



Managing Human-Wildlife Interactions: Canada Goose (*Branta canadensis*)

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In recent decades, the Canada goose (*Branta canadensis*) has become a familiar, easily recognized, and widely distributed bird species across Virginia. For many people, hearing the characteristic honking and then looking up to catch a glimpse of the V-shaped formation of migrating Canada geese heading south for the winter brings back fond memories. However, unlike what the geese's ancestors had done for eons, many of the birds in these formations today likely never migrate long distances between the traditional northern breeding grounds and the southern wintering areas. Instead, the birds in many of today's flocks of geese have foregone migration completely and remain in Virginia year-round, making only relatively short jaunts from feeding sites to overnight open-water resting areas.

Although migratory Canada geese can damage winter cover crops through their foraging activity and the physical trampling of plants, particularly within Virginia's Coastal Plain, this damage often is relatively short-lived. Geese that have migrated to and spend the winter in Virginia typically arrive in mid- to late fall, but start heading back to their northern breeding grounds sometimes as early as February. Once they depart, the seasonal foraging problems attributed to migratory geese quickly abate.

The same cannot be said about nonmigratory, or "resident," geese. The incidence of conflicts with resident geese has been increasing dramatically as the number of these nonmigrating birds has multiplied, especially in suburban areas and on agricultural lands. Concerns about physical damage to crops, turf, home landscapes, and natural habitats, threats to water quality and personal health, and safety issues associated with aggressive habituated geese all are examples of the kinds of negative human-geese interactions that have arisen in recent years. This publication provides information to help readers become familiar with this bird and its behaviors and presents suggested legal approaches to address problems caused by Canada geese.

Biology and Behavior

To most people, a Canada goose is a Canada goose. However, taxonomists historically recognized as many as 11 subspecies of the Canada goose within the United States and Canada. Recently, through use of genetic analysis techniques, four of the 11 previously listed subspecies are recognized as subspecies of the cackling goose (*Branta hutchinsii*), leaving seven distinct subspecies of the Canada goose. Here in the mid-Atlantic region, the giant Canada goose subspecies (*Branta canadensis maxima*) is most common.

The Canada goose has a grayish-brown body and wings, a light breast and rump, and a characteristic white patch on each cheek. The feet, bill, face, and neck all are black (fig. 1). Although body size varies among the subspecies, male giant Canada geese typically reach 14 to 20 pounds as adults, whereas females are slightly smaller, reaching about 12 to 18 pounds at maturity. Canada geese are relatively long-lived animals, and some individuals may live to be more than 20 years old.

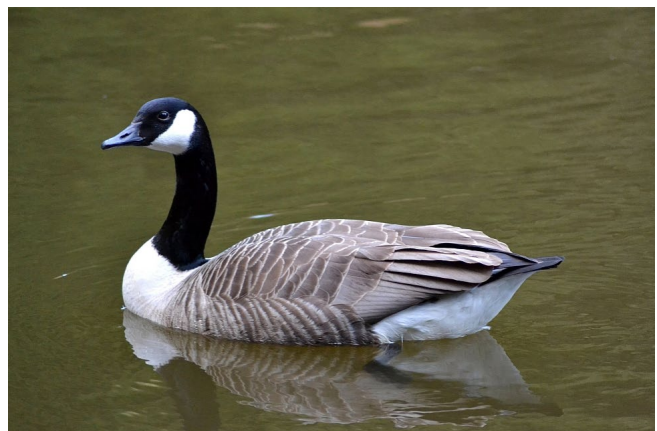


Figure 1. Canada goose resting on water. ("[Canada Goose. Nikon D3100. DSC_0499](https://www.flickr.com/photos/50144889@N08/5517348334)" <https://www.flickr.com/photos/50144889@N08/5517348334> by Robert Pittman is licensed under [CC BY-NC-SA 2.0](https://creativecommons.org/licenses/by-nc-sa/2.0/) [<https://creativecommons.org/licenses/by-nc-sa/2.0/>].)

As noted, two distinct behavioral patterns exist among Canada geese today — some birds are truly migratory, and some are nonmigratory (“residents”). Migratory Canada geese spend the spring and summer on northern breeding grounds, primarily throughout the northern Canadian provinces from Quebec to the Maritimes, then fly south during fall to wintering areas that extend from as far north as western New York, through Delaware, Pennsylvania, and Maryland, south to Virginia, North Carolina, and South Carolina. Geese use the Delmarva Peninsula area in Delaware and Maryland and the entire Chesapeake Bay region extensively during winter.

