture technique for nighthawks, and 5) evaluate the feasibility of nighthawk translocation to reduce nighthawk/aircraft strikes at McConnell AFB.

STUDY AREA

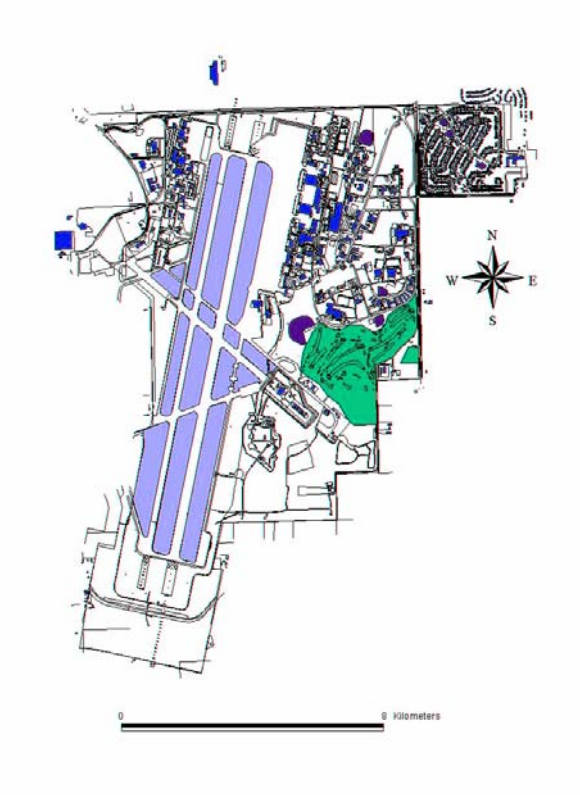
McConnell AFB is located southeast of Wichita, Kansas, and has a number of naturally occurring characteristics that make portions of the base attractive to birds, especially common nighthawks (Figure 1). On McConnell AFB, there are vast areas of vegetative habitat which attract an array of wildlife, intermittent and permanent water sources, and large, flat open areas. These areas are attractive to common nighthawks for foraging and roosting. All of these areas are synonymous with insect production and some, i.e. the runways, offer ideal roosting areas.

Figure 1. McConnell Air Force Base, Kansas.

METHODS

Nighthawk Use of McConnell AFB Airfield

We conducted a series of surveys



during August, September and October in 1998, 1999 and 2000 to index the number of nighthawks foraging, loafing and roosting on McConnell AFB. Survey period for each year varied depending on logistics and access to the airfield. We used a vehicle equipped with 3 one-million candle power roof-top spotlights to illuminate the search area. In addition, a hand-held spotlight was used to illuminate individual birds. We drove the east and west runways, taxiways, infield road and light bank adjacent to the aircraft ramp every 2 hours, starting at 1800 hours and continuing to 0800 hours. We documented the number of common nighthawks observed and their location using a geographic positioning system (GPS). During 1998, surveys were conducted for 3 consecutive nights every two weeks starting on September 2. During 1999 and 2000, surveys were conduct weekly for 4 consecutive nights from September 7 to October 9 and August 28 to September 29, respectively.

Nighthawk Food Habits

We collected up to 13 common nighthawks during each of 3 survey periods in 1998. Birds were collected with a pellet gun from random locations on the airfield and frozen within 2 hours of collection. The collection location was documented using a GPS and noted on an airfield map. In the laboratory, each carcass was weighed to the nearest 0.1 kg, and classified as adult or juvenile and male or female according to plumage characteristics, and the stomach-esophageal contents were removed and placed in isopropyl alcohol (Pyle 1997).

Stomach-esophageal contents were identified by flushing the contents onto a wire screen and washing them with water to separate food items. For each sample, we recorded the total number of individual items, the volume they represented, and the number of the most abundant insect species and their volume.

Nighthawk Capture Technique

In 1999, we developed a technique to capture common nighthawks that were loafing or roosting on McConnell AFB airfield. A mist net was mounted on a frame that was attached to the front hitch receiver on a truck (Figure 2). The pivot point at the base of the frame allowed the net to be raised or lowered. The frame was made from 0.75 inch (1.9 cm) aluminum tubing with telescoping aluminum poles inserted into the framework on either side that could be adjusted to cover the anticipated capture area (4.6 m x 6 m). The framework was raised and lowered from the cab of the truck with a rope attached to each side of the frame. The capture truck had two personnel, one to operate the spotlights and one to position and drop the net over a nighthawk.

