1999 ANNUAL REPORT
and 2000 MANAGEMENT PLAN

Anchorage Waterfowl Working Group

Canada geese were last seen on October 25, having spent about seven months in Anchorage in 1999. The first flocks of Canada geese returned to Anchorage on April 5, 2000.

Goose Population Estimate

Crowley (1998) summarized the population status of Anchorage's Canada geese from 1996 to 1998 by compiling goose population counts and collar sightings in Anchorage, and goose leg band returns from hunters throughout the Pacific Flyway. By collaring 1,614 geese from 1992-1998 we have increased the statistical confidence in the population estimate.

Surveys indicated that the goose population increased rapidly in the 1980s and early 1990s (12-15% annually). The growth rate was slowed in the late 1990s by a combination of lethal and nonlethal means. In Anchorage, increased shooting on airports, egg collecting, and gosling translocations contributed to the reduced rate of growth.

The summer 1999 Anchorage goose population estimate was 3,411 and appears to have declined nearly 600 birds since 1998 (see below). However, after the 1999 summer count, Karen Laing and Rick Sinnott independently observed 300 or more molting adults and goslings in the Anchorage Coastal Wildlife Refuge below the Campbell Lake dam. These geese were not seen during the summer count. Notably, they acted like unhabituated Canada geese; i.e., they moved quickly to keep several hundred yards away from human observers, even though some of the birds were collared. These birds may have been missed in previous summer counts, or they may be a flock of Anchorage geese that has learned to avoid human activity, including annual banding round-ups by biologists. However, even if these birds are added to the total estimate, it appears that goose numbers did not increase in 1999, and may have declined. Local egg collecting and gosling translocations were expected to reduce the growth rate, but not the number of geese, in the short term.

Year	Survey	Date	Population estimate
1996	Summer	July 9	3559[a]
	Fall	Aug 21	5160 $\pm$ 921
1997	Spring	April 18	4656[a]
	Summer	July 7	4300 $\pm$ 830
1998	Spring	April 20	4650 $\pm$ 183
	Summer	July 7	3991 $\pm$ 268
	Fall	Sept 2	4006 $\pm$ 324
1999	Spring	April 30	4347 $\pm$ 450
	Summer	July 14	3411 $\pm$ 198
	Fall	Aug 27	not calculated

[a] Confidence interval not calculated.

Population growth has been blunted primarily by lethal methods. If out-of-state hunter harvest was at least 250 geese, the total kill of Anchorage-area geese exceeded 500 birds in 1999, which is more than 13% of the Anchorage goose population estimate. The combined lethal take of hunters, airport goose control staff, and vehicle collisions (see figures below) may have curtailed the population growth even without egg collecting and gosling translocations.

Airport Hazing and Goose Kills

Although the 1999 population estimate of urban geese appears to be only slightly less than the 1998 estimate, the number of geese flying around local airports has declined substantially. USDA Wildlife Services hazed 2,878 Canada geese (including repeats) from Anchorage International Airport in 1999, about one-quarter of the number in 1998. For the first time in decades no goose nests were found at Anchorage International Airport, primarily because Wildlife Services staff was so thorough in hazing geese during nest initiations. Twenty-five molting geese were captured and moved to Palmer Hay Flats. Adult geese return to the capture site after molting; however, the airport believed even a month's absence was preferable to letting floatplanes dodge the geese on the lakes all summer. The hazing crews killed 102 geese on airport property in conjunction with normal hazing. Elmendorf AFB hazed over 5,000 geese (including repeats) and killed 16 geese in 1999.

Research at Eielson AFB in Fairbanks indicates that grass over 12 inches in height deters goose use. Elmendorf AFB allowed grass in large, open parade fields and lawns to grow the entire summer without mowing in 1998 and 1999, except for eight-foot-wide swaths bordering streets and sidewalks. Over 500 acres of airfield clear zones will be replanted with tall native grasses over a 10-year period, if funding can be obtained. Elmendorf AFB also converted a pond under the landing approach (originally created a decade ago by removing peat) from an open water wetland to a closed water wetland by planting emergent sedges (*Carex rostrata*).