Birds that migrate to or through Virginia each fall are part of the Atlantic Population (AP). The number of migrant geese in the AP reached a peak of approximately 955,000 in 1981, but declined significantly to a low of about 29,000 breeding pairs in 1995 (Hindman and Ferrigno 1996). The decline was severe enough that authorities closed the entire hunting season for these geese from 1995 to 1998 and reduced limits on harvest for several subsequent years. Soon thereafter, following several years of favorable nesting conditions on the northern breeding grounds and the effects of imposed reductions in harvest allocation, the AP recovered rapidly, reaching a high of more than 220,000 breeding pairs in 2012. Since then, the AP again declined, somewhat precipitously from 2017 to 2019, to a low of about 112,000 breeding pairs. After two to three years of favorable nesting conditions and reduced harvests, the population now appears to be recovering again, and the 2022 survey estimated 163,000 breeding pairs.

In addition to these migratory geese, there are nonmigratory Canada geese that spend much of the year in the same general area. They travel substantial distances only to find food or new, secure open-water resting areas (for example, in winter when ice covers previously used water sources). The number of resident Canada geese in Virginia grew steadily for several decades, reaching a peak of nearly 265,000 individuals in 1998. Special management programs, including hunting seasons and federal depredation orders, were implemented over the past couple decades to reduce this population and minimize their conflicts with humans. The Atlantic Flyway Resident Canada Goose Management Plan (Atlantic Flyway Council 2011) helped guide these efforts and established suggested goals for statewide population levels. In Virginia, resident goose numbers declined from the late 1990s to the mid-2000s and have since fluctuated around 150,000 birds. Management programs have been successful in maintaining a population between 125,000 and 150,000.

Although Canada geese reach sexual maturity at age 2, they usually don’t breed before age 3. Males and females form lifelong pair bonds, but should one member of the pair perish, the surviving individual will select a new mate. Pairs usually return to the same nesting site year after year. Each mated pair will construct a bowl-shaped nest approximately 1½ feet in diameter. The pair uses vegetation such as reeds, grasses, and leaves to build the nest, lining it with down feathers plucked from the female’s breast (fig. 2). Nests are typically within 150 feet of water, often beneath shrubs or small trees or on raised patches of wetland vegetation. Where suitable nest sites are not abundant or where predation risk along the shoreline is high, geese also will make use of artificial nest platforms constructed no more than 1 foot above the water in ponds. Pairs sometimes will nest within 10 feet of each other, but to avoid attracting predators, they usually space themselves farther apart to reduce the concentration of nests in an area. Both the male and female will defend the nest site aggressively until all eggs are laid, at which point the male continues to defend the nest while the female incubates the eggs. If a predator or human destroys the nest or eggs during the early egg-laying period, the pair may produce a second clutch of eggs. However, they will raise only a single brood each year.



Figure 2. The nest and eggs of a mated pair of Canada geese. (“[Canada Goose Nest at Gavins Point National Fish Hatchery](https://www.flickr.com/photos/51986662@N05/47959704913/)” [https://www.flickr.com/photos/51986662@N05/47959704913] by Sam Stukel, U.S. Fish and Wildlife Service, is licensed under [CC BY 2.0](https://creativecommons.org/licenses/by/2.0/) [https://creativecommons.org/licenses/by/2.0/].)

Egg laying begins shortly after nest construction. In Virginia, the peak of egg-laying usually is completed by early to mid-April, but eggs may be laid beginning as early as late February. Females lay one egg about every 1½ days. Clutches range from two to eight eggs, with an average clutch size of about five eggs per nest. The female ensures that all eggs hatch around the same time by not beginning incubation until the last egg is laid. Incubation lasts about 25 to 30 days. The entire clutch may take between 8 and 36 hours to completely hatch; goslings are mobile within 24 hours of hatching. Both parents will defend the brood for about 10 weeks. At that time, goslings will be self-supporting and fully capable of sustained flight. Goslings from multiple family broods may form “gang broods” of 30 to 50 goslings monitored by up to a dozen nonrelated adults.

Canada geese are grazers — they forage on the leaves and soft stems of grasses, clover, broad-leaved weeds, watercress, and numerous other types of aquatic plants. They also consume agricultural grain crops, such as corn, soybeans, and wheat, especially when new seedlings emerge and then once again as the grains mature. Like most other birds, newly hatched goslings require a high protein diet for proper development. To meet that need during the first four to six weeks after hatching, goslings consume primarily insects, small crustaceans, and bite-sized mollusks attached to aquatic vegetation. Then they switch to a predominantly vegetarian diet. In suburban settings, geese are attracted to expanses of well-manicured lawn adjacent to water bodies as well as large open areas of managed turf, such as recreational fields and golf courses. They also readily accept supplemental foods offered by humans, even though most of what is provided typically is of little to no nutritional value and often detrimental to their health. Canada geese prefer to feed near water or in open fields and pastures that provide a clear field of vision.

