DENVER
PARKS & RECREATION

2019

City and County of Denver

Goose Management Program

Natural Resources Office of the City Naturalist

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I. Introduction

Urban goose management is a complicated and controversial issue that affects urban areas nationwide. Canada geese (Branta Canadensis) have been a part of the Denver Parks and Golf Courses landscape for many decades. The increasing populations of resident Canada geese throughout North America, and more specifically in the Denver Metro and Front Range area has resulted in increasing numbers of conflicts with human activities and concerns related to human health and safety. Much larger increases in the human population along the Front Range have also contributed to human-goose conflicts. The more common issues identified by the public are related to unacceptable and potentially dangerous accumulation of feces on turf and pavement, goose aggression during nesting season, over grazing of landscape vegetation, and safety hazards for vehicles. Canada geese, on the other hand, along with other wildlife, provide people with a valuable connection to nature. Because of their prolific nature, site tenacity, longevity, size, and tolerance of human activities they are, however, considered a nuisance by some park users. Understanding the ecology of giant Canada geese plays a crucial role in managing urban–suburban problems.

Under federal regulations, non-lethal control activities for Canada geese, such as hazing and harassment, habit management and repellants, can be used without a permit at any time. All control devices that involve direct contact with geese require a federal permit issued by the U.S. Fish and Wildlife Service (USFWS). This plan defines Denver Parks and Recreations (DPR) goals, objectives and strategies for managing damage to Denver park properties related to Canada geese and aligns with the Colorado Parks and Wildlife (CPW) Colorado Resident Canada Goose Management Plan.

A. General Biology and Reproduction

Canada geese are herbivores. During spring and summer, they selectively graze on plants, or parts of plants, that are high in protein, such as grass shoots, seed heads, and aquatic vegetation. Canada geese have many natural predators. Raccoons, skunks, foxes, crows, and snakes, prey on their eggs; snapping turtles, foxes, bobcats, hawks, coyotes, and raccoons, prey on goslings; and coyotes, bobcats, and people prey on the adults. Geese generally start breeding at three years of age. Nest construction and egg-laying begins in late March or early April, depending upon latitude. Geese tend to nest on islands, muskrat houses, or nesting platforms that are surrounded by water. Such sites offer additional

security, although the male guards the female and the nest, protecting his territory from other geese and predators. Geese lay 4 to 8 eggs; incubation begins when the last egg is laid and lasts about 28 days. Hatching occurs from late April through mid-May. About mid-June, adult geese shed (molt) their long flight feathers to grow new ones. They are flightless for 30-45 days. (Gosser, A. L., M. R. Conover, and T. A. Messmer 1997)

B. Migration Flyways

Flyway is a flightpath used by large numbers of birds while migrating between their breeding grounds and where they overwinter. (North American Migration Flyways March 2017). Colorado is in the central flyway where millions of waterfowl migrate to warmer regions in search of food and habitat.

C. Migratory Canada Geese

These are birds that nest and raise their young in Canada and Alaska. Migratory Canada geese make seasonal movements to areas that are outside of the area in which they nest and raise their young. Large numbers (hundreds of thousands) of Canada geese that breed in Canada migrate through and/or spend the fall and winter in Colorado. All Canada geese that nest anywhere in Canada and Alaska are considered migratory.

D. Resident Canada Geese

These are birds that nest and/or reside on a year-round basis within the Central Flyway. They are hatched and/or nest in the United States. Resident geese spend most of the year near their breeding areas, although many in the northern latitudes do make seasonal movements. Although there are no statewide rigorous breeding population surveys of Canada geese conducted by CPW or USFWF in Colorado, CPW has assisted DPR with annual and winter surveys of geese at specific Denver park properties to determine resident Canada Goose populations. (J. Gammonley, CWP Avian Researcher 2019)

E. Colorado's Resident Canada Geese Populations

Locally breeding Canada geese populations in Colorado were established by CPW and the USFWS during the 1950s to the 1970s. Breeding Canada geese now occur throughout most of Colorado, but the highest concentrations of resident

Canada geese are along the Front Range foothills and plains north of Denver and the Denver metro area. (J. Gammonley, CWP Avian Researcher 2017)

In the metro area, urban corridors and landscapes, such as river corridors, parks and golf courses are the perfect habitat for Canada geese. Habitat conditions influence the movement patterns and home range size in waterfowl and many other animals (Eberhardt et al. 1989, Dzus and Clark 1997, Didiuk and Rusch 1998, Yerkes 2000).

