CITY OF EDEN PRAIRIE

CANADA GOOSE MANAGEMENT PLAN

June 11, 2008

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1.0 INTRODUCTION TO THE CANADA GOOSE

The Canada goose is the most widespread and abundant North American goose, found in every state and Canadian province at some time during the year. In spring, the species breeds from Labrador, throughout the high Canadian arctic islands to Alaska, south to California, and eastward to Georgia. Wintering Canada geese are found from southeastern Alaska to Hawaii and northern Mexico eastward to Massachusetts and Florida (Bellrose, 1976). The Canada goose is one of the earliest spring migrants, first among Midwestern waterfowl to return to the breeding grounds.

Current surveys indicate that the species exceeds 4 million individuals. At one time virtually extinct, the Canada goose was re-established over much of its former range by the US Fish and Wildlife Service (USFWS), state wildlife departments, and conservation clubs. The population, particularly in urbanized areas, is now growing exponentially. The Minnesota wild giant Canada goose population went from zero in 1954 to more than 360,000 in 2004.

The Canada goose shows great variation in body size and regional differences in plumage, bill shape and call. One resident and three migrant Canada goose subspecies are found in Minnesota. These include Richardson's goose, Canada goose and Todd's Canada goose. The largest birds average 12 to 14 pounds, although some weigh up to 18 pounds.

Mowed lakeshores, parks and golf courses provide an abundance of brood-rearing habitat and food sources. Predator densities are low, hunting is limited and the bird is unaffected by most human activities. As such, the bird has become supremely adapted to an urban environment. When Canada geese damage crops, golf courses, parks; reduce water quality; or endanger human life on roads and airports, intensive management programs are needed.

1.1 Nesting

Female geese build the nest and incubate the eggs without direct aid from the gander (the male). The gander guards the female from disturbance by other mature pairs and assists the female in protecting the eggs, and later, the goslings. Eggs are laid as soon as there is open water for mating and snow-free nest sites. It is not unusual for the birds to continue nesting in spite of temperatures as low as zero degrees Fahrenheit and snowfalls up to 10 inches.

Pair bonding takes place in spring among young geese at 1 or 2 years of age. The pair remains steadfast until the death of one of the members. There are no known cases where a female has successfully nested after the death of her mate.

Nests are typically built on isolated sites separated from adjacent dry land by a moat of open water; this could include nesting islands, beaver lodges or sedge hummocks. Females often use the same site year after year or alternate between 2 nest sites in close proximity. Young females nesting for the first time attempt to nest close to the location where they were reared.

The female incubates from 97 to 98% of the day, taking only one or two brief recesses from incubation. Because she feeds so little, the female can lose up to 30% of her body weight during incubation and is within 4-10 days of starvation when the eggs hatch.

Canada goose nest success normally ranges from 60 to 80%. On average, 4 goslings are hatched per successful nest. Nests can be lost to predators such as coyote, fox, skunk, raccoons, crows,

ravens and large gulls. Nests can also be lost to flooding or desertion (usually due to interference by adjacent territorial pairs).

1.2 Brood-Rearing

Once the young have hatched, the family abandons the nest site and travels overland, up to 5 miles in the Twin Cities Metropolitan Area (TCMA), to a suitable brood-rearing site. Most commonly, brood concentration sites have expanses of grass (such as bluegrass turf) where visibility is good, food is abundant and open water is only a short run away. Geese are social animals and flocks can exceed 100 or more birds.

1.3 Molting

Five weeks after hatch, the breeding female loses her flight feathers and enters what is termed a molt period. The male molts 4 to 10 days later. Both remain flightless until the young can fly, which is approximately 9 to 10 weeks of age. Because of the energy and nutrients needed to replace the adults' flight feathers and for the goslings to grow from fist-sized to nearly full-grown in less than 10 weeks, large quantities of forage must be consumed during this period.

1.4 Goose Damage

Damage complaints due to Canada geese have been filed for damage to crops, golf courses, lawns, gardens, decks, vehicles, ponds and lakes due to feeding habits, excretion of fecal matter and walking or flying into traffic. When human health or safety is endangered, intensive management programs are often needed.

Goose digestive systems are relatively inefficient and results in production of approximately 3 to 4 lbs. of droppings or fecal matter per day. The amount of droppings produced can reduce water quality in lakes and ponds adjoining brood-rearing and feeding areas. In 1994, Manny, Johnson, and Wetzel found that goose droppings were contributing up to 70% of the phosphorus entering a small Michigan lake. The goose serves as a transport vector, moving nutrients derived from upland grass into or near a wetland, pond or lake. The potential for impact depends on size of goose population, volume of water, time spent on the water body and water inflow and outflow.

In summary, the Canada goose has adapted to both highly human altered and wilderness settings. Predation is low, hunting is limited by human safety, and the bird is unaffected by most human activities.

Table 1 - Canada Goose Damage Reported in 1998 in the Twin Cities Metropolitan Area (Government and Non-governmental organizations)

Damage Type	Number
Grass damage	40
Decreased water quality	34
Road Traffic Hazard	32
Droppings on residential yard	30
Droppings on playground	25
Droppings on public park	25
Damage to gardens	25
Droppings on golf course	24
Attacks on people	24
Droppings on commercial property	21
Droppings on swimming beach	19
Shoreline erosion	17
Other	4

2.0 EDEN PRAIRIE INFORMATION

No comprehensive surveys of the Eden Prairie Canada geese have been done previously. Using University of Minnesota Extension Service (UMES) data, Department of Natural Resources (DNR) goose damage databases and additional sites provided by City of Eden Prairie staff, 101 potential goose damage locations were identified. The sites evaluated include marshes, lakes and ponds that were greater than ½ acre in size. These sites were visited during the June through July and November 2004 periods. Sites with evidence of summer goose use were visited again June through August in 2005.

Goose broods were sighted at 46 wetlands in Eden Prairie, with more than 400 non-breeding birds found at Purgatory Creek Park alone in the summer of 2004. Among the 101 sites evaluated, 57 ranked high or excellent quality for summer use, 66 ranked moderate to excellent quality for fall use and none were ranked as high or excellent quality for over-winter use due to the lack of open water in the winter. Summer complaints for goose damage, health safety risks or aggressiveness were recorded at 60 different sites.

