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Vegetation preferences of captive Canada geese at Elmendorf Air Force Base, Alaska

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Abstract Bird–aircraft strikes represent a serious safety and economic problem in the United States. Canada geese (*Branta canadensis*) are frequently attracted to airfields because of the availability of preferred forage and large open areas. At Elmendorf Air Force Base, Alaska, we determined preferences of captive, wild-caught, lesser Canada geese (*B. c. parvipes*) for alternative vegetation types not normally planted at this airfield. We compared Canada goose preferences for Kentucky bluegrass (*Poa pratensis*), bluejoint reedgrass (*Calamagrostis canadensis*), beach wildrye (*Elymus mollis*), Bering hairgrass (*Deschampsia beringensis*), lupine (*Lupinus nootkatensis*), and flightline turf (a mix of smooth brome [*Bromus* sp.], dock [*Rumex acerosella*], and red fescue [*Festuca rubra*]). Geese preferred flightline turf over Kentucky bluegrass. Bering hairgrass was marginally less preferred than Kentucky bluegrass. Kentucky bluegrass was preferred over lupine, bluejoint reedgrass, and beach wildrye. We discuss vegetation management as an alternative goose control technique. Further evaluation of the least preferred vegetation types should be conducted in large flight pen and field plot studies.

Key words airport, bird hazard, *Branta canadensis,* Canada geese, cover management, forage

Bird-aircraft strikes are a serious economic and safety problem in the United States, causing over $200 million annually in damage to civilian and military aircraft and the occasional loss of human life (Dolbeer et al. 1995). The United States Air Force reported 13,379 bird-wildlife strikes to aircraft worldwide between 1989 and 1993 (United States Air Force Bird Air Strike Hazard Team, unpublished data). These strikes resulted in 8 lost aircraft, 1 pilot fatality, and 1 permanently disabled pilot. The damage estimates during this period exceeded $85 million. The most significant military aircraft disaster caused by birds occurred at Elmendorf Air Force Base (EAFB), near Anchorage, Alaska, on 22 September 1995, when an E-3 Sentry Airborne Warning and Control System (AWACS) aircraft struck several Canada geese (*Branta canadensis*) on takeoff and crashed, killing 24 people (Bird 1996).

At EAFB, several species of birds, specifically lesser Canada geese (*B. c. parvipes*), other waterfowl, ravens (*Corvus corax*), and gulls (*Larus* spp.), have been observed on the airfield. Canada geese are attracted to the airfield because of the availability of preferred forage for feeding and large open areas for loafing. Canada goose populations are likely to continue to grow in the Anchorage area (Crowley et al., unpublished report, Alaska Department of Fish and Game, Anchorage, Alaska, 1997), thus increasing the risk of other serious accidents involving aircraft and birds.

Reducing bird hazards at airports is an important management consideration. Methods to reduce and control bird activity at airfields have included

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using frightening devices such as propane exploders, pyrotechnics, flagging, and chemical frightening agents; repellents; trapping; and selective removal of pest birds (Godin 1994). These methods are considered short-term solutions because of cost, logistics, and effectiveness. Long-term methods include soil cement and asphalt. Soil cement (a chemical applied to the soil that makes it harden like cement) will fracture in the cold temperatures of Alaska and create a foreign objects and debris (FOD) problem. Asphalt is too expensive (approximately $90,000/ha versus bluejoint reedgrass at about $200/ha). Vegetation is economical and also prevents FOD and dust from becoming airborne. Therefore, vegetation management is being examined as a long-term and more cost-effective method to deter bird use at EAFB.

Currently, the most common approach to reducing airfield use by birds is habitat management involving maintaining vegetation height at 17 to 35 cm. Long grass restricts the line of sight of birds, making them vulnerable and nervous about unseen approaching predators (Brough and Bridgman 1980, Conover and Kania 1991). However, in Hawaii, long-grass management was not effective, because it attracted many granivorous birds and it caused territorial lesser Pacific golden-plovers to move onto runways and taxiways where they increased the hazard of bird–aircraft strikes (M. A. Linnell et al., unpublished report, Utah State University, Logan, Utah, 1996). Mowing and fertilizing grass, as practiced at some airports, encourages new growth, which attracts geese (Owen 1975). At EAFB, long-grass management (mowed once/year, >30 cm height) was being used in the infield areas at the time of the 1995 AWACS crash.