Translocation of Common Nighthawks from McConnell AFB

Nighthawks were captured September 7-18, 1999 and August 28-September 2, September 12-15, and September 26-29, 2000 between 2200 to 0600 along the same transect route used to monitor nighthawk activity. No attempt was made to capture nighthawks around the light-bank area because we were not permitted in this area. The drop net (4.6 m x 6 m) attached to the front of a full size pickup truck was used to capture all nighthawks (Figure 2). The drop net was used as follows: a nighthawk was observed on the ground with the vehicle lights and/or the spot light. The vehicle was slowly positioned to within 3 to 4 m of the bird. The spot light was kept on the bird while the net was dropped. Captured nighthawks were banded with U.S. Geological Survey bands, identified as male or female, weighed and placed in a transport cage. The time and location (GPS) of either a captured or unsuccessfully captured nighthawk were recorded. Nighthawks were transported and released the following morning at 1 of 4 pre-selected locations in 1999: (1) 88 km south; (2) 88 km north; (3) 44 km south; or (4) 44 km north of McConnell AFB. In 2000, nighthawks were transported and released at 2 pre-selected locations: (1) 44 km south of McConnell AFB; and (2) 44 km north of McConnell AFB. McConnell AFB was monitored for the return of translocated birds. The band number, location and date were recorded for each bird that returned. The effectiveness of nighthawk translocation was determined by analyzing the number of returns by location and distance, and comparing the number of nighthawk/aircraft strikes during these study periods to the same period in 1998.

Figure 2. A drop net consisting of a mist net mounted on a frame was attached to the front hitch receiver on a truck and operated from within the cab of the truck this was used to capture common nighthawks roosting on runways at McConnell AFB, Kansas for translocation in 1999 and 2000.

RESULTS

Nighthawk Use of McConnell AFB

Common nighthawks were present on the airfield at McConnell AFB from the latter part of August through the end of September each year. During the respective observation periods for 1998, 1999 and 2000, 600, 540 and 920 observations were made of nighthawks on the airfield. The greatest activity on the airfield occurred from September 27-30 in 1998, September 9-14 in 1999, and September 6-8 in 2000 (Figure 3). The peak number of nighthawks observed using the airfield during these periods was 142, 90 and 118, respectively.

Figure 3. Common nighthawk roosting activity on McConnell AFB, Kansas from August through October 1998, 1999 and 2000.

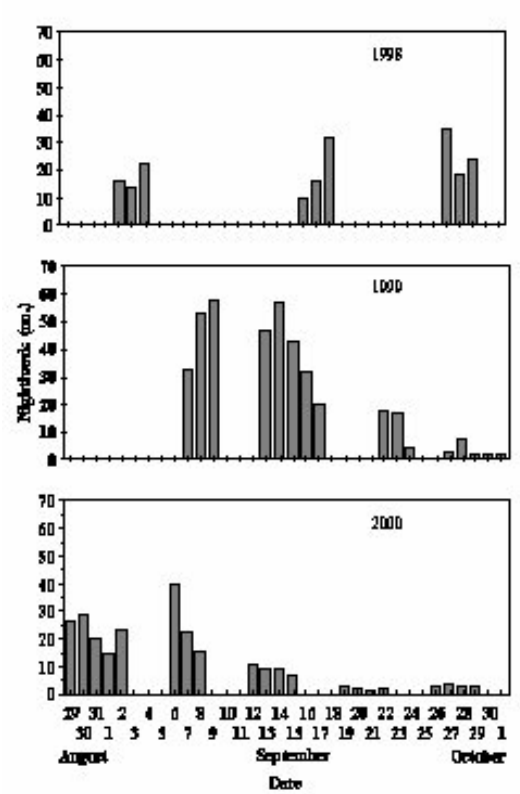


Figure 4. Common nighthawk roosting activity by time period on McConnell AFB, Kansas from August through October 1998, 1999 and 2000.

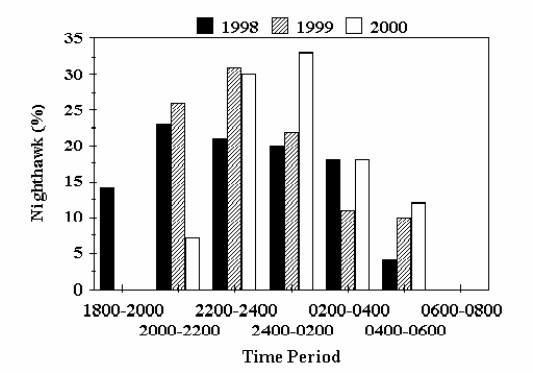
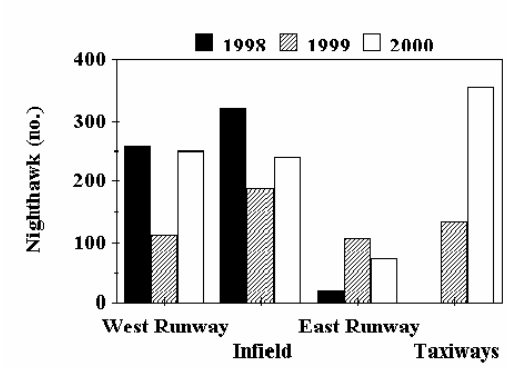


Figure 5. Common nighthawk roosting activity by location on McConnell AFB, Kansas from August through October 1998, 1999 and 2000.