Canada goose damage was first reported in 1986 at the Olympic Hills Golf Course. A trapping program was implemented and 134 birds were captured and relocated in 1987. Removals at the course continued until 1995, when the population stabilized at approximately 34 geese. Since that time a dog has been used to harass and disperse the geese to adjacent wetlands.

The first removal for management of goose damage and beach health concerns occurred in 2000 at Round Lake Park. The summer population of geese at Round Lake has declined from 52 in 2000 to 5 in 2005. Since 2000, the City has expanded its program to more than 20 locations. A total of 86 goose damage locations have been identified based on complaints made to the City, DNR and UMES or The Canada Goose Program between 1982 and 2005.

Based on an ecological impact assessment survey of 48 TCMA municipal governments, lakeshore homeowner's associations and corporations reporting goose damage in 1997, a median economic loss of $2,001 to $5,000 for Canada goose damage sites was estimated (University of Minnesota, 2001). Based on this estimate, the cost of the damage in Eden Prairie was estimated as between $172,000 and $430,000 per year, not including the cost of harassing birds at Flying Cloud Airport. The

2.1 Summer Goose Population

In summer 2004, the population was near 1,550 (9% of the TCMA population) and goose broods or goose damage were found at 86 Eden Prairie water bodies. Sites ranked as high for damage during the summer included Purgatory Creek Park, Round Lake, Duck Lake, Hidden Ponds, Bearpath Golf & Country Club, Bryant Lake, Water Treatment Plant, Emerson-Rosemount property, GMAC-RFC property, Mitchell Lake / Miller Park, Olympic Hills Golf Course, Smetana Lake, Red Rock Lake and the intersection of Highway 5 / Prairie Center Drive.

Eden Prairie has an abundance of high quality breeding and broodrearing sites for Canada geese. Among the 101 sites evaluated 20 ranked high and 14 excellent for goose nesting. Goose broods and flightless adult geese in summer require areas with open water and shorelines with ample grass for food. Among the 101 Eden Prairie summer sites evaluated, Purgatory Creek Park, Round Lake,

Duck Lake and Lake Smetana ranked as excellent and 57 sites ranked as high for goose broodrearing. The Minnesota River Valley also supports a goose population but is relatively light (85 geese counted by aerial survey)

2.2 Fall Goose Population

There are 23 excellent and 18 high quality fall use sites in the city. In fall 2004 large numbers of flying geese populations were identified at:

- Purgatory Creek Recreation Area (200-600 birds)
- Olympic Hills Golf Course (up to 300 birds)
- Eden Prairie High School (75-400 birds)
- Bearpath Golf and Country Club (100-150 birds)
- Eden Lake School (50-150 birds)
- Eden Lake Park / Eden Lake School (100-300 birds)
- Eden Prairie High School (50-150 birds)
- Prairieview School (up to 150)
- Prairieview Park (up to 150 birds)
- Round Lake Park (up to 100± birds)
- Flying Cloud Airport (up to 500 birds) (the Airport has their own goose management program)

Summer and fall goose use typically extends to neighborhood businesses, streets, and highways, especially in locations such as the Purgatory Creek Recreation Area.

3.3 Goose Complaints

There are 86 Eden Prairie locations where complaints were recorded by the City, DNR, UMES, or The Canada Goose Program during the 1982 to 2005 period or from the field assessment conducted for this plan. Complaints included:

- Residential (35)
- Business / Commercial (16)
- Parks (11)
- Golf courses (4)
- Beaches (3)
- Schools (3)
- Highways (3)
- Churches (1)
- Water treatment plant (1)
- Nature center (1)
- Airport (1)

In most cases, the complaint arose from both the physical impact of grazing on turf and the impact of the goose droppings. For example, concern for contracting disease from droppings was expressed in 14 cases.

3.0 DATA COLLECTION

A comprehensive survey of the Eden Prairie Canada geese was done by The Canada Goose Program in 2004 and 2005. University of Minnesota Extension Service (UMES), DNR goose damage databases, and data provided by City of Eden Prairie staff were used to identify potential goose damage locations.

3.1 Draft Plan Preparation / Data Collection

All data used to prepare this Plan was collected by James A. Cooper, Ph.D. with The Canada Goose Program, Inc. The data was compiled and submitted to the City in December 2007 by Dr. Cooper and Erin Cooper of The Canada Goose Program. City staff edited the draft plan and information submitted and this report is a compilation of both the data provided and that collected by staff.

3.2 Field Survey

A total of 101 potential locations were identified and visited during the June through July, and November 2004 periods. Sites with evidence of goose use were surveyed again in May through June 2005. To assess fall damage, managers of golf courses, schools with playgrounds and athletic fields, large parks, and the Flying Cloud Airport were contacted by phone, followed by a site visit to reported damage sites in November 2004.

In comparison with most TCMA cities, Eden Prairie has an abundance of high quality breeding, summer broodrearing, and fall sites for Canada geese. Among the 101 sites evaluated:

- Goose Nesting – 20 sites ranked high and 14 excellent for nesting.
- Goose Broodrearing – 57 sites ranked either high (24%) or excellent (33%) for goose broodrearing. Purgatory Creek, Round Lake, Duck Lake, and Lake Smetana in particular ranked as excellent.
- Fall Use / Grazing - 23 sites ranked as excellent and 18 as high quality for fall usage. Major fall goose concentrations were identified at the Olympic Hills Golf Course (up to 300 birds), the Bearpath Golf Course (100-150), Eden Prairie High School (75-400), Eden Lake School (50-150), Prairieview School (up to 150), Purgatory Creek Park (200-600), Eden Lake Park (50-150), Prairieview Park (up to 150), and Round Lake Park (approximately 100).

In the Purgatory Creek Park area, both summer and fall goose use extends to neighborhood businesses and streets.