Like all waterfowl, Canada geese undergo a simultaneous replacement of all their flight feathers between mid-June and early July. During this molting process, geese are unable to maintain sustained flight, which makes them vulnerable to predation. Before molting starts, geese will move to safe areas where they hang out, waiting for new wing feathers to develop. Preferred safe areas typically are water bodies within easy walking distance to areas with readily available food and unobstructed views that allow geese to monitor predators or other dangers.

Average annual mortality rates for Canada geese overall range from 20% to 52%, but juveniles suffer higher losses than do adults. Survival of first-year resident birds ranges from 70% to 90%, whereas that of first-year migratory birds ranges from 25% to 80% (average

= 59%). Mortality of adult Canada geese is usually due to hunting. Predators of Canada goose eggs include crows, ravens, magpies, seagulls, skunks, and raccoons. Coyotes, red fox, mink, domestic and feral dogs, eagles, and snapping turtles are known to prey on goslings and juvenile geese and occasionally take adult geese if they have the opportunity.

Canada geese are subject to numerous bacterial, viral, fungal, and parasitic diseases and toxic situations. Close contact in large congregations of birds enhances disease transmission. For migratory individuals, this usually occurs during the fall migration and on the wintering grounds, whereas potential exposure among resident goose populations remains high year-round. Of special concern is the highly pathogenic strain of avian influenza (HPAI), which recently was introduced from Europe and has been spreading through waterfowl, shorebirds, aquatic wading birds, and certain raptors. Canada geese appear to be more susceptible to HPAI than some other waterfowl species, and goose mortalities have occurred in several areas of Virginia over the past year. Other diseases of concern for Canada geese include avian cholera, avian botulism, avian salmonellosis, chlamydiosis, duck plague (duck virus enteritis or DVE), and aspergillosis. Other threats include gizzard worms, lead poisoning from consumption of spent shotgun pellets and fishing weights, and pesticide exposure from foraging in recently treated agricultural fields or turf.

Economic Status and Importance

Canada geese contribute to overall biological diversity of the natural ecosystem. They also provide various benefits to humans. However, negative effects associated mostly with resident geese and concerns about public health and safety often overshadow these contributions.

Nationwide, hunting of Canada geese is popular, both for recreation and subsistence. Approximately 1 million people in the United States reported hunting waterfowl during the 2020-21 fall season, and, within the Atlantic Flyway, they harvested a little over 400,000 geese (Roberts 2021). During the 2020-21 season, hunters in Virginia harvested slightly more than 30,000 Canada geese — approximately 35% below the five-year running average of harvest.

The money people spend while hunting adds economic value to local communities. For example, the Delmarva and greater Chesapeake Bay regions derive substantial economic benefits from the well-known opportunities they provide for great goose hunting (IAFWA 2002).

Communities also benefit economically from other recreational opportunities associated with geese. According to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U.S. Department of Interior 2018), 86 million people over 16 years old reported participating in wildlife photography (35%), wildlife feeding (69%), or wildlife watching (51%). Collectively, they spent \$75.9 billion dollars — \$882 per person, on average — on these activities in 2016. Some 48% of them reported engaging with waterfowl, with 94% of their activities occurring within 1 mile of their homes. These local residents, homeowners, and tourists or relatives visiting with residents all contributed to local economies. This is especially true in communities with parks and nature preserves, where people can experience nature, reflect on their thoughts, relax, and simply be outdoors where they are also likely to interact with wildlife.

In contrast to the economic benefits derived from Canada geese, a substantial economic burden can be imposed on those who experience property or crop damage due to geese's foraging activities. Because geese often forage in large groups, the extent of physical and economic damage inflicted in a short time can be serious, particularly for agricultural crops and golf courses, residential lawns, and private landscapes with leafy ornamental plants. This can be especially problematic in settings adjacent to areas where geese seek shelter during the molting period. In residential areas, feeding damage on grass, clover, and cover crops often leaves large bare spots that become susceptible to erosion. Geese also trample vegetation and compact the soil as they repeatedly move from the water to upland feeding sites, creating a hardened surface that prevents growth of new vegetation. This makes the denuded landscapes unstable and can alter how other wildlife species use the habitat.