USDA Wildlife Services was paid about $134,000 for hazing birds and mammals at Anchorage International Airport in 1999; about 75% of the time was spent on geese (C. Rossi, pers. commun.). USDA Wildlife Services was paid about $11,000 for hazing birds at Merrill Field; about 90% of the time was spent on geese (C. Rossi, pers. commun.). The Elmendorf bird-dispersal program cost $318,000 in 1999. Elmendorf AFB spent an additional $108,500 in landscaping to discourage goose feeding on grass near the runways and $7,000 on ground cover research.

Many geese are struck and killed by vehicles in Anchorage. Forty road-killed geese were found in 1999. In addition, 21 injured adult geese and 36 goslings were brought to the Bird Treatment and Learning Center in 1999. Seventeen of the injured adults and 6 goslings subsequently died from their injuries or were euthanized. The remaining birds were treated and released. Six geese were found dead after having been shot illegally in town. Undoubtedly vehicles and scofflaws killed more geese that were not found.

In 1997 hunters reported shooting 108 Canada geese in the Anchorage Coastal Wildlife Refuge. At least 118 geese were shot in the refuge in 1998, and at least 105 geese were shot by 186 hunters in the refuge in 1999. Presumably, many of these were local geese. A few of Anchorage's Canada geese are also shot by Alaskan hunters outside of the Municipality. Numbers of Anchorage geese taken by hunters in other states and provinces, primarily in

Oregon and Washington, have also increased, from about 100 in 1993 to about 250 in both 1996 and 1997. More recent harvest figures from these states are not available.

Egg Collection

Other communities in the contiguous 48 states with overabundant Canada goose populations have tried several methods to reduce or stabilize growing goose populations by reducing hatching success. If all eggs in a nest are collected, the pair is likely to renest at least once. Some communities have addled eggs by shaking or killed embryos by coating eggs with an impermeable substance such as vegetable oil or paraffin. Female geese seldom renest as long as the eggs are left in the nest; however, they may continue to sit on the eggs for weeks after they would have hatched. Because female geese eat very little during incubation, this prolonged incubation period is stressful and may prove injurious.

Alaska is unique among the states in that some people have retained a strong tradition of collecting eggs from wild birds, including geese, for consumption. The Migratory Bird Treaty Act does not allow egg collecting; however, Canada goose eggs may be collected under special depredation permits. To avoid renesting, it may be important to leave one egg in each nest.

The U. S. Fish and Wildlife Service (USFWS) and Alaska Department of Fish and Game (ADFG) issued permits to landowners and managers, including the Municipality, who wanted to participate in reducing the goose population by allowing eggs to be collected for human consumption. Most of the marshes and bogs searched for nests were municipal and state property. Volunteer egg collectors, operating under the provisions of the permits, and biologists collected 399 eggs in early May. Eggs were donated to the Elders Programs of the Southcentral Foundation and the Cook Inlet Tribal Council. This was a popular program with Alaskan Natives and the public in general. Illegal egg collecting (i.e., not under the provisions of a permit) continues to occur, especially in midtown wetlands, such as Business Park. Illegal egg-collecting is problematic because it leads to trespassing and the eggs of other species, such as ducks and gulls, are collected. Illegal collectors take all eggs from each goose nest, which encourages the geese to renest. There is no easy way to determine the number of eggs collected illegally.

Gosling Translocation

Moving goslings to other suitable habitat in upper Cook Inlet is a nonlethal way to reduce the number of geese in Anchorage. The ADFG and USFWS translocated 184 goslings from Anchorage to Seeley Lake, west of the Susitna River in 1999. The goslings were flown to Seeley Lake in a de Havilland Beaver within a few hours of capture and released without adults. The young geese soon joined local flocks. The three flights cost approximately $900.