Overall, population counts on the airfield by time period indicate that nighthawk numbers peaked between 2000-2200 in 1998, 2200-2400 in 1999, and 2400-0200 in 2000 (Figure 4). There were nightly variations within these time frames by survey period. The period between 2000-0200 accounted for 71% (range=64%-79%) of the nighthawks observed using the airfield during all years. Generally, nighthawks started arriving at the airfield from 1800-2000 to loaf and roost after foraging. Numbers steadily increased until approximately 0200. Following the peak period, nighthawk numbers stayed fairly constant until about 0600, when they dispersed to day roosting locations off the airfield.

Overall distribution of roosting nighthawks on the airfield at night was mainly on runway 10R (west) and 10L (east), the infield road, and the west taxi-way (Figure 5). In 1998, nighthawks were observed on runways 47% of the time, of which 92% were on runway 10R (west) and 8% on runway 10L (east). In 1999, nighthawks were observed on runways 41% of the time, of which 51% were on runway 10R (west) and 49% were on 10L (east). In addition, nighthawks were observed 24% of the time on the north displacement thresholds, of which 23% were on 10L threshold and 77% were on 10R threshold. During 1999, the southern half of runway 10L (east) was used for parking aircraft. In 2000, nighthawks were observed 35% of the time on runways. Of the runways, 10R (west)

accounted for 78% of the nighthawks observed and 10L (east) accounted for 22% of the nighthawks observed.

Common Nighthawk Food Habits

In 1998, we collected 12, 13, and 12 common nighthawks during each survey period, September 2-4, 16-18 and 27-29, respectively, with a pellet gun. Eight were adults (3 females/ 5 males) and 28 were juveniles (13 females/ 15 males). Adult females weighed an averaged of 95.7 g, adult males 93.6 g, juvenile females 81.5 g and juvenile males 83.0 g. Esophagus and gizzard contents averaged 11.0 g for adult females, 8.9 g for adult males, 6.9 g for juvenile females and 7.9 for juvenile males. The volume of the esophagus and gizzard contents varied from 7 ml to 28 ml of insect material. The contents consisted mainly of small insects such as mosquitoes (Culicidae), ants (Formicidae), beetles (Chrysomelidae), flies (Muscidae), bees (Sphecidae), moths (Noctuidae), large beetles (Scarabaeidae), grasshoppers (Acrididae) and leafhoppers (Cicadellidae). Moths (adult corn worm) and beetles accounted for 3-19 ml and 2-3 ml of esophagus/gizzard contents, respectively. One nighthawk contained 32 corn earworm moths, which represented about 68% of the total esophagus/gizzard contents. Overall, corn earworm moths represented about 47% of the nighthawk esophagus/gizzard contents.

Translocation of Common Nighthawks from McConnell AFB

We captured 121 and 93 nighthawks in 1999 and 2000, respectively, from various locations on the airfield. An average of 12 nighthawks (range=1 to 24) were captured each night. The capture rate (number captured/number observed) was 64% for 1999 and 72% for 2000. In 1999, over 45% of the nighthawks were captured directly from runways 10R west and 10L east whereas in 2000 about 51% were captured from the taxiways. We translocated 121 and 93 nighthawks during 1999 and 2000, respectively, from the airfield to pre-selected sites. In 1999, 47 and 40 nighthawks were translocated 88 km south and north of the airfield; and 20 and 14 nighthawks were translocated 44 km south and north of the airfield, respectively. Of the 121 nighthawks, 16% were males, 36% were females, and the sex of remaining nighthawks could not be determined because they were juveniles or did not have any distinct plumage characteristics. The age structure was 52% adult birds greater than one year of age and 48% juveniles. Only one translocated nighthawk returned to the airfield. This bird was translocated to a site 44 km north of the airfield and returned to within 100 m of its capture location 11 days later. It took 125 person-hours to capture and transport 121 nighthawks to their respective translocation sites. In 2000, 46 nighthawks were translocated 44 km north of the airfield and 47 nighthawks were translocated 44 km south of the airfield. Of the 93 nighthawks, 32% were males, 32% were females and 36% could not be sexed. The age structure was 44% adult birds and 56% juveniles. None of the nighthawks returned to the airfield. It took 156 person-hours to capture and transport 93 nighthawks to their respective translocation sites.