Agricultural development – to the creation of more water reservoirs – to fresh cut green grassland in city parks, golf courses and cemeteries, has also been a contributor to the encouragement and establishment of new goose populations over the last few centuries.

Geese are extremely adaptable and may use the food and protection provided by humans in urban landscapes for nesting, raising young, molting, feeding, and resting. This has led to increasing numbers of conflicts of Canada geese and people. (Smith, Craven, Curtis, 1998)

Results from an intensive statewide banding program conducted by CPW in 2000 provided a benchmark of approximately 17,400 to 26,100 resident Canada geese statewide, with much of the population residing along the Front Range. (CPW Colorado Resident Goose Management Plan April 2019)

F. Background of Goose Management in Denver Parks

Park visitors and resident Canada geese find city parks, golf courses and other recreational facilities such as picnic areas and lawns attractive and enticing, and potentially creating conflicts between the human park users and geese. Although other impacts are present, the most prevalent impacts of the resident goose populations are accumulations of feces in areas where park users are recreating in.

Canada geese are protected by the Migratory Bird Treaty Act of 1918. This Act gives the USFWS the authority to set limits, make regulations, and issue permits to harvest or take waterfowl. The year 2002, was the pilot year for using Colorado's federal permit allowing the oiling of Canada goose eggs along the Denver Metro and Front Range area.

II. Denver Parks & Recreation Resident Canada Goose Management Plan

The most effective approach to resolve the conflict between park users and the high populations of geese in Denver parks is to integrate a multi-strategy approach of using several methods of control simultaneously or sequentially. The best combination of effective management methods should be implemented in a cost-effective manner while minimizing potential harm to humans, the resident Canada geese and the environment.

An Integrated Canada Goose Management Plan is important to have in place for guidance to DPR management, park district field staff, and partner wildlife government agencies such as CPW, USFWS, and U.S. Department of Agriculture (USDA) to insure everyone is operating under the same guidelines and principles. The Plan will include a comprehensive description of DPR's goose management strategies and measures. The Plan will also provide for recording of all measures taken and their results and should reflect a progression of measures from non-lethal to lethal. All management measures will follow conditions as stated in the USFWS Resident Canada Goose Permit. Denver Parks and Recreation's management goal for resident Canada geese in Denver parks is to maximize recreational opportunities, habitat constraints and public tolerance, and to maintain a health citywide population of resident Canada geese.

A. Objectives

The objectives of Denver's Goose Management Plan are to 1) prevent current resident populations from increasing through using various methods and techniques, and 2) to define the public tolerance levels in an area for Canada goose populations and to maintain healthy goose populations that are consistent with the goal of this plan. Conducting a survey about public attitudes towards geese will also be useful in this process. Total elimination of geese from any area would never be successful, is unrealistic and would not be a desirable outcome by DPR.

B. Current Goose Management Strategies

The primary methods deployed by DPR include Egg Oiling, Hazing and Habitat Management. This multi-strategy approach is used to make geese as uncomfortable as possible to encourage them to leave, migrate or keep moving elsewhere.

Federal and State Wildlife Agencies approve of egg oiling and addling to help landowners respond to Canada goose issues and conflicts. Other agencies such as the Humane Society of the United States, US Department of Agriculture, PETA, and other animal welfare organizations approve of egg addling as a humane method of management for Canada geese.

1. Egg Oil Method

Since 2002, DPR has participated in CPW's Egg Oiling Program as a sub-permittee under their Federal Special Canada Goose Permit, which is the only approved lethal control method at this time for reducing goose populations on city park property.

Because geese tend to return to the area they were born in subsequent years, local breeding populations, as we've seen, can grow rapidly over time if geese are successful at nesting and raising their young. During the breeding season, March – June, staff and volunteers locate nests throughout the parks, and spray 100% grade corn oil on goose eggs. The corn oil blocks the air passages of the egg shell and prevents the embryo from developing. This method is quite successful due to the minimal disturbance to the nest, allowing the female goose to continue incubation of the treated eggs and minimizes her chance of re-nesting.

a. Results from Egg Oiling in Denver Parks

2002 to 2007 - Since the inception of this program within the Denver park system, past records of egg oiling were not found.

