

## Executive Summary

Beginning in the 1950s, enthusiastic wildlife managers across North America began relocating Canada Geese and enhancing potential goose habitats in a concentrated effort to grow their populations. This highly successful assisted migration led to many locally overabundant goose populations. Unwanted geese were transplanted to unfilled sites where their offspring would eventually become a problem for farmers or municipalities and the phenomenon would repeat.

Once a small population was established, site fidelity, a tendency to return again and again to the same places, ensured it would continue to grow. Young breeding females in particular precipitated exponential growth in local goose populations by returning to nest where they were hatched or reared. It is a myth that geese have become a problem because of a failure to migrate.

In fact, many geese in the area do migrate, if only for short distances (e.g., to the Saanich Peninsula or Washington State), debunking the notion that geese stay in the area because all of their needs are met right here. Fourteen different migrant types have been found among geese that were presumed resident, banded at the nest or during the moulting (or flightless) period. These ranged from local residents, present for all five seasons of the Canada Goose life cycle (i.e., spring migration, nesting, moulting, fall migration, and overwintering) to birds that flew long distances (e.g., to California, Alberta). Although local residents are the foundation of our year-round Canada Goose population, other migrant types are always present. Migrants are attracted to areas where local residents gather, and within a few days can have a major impact on those habitats.

Such findings are key to effective management decisions. Since 2000, members of the Guardians of Mid-Island Estuaries Society have helped manage Canada Geese to protect conservation lands damaged by burgeoning goose populations, and in 2008 began marking individual birds ahead of surveys to better understand their population dynamics and distributions. Birds were banded at the Little Qualicum River (LQRE), Englishman River (ERE), and Craig Creek (CCE) estuaries. More than 12,707 survey records, some dating back to 1989, as well as 1,663 nest records and 4,746 records of re-sighted marked birds were used to examine our regional Canada Goose population and develop this strategy.

Still, we were unable to determine whether the regional population is significantly increasing or decreasing. Comparable external datasets, such as those from Bird Studies Canada, showed weakly increasing or possibly cyclic trends. Notably, goose populations are unlikely to be limited by the ecological carrying capacity of the region. They were observed on only 232 of 342 sites identified as available goose habitat.

There were two times of year when large numbers of geese were observed. Overwintering and summer moult counts were higher than counts in other seasons, peaking at ~1,500 birds in 2014. These peaks, partly attributed to additional survey sites, may be of management concern. Only continued monitoring will determine whether these represent a new trend upwards, peaks in a recurring cycle, or standalone highs.

The least amount of mixing between local residents and other migrant types occurred during the nesting season. The maximum count during the nesting season was 443 in 2013, not including undetected nesting birds and geese that left the region to moult. If surveys of both breeding and non-breeding birds were conducted on and near the nesting grounds, a trend for local resident populations might emerge.

Across all seasons, goose counts were highest at the estuaries. During the moult, they concentrated on the estuaries and in marine and freshwater habitats, such as Hamilton Marsh. In fall and winter, estuaries were preferred roosting and loafing sites, and destinations when other areas were exposed to hunting pressure or were frozen. Our estuaries experienced a reprieve of sorts only after the moulting period prior to the first hunting season, when flocks tended to forage elsewhere.

Estuaries are critical and year-round habitats for Canada Geese, but they are also used by an estimated 80% of coastal fish and wildlife and provide many services to humankind (e.g., flood control, water filtration, carbon sequestration). Geese have overgrazed mid-island estuarine marshes, and grubbed the roots and rhizomes along channel edges, exposing the thick marsh platform to erosion. Built up over millennia, this platform has washed away in many areas, channels have become shallow, and productive habitats have been reduced to gravel. When a similar scenario occurred in northern salt marshes, primarily from overabundant snow geese, entire plant communities were eliminated and areas excluded from geese remained denuded 20 years later.

Even without the additional burden of overgrazing geese, many mid-island marsh ecosystems are at-risk of extinction; at least four ecological communities are provincially imperiled, and another three are of special concern. Geese have also introduced invasive plants into imperiled Garry Oak ecosystems, and may be overgrazing eelgrass, a keystone species in estuarine and subtidal environments.

Urban and agricultural areas have also suffered. When the size of habitats were taken into account, goose densities were found to be highest in the Parksville Church Road and Parksville Bay/City areas, and on sites with access to freshwater in particular.

High concentrations of geese may lead to contamination of drinking water, and fouling of beaches, parks, school grounds, sports fields and other sites, all of which pose risks to human and animal health. Island Health inspectors have found no significant issues with water samples taken from Qualicum Beach, Parksville, or Rathtrevor Provincial Park's popular beaches. However, other areas remain unsampled. Young children playing in sand may have a greater exposure to goose-borne bacteria, as bacteria persist longer in sand than in water. Some dogs participating in hazing programs have become unwell. A 2010 health risk assessment, commissioned by the Canadian Wildlife Service (CWS), found there were insufficient data to conduct a meaningful assessment. It recommended fecal waste management, a working group to develop national standards for the management of peri-urban (or 'rurban') goose populations, and investments in monitoring and research.

Our survey of stakeholders identified many concerns. The Department of National Defense was concerned about bird strikes near its helicopter pad in Nanoose Bay. Local farmers had experienced crop damage. Some respondents suspected contamination of drinking water, shellfish beds, and areas used by farm animals. People complained about damage to landscaping, noise issues, and aggression towards people and pets. Many had incurred costs associated with goose control or damage. Importantly, the survey revealed Canada Geese had diminished the quality of life of area residents by keeping them from enjoying special places and activities. Some local businesses were affected by off-put tourists. Although it appears that our communities have exceeded our tolerance, or 'social carrying capacity' for geese, additional community members should be surveyed to augment our limited survey data.