Municipal Hazing, Goose Repellent, and Habitat Alteration

The city hired a contractor to spray athletic fields and some parks with methyl anthranilate. In summer 1999 the Municipality spent $16,000 on goose repellent, compared with about $12,000 the previous summer. After the geese returned, in early spring, the contractors sprayed de la Vega Park, the Park Strip downtown, Mulcahy fields, Westchester Lagoon park, South

Anchorage Sports Field Complex (at O'Malley and C Street) and the Loussac Library lawn. Crews did not spray turf during the molt, except narrow strips along the grassy shores of Jewel and Cheney lakes and Westchester Lagoon. After the molt, in mid-summer, spraying was continued at Westchester Lagoon, Spenard Lake park, Cheney Lake park, the Park Strip, South Anchorage Sports Field Complex and the softball fields on Northwood leased from Anchorage International Airport. In addition, the Alaska Native Medical Center and the Tudor Fund property owners' association (adjacent to the medical center) spent over $2,500 to spray lawns around the hospital and nearby lake, in cooperation with municipal parks.

Jerry Walton reported applications of methyl anthranilate seemed to be working before the molt period in July, but heavy rains during and after the molt limited the repellent's effectiveness. Geese used parks immediately after spraying.

The Municipality is in the process of updating its comprehensive plan. AWWG members participated in meetings throughout 1999 to ensure that the plan includes goose population control and habitat management. Only the Municipality can prohibit goose feeding throughout the metropolitan area; make parks and athletic fields less attractive to geese by altering habitat, using repellents, or hazing; and allow lethal goose control on city property.

The AWWG worked with two state legislators, Senator Ellis and Representative Croft, municipal planners and others to improve erosion control and public use at the Chester Creek inflow to Westchester Lagoon. The design incorporated ground cover that discourages use of the area by Canada geese, mallards, and gulls. No-feeding signs were erected in the park. However, hand-feeding continues at the site and threatens to undo the project's goal.

Alkali Grass (*Puccinellia*) Research Project

The AWWG supports research on alternative ground covers that do not attract geese. Arctic alkali grass (*Puccinellia arctica*) is widespread on the North Slope, although its distribution appears to be patchy. It grows well in disturbed soil and is tolerant of salt and hydrocarbons. Pete Scorup, owner of Northern Native Seeds, never observed geese eating this species in 25 years of research on vegetation study plots on the North Slope. He planted several rows of the grass in the Palmer area in 1995 and has been monitoring growth and collecting seeds (5,000 seeds/gram). In 1998, Scorup recommended conducting experiments to assess the grass's palatability for urban Canada geese. Palatability can change when a species is translocated to different soils and when the plants are treated with fertilizer, lime, or other chemicals. Potential flaws are *Puccinellia* is a poor competitor with other plants, and its ability to sustain mowing or trampling is unknown.

Puccinellia showed some promise in the 1998 field experiments (Scorup and Tobin 1999); however, the second year's research had some conflicting results (Scorup and Tobin 2000). Geese grazed *Puccinellia* plots to a greater extent than in 1998, although still 50-90% less than adjacent bluegrass lawn. It appears that two-year-old stands are more palatable than new stands. Snow mold (*Typhula* sp.), icing, and scraping for outdoor events reduced cover of *Puccinellia* plots in Anchorage to 5-40% at the end of June 1999. All Anchorage plots were top-seeded to restore coverage. Snow mold was not a problem in Palmer, where winter winds kept the plots and seed rows bare of snow most of the winter.

Grazing preference and growth rates of goslings were studied. Fifty-seven goslings were captured in Anchorage on June 15. Goslings were used because they adapt quickly to captivity, they grow rapidly so that differences in nutrition are easier to detect, and they have had little time to develop a forage preference. After the study, the goslings were translocated to Susitna Flats refuge with other just-caught goslings and released on July 19. Results contradicted expectations. Goslings that ate *Puccinellia* grew faster and had greater weights than those fed bluegrass. Goslings also preferred to eat the *Puccinellia*. However, results may have been biased by the feeding pen designs and research protocols (Scorup and Tobin 2000).

Puccinellia was analyzed for compounds that reduce palatability or digestibility by Dr. Tom Clausen and Trent Volz from the University of Alaska Fairbanks. Its low palatability appears to be due to secondary chemical compounds, probably alkaloids (Scorup and Tobin 2000).