2008 - 166 goose eggs oiled with an approx. 15% gosling success
2009 - 185 goose eggs oiled with an approx. 30% gosling success
2010 - 2012 - no data found
2013 - 428 goose eggs oiled with an approx. 15% gosling success
2014 - no data found
2015 - 950 eggs oiled with an approx. 1% gosling success
2016 - 2,800 eggs oiled with approx. less than 1% gosling success
2017 - 3,834 eggs oiled with approx. 1.8% gosling success
2018 - 3,034 eggs oiled with approx. 1.4% gosling success

Since the adoption of the Egg Oil program in 2002, where approximately 200 eggs were oiled that first year at various parks, the

numbers of eggs oiled have consistently increased dramatically resulting in fewer gosling numbers.

2. Hazing Method

The second method of goose population control that DPR deploys is active hazing during the months when migratory goose populations have joined with the resident populations from September through March.

DPR uses a remote-controlled machine that is fiercely painted and looks like a predator called the *Goosinator.* The machine makes a noise that is undesirable to geese and chases the geese away from turf, water, snow, and ice. DPR has been using the *Goosinator* since 2013 and it has proven to be a successful tool in our attempt to haze geese from the more concentrated parks such as Washington and City Park. The *Goosinator* is deployed during the hazing season from September through March in parks that have a water feature. Washington Park, City Park and Sloan's Lake have been the priority locations for controlling goose populations where the larger numbers of geese have made those parks their home. In winter months from approximately November to February, the goose population can more than triple the resident population. The goal of the Goosinator is to encourage geese to keep moving period. Besides the direct impact of Canada geese residing in urban areas, they can act as decoys for migratory geese, causing periodic increase in urban goose populations. (Smith, Craven, Curtis 1998)

Although successful in hazing and moving geese around from location to location, the downside of using the *Goosinator* is that DPR does not have the required resources (personnel and funding) that's necessary to gain full potential results of the machine. Full potential of the *Goosinator*'s success in minimizing goose populations would require deployment at least 2 times a day, 4 to 5 times a week, using two machines at once. In addition, the park would have to change its traditional layout of landscaping, making a park undesirable for geese to be there. Landscape changes to traditional parks is an unrealistic expectation of park usage and another controversial issue amongst park users.

a. Goose Population Survey Results – Migratory Goose Season (Sept – March)

Goose Population Survey Results from 2015-2016
The *Goosinator* was deployed at 9 Denver parks: Washington Park, City Park, Sloan's Lake, Berkeley, Rocky Mountain, Harvey, Huston, Garfield, and Garland Park, resulting in approximately 11,000 geese that have been hazed with the *Goosinator*.

Goose Population Survey Results from 2016-2017
The *Goosinator* was deployed at 8 Denver parks: Washington Park, City Park, Sloan's Lake, Berkeley, Rocky Mountain, Harvey, Huston, Garfield, resulting in approximately 98,245 geese that have been hazed with the *Goosinator*.

Goose Population Survey Results from 2017-2018
The *Goosinator* was deployed at 9 Denver parks: Washington Park, City Park, Sloan's Lake, Berkeley, Rocky Mountain, Harvey, Huston, Garfield, and Garland Park, resulting in approximately 60,868 geese hazed.

Goose Population Survey Results from 2018-2019
The *Goosinator* was deployed at 9 Denver parks: Washington Park, City Park, Sloan's Lake, Berkeley, Rocky Mountain, Harvey, Huston, Garfield, and Garland Park, resulting in approximately 62,085 geese hazed.

3. Effectiveness of Various Strategies

Each Denver park and each local population of Canada geese are unique. As such, techniques that work best at one area may or may not be appropriate at another area. As an agency that has the responsibility to manage parks for the benefit of its users and the resource, we must be flexible in our approach to how we manage goose populations due to the differing and opposing opinions about geese. How DPR manages geese in Denver, has a cumulative effect on the overall Front Range and Colorado goose population that is accessible to other publics, such as hunters, bird watchers, wildlife lovers, and other outdoor and natural resource enthusiasts. It will be important to consider the overall effects of how DPR manages geese.

C. Executive Director and Deputy Executive Director of Denver Parks & Recreation Responsibilities

The DPR Executive Director and Deputy Executive Director will have the responsibility of making the final decision on implementation of a Management Plan pertaining to other forms of lethal control of resident geese in Denver parks. Those decisions will be based on assessment of the local resident Canada geese population, the impacts at each Denver Park and public acceptance of lethal methods.

When it is determined that resident Canada geese populations have no impact and control measures are not necessary, the current strategies for controlling goose populations will remain in effect and no plan for lethal control (other than egg oiling) is needed. For parks that have been identified as having major impacts to the landscape, safety or health hazards to park users, or for other extenuating reasons determined by the Executive and Deputy Director of Parks, the current control measures will be assessed for efficacy and may result in the consideration and implementation of lethal control measures. This Management Plan will be reviewed and updated annually by Denver Parks Natural Resources/Office of the City Naturalist.