Public health and safety risks are a growing concern with Canada geese. A large flock of geese visiting a lawn, a golf course, or an agricultural field can leave behind an unpleasant mess of fecal material and, during the molt, numerous discarded feathers. A well-fed, healthy adult Canada goose can produce nearly a pound of fecal matter per day. Where resident goose populations exceed 100 birds, the continuous influx of nutrients contained in Canada goose feces can stimulate excessive algae and weed growth in small water bodies, especially those that have restricted circulation and flow-through. If enough bacteria and particulate matter contained in goose feces ends up in surface ponds or reservoirs that supply drinking water for people, the water may need special treatment to ensure it's safe for consumption. Beaches, community parks, grassed recreational fields,

and other public areas littered with accumulated goose feces sometimes must be closed temporarily for cleaning to reduce the threat to which people will be exposed from contaminated surfaces or injured by slips and falls on fecal-covered surfaces. When communities need to frequently and repeatedly wash fecal deposits from sidewalks and bike paths in municipal parks visited by large numbers of people and geese, they can incur significant economic costs.

Canada geese pose potentially significant safety problems at airports. The Federal Aviation Administration has estimated that 35% of reported bird-aircraft strikes involve Canada geese. In all, about 240 goose-aircraft collisions occur each year. The noise of a passing aircraft or the sudden appearance of a perceived predator can spook geese allowed to congregate or forage in grassy areas adjacent to runways and taxiways. In response to such perceived threats, an entire flock may simultaneously take flight directly into the path of a departing or landing plane. Many of today's jet airplanes are susceptible to catastrophic mechanical failure if foreign objects are drawn into a jet engine. A small songbird can cause thousands of dollars in damage to the plane. More importantly, debris from a disabled engine may penetrate the fuselage or cause the plane to lose power and crash, jeopardizing passengers. For example, in 1995, after reportedly ingesting 13 Canada geese as it took off, a U.S. Air Force AWACS jet plane worth \$184 million dollars crashed just beyond the end of the Elmendorf Air Force Base runway outside Anchorage, Alaska, killing 24 people. The 2009 "Miracle on the Hudson" represents a similar, but less perilous, outcome. In that case, US Airways Flight 1549 was departing LaGuardia Airport in New York when the plane struck a flock of Canada geese. This knocked out all power to the engines, forcing the crew to make an emergency landing on the Hudson River; fortunately, all 155 passengers and crew survived.

As noted earlier, the presence of HPAI within the Atlantic Flyway along the East Coast poses a significant threat to commercial poultry and facilities that raise game birds. Because avian influenza (AI) is easily transmitted, any close contact between domestic birds and infected wild birds presents great opportunity for transmission. Typically, if AI is detected in a commercial poultry flock, the facility must be totally depopulated. This inflicts a tremendous economic impact on the affected operation. Rigorous prophylactic sanitation protocols must be implemented to prevent introduction of the pathogen, especially in areas where large flocks of waterfowl exist.

Control and Management Techniques

Integrated pest management (IPM) techniques can be used to manage Canada goose conflicts. These techniques are broken into three categories — husbandry methods, non-lethal methods, and lethal methods. IPM begins with identifying the true nature of a perceived problem; accurately establishing the organism, disease, or pest involved; and assessing the seriousness of the problem to determine if a response is needed. If response is justified, all options are reviewed and evaluated to determine their cost-effectiveness and ability to reduce or permanently solve the conflict. Based on these assessments, management options best suited to the need are selected and applied, starting with the simplest, least inexpensive, and less invasive techniques. More complex, expensive, or time-demanding options follow only when the first response fails to reduce the problem to a tolerable level. For conflicts involving vertebrates, an accepted IPM rule of thumb is to use lethal methods as a last resort, only when all other methods have been tried and proven ineffective. The next sections of this publication address options for managing common Canada goose interactions in a manner consistent with IPM's hierarchical approach.

Husbandry Methods

Canada geese often congregate on bodies of water where unobstructed access to foraging areas is within easy walking distance. To reduce the numbers of geese at such sites, minimize the amount or the attractiveness of palatable forage adjacent to the water. Cutting back on the amount of fertilizer and supplemental water applied to sections of lawn adjacent to the water can slow down the production of grass that geese find attractive and reduce its nutritional quality.

To make it difficult for geese to make their way toward food sources and to detect the presence of potential predators or other hazards, establish a zone of dense vegetation beyond the water's edge. Simply ceasing to mow a 20- to 25-foot-wide swath of vegetation just inland from the water's edge will allow a strip of thick, impenetrable vegetation to develop; this vegetation will restrict the ability of geese to move freely from the water into a foraging site (fig. 3). It also will interfere with a goose's visual line of sight from the water into the foraging area, making the goose more wary.