No-feeding Ordinance

People who feed geese create nuisance geese. Geese learn to congregate for handouts, often at inappropriate locations such as near roads or in parks. Geese from Anchorage's most popular feeding area, Westchester Lake, are frequent visitors at the city's three largest airfields. Geese that have learned to trust people who feed them are the most difficult to haze at airports; thus, they are more frequently shot as a last resort than their wild cousins. Feeding geese is not prohibited by law, except in specific locations. Existing federal laws prohibit feeding geese on Elmendorf Air Force Base. Existing state laws prohibit feeding geese at Anchorage International Airport and in Potter Marsh, part of the Anchorage Coastal Wildlife Refuge. Municipal law prohibits feeding geese at Merrill Field.

An Anchorage-wide no-feeding ordinance drafted by John Richard, the municipality's Chief Prosecutor, was forwarded to Assembly Member Bob Bell in 1998. It has not been introduced in the Assembly. The draft ordinance would amend Anchorage Municipal Code Title 8 by enacting a new section to read as follows:

> 8.75.170 Encouraging Waterfowl
>
> A. It is unlawful for any person to knowingly feed waterfowl on public or private property.
>
> B. It is unlawful for any person to deposit or abandon food on public or private property under circumstances in which a reasonable person would know that the food was likely to be consumed by waterfowl.
>
> C. It is unlawful for a private property owner or lessee to permit food to remain available under circumstances in which a reasonable person would know that the food is likely to be consumed by waterfowl.
>
> D. Nothing in this section is intended to restrict the raising or keeping of domesticated waterfowl.
>
> E. Violations of this section shall be punishable by a fine of not more than $300.00.

Assembly Members are encouraged to submit this ordinance for consideration.

Homeowner Assistance

In March 1998 the ADFG, USFWS, and USDA Wildlife Services published a brochure--*Homeowners' Guide to Goose Solutions*--which explained and illustrated techniques for minimizing goose problems on residential and commercial lawns. The guide was made available free-of-charge at local home-and-garden stores--including Eagle Hardware, Home Depot, Alaska Mill and Feed, Bells Nursery, and Alaska Greenhouse--and the main municipal parks office and the municipal greenhouse. In the last two summers AWWG agencies received few complaints about goose problems on residential lawns.

The brochure, Environmental Assessment, and other information is available on the USFWS website (www.r7.fws.gov/mbm/ancgeese/index.html) and the brochure is also on the ADFG website (www.adfg.state.ak.us).

Public Outreach and Education

The municipal watershed program and USFWS cooperated with the AWWG in public outreach and education. A $23,000 grant was used by the municipality to design and place low signs and colorful posters in kiosks with a "no-feeding" message. The municipality also paid for airing of a 15-second video public service announcement on two Anchorage television stations in May that advised people not to feed geese. Other projects were funded by the USFWS. All projects funded in 1999 included:

- "Ask me why I don't feed geese" buttons and color flyer
- Outdoor Week in May
- Two "no feeding" video public service announcements (15 and 30 seconds)
- Kiosk posters with reasons not to feed geese
- Low "no feeding" signs (with reasons why the geese shouldn't eat human food)
- Two free-standing educational displays
- Urban goose ecology video (not completed)

One of the freestanding displays illustrates how the Canada goose population has increased in Anchorage and some of the problems and benefits of urban geese. The other display has information on landscaping to discourage goose foraging and loitering on lawns. Anchorage Audubon distributed "no feeding" posters to local bakeries which supply the goose feeders. The USFWS website on Anchorage goose management had 25,911 hits in less than a year (July 1998 to June 1, 1999). No-feeding signs were placed in several city parks where feeding has occurred. However, no signs have been placed at one of the two most popular feeding areas (intersection of O'Malley and C Street). The Alaska Department of Transportation and Public Facilities manages this property. AWWG will continue to recommend that signs be erected at this site.

2000 Research Projects

Public Education and No-feeding Signs – No-feeding signs will be placed at the sedimentation ponds at O'Malley and C Street. AWWG members will continue to talk to groups interested in urban goose management.

Goose Nesting Study – The goose nesting study that was scheduled to continue through the 1999 molt was not conducted in 1999, due to the departure of the University of Alaska graduate student. However, a new research project involving the use of radio transmitters will be initiated in summer 2000 by the U. S. Geological Survey, Biological Research Division. Biologists will monitor movements and nesting success of Anchorage geese.