D. Responsibilities of the Natural Resources/Office of the City Naturalist

The Wildlife Program Administrator under the Office of the City Naturalist will be responsible for the implementation, evaluation, and maintenance of DPR's Resident Canada Goose Management Plan. In addition, the Wildlife Program Administrator will provide the Executive Director and Deputy Executive Director of Parks, an annual report of goose population management measures, their effectiveness, and population numbers. Current data and research of goose management strategies used by other park and wildlife agencies throughout the states will continue to be assessed and considered in future management strategies of Denver Parks and Recreation.

E. Other Nonlethal Methods for Managing Geese in Denver Parks

The success of a cost-effective and implementable management plan for resident Canada geese depends on identifying the site characteristics of each park that attract geese (food, nesting structure, security, water, etc.) and the use of various techniques. Lessening the attractiveness of the site to geese may lessen the

goose population at that site. Nonlethal control techniques may include elimination of food handouts, exclusion, landscape modification, the use of frightening devices, hazing, and repellents.

Points to consider when deciding the appropriate technique to use in Canada geese management: A single, quick fix solution is unlikely to reduce goose problems over time. An integrated approach using several techniques in combination is much more likely to be successful in time.

- Timing is critical.
- Public relations or outreach is important to success.
- Use common sense.
- It is rarely desirable or possible to eliminate all geese in an area. Most management programs strive for maintaining a population or a reduction in goose numbers and related problems to a level that can be tolerated. "Tolerated" is subjective and will be different for each person. It is not DPR's mission to eliminate all geese from all parks.
- No matter what strategy is used (lethal or nonlethal), the plan is to use that method repeatedly, year after year. Funding allocated for this program will be imperative.

1. Elimination of Food Handouts

Feeding waterfowl and other birds is a popular pastime for many people and is a major cause of high urban bird populations, especially during harsh winters when natural food sources are in short supply. Canada geese do not need handouts to exist. Feeding waterfowl encourages them to congregate in an area and may make geese more aggressive toward people. (Smith, Craven, Curtis 1998)

2. Exclusion and Landscape Alterations

Can be very effective nonlethal techniques in controlling goose damage. Canada geese prefer to feed, roost, and loaf near water where they can escape if threatened. (Gosser, A. L., M. R. Conover, and T. A. Messmer 1997). ("Managing Problems Caused by Urban Canada Geese" Berryman Institute Publication 13, Utah State University). Techniques such as removing desirable habitat and landscape alterations can be costly, challenging and controversial amongst park users. Most park users prefer manicured, wide open spaces with mowed grass landscaping and water features which is

the perfect habitat for geese. Some areas within certain parks lend themselves to landscape modifications, where others do not.

3. Harassment

Other than the Goosinator, harassment techniques can be stepped up with the use of volunteers or park staff. Harassment through personal tactics such as redirecting geese out of an area using a variety of methods as needed to discourage them from moving/staying on the grass as geese leave the water and access the park. Examples may include using noisemakers, flags, etc. to warn the geese that they are not welcome in those areas. This would be performed by district or seasonal parks staff and possibly volunteers.

4. Mylar Tape or Flags

Mylar tape or Flagging has been used in some areas of parks. It may be installed around some of the lakes as needed and along the water's edge. Can be labor intensive however, because it should be moved every few days.

5. Noise Devices or Scare Techniques

Depending on park rules and regulations, other hazing and scare tactics can be used to frighten geese from problem sites such as pyrotechnics and noise devices. If implemented, these techniques would be performed by a trained park ranger, natural resource staff or wildlife service contractor.

6. Chemical Control Agents

Repellent treatment - Chemical repellents may be used as needed. Approved methods registered with the U. S. Environmental Protection Agency are ReJex-iT ®, GooseChase®, Goose-B-Gone®, and Bird Shield® and Flight Control®. Repellent treatment is most successful where smaller areas are treated; treatment of larger areas is not as effective a control. Only park staff who are certified to apply chemicals can apply these repellants. Some Denver parks are using repellants for goose management.

7. Removal/Relocation

Relocation of Canada geese in Denver parks was discontinued in 1999 by CPW for various reasons. This method of goose control was costly, labor intensive, no other states wanted Colorado's nuisance geese, and it required a special permit. The major problem with relocating geese to a new area is that geese imprint on the area they came from in an urban environment and return. Soon after this management strategy was discontinued, egg oiling was implemented.

