Canada Goose Management Plan

for the

City of Duluth

September 7, 2022

City of Duluth Canada Goose Management Plan

1.0 Context and Background

The purpose of this Canada Goose Management Plan (Plan) is to enable and support the City of Duluth (City) and its partners in managing a growing Canada Goose population that is negatively impacting efforts to restore wild rice plantings in the St. Louis River Estuary (Estuary) (Estuary; Figure 1). This Plan provides specific guidance for managing goose herbivory at wild rice restoration sites within the Estuary while allowing flexibility to address goose management needs that may arise in other parts of the City, including city beaches, golf courses, and other city-owned and/or managed properties.

Figure 1. Wild rice restoration sites in the St. Louis River Estuary (source: Wisconsin Department of Natural Resources).

As a migratory species, Canadian Geese are federally protected under the Migratory Bird Treaty Act (Act; 16 U.S.C. 703-712) and both state and federal permits are typically required for managing Canada goose populations. The Minnesota Department of Natural Resources, (MN DNR) requires any that municipalities have an approved Management Plan in place before initiating management actions to control goose populations. Although the City itself has no immediate plans or funding to conduct goose management efforts, the City's partners will benefit from having this Plan available to help them conduct goose management activities within the City of Duluth.

Wild Rice (Manoomin in Ojibwe) is both culturally and ecologically significant to our community. Manoomin is a sacred symbol for the Ojibwe people and provides important habitat and food for animals, fish, and people. The Estuary once supported vast stands of wild rice, but habitat modification and sediment contamination caused by mining, logging, iron making, and other industrial uses of the St. Louis River reduced

wild rice to a few remnant stands (MN DNR 2014). By the 1970s, wild rice was nearly extirpated from the Estuary (Schwartzkopf 1999).

Restoring wild rice beds in the Estuary is a high priority for many local, state, Tribal and federal agencies and local non-profit organizations. There are ongoing, multi-agency efforts to re-establish wild rice beds in suitable areas of the Estuary under the guidance of the St. Louis River Wild Rice Restoration Implementation Plan (Rice Plan; MN DNR 2014). While progress towards restoration goals is being made, the success of these efforts is significantly hampered by Canada geese which browse the rice at a high enough rate to inhibit the development of rice seed and the establishment of self-sustaining rice beds.

Table 1. Wild rice seed distributed at restoration sites in the St. Louis River Estuary (source: 1854 Treaty Authority)

St. Louis River Estuary	2015	2016	2017	2018	2019	2020	2021	totals
Rask Bay	2085	1650	1647	0	1530	3349	0	**10,261**
Duck Hunter Bay north	2165	948	953	0	1642	2805	0	**8,513**
Duck Hunter Bay south	1642	1935	2006	0	1151	2306	0	**9,040**
North Bay	1666	718	707	0	379	1534	0	**5,004**
Radio Tower Bay	946	750	767	0	701	1499	0	**4,663**
Walleye Alley Bay	0	1247	850	0	592	1105	0	**3,794**
Landslide Bay	0	553	425	0	419	812	0	**2,209**
Oliver-Bear Island	0	2120	1341	0	743	130	0	**4,334**
Mud Lake northeast	0	2089	1788	0	0	0	0	**3,877**
Clough Island east	0	508	0	0	0	0	0	**508**
Foundation Bay	0	0	0	0	285	101	0	**386**
Red River	0	0	0	0	180	175	0	**355**
totals:	**8,504**	**12,518**	**10,484**	**0**	**7,622**	**13,816**	**0**	**52,944**
Clough Island east	*500*		*550*	*400*	*1500*	*500*		*3,450*
Allouez Bay	*1932*			*500*			*363*	*2,795*
Kingsbury Bay							*500*	*500*
totals:	***2432***		***550***	***900***	***1500***	***500***	***863***	***6,745***

x $5/lb. = $264,720

The St. Louis River Estuary Manoomin Restoration Team, comprised of professionals from state, Federal, and Tribal agencies, has implemented several non-lethal methods to deter geese from browsing wild rice plantings within the Estuary including egg addling on the Wisconsin side of the river, hazing geese with kayaks and dogs, mylar tape deterrents, swan decoy placement, and fenced goose exclosures. These efforts are costly, time consuming, and have not resulted in a sufficient reduction in herbivory. Goose exclosures have proven highly effective (Figure 2) but their implementation is limited in scope due to the spatial extent of the restoration sites and acreage goals outlined in the Rice Plan.