4.0 CANADA GOOSE MANAGEMENT REGULATIONS

The Canada goose is a migratory bird protected by federal and state law. The Migratory Bird Treaty Act of 1918 prohibits the taking of migratory birds and their nests and eggs except during established hunting seasons or by USFWS permit. Activities covered by permits include capture and banding (Banding Permit), collection for scientific or educational purposes (Scientific Collecting Permit), removal of eggs from wild nests and possession of captive birds by aviculturalists (Special Purpose Permit), and the removal of birds, nests or eggs to protect people or property from damage (Depredation Permit).

Due to the rapid expansion of Canada geese and the concurrent increase in requests for depredation permits, the USFWS has implemented a policy allowing states broader authority to address goose damage under a 5-year Resident Canada Goose Permit. The precedence for issuing a depredation permit was upheld in federal court under *Humane Society of the United States vs. USFWS.* Currently this permit is being used in states such as Minnesota where an urban Canada goose management plan has been prepared.

Minnesota statutes also protect migratory birds. The Minnesota Department of Natural Resources (DNR) was established as the regulatory authority to review and issue permits to manage goose populations (Appendix A). The legality and humaneness of the procedures used in the Twin Cities were upheld in state court by *People for the Ethical Treatment of Animals (PETA) vs. the DNR and the University of Minnesota.*

More information on state and federal provisions and permits can be found online at the following websites.

U.S. Fish and Wildlife Service:
http://www.fws.gov/
http://www.fws.gov/migratorybirds/issues/cangeese/finaleis.html

State of Minnesota
http://www.dnr.state.mn.us
http://www.revisor.leg.state.mn.us/stats

5.0 CANADA GEESE AND PUBLIC HEALTH

Due to their inefficient digestive systems, grazing habits and molting patterns, geese do pose a risk to human health and safety. Canada geese can also cause a deterioration of water quality in ponds or lakes that support geese.

5.1 General Health Risks

Potential health risks posed by the abundant droppings of the Canada goose are a relatively untouched area of study as the urban goose concentrations are a relatively new phenomenon. Human pathogens, such as *Giardia sp*. and *Cryptosporidium sp.* have been found in goose droppings in New Jersey Canada goose droppings (New Jersey Wildlife Dept.), although the longevity of the pathogens in the droppings or the likelihood of human ingestion or inhalation were not studied.

A study conducted in London, England (Feare et al. 1999), where introduced Canada geese are also causing damage in urban parks and at airports, showed that bacterial species such as *E. coli* and *Salmonella* sp. remained viable in Canada goose droppings for at least a month after they were deposited. Because fecal material is readily transferred to human hands by the handling of soccer and other game balls, the authors concluded that pathogens present in waterfowl droppings constitute a potential health risk to humans using parkland for recreation activities.

Locally, high fecal coliform levels attributed to goose droppings have been identified in lakes in the Twin Cities Metropolitan Area, including Round Lake in Eden Prairie. These findings have resulted in mandatory beach closures after analysis of water samples by the Minnesota Department of Health for lakes such as Round Lake.

Due to the fact that it is possible to contract disease from goose fecal matter, following are general recommendations for areas where these droppings may be present.

- Wash hands, clothes and sports equipment immediately after exposure
- Small children, pregnant women or immune-compromised individuals should avoid areas with high concentrations of droppings
- Small children who may put hands in their mouths should not be placed in contact with these areas

5.2 Avian Influenza Risks

Currently there is serious concern and research on the potential pandemic threat of avian influenza (otherwise known as bird flu or the H5N1 virus). At present, there appears to be three likely scenarios for bird flu. From best to worst they are:

1. The virus will loose it virulence and while still spreading be less of a threat to humans and birds. This is hypothetical, based on changes between influenza strains found in the past and current flu outbreaks.
2. The virus will remain as it is and be spread widely by migratory birds. Management of bird/bird and bird/human contacts is and will continue to be required to follow the spread of the virus and will be important if the virus reaches Minnesota.

3. The virus will mutate and be transmitted human to human. This could produce a worldwide pandemic and would need to be addressed by the development of effective rapid quarantine methods and production of a vaccine.

There is a high likelihood that H5N1 will be brought to Minnesota by migratory birds. The Tundra swan is a likely vector candidate and their migratory route includes Minnesota in both spring and fall where they mingle with migrating geese. Ducks may also carry the virus to the Midwest. There are a number of measures that are and should be done now.

- Monitor for the virus. The DNR and the Canada Goose Program, Inc. agreed to cooperate with the University of Minnesota's H5N1 monitoring program beginning in summer 2007.
- Determine where humans would be exposed to infected birds. Unlike the current situation overseas, where human contact has been primarily with infected domestic poultry and waterfowl, North American exposure is likely to come from wild bird populations as most domestic North American fowl are reared indoors. Top among the wild birds that have the potential to transmit the virus to humans is the Canada goose. This is because viruses are common in geese and other waterfowl, are shed in the droppings, and Canada geese concentrate droppings in numerous public areas that are frequently used by people.

If bird flu were detected, The Canada Goose Program recommends that a massive goose reduction program be implemented to reduce the chance of human-goose dropping contact in parks, playing fields, beach areas and others. In addition, goose harassment should be used in areas where geese remain on or near playing fields, beaches or others to further limit human exposure to the droppings.

Additional information on the avian flu and its risks can be found at the following web sites:

U.S. Center for Disease Control
www.cdc.gov/flu/avian/

U.S. National Wildlife Health Laboratory
www.nwhc.usgs.gov/research/avian_influenza/avian_influenza.html

U.S. Occupational Safety & Health Administration
www.osha.gov/dts/shib/shib121304.html

U.S. Fish and Wildlife Service
www.fws.gov/migratorybirds/issues/AvianFlu/WBAvianFlu.html

6.0 TCMA CANADA GOOSE MANAGEMENT PROGRAM

In 1982 when it became clear that the Canada goose population was negatively impacting people and the environment, the DNR took the lead in developing an urban Canada goose management program as well as joining U of M and UMES cooperative research program. The DNR has established an Urban Goose Management Plan for the Twin Cities Metropolitan Area (TCMA). This Plan includes information on:

- Canada goose history and biology
- Social goose carrying capacity within the TCMA
- Rationales for management technique recommendations
- The damage site management decision making process
- Policies for goose hunting and goose removal
- Requirements for goose removal contractors
- Population management

Central to the management plan is the acceptance of the fact that the biological carrying capacity (the level the goose population would reach if left alone) far exceeds the social carrying capacity (the number of geese people will tolerate). The former has been estimated at 400,000 to 500,000 birds in the summer, the latter at 25,000 in the summer.

