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ABSTRACT: The North American Canada goose population increased at a rate of 10.5% per year, 1966 - 2001. Canada geese rank as the third most hazardous species in regards to collisions with aircraft. Sound Canada goose management tools are critical for a safer airport environment. We conducted field evaluations of a Canada goose effigy during the breeding season with territorial pairs and in late summer with post-fledging flocks to determine if geese were deterred by the effigy. No difference in territorial pairs was found between pretreatment and treatment periods for Canada geese when goose effigies were placed within their territories. In post-fledging flocks, the mean number of geese observed during pretreatment (74.9 ± 12.9), treatment (14.8 ± 4.5), and posttreatment (53.6 ± 14.2) periods differed ($P < 0.01$). There was no difference ($P = 0.56$) between the mean number of geese observed during a second round of 5-day pretreatment (58.7) and 5-day second round treatment (43.7) periods. By itself, the goose effigy was not effective as a Canada goose deterrent after approximately 5 days. However, this effigy may have some potential in an integrated goose control program conducted outside of the breeding season. Further evaluation of the effigy as part of an integrated Canada goose control program is recommended.

KEY WORDS: bird damage control, *Branta canadensis*, Canada goose, deterrents, effigy

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INTRODUCTION

Long term population trends from North American Breeding Bird Survey (BBS) data (1966 - 2002) show an increase of 10.4% per year ($P < 0.01$) for Canada geese (*Branta canadensis*) populations in North America (Sauer et al. 2003). The giant Canada goose (*B. c. maxima*) population in the Mississippi flyway has increased from about 800,000 in 1993 to about 1.5 million in 2000 (U.S. Fish and Wildlife Service 2000). Ankney (1996) noted that it is not possible to predict when the giant Canada goose population will stop increasing.

Wildlife-strikes cause serious safety hazards to aircraft. Wildlife strikes cost civil aviation at least $489.8 million annually in the United States (Cleary et al. 2003). Canada geese rank as the third most hazardous species in regards to collisions with aircraft (Dolbeer et al. 2000). From 1990 to 2002, geese were involved in 1,027 strikes with civil aircraft and caused $351 million in total costs (Cleary et al. 2003). In September 1995, 24 people were killed and a $190-million aircraft was destroyed when an AWACS aircraft crashed on takeoff at Elmendorf Air Force Base, Alaska, after striking Canada geese (Wright 1997). Sound management techniques that reduce goose numbers in and around airports are therefore critical for safe airport operations.

Large-scale killing of nuisance birds is often undesirable or impractical (Dolbeer 1986, 1998; Dornbush et al. 1996, Smith et al. 1999); thus, there is considerable demand for effective nonlethal techniques to deter bird use of problem sites. Numerous harassment and frightening techniques for reducing conflicts involving birds are available (Solman 1994, Cleary 1994, Dolbeer et al. 1995). Many of these techniques are expensive, ineffective, require multiple years to achieve desired results, produce temporary results, or have not been evaluated quantitatively. Realistic dead bird effigies of gulls (*Larus* spp.) and turkey vultures (*Cathartes aura*) have shown promise as species-specific frightening devices (Saul 1967, Stout et al. 1975, Stout and Schwab 1979, Stout and Schwab 1980, Seamans et al. 2000, Tillman et. al. 2002). Currently, a device called the Dead Goose Decoy is marketed as a non-lethal method to scare geese away from designated areas. This device consists of a plastic Canada goose decoy that has the form and appearance of a dead goose. No studies on the efficacy of the device have been published in peer-reviewed journals or proceedings. Our goal was to evaluate the efficacy of this Canada goose effigy.