The Wisconsin Department of Natural Resources (WDNR), in partnership with the City of Superior and the Animal and Plant Health Inspection Service (APHIS) – Wildlife Services, coordinated Canada goose removals (i.e., roundups) on the Wisconsin side of the St. Louis River in July 2021 and June 2022 (WDNR 2021; Goose Roundup Report - Appendix A). When combined with barriers (i.e., goose exclosures), goose removals have been a highly effective means of reducing goose herbivory and the Manoomin Restoration Team seeks to expand removal efforts to the Minnesota side of the Estuary.

The MN DNR is the permitting authority for managing wildlife that cause property damage and/or public safety issues, including issues occurring within City limits. To obtain a permit for goose removal, , an entity or an individual must provide justification for the action and must consider available non-lethal techniques for managing goose impacts before implementing lethal techniques. Implementing removal efforts on the

Minnesota side of the river must be conducted by an entity permitted for goose removal by MN DNR and authorized under Federal permit through the U.S. Fish and Wildlife Service (USFWS). To date, permits for roundup work on the Minnesota side of the river have been unavailable to the restoration team. This Plan will facilitate permitting for future removal efforts on the Minnesota side of the river to protect wild rice restoration work. Being able to perform goose management work on both sides of the river will make these efforts more efficient, effective and humane.

Figure 2. Exclosures have been effective in reducing the impact of goose herbivory in the St. Louis River Estuary (source: Lake Superior National Estuarine Research Reserve).

The City has been an active partner in restoring the Estuary and the St. Louis River Area of Concern (AOC) with its partners for many years. In the interest of supporting its partners' commendable efforts to restore wild rice and to protect the significant investment that has been and will continue to be made in restoring wild rice in the Estuary, the City has funded and contracted with Tom Keefe, with Canada Goose Management, Inc. to assist with the development of this Plan. While the initial focus will be on the Estuary and protection of wild rice, this Plan will apply City-wide, making it easier to obtain permits to control Canadian geese in other areas of the City in the future, if desired. Any goose management activities that are undertaken by the City would require a permit and further public input.

1.1 Canada Goose Habitat Use

Duluth's geography of steep hills and defined shorelines does not provide abundant wetlands or storm water ponds found in most urban communities with goose conflicts. As a result, most of the Canada goose habitat is limited to the Estuary and public green spaces within the city.

1.2 Population Estimates

Estimates of the resident and migratory goose populations within the City and across the Estuary are based on visual estimation by City staff and informal goose surveys by members of the Manoomin Restoration Team, primarily personnel from WDNR, MN DNR, 1854 Treaty Authority, and Fond du Lac Band of Lake Superior Chippewa. In addition, annual wild rice monitoring initiated in 2015 continues to document high rates of goose herbivory at restoration sites as a primary metric for tracking herbivory impacts. This Plan includes the provision to conduct new population surveys as needed to justify future management action.

Table 2. Estimates of goose numbers in the City of Duluth and the St. Louis River Estuary.

Site	Summer Breeding / Molting	Fall Migrants
St. Louis River Estuary (MN/WI)	850 -1,200*	3,000 - 5,000
Soccer Fields	25-50	100
Green Spaces/Parks	TBD	TBD
Golf Courses/Others	TBD	TBD

*Estimate based on WDNR aerial goose survey of the St. Louis River Estuary on June 29, 2022.

1.3 Concentrated Habitat Use and Human Use Conflicts

This Plan provides specific management options to reduce Canada Goose herbivory impacts to wild rice restoration efforts in the Estuary and provides flexibility to support goose management in other locations in the City where geese negatively impact habitat, water quality, or public safety.

1.3.1 St Louis River Estuary and Area of Concern

The City is an active partner in wild rice restoration and supports actions outlined in the Rice Plan that advance restoration progress in the Estuary. The impact of Canada goose herbivory on wild rice restoration is well-documented (see Appendix A). Goose herbivory pressure severely limits the growth and establishment of self-sustaining wild rice beds in the Estuary. As a result, goose management is a critical tool for restoration success. Reducing herbivory on wild rice plantings will result in more dense rice beds that are resilient to future herbivory pressure.