The decision-making process for dealing with goose damage was adapted in 1982 from the DNR's urban deer control policy. This policy requires that where a hunting harvest cannot be used to manage a wildlife population, the local governmental unit (usually a city council or township board) must establish population goals, select control procedures, fund the operational phase and evaluate the program. Procedures must comply with state and federal statutes and permit requirements. The DNR, USFWS, and the UMES provide technical input, and a contractor provides operational assistance and evaluation.

A goose hunting policy was adopted state-wide in Minnesota in 1994. Based on the distribution of open space, metropolitan area municipalities are classified by the potential for safe hunting. Priorities are set for removal of problem geese based on the potential for hunting harvest. Assistance in determining the potential for safe hunting is provided by DNR Area Wildlife Managers.

7.0 CANADA GOOSE MANAGEMENT ALTERNATIVES

7.1 Current Goose Management Program

Successful management of the goose population typically includes a mix of management measures. The City currently utilizes public education on how to manage geese, trapping and removal of adults and young in summer and allowing sport hunting wherever it can be done safely (such as in the Minnesota River floodplain).

The City has a private / public management program for trapping and removal of geese. Private businesses or individuals who wish to participate in the program, either for a survey of the property or collection of geese due to damage to property, must complete a Wildlife Management Report Form. The form includes a requirement that alternate measures used on site to manage geese be listed and incorporated where feasible. The form is available on the City's web site and through Environmental Services. Federal authorization of goose population management is based on the depredation provisions of the Migratory Bird Treaty Act. This means that a goose damage management program must be complaint-based.

7.2 Habitat Modification

A comprehensive evaluation of the utility and effectiveness of habitat modification is lacking. However, the University of Minnesota did use TCMA goose population, goose damage, and wetland data to assess the potential biological and economic efficacy, social acceptability, and application of landscape alterations as an urban goose management tool.

Potential alterations of Twin Cities nesting habitat for either short- or long-term goose management are limited. Alternatives that could be used include:

- Remove and replant shoreline areas with tall vegetation, such as grasses or shrubs. This would only serve to displace geese to open turf areas such as parks, playgrounds, school fields, lawns and golf courses where they would become more concentrated.
- Reduce or eliminate mowing. Again, this would only displace geese to more open areas and the vegetation may not grow to a desirable height to limit goose usage.
- Drain or fill ponds and wetlands to limit goose habitat. This would negatively impact other wildlife and diminish water quality and habitat.

From a long-term management perspective, if sufficient shoreline were converted from grass to natural vegetation not used by geese, the population would be limited through higher gosling mortality, that is, summer starvation. The magnitude of habitat conversion necessary to limit the Twin Cities goose population at its desired level (25,000 birds in summer), was estimated in a 1998 U of M study. Using the area of the TCMA Public Waters wetlands, it is estimated that the Twin Cities has a minimum of 3,308 miles of shoreline. Based on estimates of grass shoreline made at 227 wetlands in 1994, one-quarter (25%) of the TCMA shoreline is in mowed grass or pasture. Therefore, 750 miles of shoreline is currently suitable for goose broodrearing. Because goose broods will go at least 100 yards from the water to feed, the TCMA has about 30,000 acres of suitable brood habitat.

One acre of un-manicured pasture grass will support a minimum of 13 geese per acre. Assuming this is representative of the capacity of fertilized and mowed urban lawns to support geese, the Twin Cities brood carrying capacity is approximately 375,000 birds.

Stated another way, 93% of the existing shoreline turf in TCMA would have to be converted to limit the population to 25,000 geese. Based on the cost of planting tall grass prairie, trees and shrubs, the cost of controlling the goose population by habitat change would be nearly $34 million.

However, returning shorelines to native vegetation provides many other environmental benefits and decisions to resolve goose damage should consider habitat modification where feasible, particularly on small wetlands and ponds where water quality is likely to be impacted by the geese.

7.3 Redistribution

Short-term or redistribution techniques involve denying or limiting goose access to specific sites for periods ranging from hours to weeks. Twelve TCMA redistribution techniques have been evaluated on a scale of low (no or little effect), moderate (worked temporarily, but the geese returned), or high (birds were displaced permanently). The most effective measures are listed below.

7.3.1 High effectiveness

- Permanent or electric fences to block access during the broodrearing period in June and July. Barriers must be sturdy enough to deter geese from going under, over or around them.
- Harassment with dogs in late summer and fall. Harassment works best at locations that lack large water bodies and alternative foraging areas are nearby.
- Elimination of nesting islands

7.3.2 Moderate effectiveness

- Temporary barriers constructed from products such as Mylar tape, rope or wire to deter flightless geese.
- Harassment with dogs during broodrearing. However, the broods will either return or walk to nearby areas when the dogs are gone.

7.3.3 Low effectiveness

- Spray area with aversive chemicals such as Rejex-It ™ or Flight Control ™. These will be very effective for the short-term; however, the effect of these chemicals only persists about 14 days or until the first rain or irrigation.
- Harassment or hazing using various sounds, swans, decoys, vehicles, or humans. However, geese often become habituated to these tactics.
- Habitat modification. The extent to which the modifications would have to change the landscape would preclude human use of the area as well and are often not used. In addition, habitat modification of the entire shoreline could also entrap goose broods, including goslings.
- Prohibition of feeding by ordinance. Human feeding of waterfowl tends to concentrate birds and their impacts on localized areas and has a negative impact on the health of geese and other birds. Such a ban will not reduce bird populations because of the abundance of grass, but it could spread the impact of the geese over a wider area.

- Use of live swans.
- Use of decoys such as swans or dead geese.