METHODS

Territorial Pairs

This study was conducted from March to April 2001 on the 2,200-ha National Aeronautics and Space Administration's Plum Brook Station (PBS) in Erie County, Ohio. Eight territorial pairs of Canada geese were located on 8 separate ponds (≤ 0.4 ha) on PBS. Counts of geese were conducted for 7 days at about the same time each day to establish the consistent use of each pond by at least one pair of Canada geese. Four of the 8 ponds were then randomly selected to receive 2 goose effigies. Counts of geese on each pond were again conducted as during the pretreatment period for 7 days.

Because territorial Canada geese maintain their territory and generally do not leave their territory for another occupied territory, the control and treated pairs may be considered as independent. The change in numbers of geese using the ponds was compared using *t*- tests.

Post-fledging flocks

During August through September 2002, we located 6 ponds (0.4 - 2.0 ha) in Erie and Huron Counties, Ohio that were actively used by Canada geese. We counted geese on each pond or within 25 m of the pond between 1300 and 1600 hrs for 5 consecutive days (pretreatment). Two

days following the last pretreatment count, at least 2 effigies per 0.4 ha were placed between 0800 and 1100 hrs in each pond as per the manufacturer's suggestions. Counts were conducted as during pretreatment for 5 consecutive days (treatment). At the end of the 5-day treatment period, effigies were removed and geese were counted on the ponds for 5 consecutive days (posttreatment). The mean number of geese using all ponds was compared between periods using Kruskal-Wallis analysis of variance (Statisix7 2000).

Following the posttreatment period, 4 ponds were selected to receive effigies for a second time. At the 2 ponds not retested, goose use had become too inconsistent to effectively test the control technique. Counts were conducted as during the earlier portions of the study but continued until Canada goose numbers were similar to the posttreatment numbers. The change in numbers of geese using the ponds during this portion of the test was compared using *t*- tests.

RESULTS

Territorial Pairs

There was no difference (t =0.66; 49 df; P = 0.51) at the 4 control ponds in the mean (± SE) Canada goose numbers between pretreatment (2.1 ± 0.5) and treatment (2.7 ± 0.7) periods. At the 4 treated ponds, there also was no difference (t =0.52; 51 df; P = 0.61) in mean Canada goose numbers between pretreatment (1.1 ± 0.1) and treatment (0.9 ± 0.2) periods.

Post-fledging flocks

The mean number (± SE) of geese observed on the 6 ponds during pretreatment (74.9 ± 12.9), treatment (14.8 ± 4.5), and posttreatment (53.6 ± 14.2) periods differed (W = 17.65; $P < 0.01$). There was no difference (Z = 0.58; P = 0.56) between the mean number of geese observed on the 4 ponds during the second round 5-day pretreatment (58.7 ± 20.7) and 5-day second round treatment (43.7 ± 15.6) periods.

DISCUSSION

Territorial pairs of Canada geese showed no response to the goose effigies. The manufacturer claims that geese will abandon nests and eggs when a decoy is placed near a pair's nest. We did not observe this behavior at any of our 4 treatment ponds. However, during the post-fledging period, the presence of goose effigies had an initial repellent effect at all sites tested. Canada geese were observed either flying towards treated ponds and then flaring away, or landing on the water only to flush off of the pond within 30 seconds of landing. By the end of the first 5-day treatment period, geese were generally returning to the pond but were staying at least 25 m away from the effigies. During the second 5-day treatment period, geese were observed swimming next to or between the pairs of effigies within 1 to 3 days of effigy placement.

Effective Canada goose management programs generally require an integrated approach to be ultimately successful (Booth 1994, Smith et al. 1999). The presence of goose effigies may enhance other control techniques, such as pyrotechnics that simulate gunfire (danger), lasers (Blackwell et al. 2002), and chemical repellents (Dolbeer et al. 1998). The short-term (1 week) use of effigies at the start of an integrated control program to disperse Canada geese from an airfield or other site should prove useful.

Further experiments with goose effigies may include use of pyrotechnics and lasers to determine whether, if used in combination, the effectiveness of these techniques might be enhanced. Also, the use of lethal control could be added to see if a combination of all 4 techniques would create effective control.

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