8. Public Support

Besides hazing and egg treatment, the next most important part of a Resident Canada Goose Management Plan is public outreach and support. The public's understanding of the specific measures being performed, and their support of those strategies are necessary for the success or failure of a control program.

Funding for continued goose management activities are currently funded through the Natural Resource Operations budget, however additional funding sources will be necessary to continue the existing multi-strategy approach and implementation of new strategies and approaches (if and when appropriate) for managing geese in the city. Public acceptance of lethal control, partnerships and assistance from state and federal wildlife agencies, and Denver City Council support will also be sought.

9. Enforcement

Enforcement of the "No Feeding wildlife" policy by Denver Park Rangers will be enforced. New "No Feeding Wildlife" signs have been installed in the parks where goose management strategies are being used.

10. Education and Outreach

Notification boards, bulletin boards or goose management brochures could be utilized in/near high usage areas of each park to educate the public about DPR's Goose Management Program on a periodic basis. DPR's Goose Management Program outlining the strategies utilized to manage geese could be added to the Natural Resources already existing educational programs and displays. This material would be prepared and maintained by The Office of the City Naturalist staff.

Although not a goose population management method, DPR will seek new ideas and technology for addressing the goose poop situation in the parks. Possibly the use of different maintenance equipment such as sweepers, blowers or vacuums to keep the sidewalks and park paths free of goose poop.

F. Removal through Capture and Euthanization

It is important to understand the differences between dispatching geese and capture and euthanization. Dispatching removes selected individuals from a population of geese to reinforce pyrotechnics and to remove problem individuals. Capture and euthanization removes and eliminates an entire population of geese.

The opinions about how to manage goose populations in urban settings varies. There are those who have an expressed opposition to the culling of geese, those who express their desire for taking more drastic measures to manage populations, those who believe capturing and relocating to another area will alleviate damages and threats to human safety, and those who believe that culling goose populations will remedy goose damage. (Gosser, Conover, Messmer 1997)

Annual roundups and euthanization have been criticized as inhumane. Critics claim that these measures do not permanently rid a community of Canada geese; they only clear the habitat for other geese to move in the following year. DPR has participated in past goose roundups and relocation and this program was unsuccessful. Humane organizations maintain that by stopping the feeding of geese, habitat management, use of chemical repellents, and diverting birds to other areas will be enough to manage any resident Canada geese population. Some organizations even oppose removal of individual geese from a local population. A few organizations will claim treating eggs is not considered a humane management method.

Process for capture and euthanasia - When all other management methods for controlling resident Canada goose populations fail, capture and euthanization may be a viable alternative. Resident geese are usually captured by herding into a corral or fenced area and then carried into a trailer and taken off site. This method would be performed by the U.S. Department of Agriculture/Animal & Plant Health Inspection Service (APHIS). The time for capturing resident Canada geese is during their molting period, from June through July/August. Migratory Canada geese would not be affected since they are only present in Colorado from

mid-September through March. Once captured, it is the preference of DPR Management, that goose carcasses be utilized.

The advantage of this lethal management is that it is applied directly to the problem goose population, its effects are obvious and immediate, and carries no risk that the geese will return immediately or move and create conflicts elsewhere. However, the possibility of another population re-establishing is possible over time.

Because these measures are, however, subject to much public criticism, and opposition, and is a solution that will require yearly maintenance, the final determination to capture and euthanize resident Canada geese at any one park would have to be a decision made and endorsed by the DPR Executive Director and Deputy Executive Director. (See II C - Executive Director and Deputy Executive Director of Denver Parks & Recreation Responsibilities) before implementation. The plan must include documentation as to dates, times, places, and persons where non-lethal and lethal measures had been used and were not successful. The plan would also include how the birds would be rounded up, penned, shipped and finally euthanized in a humane way. If the birds are to be processed for human consumption, the name of the processing location, costs and final distribution location must be included in the request. If the birds are to be destroyed, the disposition of the dead birds must be indicated.

The Office of the City Naturalist would either acquire a Depredation Permit from USFWS or fall under a Depredation Permit of the USDA-Wildlife Services, or CPW.

The Annual Depredation permit issued by the US Fish and Wildlife Service authorizes the take of a specific number of Canada geese each year.

G. Record Keeping and Reporting

If DPR acquires a Depredation Permit, DPR will be required to submit an annual report to the US Fish and Wildlife Service detailing activities, including the time, numbers and location of birds, eggs, and nests taken and non-lethal techniques utilized, before the end of each year. (50CFR21.26) If DPR is operating under USDA-Wildlife Services or CPW's Depredation Permit, those numbers will be recorded on that agencies permit.