Drawbacks to redistribution techniques include:

- Displaced geese frequently cause damage elsewhere.
- The techniques don't stem overall goose population growth.
- Barriers erected around the entire shoreline of a pond or wetland with nests may entrap goose broods, which could result in starvation.
- The likelihood of displaced geese being accepted elsewhere is low (U of M graduate student (Al Eiden) research).

7.4 Population Reduction

Long-term approaches to population reduction act by directly decreasing reproductive success and survival. Reproduction has been reduced by using techniques such as use of embryocides, egg destruction, and vasectomization. Hunting, shooting, and capture and processing for human food are also used to reduce populations. Habitat modification can lower nesting and bird survival.

Whether by removing eggs or killing embryos, reproductive management of a goose population can be expensive. In a study in the TCMA during the 1990-96 period, the average cost to destroy each egg was $4.17 (based on an $8/hour wage plus travel and equipment). Currently, the DNR has only approved this method for population reduction in airport areas and for research.

7.4.1 Egg Removal

Reduction of reproduction is one potential option for the management of geese doing damage. This is done by searching out nests and removing eggs, which replicates natural predation, or killing the embryos and leaving the nest intact.

Nest searching in spring can be difficult as Canada geese nest in early spring and use lakes and marshes for nesting. Searching can be dangerous and time consuming. Once a nest is found, the eggs may be removed, but if they have been incubated less than 2 weeks, the female may re-nest if all of the eggs are taken.

7.4.2 Egg Destruction / Embryocide Use

Different techniques can be used to eliminate egg hatching.

- Blocking air passage through the shell with mineral oil, thus killing the embryos
- Shaking the egg to break the egg aircell resulting in asphyxiation, but does not work well on advanced stage embryos.
- Injecting eggs with an embryocide such as 10% formalin.

The drawback to techniques that leave eggs in the nest is that Canada geese are indeterminate incubators and use a fasting incubation strategy. This means that if at least 1 egg does not hatch, the female will continue to attend the clutch until she reaches starvation conditions, and has to abandon the effort. To be humane, it is necessary to return to the nests and remove the eggs after the 14th day of incubation and before the 28th day of incubation when hatching would have occurred.

7.4.3 Vasectomization / Sterilization

Males can be captured in summer, surgically vasectomized, and then returned to the wild. No studies have evaluated the efficacy or cost of vasectomization as a population control method, but would likely be expensive. Several multiple-year chemical sterilents are also available for birds, but none are labeled for use in wild geese because of the unknown health risk to humans who eat the meat.

7.5 Trap and Relocate

As part of a U of M research program, 22,477 flightless adult and 44,183 young geese were trapped in and relocated from the Twin Cities between 1982 and 1995. The efficiency of trapping was high, averaging 98%, and ranging from 96 to 99%, of the flightless geese present at the time of capture. Mortality during trapping and transport totaled 45 birds (0.07%). An analysis of banded birds trapped in the Twin Cities at sites from which birds had been relocated in previous years shows that 22-42% of the adults sent to southern states returned to the TCMA. Less than 0.01% of the young geese released were trapped again.

In spite of the return of some of the relocated adults, removal and relocation reduced populations at TCMA removal sites significantly. Overall, after 5 years of continuous removal, the population was 60% lower than at the start, after 10 years an 80% reduction was attained.

However, after 10 years of relocation, the states of Oklahoma, Kansas, Kentucky, and Mississippi indicated that they would no longer accept geese. As a result, if population control through removal was to continue, an alternative to relocation was needed for adults by 1996 and for goslings a few years thereafter.

The DNR found locations for gosling release between 1996 and 2006, with more than 58,000 young transported to Oklahoma, Kentucky, Mississippi, North and South Dakota, Iowa, or Minnesota and set free since 1982. However, since 1996, releases have been limited to Iowa and Minnesota. In 2006, the Iowa Conservation Department indicated that they would not take additional geese.

7.6 Trap and Process

Due to requests by citizens and elected officials who suggested that using the surplus geese for food would be an acceptable alternative to relocation, a feasibility study was done in 1995. Operational processing of geese for TCMA food shelves began in 1996.

St. Paul and Minneapolis food shelf distribution center operators indicated that they had difficulty obtaining donations of high protein products, and that the centers would take all the goose products that were available. The centers agreed to accept the frozen goose products provided the geese were processed by either a USDA or state inspected plant. As a result, a total of 16,551 geese were trapped and processed from 1995 to 2005.

In 1999, a white paper was prepared on the disposal of goslings if they could not be relocated. Using U of M and Goose Program research on gosling disposal options and costs, two options appeared feasible: use for human food and use as animal food. A third option, killing and landfilling or incinerating was discussed and rejected. This option may be necessary if geese become infected with avian influenza in the future.

In 2002, the Goose Program explored gosling pasturing by surveying the availability of rental goose pastures and costs by contacting Minnesota elk ranchers. Survey results showed no individual properties large enough to take the 2,500± goslings trapped each year. Combined with processing costs, labor, and transportation, the pasturing option would increase the program cost about $25 per gosling. Holding the goslings in pens and feeding them grain until they could be processed in September was less expensive, at $18 per gosling. However, this option would require construction of new pens.

The Wildlife Science Center, a non-profit education and research program, indicated interest in using the birds as food for captive wolves and bears. The animal food option was approved by the USFWS and DNR in 2006. Initially 400 goslings were humanely killed and frozen for use by the Wildlife Science Center (WSC). The Center's freezer space was quickly filled, and by early July, other options for the 2,000 remaining geese were explored.

The DNR has a Southeast Asian Program (SEA) that utilizes donated wildlife for human consumption. While the SEA Program was given whole humanely killed goslings, the Goose Program objected to this practice due to concerns it might potentially violate Minnesota Public Health standards for food handling. In 2007, all goslings were provided to WSC at a cost to the Canada Goose Program of $6 per bird.