Figure 3. An example of a heavily vegetated natural barrier along the shoreline that can deter geese from accessing preferred grassy foraging area. This barrier was installed as part of a restoration project at Thompson Lake, Dakota County, Minnesota. (Courtesy of Dakota County Parks, parks@co.dakota.mn.us)

Canada geese will congregate in great numbers where they are being fed. While providing supplemental feed to wildlife has become quite popular, what members of the public are providing as food often is not beneficial and can cause health problems for wildlife. Additionally, sites where human-provided food attracts large numbers of geese typically become significantly degraded, with denuded or trampled shoreline vegetation, eroded embankments, sediment-laden waters, accumulated fecal material, and impaired water quality. Therefore, all supplemental feeding of geese should be prohibited.

To deter geese from being attracted to plantings of grain crops, producers sometimes are urged to employ bait stations or lure crops. Bait stations are structures strategically located away from crop fields that provide readily accessible grain to geese in the hope that the abundant food will distract birds from consuming the planted crops. Lure crops, sometimes referred to as decoy crops, are small fields of grain planted and purposefully left for geese or other waterfowl to consume without harassment. Bait stations and lure crops often can increase the local number of geese once birds realize that abundant and readily accessible food is available; unfortunately, when those resources are depleted, this larger-than-normal population of birds will seek out alternative resources in the immediate area, which often turns out to be the very crop the producer initially hoped to protect.

Additionally, the use of bait stations during the regular hunting season would constitute illegal baiting. Similarly, lure or decoy crops may be deemed a form of baiting if the crop is mowed and grain is distributed on the ground before or during the hunting season; such activity is not

considered normal agricultural practice and thus would be illegal.

Instead of using bait stations or lure crops, farmers should evaluate other deterrent strategies or consider altering their planting or harvesting times, or both, so they don't coincide with peak migration periods.

Corporate properties, municipal parks, and outdoor recreation facilities, such as golf courses that have small ponds or other water features surrounded by large expanses of lush grass, can become favorite hangouts for geese. To deter geese, place objects such as trees, shrubs, and large boulders around the perimeter of water features when they are constructed or modified. Tall obstructions, such as large trees, can interfere with the angle of flight that geese need to become airborne when taking off from water. Such obstructions can also make geese wary by making it difficult to monitor predators or other threats that could be lurking behind them.

Nonlethal Methods

Nonlethal deterrents are grouped into two main categories: scare techniques or physical deterrents. Scare devices or strategies are intended to frighten or chase birds away from an area, whereas physical barriers are intended to prevent birds from gaining access to an area.

Scare Techniques

To be most effective in discouraging geese from congregating in an area, scare techniques must be deployed promptly at the first sign of geese and then used persistently. The three broad categories of scare devices or strategies are auditory, visual, and physical hazing.

Auditory scare devices are designed to make loud noises that frighten geese. One example is the propane cannon (fig. 4), a device that makes a loud blast, but does not fire a projectile. Under ideal conditions, strategically placing one cannon per every 2 acres may reduce goose depredation in crop fields to a tolerable level. Many newer cannon models have incorporated features to increase their effectiveness; these features include variable-timed detonators, which make the device fire in a random, unpredictable fashion, and mechanisms that automatically rotate the cannon's direction-of-projection following each blast. Relocate stationary noisemakers, such as propane cannons, to a different spot in a field every two to three days to prevent the geese from becoming habituated to them.



Figure 4. A propane cannon deployed in the field to deter geese from congregating or foraging. (Photo by Lance Cheung, U.S. Department of Agriculture)

Another auditory approach is use of pyrotechnic devices referred to as “whistlers,” “shell-crackers,” “screamers,” or “bangers.” These firecracker-like devices are shot from a hand-held pistol or 12-gauge shotgun into the air over a group of geese to encourage them to take flight or to deter them from coming into an area to feed. Some of these pyrotechnics produce a loud whistle or high-pitched whine as they travel. In most designs, a final firecracker-like blast occurs at the peak of their trajectory. Some of these devices have a range of about 50 to 75 yards. Blanks (a cartridge that lacks a projectile) can also be discharged from a gun to disturb a group of geese, but the zone of effectiveness typically is much less than that observed with pyrotechnics. Safety restrictions may make pyrotechnics unavailable to the public, but trained and authorized applicators have relied on these tools for decades. Before using pyrotechnics, determine whether local ordinances prohibit the discharge of a firearm. This is a common ban in Virginia's incorporated cities and towns. Even in communities where discharge of a firearm is legal, notify the local police or sheriff's department as a courtesy of your intent to use pyrotechnics so that they are aware in advance of the activity should they receive calls of shots being fired.