A log will be maintained for each park implementing/continuing goose control measures to record the number of nests, eggs and geese affected, time, date, and location of use. These logs will be maintained and kept for a minimum of five (5) years, as required by US Fish and Wildlife Service. These records provide

valuable information regarding geese populations at specific areas. Although the US Fish and Wildlife Service indicate record retention for five years, records may be maintained longer to support specific management strategies for resident Canada geese populations.

At the end of each year, the Wildlife Program Manager of the City Naturalists Office will submit a final report of goose management activities to the Executive Director and Deputy Executive Director.

Wildlife is regarded as providing ecological, educational, economic, recreational and aesthetic benefits, and there is enjoyment in knowing that wildlife exists and contributes to natural ecosystems. Canada geese, like all wildlife, provide people with a valued connection to nature, wildlife viewing opportunities, and they contribute to the quality of life in the City and County of Denver and the state of Colorado.

This Plan has been approved and endorsed by the DPR Executive Director and Deputy Executive Director.

III. Appendices

A. Methods of Control Available to reduce goose damage

1. Eliminate Artificial Feeding
2. Habitat Modification
3. Harassment
4. Chemical Repellents
5. Lethal Management
6. Methods that ARE NOT recommended

1. Eliminate Artificial Feeding

All artificial feeding by park users should be stopped immediately. New signs have been posted in the parks that say, "Do Not Feed Waterfowl." People who feed the geese need to be educated about the problems they are creating. When fed by hand, geese become concentrated, making them more aggressive toward people because they are expecting to be fed. Hand feeding also makes geese more susceptible to diseases, such as avian botulism and avian cholera. Moreover, artificial feeding, especially with bread, rarely provides the proper nutrients that geese require. Park Rangers will enforce this rule.

2. Habitat Modification

Habitat modifications can either be permanent or temporary. For many of the parks permanent modifications will be costly and inappropriate. Where site renovations and re-landscaping are being planned, considerations should be made to incorporate permanent habitat modifications into the landscape design. When permanent modifications are inappropriate, temporary modifications may be considered and used.

Permanent Modifications

Canada geese provide an excellent example of a wildlife species whose behavior can be somewhat modified by managing the landscape. They not only prefer to walk between water and land but also must be able to walk to grazing areas when molting or escorting goslings. Habitat modifications can be made that eliminate or reduce those landscape features that geese prefer and/or add specific features that make a site appear inconvenient or unsafe to geese. The following landscape principles can be effective in minimizing the attractiveness of an area to geese.

- Reduce sightlines to less than thirty feet
- Use landscaping that physically reduces access to forage areas
- Reduce the size of foraging areas
- Reduce the palatability of the forage vegetation. Use coarse grasses rather than the goose preferred grasses like Kentucky Blue, fescues or timothy.

Grasses and shrubs that grow as little as eighteen inches high can be placed in a ten-foot band at the water's edge to serve as a deterrent to geese. These grasses and shrubs will impede their access to grazing and block their view of predators. There are side benefits to this kind of landscape alteration as well. It reduces mowing, filters the runoff of fertilizers and herbicides from lawn surfaces, increases habitat for other wildlife species such as songbirds, and has an aesthetic appeal to many that is more satisfying than the homogeneous and neatly trimmed lawn run down to water's edge.

Canada geese prefer a gentle, grassy slope coming out of the water that enables them to easily walk into and out of the water to feed or rest. If access to the water is poor, the adult geese may leave that area to raise their young elsewhere. To steepen the shoreline, a vertical seawall about 3 feet above the surface of the water may be built or create a 63-degree angle slope from the water's edge. Riprap, while ineffective on gentle slopes, is often effective on steeper ones.

Canada geese typically prefer to use a route from a body of water that allows them a clear view of predators. By planting large, dense shrubs or placing large rocks (2 feet in diameter or more) along a shoreline; a barrier is created that geese will be reluctant to penetrate.
Note: Sometimes giant Canada geese adapt to rocks and vegetation barriers. If so, fencing may need to be added.

Using Plants as Management Tools

Planting with vegetation that is undesirable to geese may discourage them from remaining in an area.