7.7 Hunting

In response to the growth of re-established Canada geese in the U.S., the USFWS approved provisions for special early and late Canada goose hunting seasons in 1983. Minnesota initiated experimental early and late seasons in the TCMA in 1987; these seasons became non-experimental in 1991. Early seasons occurred during the first 10 days of September, prior to the arrival of migrant geese, with a 5-bird bag limit. In 1999, the early hunting season was extended to 20 days on an experimental basis until the proportion of migrant geese shot was evaluated. Late seasons have also lasted 10 days beginning in mid-December with a 2-bird limit. Harvest data for these seasons were attained from DNR and the USFWS surveys. The effect of hunting on the TCMA goose population was also measured by comparing the number of geese counted in the hunted and non-hunted zones in 1994 and 1999, and from neckband goose re-observation in 1987-89.

Data from the DNR surveys indicate that the goose harvest during the early September special season ranged from 2,782 to 16,345 and late season harvest from 376 to 895. Because the latter was incorporated into the regular hunting goose season, which extended from on or near 1 October to 1 December, there were no data after 1992 for the late season. However, if the harvest has been similar to that of the 1994-96 period, from 10,000 to 16,000 additional TCMA geese were killed during the special hunts.

The number of geese found in the hunted and non-hunted wetlands in the TCMA averaged 30.9 and 46.1 in 1994, and 25.2 and 35.3 in 1999. These differences were statistically significant with hunting determined to be the significant variable. The effect of hunting on survival was also evident in the survival of geese neck banded in 1987. When survival estimates were compared for class 1, 2, and 3 cities, geese banded in class 3 cities with hunting had a statistically significantly lower survival rate than those banded in cities with no or restricted hunting.

7.0 EDEN PRAIRIE GOOSE MANAGEMENT RECOMMENDATIONS

Following are recommendations developed that will be implemented as part of this Plan.

- **Develop an educational program:** Provide a basic understanding of goose biology and management to the citizens of Eden Prairie. This would include items such as the objectives, background, methods, complaint process and applicable ordinances and policies regarding the City's goose management program. This could be done through newsletters, the City's web page, and public access programming. If needed, signs will be developed to educate park patrons who may be feeding geese.
- **Respond to aggressive goose complaints**: Aggressive geese who have attacked humans, especially the young or elderly, should be handled quickly and efficiently to prevent future attacks. This would include actions such as removal of nests and/or geese by a permitted contractor.
- **Replace shoreline turf with native species**: Where feasible, establishment of shoreline buffers on private and public properties will be encouraged to help reduce goose movement between the water and the upland and displace the geese to other locations. The buffers should include a mixture of tall grasses, shrubs and trees to deter ground and flight connections and be at least 15 to 30 feet wide. The action would also improve biodiversity and water quality. Because geese are attracted to new plantings, intensive removal or harassment may be needed until the vegetation is well established. Plantings could also be extended into the shoreline area by adding emergent vegetation such as water lilies which cover the water.
- **Minimize use of Kentucky bluegrass**: Where feasible, Kentucky bluegrass should be replaced or interspersed with other vegetation. Warm season grasses could be considered as they are less desirable to geese for feeding. Areas that are infrequently used should have the height of the grass kept as high as possible, as much as 8 inches, to deter feeding. Use of grasses that don't require fertilizer would reduce the nutritional value of the grass. Other options that could be considered include planting islands of trees or tall grasses within open areas to reduce the open feel of the space or use of lure crops in nearby areas to provide alternative habitat near public use areas.
- **Evaluate the need for a policy or ordinance prohibiting feeding of waterfowl**: Waterfowl that are fed by the public will concentrate in these areas and increase goose impacts and risk of the spread of bird disease.
- **Evaluate the use of harassment**: This technique can be used to move geese from parks or other open areas where they are unwanted to alternative locations. This does not manage the size of the goose population and may shift geese to unwanted locations so the use of harassment must be evaluated carefully and only used where feasible.
- **Maintain hunting policy**: Hunting is an effective method for limiting goose populations where sufficient open space exists for the safe discharge of shotguns. Allowing hunting where it can be done safely is a DNR prerequisite for issuance of goose removal permits (see Appendix B) to a City. Hunting near Flying Cloud Airport should be prohibited because

geese disturbed by shooting may fly into the paths of aircraft approaching or departing the airport.

- **Continue summer goose removal and processing program**: To maintain a goose population at a level which can be sustained with fewer safety or health issues, a population reduction technique is needed. Trapping and removal of geese for processing during the early summer is an effective technique for goose population reduction (Appendix C). Areas of focus should include parks, public beaches, elder care facilities or other areas where there are large goose populations, safety concerns or high numbers of damage complaints. If requested, the City will evaluate residential and commercial properties to determine if removal on private property is warranted.
- **Continue wildlife management request policy**: The current policy includes asking applicants for the goose management program to participate in the program by matching the cost on a 50% basis. We also partner with other agencies, such as the Three River Park District, and individuals as needed. To effectively reduce the city population, it is necessary to remove large concentrations of birds whether they are on public or private property.
- **Utilize a goose damage tracking system**: The laws permitting goose removal require documentation of damage. A goose damage report form for both public and private property will be developed. Information such as date, location, damage type(s), estimated economic loss, health and safety concerns, and an estimate of the number of geese present would be included on the report.
- **Develop a health risk contingency plan:** In case of a highly contagious disease, such as Avian Influenza, developing in the Minnesota Canada goose population, the State of Minnesota will be contacted to determine what steps would be required for dealing with this event and a contingency plan would be developed as needed.
- **Reduce the construction and use of nesting islands:** Nesting islands would be prohibited in new development plans to reduce goose habitat for nesting. City staff would evaluate requests for removal or modification of nesting islands where appropriate to reduce the number of productive or desirable goose nesting wetlands.