***E. coli* Research** – Municipal Water Quality and ADFG staff will collect fecal samples from a variety of waterbirds and mammals to determine their relative contributions to degraded water quality in Anchorage lakes and streams.

Ground Cover Research – Research on palatability and feasibility of *Puccinellia* will continue, as will Elmendorf AFB research on alternative native species.

Gosling Feeding Trials – Research on forage preference, nutrition, and digestibility of *Puccinellia* will continue.

Recent Literature on Canada Geese and Goose Control

Population biology and behavior

Wildlife agencies and communities should not assume that urban goose populations will stabilize in the near future. Instead they should determine the optimal number of Canada geese for specific urban areas and what steps could be taken to keep populations at those levels (Gosser and Conover 1999). Canada geese prefer to build nests on islands in lakes and rivers rather than on the mainland. In recent years, however, increasing numbers of urban Canada geese in southern New England have begun to nest on the mainland. Researchers studied 3 local populations in Connecticut from 1982-1990 and from 1995-1996. The proportion of nests found on the mainland averaged 32%, which was higher than that (<10%) reported for Canada geese nesting in more rural areas. Although mainland nesters did incur higher predation rates than island nesters, this loss was offset by more abandonment of island nests so that nest success was similar. Overall, only 11% of nests failed due to predation. Contrary to expectations, the population continued to increase because (1) most islands, although small (<0.5 acre), by 1995 contained 2-4 goose nests, and (2) mainland nesting had become common.

Management techniques

Wildlife management in suburban areas is widely perceived as difficult because of the objections of some residents to many mitigation measures (Loker et al. 1999). Researchers examined suburban residents' experiences with, concerns about, and acceptance of management actions for Canada geese on Long Island, New York. Residents who were most concerned tended to accept more invasive methods than those who had fewer concerns. Only nonlethal-noninvasive methods (e.g., altering pond appearance with flags on floating boards or putting fencing over the pond) were not acceptable as exclusive actions by highly concerned residents. Contrary to predictions, acceptance of invasive and lethal methods was more

strongly related to concerns about nuisance, aesthetics, and economic damage than to concerns about health and safety. Despite this finding, not all residents are likely to share negative views, thus leading to highly contentious public controversy. It may be strategically advantageous for a management agency to identify areas where the potential for widespread concern exists, and then implement a proactive, ongoing communication program to increase public tolerance of the problem species.

Five common approaches have been used to determine survival of Canada goose goslings (Stolley et al. 1999). Each technique is described and inherent problems are discussed. Comparisons of gosling survival rates based on average brood size or meta-analysis are likely to overestimate survival, while those based on total gosling counts may over or underestimate survival. Survival rates based on marked adults or goslings appear to be most accurate, although some problems still persist.

USDA Wildlife Services summarized their use of alpha-chloralose to capture nuisance birds, including Canada geese (Belant et al. 1999). Alpha-chloralose is a derivative of glucose that has been used as an anesthetic in laboratory animals since 1897. It is administered to geese in bread baits, which typically contain the estimated most effective dose, or corn baits. Overall mortality of target birds was 5%. Mortality of waterfowl was $\geq$1.5 times greater with bread baits, partly because some birds received more than one bait. It was more difficult for a bird to obtain an overdose from the treated corn baits.

Bird strikes

Historically, bird strike reports are derived from voluntary reports submitted by pilots, air traffic controllers, or mechanics. Most bird strikes are not reported, because pilots are unaware they have hit a bird or they want to avoid logistical hassles such as paper work, debriefings, and mechanical inspections. Only an estimated 20-25% of all bird strikes are reported by pilots, according to other researchers. Researchers at an airfield in Hawaii compared reported bird strikes with dead birds found during routine runway searches during 1990-94 (Linnell et al. 1999). Only 25% of 526 bird strikes were reported by pilots. The actual reporting rate is probably lower than this, because not all birds hit were necessarily found, as some may have fallen into the vegetation bordering the airfield, and smaller birds may have been overlooked. However, there was no correlation between the size of birds and reporting rate.