Playing recorded distress calls made by Canada geese is another form of auditory deterrence. To truly scare these birds, play recorded distress calls loud enough (at least 80 decibels) to be heard by geese at a distance. However, unless other forms of deterrence are used concurrently with distress calls, geese quickly habituate to repetitively played recordings, ignoring them in as little as three to four days of repeated use. Prerecorded distress calls may not be widely available commercially, but you can capture audio of their vocalizations with a personal recorder at a hotspot where geese have congregated.

Visual frightening devices are images or objects that represent a perceived threat to the animal. These devices usually do not produce a sound and are easy to implement; they simply are placed in the area where goose activity is occurring. Examples include strobe lights or laser-emitting lights used to startle and drive geese away. When strung between posts to form a fence or attached as free-flowing streamers to an upright pole, Mylar reflective tape (red on one side, shiny silver on the other; see fig. 5 and fig. 6) will catch and cast off glints of sunlight as it flickers in the breeze, startling nearby geese. Also, you can create flags by cutting brightly colored plastic garbage bags along the seam to produce two halves, then staple each half to a 4-foot-tall wooden stake so they will flutter in the wind. Placing about 10 to 15 flags per acre in an agricultural field may reduce foraging damage caused by grazing geese in newly sprouting crop fields. Scarecrows, owls, or other predator effigies, rubber snakes, and eye-spot balloons (fig. 7) all have been touted as triggering a goose's fear. To work, usually a minimum of three to five eye-spot balloons per acre must be installed as soon as geese are detected and

before they become comfortable occupying a site. As geese do with auditory deterrents, they habituate to and quickly ignore most inanimate visual devices, often in as little as three to four days. For greater effectiveness, move such devices at least once every two to three days. To extend the period of potential effectiveness somewhat, combine visual deterrents with another form of deterrence.

If used persistently, physical harassment, or hazing, of geese sometimes can provide longer-lasting deterrence than inanimate stationary visual objects. Examples of hazing include using radio-controlled toys, herding dogs, and water-spray devices. Although more labor intensive and expensive to implement than visual or auditory deterrents, radio-controlled toy aircraft or boats present a greater perceived threat to geese. Model aircraft can fly over or chase groups of geese on land or water, and model boats can herd geese away from water. With both approaches, exercise proper care to avoid hitting or injuring the birds.



Figure 5. Mylar reflective tape used to deter birds. (Photo by Jim Parkhurst, Virginia Tech)



Figure 6. Mylar tape suspended above field crops from support posts to reduce bird depredation. (Image courtesy of Johnny's Selected Seeds, Winslow, ME)



Figure 7. An eye-spot balloon deployed as a deterrent to ward off foraging birds. (Photo by Jan Hygnstrom)

Dogs, especially border collies, can be trained to chase and harass geese. However, geese continue to monitor favorite foraging and loafing sites, and, as soon as dogs leave the area and the threat of harassment no longer exists, the geese simply return. Even with persistent and repeated harassment, using dogs to drive geese away from highly preferred sites is rarely completely effective, especially in those areas where supplemental feeding occurs. For homeowners with water features on their property, the family dog may offer some protection against geese, but owners must remember that, in many communities, local leash laws apply — the dog cannot be allowed to venture off the property unattended. Additionally, it is illegal to allow a dog to catch or harm a goose. Dogs should be leashed or prevented from chasing geese during the time of the summer molt when these birds are flightless.

Devices that use pressurized water sprayers and motion detection technology to deter geese from entering a property are available commercially. When a garden hose is attached to such a device, a motion detector will cause the device to spray water toward animals it senses (fig. 8). The device automatically shuts off when no further motion is detected for a few moments. To establish a potentially effective line of defense, place several of these devices along the normal lanes geese use when walking from the water to their landward feeding area. Be sure to set the trajectory of the pressurized water stream at the proper height so the spray doesn't go over an approaching goose's head rather than into the face and upper body.



Figure 8. Example of a motion-activated water-spray device used to deter wildlife. (Image courtesy of AliExpress™)

Physical Deterrents

You can create physical barriers of vegetation, fencing, or rocks to impede geese from moving from their resting or flocking areas to feeding areas. As described earlier, a densely vegetated swath along a shoreline will block the path geese use to move from water to land and obstruct their view of potential danger beyond the barrier. Barriers are most effective when the vegetation is compact; is continuous, with no gaps; and extends tightly to the ground.