Geese prefer:

- Kentucky bluegrass (Poa pratensis)
- Brome grass (Bromus inermis)
- Canary grass (Phalaris arundinacea)

Geese do not prefer:

- Yellow indiangrass (Sorghastrum nutans)
- Switchgrass (Panicum virgatum)

- Timothy (Phleum pretense)
- Perennial ryegrass (Lolium perenne)
- Perennial bent grass (Agrostis palustris)
- Quackgrass (Briza maxima)
- Red fescue (Festuca rubra var. rubra)
- White clover (Trifolium repens)
- Indian blanket (Gaillardia pulchella)
- Prairie cordgrass (Spartina pectinate)
- Nebraska sedge (Carexnebrascensis)
- Common rush (Juncus effuses L.)

Temporary Modifications

Permanent habitat modifications may not be acceptable because of the costs associated with these changes or because of new landscaping. Temporary measures may be just as effective as permanent modifications. Fencing acts as a sufficient barrier, and while it lacks many of the side benefits of habitat changes; it can be put up before nesting season to discourage geese and then removed when nesting has begun elsewhere. Fencing is also effective during the flightless periods. This allows grass and shrubs to grow in ten-foot bands around ponds. These will impede goose access to grazing areas and block their view of predators.

Water Surface Covering

Canada geese may be excluded from ponds using overhead wire grids or "ball blankets. Wire grids and "ball blankets" with balls approximately five inches in diameter work best on small ponds but may be considered aesthetically unappealing to some people. Both the grids and blankets will make a pond unusable for boating, swimming, fishing and other water type activities.

3. Harassment

Canada geese seek areas where they can go about their daily activities with minimum disturbance. If someone or something bothers them enough, they usually will find another area where they will not be disturbed. However, they sometimes become accustomed to some harassment techniques when they learn they won't be harmed.

Mylar Tape, Flagging and Balloons

Mylar tape, flagging and balloons are visual deterrents that can be used in conjunction with other exclusion methods. Mylar tape is ½ inch wide, red on one side and shiny on the other. To use Mylar tape as a fence, string one or two strands between two posts and twist the tape two or three times. When

the wind blows, the tape rotates; balloons and flagging will create a flashing action. This unfamiliar flash acts as a visual barrier and makes the geese shy away from the area.

Harassment techniques usually will not stop damage once it has started. They are, however, useful in preventing damage before it begins. If Canada geese were raised in an area or have become accustomed to using it for feeding, they will be more difficult to move.

Dogs

Using dogs to harass geese from an area is a popular method of hazing geese. While some nuisance animal businesses use highly trained border collies, just about any athletic, medium-large dog capable of obeying commands can be used. Control of the dog is vital because dogs used in this manner are legally considered an extension of your hand and must not be allowed to catch, injure or kill a Canada goose. DPR has chosen to use the Goosinator in place of a trained dog, as both operate in the same manner, stocking the geese and chasing them off an area. As with the Goosinator, harassment must continue and be repeated until the geese leave the area permanently. State regulations prohibit the use of dogs to harass geese from April 1 to July 31.

DPR will begin a pilot project in 2017-2018 using trained dogs on Park Golf Courses.

Pyrotechnics

Although not all geese react to pyrotechnics, most do. Pyrotechnics are specially designed Class C fireworks that are used to frighten wildlife. The types of pyrotechnics in this class include:

- Shellcrackers, firecrackers fired from a 12-gauge shotgun

The distance a pyrotechnic device will travel varies from 50 to several hundred yards depending on manufacturer and type. Check with the manufacturer to be sure that the appropriate device fits your needs. Individuals using pyrotechnics should be trained in their use and should wear eye and ear protection. Be cautious when using them in populated areas. Pyrotechnics are enhanced when used with dispatching individuals from the general goose population. Used alone, geese get habituated to the noise produced, but when individuals are removed from that same population the fight or flight response is maintained.

Chasing

Chasing geese on foot or in a golf cart is labor intensive; but in conjunction with other harassment methods, it can be successful if people are persistent. The idea is to chase geese long enough to cause them to go elsewhere, where they can live without being chased. This could possibly be a method done by volunteers.

Lasers

It has been found that lasers can be used effectively to harass and scare off resident geese. The lasers are used at dawn, dusk, and at night during the times that flocks of geese are preparing to bed for the evening. The geese think that the lasers are predators and will not land for the evening. Lasers are an alternative to pyrotechnics and propane cannons when the effect of noise from these other techniques is undesirable.

Other Techniques

Other techniques that can be used to harass Canada geese include:

- high pressure water sprayers
- air horns
- beating pots and pans together (more for private landowners)

When coupled with other techniques, they encourage Canada geese to move from an area. The key is to be more persistent than the geese are. The mentioned harassment techniques are legal and cannot physically harm the geese.