In the early 1980s the U. S. Air Force Bird Aircraft Strike Hazard Team developed a computerized Bird Avoidance Model (BAM) that computes bird-strike hazard areas for areas within the continental United States (Lovell and Dolbeer 1999). This model reduces bird strikes to aircraft on low-level training missions by providing information to pilots on locations and times of elevated bird activity based on historical data. The BAM was designed to reduce bird strikes where bird management is impractical (i.e., off airfields). A Geographical Information System (GIS)-based model that incorporates current and more complete population data on an expanded list of bird species deemed hazardous to military aircraft is in the final stages of development. This model is Windows-driven and may be more applicable to civil aircraft.

Flying geese can be hazardous to individuals as well. According to initial reports, ruggedly handsome male model Fabio was hit in the face by a pigeon while riding a roller coaster in Virginia (Anonymous 1999*a*). However, the bird was subsequently found dead nearby and identified as a Canada goose. Fabio survived the close encounter with three stitches and some swelling around the eyes (Anonymous 1999*b*).

Control techniques

Canada geese are attracted to airfields by availability of preferred food and large open areas. Researchers at Elmendorf Air Force Base, Alaska, tested goose preference for alternative ground covers. Geese preferred flightline turf (mix of smooth brome [*Bromus* sp.], dock [*Rumex acerosella*], and red fescue [*Festuca rubra*]) to Kentucky bluegrass (*Poa pratensis*). Bering hairgrass (*Deschampsia beringensis*) was marginally less preferred than Kentucky bluegrass. Kentucky bluegrass was preferred over lupine (*Lupinus nootkatensis*), bluejoint reedgrass (*Calamagrostis canadensis*), and beach wildrye (*Elymus mollis*) (Pochop et al. 1999).

A native Alaska grass, *Puccinellia arctica*, is also being tested in Anchorage as a goose deterrent (Scorup and Tobin 2000).

Airfields have experimented with noise as a hazing technique. England's Gloucestershire airport has used avian distress calls to frighten birds away from runways with only limited success (Newman 1999). Bird dispersal was dramatically enhanced by switching to recordings of rock singer Tina Turner.

A problem in the use of a repellent such as Flight Control™ is that the active ingredient, anthroquinone, adheres to grass but is not incorporated systemically. Thus, subsequent grass growth is untreated and repellency during summer is minimal after a week. Plant growth regulators such as Stronghold™ are currently used at airports and other sites to slow the growth of grass. Researchers demonstrated a mean 88% reduction in foraging in grass plots treated with a combination of Flight Control and Stronghold, as compared to untreated plots (Blackwell et al. 1999). The combination was still effective after 22 days. Discoloration of grass in treated plots--which varies relative to grass type, condition, and soil type--may have served as a visual cue. Plant growth regulators that do not discolor grass are available if aesthetics is a concern. The cost of Stronghold is comparable to mowing expenses.

Preventing park visitors from feeding waterfowl is a problem. One potential solution is to teach waterfowl not to accept food from humans (Conover 1999). Conover offered 39 Canada geese bread treated with dimethyl anthranilate or methiocarb for 5 consecutive days. Geese did develop an aversion to handouts; however, once they were fed untreated bread, most resumed eating bread within 1-2 days. The quick loss of aversion may be facilitated by large flocks because geese could watch other flock members eat bread without becoming ill during the post-treatment period. The author concluded that given the difficulty of convincing people to stop feeding wildlife, it ultimately may prove easier to change the behavior of animals than that of humans.

Special hunting seasons have been proposed to reduce populations of resident Canada geese. Resident populations of Canada geese in Massachusetts increased from 26,000 in 1991 to 38,000 by 1997 (Heusmann 1999). A special hunting season timed to occur before and after fall migration harvested 35% of Massachusetts' resident geese in 1996 and 22% in 1997. This was insufficient to reduce the size of the resident population. Too few waterfowl hunters participated in the special seasons because the weather was (untraditionally) warm, corn fields were not cut, and too many tourists were around. During special seasons hunting occurs on atypical sites such as golf courses, cemeteries, and polo fields as well as traditional sites such as corn fields, pastures, and marshes. Also, towns that otherwise restrict or prohibit hunting have made exceptions for goose hunting during the special seasons. Because discharging

firearms is often prohibited in areas where urban geese occur, the author suggested using alternative methods such as entanglement devices (bolas, snares, nets).