Fencing to deter geese can be constructed from a variety of materials, including metal mesh, such as woven wire, chain link, and chicken wire; plastic or synthetic mesh, such as snow fencing, silt/erosion control fencing, or extruded polyethylene netting; wooden picket fencing; or strands of steel wire, monofilament fishing line, Kevlar® cording, or Mylar reflective tape. Install fences just shoreward of the waterline. To prevent goslings from becoming entangled, make sure the maximum mesh size or gap opening doesn't exceed 2 inches and the structure is at least 2 feet tall. Certain electric fence designs can deter geese quite effectively, but in some areas, local ordinances or code regulations restrict their use. Do not use electric fences where small children have access to them. Attach cautionary warning signs wherever and whenever you use an electric fence. Additionally, exercise utmost care when using any form of electrified fencing near water.

In extreme cases, you can install a grid of overlapping wires above small water bodies to prevent geese from landing on the water surface. Attach taut wires or lines, such as Kevlar® cord, about 8 to 12 inches above the water's surface to stakes driven into the embankment on 10 to 15-foot centers, creating a crisscross grid above the water body. If human access or equipment operations are needed on or near the water, the grid can be installed on telescoping posts. Take care to prevent geese from walking into the pond underneath the edges of the grid.

To form a rock barrier that deters geese from moving from the water to grassy feeding areas, strategically place boulders approximately 2 feet or larger in diameter around the perimeter of a water body. These boulders not only create a physical obstruction, but they can also increase the geese's wariness by providing hiding spots for predators. Use vegetated barriers to enhance the effectiveness of rock barriers and the landscape's aesthetics.

Chemical repellents may help keep geese from congregating in areas where their presence is not desired. Repellents typically have broad public appeal because they do not harm the geese when applied according to manufacturer's directions, and they easily can be applied directly to a problem site. However, effectiveness of repellents often wanes over time; frequent and potentially costly reapplication may be needed to maintain the level of deterrence. The U.S. Environmental Protection Agency has approved methyl anthranilate, the food additive used to create artificial grape flavoring, for use as a goose repellent. The additive is available under trade names such as EcoBird® 4.0, Rejex-it®, Avian Migrate™, and Liquid Fence® Goose Repellent. Methyl anthranilate has approved formulations for application in four settings. It can be applied on the surface of landfill refuse and the open pools of standing water on landfill sites; as an area fogging agent; as a surface coating on open water bodies; and as a topical spray on turf. Repellents based on formulations of anthraquinone also are registered for use to deter geese. As is true for any registered repellent, registration does not imply any guarantee of effectiveness; it simply means the product has been reviewed and deemed safe to use as directed. Users must follow label instructions carefully and recognize the potential health and safety cautions associated with the product's use.

Lethal Methods

When husbandry and nonlethal deterrents fail to achieve the desired reduction in damage or level of conflict, some form of population or reproductive control may

be warranted. Because the Canada goose is classified as a migratory species and a regulated game species in Virginia, you must have prior review and approval by the U.S. Fish and Wildlife Service, the Virginia Department of Wildlife Resources, or both to use reproductive or population control techniques.

In rural or agricultural areas, regulated hunting is a cost-effective method to manage Canada goose populations, and it's the preferred method state and federal wildlife agencies use. Although hunting regulations have been liberalized in recent years — primarily to accommodate special early and late-season harvest opportunities focused specifically on nonmigratory goose populations — hunters have found it difficult to gain owners' permission to access private land where geese congregate. Also, regulated hunting alone often will not be sufficient to keep goose populations in balance with human desires, and other management actions will need to be used along with hunting programs. Many of today's most pressing human-geese conflicts exist within suburban and exurban landscapes where hunting typically is not possible due to safety concerns or where discharge of firearms is prohibited. Nevertheless, special controlled hunts have been authorized and conducted in unique, high-need situations and where sufficient acreage exists to address safety concerns. Examples of such special hunts include those performed on and around commercial airports, municipal water supply reservoirs, golf courses, municipal parks, and corporate or industrial complexes.

Under normal circumstances, it would be a violation of the Migratory Bird Treaty Act to destroy the nest of a protected bird species once the nest has been completed and it contains either eggs or young birds. A special permit from the U.S. Fish and Wildlife Service is required before such activities are implemented. However, landowners are allowed to disrupt nesting attempts by removing nesting materials daily before the nest is completed and becomes occupied. Common examples include cases where a bird's chosen location presents a safety hazard — for example, when flammable nesting materials are placed on top of a light fixture — or if the nest is likely to become a nuisance for the homeowner, such as when geese construct a nest adjacent to a home's primary point of access. To encourage the pair to nest elsewhere, repeatedly disrupt the nest-building process as soon as you detect it.