4. Chemical Repellants

Chemical repellents applied to lawns and other vegetation where there are high numbers of geese do work. These repellents are water soluble; therefore, moderate to heavy rain or daily watering and/or mowing will remove them from treated vegetation and additional applications may be required. These chemicals cause geese to move to nearby untreated areas. Chemical repellents work best when smaller areas are to be treated. Treatment of larger areas is less effective.

Methyl anthranilate is a registered repellent for Canada geese, which is marketed under the trade names ReJeX-it, GooseChase, Goose-B-Gone, and Bird Shield. These products help change the bird's behavior. When applied to grass where geese feed, methyl anthranilate makes the grass unpalatable. Geese may still frequent the treated area, but they will not feed there.

Anthraquinone, trade name Flight Control has also been used for Canada geese control. Anthraquinone repels geese in two ways. First, geese experience a harmless "gut reaction" after eating the grass. Secondly, the grass appears unnatural and uninviting because the chemical brings out the ultraviolet spectrum when applied to turf. The combined strange look of the grass with the intestinal reaction experienced, geese will look elsewhere to loaf and feed. Flight Control will not wash off after a rain but needs to be reapplied after mowing. This chemical has low toxicity to birds and mammals.

5. Lethal Methods

Lethal methods to control resident Canada geese include nest/egg destruction, live capture and transportation to poultry processing facilities, live capture and euthanization, and dispatching (shooting). Lethal methods are allowed year-round with a permit from the U.S. Fish and Wildlife Service.

Nest & Egg Destruction

Addling, oiling, freezing, or puncturing prevents the embryo from developing. Egg destruction can reduce production of goslings, which slows the rapid growth of local goose populations and eliminates the aggression of adult geese protecting their young. Oiling is the only approved lethal method used by DPR by spraying the eggs with 100% grade corn oil using a sprayer. Allows for minimal disruption to the nest and incubation process minimizing the female goose from abandoning the nest.

Dispatching (Shooting)

Dispatching geese can be highly effective in removing individual birds from specific areas and in supplementing harassment. Shooting a few individuals from a large flock can reinforce birds' fear of pyrotechnic techniques. The birds do not know when the noise is fake or a real danger. Taking geese in this manner is used to reduce goose problems when lethal methods are determined to be appropriate. Hunting is not allowed in the City and County of Denver therefore this method will not be an option for DPR.

Capture and Euthanize

The most efficient way to reduce the size of an urban-suburban flock of resident Canada geese is to increase mortality among adults. Hunting is the major cause of goose mortality, but geese may seldom be available to hunters in an urban or suburban environment. For the purposes of lethal control, resident geese are usually captured by hand. Resident Canada geese would

primarily be captured from June through August and would not include migratory geese. Migratory Canada geese are present in Colorado from mid-September through March. Once captured, geese would either be shipped to poultry processing locations for processing for human consumption and donated to charitable organizations or euthanized and either buried or incinerated.

The advantage of this lethal management is that it would be applied directly to the problem goose population, its effects are obvious and immediate, and carries no risk that the geese will return or move and create conflicts elsewhere. If this method were to be considered for DPR, a contractor such as USDA-Wildlife Services would be the lead role along with support and direction from CPW.

6. Methods that ARE NOT recommended

The methods listed below are often asked about but are not recommended:

Plastic Scare Devices
Plastic swans, alligators, owls, snakes and dead goose decoys, as a rule, have not proven to be effective in repelling Canada geese.

Windmills
Recently windmills have been offered for sale to use to discourage geese from using areas. These devices have been found to be poorly constructed and will not last.

Mute Swans
Live Mute swans are ineffective at preventing Canada geese from using or nesting on ponds. Additionally, swans can be aggressive towards humans and may have undesirable effects on native aquatic vegetation. The use of mute swans as a Canada geese damage management technique is ineffective and is not recommended.

Capture & Relocation
Capture and relocation of nuisance geese is commonly requested. This is not a viable solution for adult geese because the birds imprint on the area where they learn to fly, and most will return to the capture site or a similar setting.

Since giant Canada geese already occupy virtually all suitable habitats, there is limited opportunity to relocate juvenile geese without creating similar problems at release sites. Relocation is effective for young juveniles because they imprint on the release area where they learn to fly rather than returning to the area where they were captured.

Toxicants

There are no toxicants registered with the Environmental Protection Agency for controlling Canada geese in the United States.

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