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APPENDIX A

MINNESOTA DEPARTMENT OF NATURAL RESOURCES
CANADA GOOSE REMOVAL POLICIES AND PROCEDURES
1/10/2001

MNDNR CANADA GOOSE REMOVAL POLICIES AND PROCEDURES 1/10/2001

The removal of nuisance geese from Minnesota cities and towns requires a state permit and is subject to Minnesota Department of Natural Resources (DNR) policies. Oversight of state-wide goose management programs by DNR requires a federal permit. Removal and relocation/processing for the food banks are considered when other methods of addressing nuisance situations are deemed ineffective. To conduct a nuisance goose removal within the metropolitan Twin Cities area (TCMA), the following DNR policies must be satisfied:

The removal of geese at any location within TCMA must be approved by the local government unit (LGU) with jurisdiction over the site. If more than one LGU has jurisdiction over the site (i.e. Lake Owasso in Roseville and Shoreview) then all LGUs must approve the removal. Removal approval must include the establishment of a population goal (e.g., 25 geese on lake in summer).

Municipalities with open space where goose hunting might be done safely must provide an evaluation of the potential for hunting if goose hunting is currently prohibited by a firearm discharge (see Metropolitan Twin Cities Area Goose Hunting Policy). The steps for establishing and conducting a goose population reduction program and the agencies involved are:

1. Determine whether your site is in a class 1, 2, or 3 goose hunting area (check city shooting ordinances and contact your DNR Area Wildlife Manager.)
2. Establish target goose population reduction levels (DNR, city or township personnel, and removal contractor).
3. Obtain city council or township board approval of proposed goose management program (city or township, removal contractor, DNR).
4. Ascertain goose population and site characteristics (removal contractor).
5. Prepare and approve removal contract (proposer and removal contractor).
6. Obtain state permit (removal contractor).
7. Capture and ship birds in summer (removal contractor in cooperation with DNR).
8. Monitor population to determine effectiveness of removal program (removal contractor and DNR).
9. Conduct additional removal as needed under contract (removal contractor).

The services provided by the removal contractor include the design of the removal program, public meeting participation, technical information on goose ecology and management, humane and professional removal of problem geese, coordination of permits and bird disposal, and evaluation of effectiveness of the removal program.

APPENDIX B

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

URBAN GOOSE HUNTING POLICY

MINNESOTA DEPARTMENT OF NATURAL RESOURCES
URBAN GOOSE HUNTING POLICY

It is the policy of the Minnesota Department of Natural Resources (MNDNR) to control and maintain wildlife populations whenever possible through a hunting harvest.

There are three times Canada geese can be hunted in Minnesota; a regular season from October to late November and two special hunting seasons specifically designed to harvest local Canada goose populations. The first special season is held in early September before the arrival of migrant geese. The second is held in mid-December after most migrants have left the Twin Cities metropolitan area (TCMA). Bag limits are set at five per day in the September season and two per day in the December season. TCMA goose harvest surveys indicate that 10,000 - 12,000 geese per year are taken in these seasons. Increasing the harvest will help control TCMA goose populations.

Based on the distribution of open space, TCMA municipalities are classified by the potential for safe hunting. These classes are:

Class 1: Open space is too limited for safe discharge of shotguns.

Class 2: Open space is patchy within the municipality but some areas may be hunted safely with minimum restrictions.

Class 3: Extensive open space exists where shotgun hunting can be done safely.

The following priorities have been established for the nuisance goose removal program based on potential for hunting harvest:

Class 1: High priority

Class 2: High priority at swimming beaches and airports; medium priority at locations within extensive areas that cannot be hunted safely; low priority at other locations.

Class 3: High priority at public swimming beaches and airports; low priority elsewhere.

If your municipality is rated Class 2 or Class 3 and has prohibited the discharge of shotguns, it will be necessary for you to assess the potential for hunting prior to requesting approval of a removal program. For assistance please contact:

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DNR South Metro Wildlife
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Jordan, MN 55352
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APPENDIX C

MNDNR CONTRACTOR REQUIREMENTS FOR CONDUCTING CANADA GOOSE MANAGEMENT PROGRAMS IN MINNESOTA

MNDNR CONTRACTOR REQUIREMENTS FOR
CONDUCTING CANADA GOOSE CAPTURE AND REMOVAL IN MINNESOTA
3/21/2001

BACKGROUND: The Twin Cities Canada Goose Removal Program is an important component of Canada goose management in the seven county Minneapolis/St. Paul metropolitan area. The program has captured and relocated over 66,000 geese since 1982.

The program has grown from one site and 456 geese per year in 1982 to over 140 sites and 6000 - 7500 geese per year more recently. The program has proven to be effective at reducing nuisance goose problems at specific sites. The University of Minnesota's College of Natural Resources, Fish and Wildlife Extension Department, has contracted the removal of the geese with local landowners from 1982 - 2000.

This program is highly visible and receives close public review. The program has been challenged in court by animal rights groups who claimed the program was ineffective at controlling goose numbers, utilized inhumane handling techniques and that other management alternatives were more feasible and prudent. These claims were shown to be false and ineffective. The program has been held up as an example of a management program that has shown effective control, demonstrates humane wildlife handling techniques and is considered a prudent alternative for nuisance Canada geese problems.

The primary reason for the success of this capture and removal program from 1982 - 2000 is the professional and knowledgeable University of Minnesota staff responsible for implementing this management program.

As the removal program enters the private sector, DNR is concerned that future contractors maintain a similarly high level of expertise and effectiveness that has been exhibited by the University staff. Failure to maintain a high level of professional expertise and effort could impact the entire metro program and our ability to successfully manage nuisance Canada geese throughout the entire state.

The permitting of an organization or agency to conduct this removal requires more than simply capturing geese. The ability to conduct surveys, measure program effectiveness, provide information and expertise on Canada geese to local government units, handle public relations needs, and capture geese in a variety of habitats and locations within the entire metro area is needed.

OBJECTIVE: To ensure that the Canada goose control program remains a viable program for Canada goose management in the metro areas.

REQUIREMENTS: The following is a list of requirements, abilities and permit conditions that must be met and/or demonstrated in order for DNR to provide a permit to remove geese in the Twin Cities metro area by any private or public company, organization, agency or person(s). The requirements, abilities and permit conditions were developed based on the experience and problems encountered in the program. Further requirements may be added to address future problems or concerns.

"Permittee" refers to the company, organization, agency or person(s) requesting or named on the permit. The "permittee" may also include all employees, volunteers, interns, officers and

subcontractors conducting the removal or implementing the provisions of the permit under direction of the named permittee.