1.3.2 Duluth Urban Areas

Canada geese tend to congregate in city parks, beaches, and other green spaces along the St. Louis River as well as athletic fields within a short distance of the river. City staff have identified a list of locations where known human / goose conflicts exist within the City. These data come from public nuisance complaints as well as banding site and nuisance reporting data from the MN DNR. These locations include:

- Bayfront Festival Park
- Brighton Beach
- Chambers Grove Park
- Enger Park and Golf Course
- Fond du Lac Campground
- Minnesota Park Point Recreation Areas
- Lake Superior Zoo
- Minnesota Point Beaches
- Wade Stadium
- Wheeler Athletic Complex

The most common conflict reported at these locations is the prevalence of goose feces on trails, paved paths, recreation fields, greenspace, playground equipment, beaches, and picnic areas. In addition to being unsightly and offensive to the public, fecal material carries harmful bacteria, including E. coli, that can lead to aquatic use impairments in streams and beaches. Recent monitoring data from the Minnesota Pollution Control Agency (MPCA) identified five beaches in the Duluth area with elevated bacterial loads and reported a median of 11 advisories per year between 2014 and 2021 (MPCA 2022). Many local beaches and streams are currently on Minnesota's impaired waters list for bacteria including several popular City beaches (MPCA 2020). Although concentrations of Canada geese are not the sole source of E. coli and other bacteria in local waterways, cleanup strategies recommended by the MPCA include wildlife waste management.

2.0 Canada Goose Management Recommendations

2.1 Goals and Measures

The goal of this Plan is to ensure the success of wild rice restoration efforts in the St. Louis River Estuary and provide information and direction on management of Canada goose conflicts on land under City ownership in the future. This Plan will also meet requirements set forth by the Minnesota Department of Natural Resources to apply for goose removal permits. The goal is not to eliminate Canada geese from the City or the Estuary, but to reduce goose numbers and conflicts to a level that will allow for the natural propagation of wild rice within the Estuary.

This plan is congruent with the goals and purpose of City's newly approved Natural Resource Management Program, which prioritizes and supports the restoration of the Estuary.

2.2 Geographic Scope & Authority

Duluth is Minnesota's fourth largest city, located on the southwest corner of Lake Superior (Figure 3). The City extends along the shoreline of the lake with most of its residential areas located on the steep hills and shoreline of Lake Superior. Duluth is home to approximately 86,000 residents encompassing 87 square miles and is a major international trade port and tourist destination.

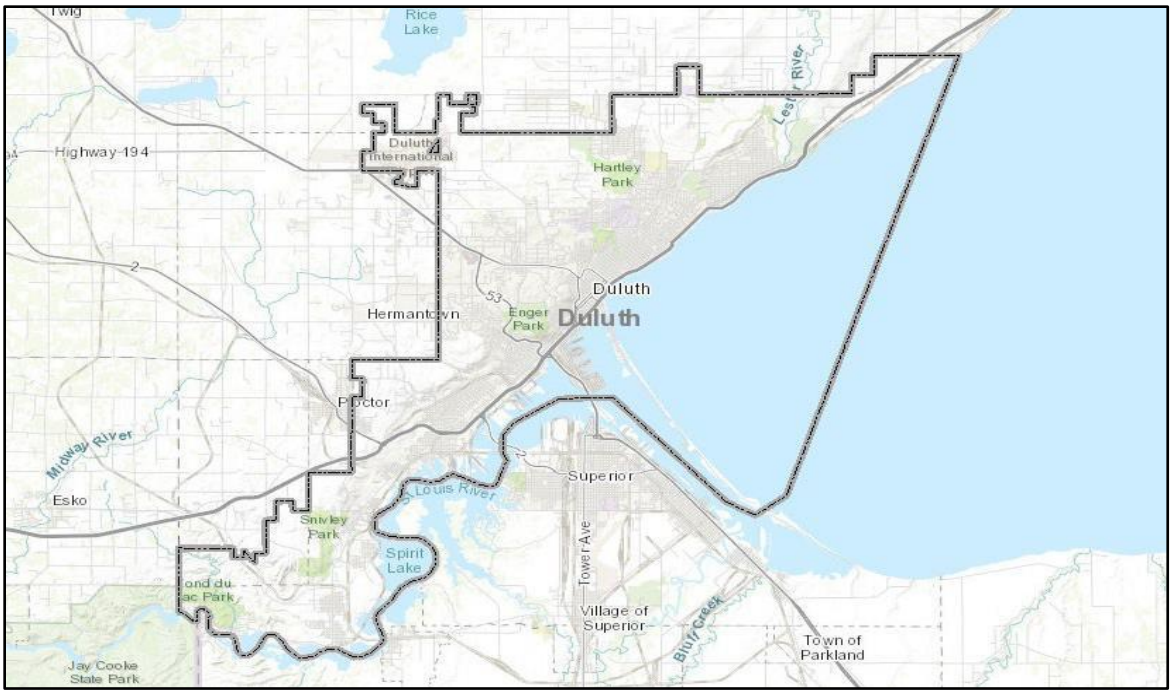

Figure 3. City of Duluth, Minnesota.