Animal rights groups have challenged programs that donate urban Canada geese for food, raising the specter of human consumption of pesticides, heavy metals, or other contaminants. To test for contaminants, Canada geese were collected in the Chicago area during the molting period (Levengood et al. 1999). Residues of heptachlor, epoxide, dieldrin, DDE, and PCBs (as Arochlar 1248) were detected. Concentrations were low, exceeding U.S. Department of Agriculture residue limits for meat in only one sample. If wild resident Canada geese from the Chicago area are provided as food for underprivileged humans, researchers recommend (1) periodic monitoring for environmental contaminants, (2) exclusion of geese from localities where samples have contaminants at concentrations that exceed recommended dietary limits, (3) the use of processing and/or cooking methods which remove large amounts of fat, and (4) advisories that provide information on known health risks.

The U. S. Department of Agriculture conducted an environmental assessment for managing conflicts associated with non-migratory and migratory Canada geese in Virginia (USDA 1999) and concluded there would not be a significant impact on the quality of the human environment as a result of control programs. Human-goose conflicts occurred so frequently in Virginia during a 6-year period (1992-1997) that they were the first or second most common request for assistance (approximately 3,045 requests to Wildlife Services alone) among all wildlife species. The EA reviewed types of human disease that may be contracted from Canada goose droppings and concluded that the risk is believed to be small. The number of geese that most Virginia residents tend to tolerate in an urban environment (wildlife acceptance capacity) appears to be 25-30 geese for an 18-hole golf course, 20-30 geese in subdivisions, and 20-50 geese in waterfront communities and most business parks. The magnitude of damage (e.g., quantity of fecal droppings, acres of excessive grazing, risk of bird-aircraft strikes) is proportional to goose abundance. Lethal methods have a longer effectiveness than nonlethal methods, reduce conflicts where nonlethal actions only spread the damage, and are the most cost effective (particularly legal hunting). Wildlife Services does not intend to kill more than 5% of the statewide population of resident Canada geese with the capture and euthanasia alternative annually. Canada geese captured in Virginia in 1998 had no pesticide residues or heavy metals except zinc and copper which were within dietary requirements established by the National Academy of Science. A risk analysis conducted by USDA-APHIS determined there is a very low risk of human health effects associated with the consumption of goose meat and no evidence of risk that supports the expenditure of additional resources to further quantify risk.

A nonscientific public opinion poll conducted by ABCNEWS.com evaluated the public acceptability of collecting Canada goose eggs in Anchorage for human consumption (Gordon 1999). Given a brief written explanation of the program, website visitors were asked “Are these Fish and Wildlife authorities MAD or RAD?” Of 405 respondents, 79% voted RAD, 11% MAD, and 10% were undecided.

Disease

Literature documenting the fecal coliform contamination of water supplies is limited. Researchers in Westchester County, New York, analyzed fecal samples from 249 ring-billed gulls and 236 Canada geese over a 2-year period (Alderisio and DeLuca 1999). Gull feces contained a greater average concentration of fecal coliform bacteria per gram (3.68 x 10(8)) than goose feces (1.53 x 10(4)). However, the average sample weight of goose feces was

more than 15 times higher than that of the gulls. The researchers did not elaborate, but we note that Canada geese may also discharge droppings more frequently than gulls due to their different diets.

Canada goose droppings collected in a park in England contained bacteria that could be pathogenic to humans. These bacteria survived and multiplied in the droppings for up to one month after their deposition by geese. Canada geese ranged further from water than other waterfowl species and thus distributed their droppings over a larger area of lawn. The researchers believed the more widespread distribution of droppings poses a higher health risk to humans than other park waterfowl, but human variations in human responses to bacteria, and variations in human and waterfowl behavior in public parks, renders quantification of this risk impossible (Feare et al. 1999).