DISCUSSION AND MANAGEMENT IMPLICATIONS

Common nighthawks present a direct hazard to aviation safety on McConnell AFB. During the fall migration, nighthawks become very gregarious, and flocks of 1,000 birds are not uncommon (Ewins 1993, Parker 1983). The habitat and conditions in and around McConnell AFB support large numbers of nighthawks. They are the most frequently struck species on McConnell AFB, which represent about 38% of the reported strikes and 82% of the bird strikes found in 1998. These strikes occurred during nightly

operations. Thus, nighthawks pose a real threat to aircraft safety and every reasonable effort should be made to discourage nighthawks from using the airfield area of the base. All birds are capable of causing damage to aircraft. In some cases size does not matter. For example, a single horned lark species (35 g) was responsible for the 1993 crash of a T38, resulting in the loss of the plane and injury to the pilot. Common nighthawks have a dense body (density = g/cm3; common nighthawk = 0.81 g/cm3) which has caused severe damage to aircraft.

The greatest risk to aircraft safety from nighthawks at McConnell AFB occurred from September 9 to 30 and between 2000 and 0200, when many birds roosted on the runways. Most foraging nighthawks around McConnell AFB present a minimal risk to aircraft safety since they forage away from the airfield during a 60 minute period before sunrise and after sunset. Nighthawks have been reported to forage up to 175 m above ground level (AGL). Nighttime foraging is rare (Aldridge and Brigham 1991).

At McConnell AFB nighthawks tend to prefer the center road between 10R (west) and 10L (east) and the northwest threshold for roosting. Both of these areas are covered with small gravel. Several studies have shown that nighthawks prefer open, gravel sites, such as gravel roads for roosting and are often killed by automobiles (Bender and Brigham, in press, Poulin et al. 1996). We can only speculate about the attractiveness of these sites: openness, fewer predators, less disturbance, and/or matching coloration backgrounds. In addition, most nighthawks show a high degree of roost site fidelity, returning to the same location to roost each night (Poulin et al. 1996). Our surveys indicate that flushed nighthawks returned to within a few meters of their roosting location. This type of behavior suggests that nighthawks roosting on runways present a continued risk to aircraft safety, even after being flushed from the runways.

Translocation of nighthawks from McConnell AFB reduced nighthawk/aircraft strikes. Only one nighthawk returned to McConnell AFB after being translocated. In 1999 nighthawk/aircraft strikes were reduced 100% and in 2000 they were reduced 67% over 1998 base levels. Nighthawks that are migrating have little incentive to return to their capture site but rather presumably continue on their migration. Nighthawk translocation at McConnell AFB is an effective non-lethal technique to manage aviation strike hazards associated with a species whose populations are declining and are considered a species of concern.

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LITERATURE CITED

ALDRIDGE, H.D. AND R.M. BRIGHAM. 1991. Factors influencing the forage time in two aerial insectivores; the bird, *Chordeiles minor* and the bat, *Eptesicus fuscus*. Canadian Journal of Zoology 69:62-69.

ARRINGTON, D.P. 1994. U.S. Air Force Bird Aircraft Strike Hazard (BASH) summary report for 1989-1993. Bird Strike Committee-Europe 22:201-208.

BENDER, D.J. AND R.M. BRIGHAM. In press. Preliminary inventory manual for sampling goatsuckers in British Columbia. Resource Inventory Committee. Ministry of Environment, Wildlife Branch, British Columbia, Canada.

BLOKPOEL, H. 1976. Bird hazards to aircraft: problems and prevention of bird/aircraft collisions. Clark, Irwin, and Co., Ottawa, Ontario, Canada.

CLEARY, E.C. AND R.A. DOLBEER. 1999. Wildlife hazard management at airports. Federal Aviation Admininistration, Office of Airport Safety and Standards, Washington, D.C., USA.

EWINS, P.J. 1993. Common nighthawk foraging in

large flocks on migration. Ontario Birds 11:75-77.

PARKER, B.D. 1983. The common nighthawk in the Toronto region. Toronto Field Naturalist 359: 11.

POULIN, R.G., S.D. GRINDAL, AND R.M. BRIGHAM. 1996. Common nighthawk. The Birds of North America, No. 213.

PYLE, P. 1997. The identification guide to North American birds. Part 1. Slate Creek Press, Bolinas, CA, USA.