Goose management actions outlined in this Plan may be implemented by City personnel and its partners to address documented conflicts.

2.2.1 St Louis River Estuary and Area of Concern

The St. Louis River Estuary was severely degraded at the turn of the 20th century due primarily to the dumping of industrial waste and wood waste from lumber mills located on and around the river. These impacts were so significant that, in 1987, the lower part of the St. Louis River watershed was designated by the U.S. Environmental Protection Agency as one of 31 U.S.-based Great Lakes AOCs. As a result, restoration projects in the AOC have been a priority for Federal, state, and Tribal agencies in the hopes of delisting the St. Louis River from the AOC list by 2025.

The St. Louis River Area of Concern has nine Beneficial Use Impairments (BUIs), including the loss of fish and wildlife habitat. Four of these BUIs have been addressed thanks to years of hard work by a multi-agency effort. Once all nine BUIs are removed, the Estuary can be removed from the Federal Great Lakes Area of Concern List. Planting and nurturing wild rice plantations address BUI #9 by providing food and habitat for native species.

The Wisconsin DNR currently serves as the coordinating agency for wild rice restoration in the Estuary. City partners and the coordinating agency for wild rice restoration may use this Plan to implement management actions on City property, where appropriate. Management actions on private lands are not covered by this plan. However, City partners often make separate arrangements with private landowners to conduct management activities on private land as part of their wild rice restoration efforts in the Estuary. City partners may implement roundup efforts on private properties adjacent to wild rice restoration sites with permission from, and in coordination with, the private landowner under a separate permitting arrangement.

Anticipated Canada goose roundup locations on City owned properties include Chambers Grove Park, Perch Lake Park, Boy Scout Landing, and Munger Landing (Figure 4). However, this Plan provides flexibility for the coordinating agency to identify additional roundup sites on City-owned properties and coordinate with Duluth Parks & Recreation personnel to initiate goose management actions, if appropriate.

The implementation of goose roundups on the Wisconsin side of the Estuary by the WI DNR has proven to be successful in protecting the wild rice beds within the Estuary. This Plan will allow coordinating agencies (e.g., MN DNR, WDNR, 1854 Treaty Authority, Fond du Lac Band of Lake Superior Chippewa) to have the option of requesting the City to apply for state and Federal removal permits and coordinate with the Manoomin Restoration Team to conduct removals on both sides of the St. Louis River. Removals are recommended by the Manoomin Restoration Team until goose herbivory has been sufficiently reduced to allow the establishment of dense wild rice beds. Increased density of beds deters geese from entering the area and allows the beds to become resilient to future herbivory. Annual restoration monitoring, first implemented in 2015, will continue to document rice density and the prevalence of goose herbivory. This long-term dataset will provide a foundation for determining when removal is no longer necessary. It is anticipated that removals may be needed for a short time with their effects lasting 2 to 3 years after being discontinued. The need for future removal efforts will be determined by the Manoomin Restoration Team after examining the annual monitoring data.

Figure 4. Anticipated Canada goose roundup locations on City of Duluth managed properties adjacent to wild rice restoration sites in the upper reaches of the St. Louis River Estuary. A = Chambers Grove Park, B = Perch Lake Park, C = Boy Scout Landing, D = Munger Landing.

2.3 Management Techniques

Canada goose management strategies fall into two categories: (1) non-lethal (2) lethal (Smith et al. 1999). Specific techniques implemented to address conflicts with geese may, or may not, impact the overall goose population. For example, in some cases, repeated hazing of geese from conflict areas or installing predator decoys can be effective at moving geese to alternate locations. This approach does not affect the local goose population but redistributes geese for short-term benefit. Egg addling, a technique used to keep eggs from hatching, is considered non-lethal but can impact local goose populations if implemented effectively. Due to the remote nature of the sites, spatial distribution and thick nesting cover egg addling is not an effective method to help resolve the impact local goose populations have on wild rice establishment in the Estuary.