In Canada, they may be an icon, but in many other countries Canada Geese are considered one of their worst invasive species and a serious threat to biodiversity. In some U.S. jurisdictions, they are classified as ‘overly abundant’, although areas without this designation appear to have considerable latitude in dealing with nuisance geese. The U.S. Fish and Wildlife Service provides management support, including, among other things, capture and euthanasia, egg addling, and hazing. It maintains an e-permits website whereby anyone in the conterminous U.S. (i.e., the lower 48 States) can register for federal authorization to destroy Canada Goose nests and eggs. The U.S. Department of Agriculture (USDA) provides management services on a cost-reimbursable basis. There are also State-funded control programs. Due in part to the direct involvement of senior governments, culled geese suitable for human consumption are typically donated to food banks or other charitable organizations. USDA economists found that for every dollar spent controlling Canada Geese, U.S. \$1.31 to \$5.56 could be saved in damage and maintenance costs.

In general, a combination of hunting, egg sterilization, culling, and hazing are used to control Canada Geese. Elsewhere in B.C., organized hunts, kill permits, and large-scale egg addling programs have been used with some success. The first cull of geese on Vancouver Island was held in the Capital Region in the summer of 2015.

Hunting has been promoted as the best way to address nuisance geese. Twenty-one percent of our marked geese were shot by hunters, and 68% of these were killed within our region. Seventy-two percent of marked geese shot outside of the region had never been observed on huntable sites here. More than half of marked geese shot by hunters were banded at the Little Qualicum River estuary. All LQRE-banded birds had been observed on huntable sites in the region, whereas only one third of ERE-banded birds and two thirds of CCE birds were huntable.

If Canada Geese were designated as ‘overabundant’, exceptional hunting methods and equipment could be used. Hunting pressure may also be increased by opening new areas to hunting, even for a limited period, and by creating incentives for hunters, encouraging landowners with geese to allow hunters, and further reducing hunting restrictions. However, many studies have shown that hunting alone will not control goose populations.

Egg sterilization is a common management tool. The mid-island egg addling program has focused on the Englishman River and Little Qualicum River estuaries, and to a lesser degree on the Nanoose Bay unit of the Qualicum National Wildlife Area. Nest densities were highest at the Little Qualicum River estuary, however nest and egg numbers there are now trending downward. By contrast, the number of nesting geese at the other estuaries has increased. Despite these conflicting trends, we can unequivocally say the addling program has made a significant impact. From 2002 through 2014, it prevented at least 5,345 eggs from hatching, or at least 2,088 new breeding birds, despite a lack of consistent funding and personnel. Given an average clutch size of 5.8 eggs per goose, and using a very rough calculation, the addling program has prevented more than 6,000 additional eggs *per year*.

There are other ways to control geese, used with varying levels of success. What works well for one site may be unsuitable for another, and there is a legitimate concern that birds kept out of one area will wreck havoc elsewhere. Even hunting and egg addling move birds and impacts to other areas. Some survey

respondents had used damage or danger permits, however these are probably underutilized due to a lack of awareness that such permits exist, onerous permitting processes, and a reluctance to perform the tasks. A provincial compensation program for farmers was also underutilized; while compensation is not a control measure, it is a form of management.

Culling - the selective, lethal removal of wild animals, is a sensitive topic and has been considered a measure of 'last resort'. Yet, it has some distinct advantages over other types of control methods. Like hunting and permits to kill adult birds, it decreases the breeding population. However, it typically targets a larger number of birds at one time, can be applied directly to a problem population, its effects are obvious and immediate, and there are fewer risks that surviving members will cause problems elsewhere. Still, repopulation is anticipated, as individuals that escaped the cull return, nearby populations continue to grow, and suitable habitats remain available.

Fewer people are opposed to culling of nuisance geese when they are utilized in some way. Other game animals have been culled, processed, donated, and even sold and exported, and our provincial agencies support the use of culled meat. There are revisions proposed to the *Migratory Birds Regulations* that would allow consumption of culled geese, requiring the development of standards with public health and food inspection agencies. A made-in-B.C. solution may also be possible, should the provincial inspection program take the lead and donated meat remain in the province.

Also anticipated are revisions to the *Migratory Birds Regulations* that allow First Nations to harvest migratory birds and their eggs throughout the year; to sell down and non-edible by-products; and to barter, exchange, trade, or sell birds and eggs with other Indigenous communities. However, collaboration and consultation with First Nations is important for reasons aside from their potential contributions to goose management. Canada Geese frequent reserve lands and traditional use areas, causing degradation there too.

We encourage local governments and regulatory agencies to work together with affected landowners and land managers to reduce and control the regional Canada Goose population. It is appropriate that CWS leads a regional working group that dedicates and pools resources to address the full breadth of problems caused by geese. It is important that CWS, B.C. Ministry of Environment (MoE) and Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) develop a communications protocol to bridge the mostly-siloed goose management initiatives in B.C. so that efforts are cohesive, and experiences and expertise are shared. Some frank discussions should ensue, such as how CWS might set population objectives for Canada Geese based on the ability of habitats to support them, and the merits of an overabundance designation for temperate-breeding geese. The group should also develop a monitoring program in advance of predictive population modeling.

This strategy has been designed to serve individuals and groups coping with nuisance geese and/or tasked with creating and implementing management plans. There were three mostly distinct, but sometimes overlapping subpopulations in the region, corresponding to geese banded at the LQRE, ERE, and CCE. These subpopulations merit individual management plans, as they are composed of unique blends of migrant types, experience different levels of hunting pressure, and pose challenges that may not be relevant across the entire region. Recommendations for each plan are provided in Chapter 14.