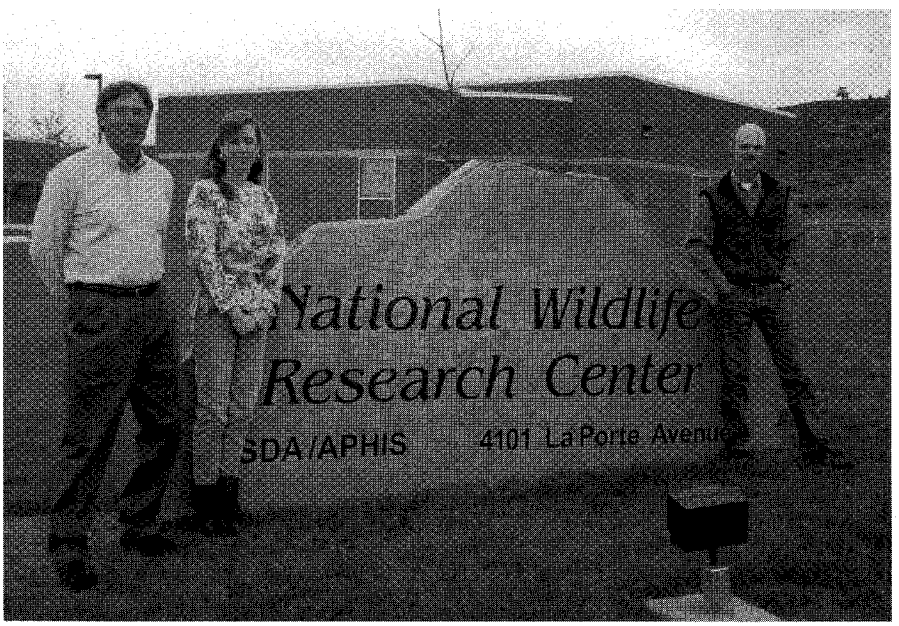
An alternative to long-grass management for bird control is to establish a less preferred vegetation type. Important characteristics for an ideal vegetation for airfields include minimal seed production, drought resistance, unattractiveness to invertebrates, poor rodent harborage, ability to exclude other plants, relatively non-flammable, resistance to vehicular traffic, ability to grow to a desired height, and minimal maintenance (Austin-Smith and Lewis 1970; M. A. Linnell et al., unpublished report, Utah State University, Logan, Utah, 1996). Vegetative species that are not already established in an area should be evaluated carefully, because of the potential for an exotic species to become a pest (Austin-Smith and Lewis 1970). Criticisms of a least-preferred-vegetation approach are that this technique is unproven, may be more expensive than long grass as a bird deterrent, and published information on the subject is limited (Austin-Smith and Lewis 1970; Brough and Bridgman; Linnell et al., unpublished report, Utah State University, Logan, Utah, 1996). Our objective was to determine lesser Canada goose preferences among some candidate vegetative species that are not normally planted on airfields.

Methods

We selected vegetation types for evaluation based on their availability, stiffness of growth, height, and adaptability to local conditions. We selected bluejoint reedgrass (*Calamagrostis canadensis*), a native of Alaska from the bluejoint grass family, which already grows in stands on EAFB; beach wildrye (*Elymus mollis*), an Alaska native that propagates mostly by rhizomes (Klebesadel 1985); Bering hairgrass (*Deschampsia beringensis*), a cultured grass adapted to Alaska and commercially available; lupine (*Lupinus nootkatensis*), a wild Alaskan flower and nitrogen fixer that successfully invades disturbed areas and outcompetes other plants; and flightline turf (a mix of smooth brome [*Bromus* sp.], dock [*Rumex acerosella*], and red fescue [*Festuca rubra*]), found along the runways at EAFB (Swanson and Miller, unpublished data, United States Department of Agriculture, Natural Resources Conservation Service, Alaska State Office, Anchorage; Figure 1).

We captured 50 adult Canada geese of undetermined sex during July 1996 in Anchorage, Alaska, and transported them to EAFB. At EAFB, we placed the geese in covered holding pens (10×10×2 m) and provided mixed grains, Purina bird chow, and water *ad libitum* during a 10-day quarantine–acclimation period. Afterwards, we housed each goose individually in a 3×2×2-m pen with a dirt floor void of vegetation.

We collected samples of each species, along with the soil immediately surrounding the roots, and placed them in a 30×23×16.5-cm plastic pan within 3 days of testing. The vegetation density was similar within each treatment type. We pulled dandelions (*Taraxacum* spp.), paper birch (*Betula papyrifera*), balsam poplar (*Populus balsamifera*), boreal yarrow (*Achillea borealis*), and Kentucky bluegrass (*Poa pratensis*) so that a pure stand of each test plant was offered to each goose. We clipped grasses to 30 cm within 4 hours of offering



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