Alternatively, goose removal during the molting period when a large proportion of local geese are unable to fly (e.g., goose roundups), is a lethal technique that is the most effective in controlling the local goose populations to allow wild rice restoration in the Estuary. Goose roundups have been identified as an important management strategy to reduce Canada goose herbivory on wild rice plantings by the Manoomin Restoration Team and were successfully implemented on the Wisconsin side of the river in 2021 and 2022 (WDNR 2021). As stated earlier in this document, the purpose of this Plan is to enable and support the City and its partners in managing a growing Canada goose population that is negatively impacting efforts to restore wild rice plantings in the St. Louis River Estuary.

A holistic approach that combines a suite of management techniques is recommended to address conflicts in most urban settings and this Plan outlines various management options that could be implemented at City-owned locations to reduce and prevent goose impacts. Protection of wild rice plantings, on the other hand, creates a unique challenge for goose management due to the remote nature of the sites and their spatial distribution throughout the upper reaches of the Estuary (Figure 1).

The Rice Plan (MN DNR 2014) anticipated the challenges that herbivory would pose for restoration success. Since that time, natural resource managers involved with the wild rice restoration project have identified goose herbivory as a significant impediment to the successful establishment of self-sustaining wild rice beds. Exclosures designed to impede access to wild rice beds have proven highly effective (Figure 2), but it is not feasible to install exclosures throughout the estuary where herbivory impacts are prevalent. The Manoomin Restoration Team recommends a combination of non-lethal (e.g., goose exclosures) and lethal (e.g., roundups) management techniques to protect wild rice plantings (WDNR 2021).

2.3.1 Non-lethal Management Techniques

Non-lethal Techniques for managing impacts from Canada geese include habitat modification, barrier construction, decoy placement, and (in some cases) treatments to destroy egg viability. A summary of these and other, non-lethal techniques is provided below. Context is provided as to the efficacy of each technique in reducing the impact of Canada goose herbivory on wild rice restoration in the Estuary.

Habitat Modification

The preferred habitat for Canada geese are large, open areas with suitable forage and access to open water. In an urban setting, local parks, residential complexes, golf courses, and other developed areas provide ideal habitat for sustaining the local goose population. These areas are also prime locations to implement design elements that modify habitat quality for geese (i.e., habitat modification). Vegetative buffers surrounding bodies of water or placed along shorelines, for example, may prevent geese from accessing open water and deter geese from congregating. Similarly, tree and shrub plantings and the construction of rock barriers can be used to reduce the attractiveness of a site. Often a combination of habitat modification and hazing (detailed below) will have the greatest impact on reducing goose activity (Smith et al. 1999).

Habitat modification techniques can be used to reduce goose impacts at specific sites but only serves to displace geese temporarily or redistribute them to other sites. In the context of wild rice restoration, there is limited opportunity to modify shorelines given the generally natural conditions found in the upper portions of the Estuary.

Egg Oiling

Egg oiling requires locating the nests, acquiring permission from the landowner and treating the eggs. The eggs are treated by covering them with corn oil. The oiling prevents air exchange to the egg and stops development. The geese will continue to attend the nest and not re-nest.

Egg treatments are time-consuming and generally most appropriate for urban areas with concentrated nesting sites that can be easily located, such as a park. The Wild Rice restoration partnership conducted nest searches in portions of the estuary in the hope of implementing egg treatment techniques as part of the wild rice restoration program's effort to reduce herbivory pressure from Canada geese. However, given the Estuary's remoteness and dispersed nesting habitat, this effort was not successful.

2.3.2 Temporary or Permanent Fencing

Temporary or permanent fencing or barriers is a non-lethal redistribution technique that prevents geese from accessing an area. Effective barriers can be constructed from a variety of materials ranging from simple chicken wire fencing to electric fencing. While the applicability of materials may vary from site to site, recommendations in Smith et al. (1999) indicate that openings in fencing should be less than 3 inches in diameter and that the fence should be greater than 30 inches in height. The installation of fencing treatments and other barriers to limit Canada goose activity on City-owned property must adhere to applicable City ordinances (See Section 50-26.4, City of Duluth Unified Development Code). It is also important to note that fencing will not work if geese are able to fly into the fenced area.

As mentioned previously, fencing has been used effectively to protecting wild rice beds in the Estuary. Specifications for Canada goose exclosure construction and installation are discussed in the Rice Plan (MN DNR 2014) and applicable state and Federal permits are required for their use in the Estuary. However, while goose exclosures continue to serve as an important, non-lethal management technique to protect wild rice plantings, it is unrealistic to implement goose

exclosures throughout the Estuary given the spatial extent over which restoration work is being conducted (Figure 1).