A. PERMITTEE REQUIREMENTS AND ABILITIES:

The permittee must demonstrate the expertise, personnel and equipment necessary to implement the following requirements. This can be accomplished through prior experience coordinating goose removal activities or a one-year probation period with a series of trial removals. The permittee may be required to present both a removal plan outlining details of proposed activities and an inventory of equipment to adequately and humanely handle Canada geese.

1. The permittee must possess a BS or BA or higher degree in wildlife ecology, management or a closely related field (e.g.. biology) and have a thorough knowledge of Canada goose ecology, biology and management.
2. The permittee must be familiar with alternatives to capture and removal, be able to explain alternative procedures to the public and be able to estimate costs and effectiveness of alternatives.
3. The permittee must cooperate in the implementation of the following Minnesota Department of Natural Resource (DNR) policies and plans.
   A. Nuisance Wildlife Control Policy and Management Plan
   B. Twin Cities Metropolitan Canada Goose Management Plan
   C. Twin Cities Metropolitan Canada Goose Relocation Facilities Management and Disease Contingency Plan
   D. Policy directives on Canada goose management within Minnesota and as it relates to the Twin Cities Canada Goose Management Program
4. The permittee must demonstrate the ability to capture Canada geese in a variety of habitats within the Twin Cities Metropolitan Area and handle and transport captured geese in a humane manner.
   A. Conduct pre-capture and post-capture surveys and provide pre-capture data to the DNR prior to initiation of capture at the site.
   B. Capture 95% of the flightless geese present at nuisance control sites.
   C. Capture geese in a variety of habitats including, but not limited to, golf courses, parks, lakes, large (20+ acres) cattail marshes, large and small rivers and streams located within the seven county metro area.
   D. Capture, hold, load, and transport 350 geese from a single site.
   E. Handle and transport geese to an approved staging area in an effective and humane manner that results in not more than 1 goose death per 1000 geese trapped and transported.
   F. Recognize sick geese prior to or during the capture process and determine cause of the sickness (disease or toxin) or be able to submit sick or dead birds to an authorized wildlife disease diagnostic laboratory.
   G. Identify injured geese during capture and transport and humanely euthanize geese that cannot be treated.
   H. Follow and understand the Migratory Bird Banding Laboratory leg and neck band

removal and reporting procedures.

I. Maintain and provide accurate records of capture operations. These records include but are not limited to; pre-capture and post-capture populations at specific nuisance sites, disease and injury reports, age (adult/gosling), brood patch females, and sex of adults captured and removed or released at each nuisance site.

5. The permittee must have a comprehensive public relations program and be able to demonstrate conflict resolution skills.

B. PERMIT CONDITIONS:

The following conditions would be part of a MNDNR permit to capture geese in the Twin Cities Metropolitan Area.

1. The permittee will obtain all local and state permits that pertain to this program and follow all permit requirements and regulations.
2. The permittee may contract with private and public landowners to remove geese under this program but such a program must include:
   A. Development of a control program
   B. Establishment of a population goal
   C. Selection of control procedures
   D. A public meeting to review the control program
   E. A fee for all geese removed, staged/pastured and processed.
3. The permittee must provide evidence of insurance including but not limited to liability ($1,000,000), workman's compensation and motor vehicle insurance.
4. The permittee must develop and implement a comprehensive safety training program that covers human and goose safety.

ATTACHMENT 1
MNDNR AND CONTRACTOR RESPONSIBILITIES
FOR CANADA GOOSE CAPTURE AND REMOVAL IN MINNESOTA - 2001

DNR will be responsible for the following activities:

1. December 2000: DNR will identify the number of goslings to be pastured and fall processed.
2. May 1, 2000: DNR will identify food banks in the Twin Cities metropolitan area which will accept processed geese for distribution throughout Minnesota.
3. June and July 2001: DNR will be responsible for transporting goslings from the staging area to relocation sites.

The contractor will be responsible for the following activities:

1. The contractor will be responsible for the daily management of geese in the staging facilities including:
    A. Purchase of specified waterfowl pellets and corn for feed (see Attachment 2). Storage areas are available at staging facility.
    B. Daily feeding
    C. Daily cleaning of pools in occupied pens
    D. Recording/reporting of injuries, illnesses or deaths
    E. Daily inspection of pens.
2. The contractor will select a processor that is inspected and certified by Minnesota Department of Agriculture (MDA) or inspected by the United States Department of Agriculture. Processing plants must meet or exceed MDA requirements for slaughtering, packing and processing as specified in MDA Regulations 1545.0890 - 1545.2040. Proof of licensure and recent inspection must be submitted to DNR prior to processing activities. Processors must make operations available for inspection by contractor, DNR and MDA staff during contract period.
    A. Geese must be handled and slaughtered humanely using accepted animal handling practices.
    B. Processing must be completed within 24 hours of delivery.
    C. Dressed geese must be individually wrapped and cooled to 36 degrees Fahrenheit within 24 hours and frozen solid in less than 60 hours.
    D. All product donated to food banks will be labeled with information identifying the product, the processing plant with MDA or USDA identification information, USFWS permit number and additional information (see Attachment 4).
    E. DNR must be notified of dates and quantities delivered to food banks within 24 hours of delivery.
3. The contractor will transport live geese to the processing plant.
4. The contractor will arrange for delivery of processed product to food banks identified by DNR in approximately equal quantities.
5. The contractor will arrange for pasturing and fall processing of 500 goslings.

ATTACHMENT 2
WATERFOWL FEED SPECIFICATION
3/21/01

Feed in pellet form. Each 50-pound bag tagged.

Amount (lbs.)	Item
1390	ground shell corn
430	44% soybean meal
50	17% alfalfa meal
50	55% meatmeal
40	40% fish solubles
35	dicalcium phosphate
10	calcium carbonate
6	QT turkey premix
5	dynamate
2	white stock salt
2	lysine
0.5	methionine

2020.5 lbs./batch

APPENDIX D

EDEN PRAIRIE SITE ASSESSMENT SHEETS