Birds can be a substantial cause of fecal coliform problems in drinking water supplies and their control can help eliminate those problems (Klett et al. 1998). Seasonal elevations of fecal coliform concentrations occurred in a reservoir in New York. The reservoir has a storage capacity of 30 billion gallons, and water resides in it for approximately 2-3 weeks. High numbers of migrating Canada geese and gulls, as many as several thousand per day, in autumn and early winter coincided with elevated fecal coliform concentrations; however, other possible sources were considered. From 1991-1993 the fecal coliform concentrations exceeded the standard of 20 CFU/100mL so frequently that water was often rerouted for use before it entered the reservoir. A bird harassment program began in 1993 and continued seasonally in 1994 and 1995 resulted in a 90% annual reduction in goose and gull numbers. In the fall of 1994 and early winter 1995 the fecal coliform concentrations never exceeded the standard. This circumstantial evidence was supported by several other findings. Microbiologists implicated birds as the origin of many of the fecal coliforms. Stormwater flows were the second most problematic source of fecal coliforms.

In the past, hypersensitivity pneumonitis has been attributed to occupational agriculture or home environmental exposure. Saltoun et al. (2000) describe the first case of hypersensitivity pneumonitis due to community exposure to droppings from Canada geese migrating through a suburban environment. People can be chronically exposed to goose dropping antigens that enter buildings through ventilation systems. Because Canada geese populations have increased in suburban areas, the exposure of humans to goose droppings has increased significantly in the past 40 years. Previous studies have demonstrated that up to 40% of persons exposed to birds in general may form precipitating antibodies to bird antigens. Although only a minority of people with antibodies to these antigens will develop hypersensitivity pneumonitis, the widespread and increasing exposure to goose droppings in the United States may be causing other undiagnosed pulmonary disease. Because there is no single confirmatory test for hypersensitivity pneumonitis, the diagnosis can be difficult. Physicians in areas with an expanding goose population should be alerted to the diagnosis of hypersensitivity pneumonitis due to goose droppings.

2000 Management Plan

The 1999 goose population estimate was slightly less than the previous summer. Airport representatives still believe there are too many geese in the area; however, they acknowledge that there has been progress in controlling goose numbers. AWWG members reconfirmed the need to reach the population goal of 2,000 geese by the year 2001, unless local airport goose

control programs are so effective in reducing risk that a population goal can be established between 2,000 and 4,000 geese.

Our recommended management plan for 2000 is as follows.

Egg collecting and gosling translocations will continue. The Municipality and other interested landowners will apply for depredation permits. Agencies will try to collect more eggs by finding more nesting areas and using more volunteers, and will capture and move at least 150 goslings without adults. AWWG will try to minimize illegal egging with press releases and media interviews.

The Municipality will continue to spray methyl anthranilate. Anchorage International Airport, Elmendorf AFB, and Merrill Field will continue to alter habitat on airport property that is attractive to geese, and will continue hazing, including lethal control, on airport property. USDA Wildlife Services will conduct goose hazing at Elmendorf AFB under contract.

AWWG will continue to ask the Anchorage Assembly to adopt a no-feeding ordinance for waterfowl in the Municipality, and encourage the DOTPF to put up no-feeding signs at the O'Malley/C Street feeding area.

AWWG plans to mail copies of the *Homeowners' Guide to Goose Solutions* to all residents of the Anchorage Bowl who live adjacent to lakes used by geese.

We will continue to monitor goose population dynamics by counting them in spring, summer, and fall.

AWWG Members -- Karen Laing, Cathy Rezabeck, Steve Kendall (USFWS); Rick Sinnott, Mark Keech, Tom Rothe (ADFG); Kate Wedemeyer, Capt. Frank Beaupre (Elmendorf Air Force Base); Jerry Walton (Municipality of Anchorage, Sports and Recreation); Kristi Bischofberger (Municipality of Anchorage, Water Quality); Tom Kempton (Municipality of Anchorage, Loussac Library); Mack Humphery (Federal Aviation Administration); Bill Quirk (Fort Richardson); Carl Tobin (Alaska Pacific University); George Matz, Owen Hughes, Sandy Belinky (Anchorage Audubon); Corey Rossi, Jon Spiegel, Terry Smith (USDA Wildlife Services); Mike Byington (Municipality of Anchorage, Merrill Field); Doug Lohr (Anchorage International Airport).

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