Given the dramatic increase in the number of conflicts involving nonmigratory Canada geese, two special depredation orders have been established to allow landowners to seek authorization to perform certain

population management activities. The Nest and Egg Depredation Order grants a landowner authorization to destroy the nest, and any eggs found within it, of resident Canada geese. No permit is required or formally issued, but the order requires the landowner to register with the U.S. Fish and Wildlife Service and to comply with mandatory reporting actions at the end of the nesting season. [Details](https://epermits.fws.gov/eRCGR/) can be found at <https://epermits.fws.gov/eRCGR/>. Research has shown that if eggs are simply removed from the nest, the mated pair will often re-nest and lay a second clutch. Instead, it is more effective to shake each egg vigorously, puncture it, or apply a light coating of 100% food-grade corn oil to it, then leave the eggs in the nest. The adults will continue to incubate the eggs, unaware that the treatment will have destroyed the contents and the eggs will never hatch. By the time the pair realizes something is wrong, it often is too late in the season for them to attempt re-nesting. [Detailed information](https://www.aphis.usda.gov/wildlife_damage/downloads/canada_goose.pdf) about the process of destroying nests and eggs is available at https://www.aphis.usda.gov/wildlife_damage/downloads/canada_goose.pdf.

The Agricultural Depredation Order applies only to those engaged in commercial agricultural operations experiencing damage to their crops from resident Canada geese. This order allows agricultural operators to destroy the nests and eggs of resident Canada geese and to shoot geese within a specified period of the growing season; however, some traditional hunting practices, such as the use of decoys and calls, are not allowed under this permit. This order requires a no-fee permit administered by the Virginia Department of Wildlife Resources in cooperation with the U.S. Department of Agriculture's in-state Wildlife Services office. The Virginia office may be reached at 804-739-7739. Those obtaining an Agricultural Depredation Order permit are required to collect and report data on all activities conducted under the permit by early September each year.

There are two other depredation orders, the Airport Depredation Order and the Public Health and Safety Depredation Order. Neither is available to the public; instead, the orders are used by government agencies to address goose conflicts in specific situations.

Where an immediate reduction in a local goose population is needed, several techniques are available. During the late-spring/early-summer molt, when geese are flightless, wildlife authorities often will herd large groups of geese that have congregated on ponds up onto the shoreline and into holding corrals for collection.

Alternatively, some state wildlife agencies use attractive grains to lure large flocks of geese to safe netting areas, where cannon or rocket nets can be used to capture the waterfowl. Individual flightless birds can be captured using large, long-handled nets, animal-control capture poles, or hand-held capture net launchers.

In the past, geese captured by federal or state wildlife personnel sometimes were transported to locations where it was believed they would be less likely to cause problems or where they would be more accessible to fall hunters. However, because adult Canada geese have strong homing instincts, many returned to their former nesting areas within a year. Today, there are few areas in Virginia where resident Canada geese are not already plentiful, and most communities are not willing to tolerate additional birds. With the confirmation of HPAI within the Atlantic Flyway, relocation and release of waterfowl now is prohibited so that this disease isn't spread unknowingly. Geese that are captured as part of a population management program typically will be euthanized and properly disposed of in landfills or via rendering or incineration. Previously, these birds were processed and prepared for donation as a food resource to zoos and local wildlife rehabilitation facilities. However, when HPAI is present, as it currently is in Virginia, this practice is not allowed out of concern that the disease might be transmitted to captive animals.

Municipalities and residential communities confronted with resident Canada goose problems can get on-site technical assistance on a contract or fee basis from the [U.S. Department of Agriculture's Wildlife Services agency in Virginia](https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/SA_Program_Overview/SA_Contact/ws-state-info?st=VA:Virginia) (https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/SA_Program_Overview/SA_Contact/ws-state-info?st=VA:Virginia).

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Related Websites

[Virginia Department of Wildlife Resources](http://dwr.virginia.gov)
(dwr.virginia.gov)

[Virginia Department of Wildlife Resources Help with Human-Wildlife Conflicts: Canada Geese](https://dwr.virginia.gov/wildlife/nuisance/Canada-geese/)
(<https://dwr.virginia.gov/wildlife/nuisance/Canada-geese/>)

[U.S. Fish and Wildlife Service: Canada Goose](https://www.fws.gov/species/canada-goose-branta-canadensis)
(<https://www.fws.gov/species/canada-goose-branta-canadensis>)

[National Wildlife Health Center](https://www.usgs.gov/search?keywords=canada+geese), U.S. Geological Survey (<https://www.usgs.gov/search?keywords=canada+geese>)

[Wildlife Services State Offices, Animal and Plant Health Inspection Service](https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/SA_Program_Overview/SA_Contact/ws-state-info?st=VA:Virginia), U.S. Department of Agriculture (https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/SA_Program_Overview/SA_Contact/ws-state-info?st=VA:Virginia)

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