2.3.3 Hazing and Scaring Techniques

Hazing and scaring techniques are non-lethal redistribution methods that can be used to make an area unattractive to geese by adding elements that trigger their flight response and frighten geese away. In some cases, permits may not be required for hazing and redistributing Canada geese (see Minnesota Statute 97B.668). Hazing and scaring techniques require repeated implementation of negative stimulus and can result in habituation such that geese lose their fear of the hazing source. In general, hazing and scaring techniques are most effective when implemented prior to geese becoming accustomed to the site (Smith et al. 1999). In addition, using multiple forms of hazing and scaring techniques is typically more successful at redistributing geese to other locations.

A variety of hazing and scaring techniques can be used to redistribute geese. Some of these techniques include:

- **Noise-making devices** such as airhorns, "crackers", "bangers" and whistle bombs have limited utility in urban areas where noise complaints are likely. Geese will often become habituated to these devices, and they have limited utility in remote locations of the Estuary.
- **Pyrotechnics** (e.g., firecrackers) can be used to frighten geese with both noise, and visual stimulus. This approach runs into the same challenges in urban areas that other noise-making devices do. They are unlikely to have much utility at remote sites in the estuary unless roosting sites are located. There are also safety issues to consider with this technique.
- **Predator simulation** can be achieved with the presence of human and/or domestic dog activity at goose congregation sites. However, chasing geese and the presence of a dog requires regular disturbance to be effective. Dogs are frequently used to haze and scare geese nesting and loafing in large open areas such as golf courses but are unsuitable for working along remote areas within the estuary.
- **Predator decoys**, particularly ones that move with the wind have been successfully used to redistribute geese. To be successful, the decoys must be regularly moved. Geese will quickly habituate if the predator decoys are left stationary.
- **Visual deterrents** such as mylar tape, strobe lights, flashers, and lasers have utility as a non-lethal distribution method. Consideration of visual impacts to adjacent landowners and the public needs to be considered prior to implementation.
- **Chemical repellants** have been typically utilized on mowed lawns and can inhibit geese from eating chemically treated grass. Application of repellents can be expensive, requires repeated applications after lawns are mowed, and can be negatively impacted by rainfall events. The greatest utility for chemical repellants would include application to high public use areas such as golf courses and other recreational fields during spring or fall goose migrations. While chemical repellants may be appropriate in some urban applications, they are unsuitable for wild rice restoration sites in the Estuary.
- **Drones** are being used more often as a tool for hazing and scaring geese. While drones could be used for remote areas of the Estuary, it requires considerable investment of time and personnel to implement effectively. Drone operators need a license and insurance prior to implementing drones-based hazing.

It is important to point out that non-lethal redistribution techniques require alternative habitat

for geese to move into once they are flushed from an area. When geese are moved from an area they do not tend to travel very far. Their destination might be a neighboring yard, nearby beach, or – in the case of the wild rice project – an adjacent bay. The implication(s) of redistributing geese from one location to another should be considered in the context of management action goals.

The Manoomin Restoration Team for the Estuary has tested non-lethal hazing and scaring redistribution techniques in the Estuary. Swan decoys and water splashing by canoeists provided some initial promise. However, decoy use was not a feasible, long-term solution given the personnel and time required to move decoys regularly enough to avoid habituation. In general, geese flushed from bays by canoeists quickly returned or simply retreated until personnel left the site. For these reasons, the Manoomin Restoration Team determined that hazing and scaring redistribution methods were not feasible methods for protecting plantings.

2.3.4 Lethal Management Techniques

Increasing adult mortality and reducing reproductive success are the most efficient and effective ways to reduce populations of resident geese and congregating migrants. Lethal management techniques suitable for urban environments include summer removal (i.e., goose roundups), and hunting or shooting by permit. It should be noted that adult mortality that occurs during the designated goose hunting season has not been shown to result in an appreciable reduction in resident or migrant geese and is not discussed further.

Goose Removal

Adult Canada geese lose and replace their flight feathers (i.e., molt) each summer. During this molting period, which takes approximately one month to complete, the birds are flightless. Goslings are also flightless during this period as they have not fully developed functional flight feathers. Molting geese tend to congregate in groups along waterbodies where they find adequate food resources and protection from predation. For wild rice restoration, this life history trait poses a challenge as groups of molting geese exert heavy browsing pressure on wild rice plantings. Because of their inability to fly, this molting period is the most efficient and effective time of year to implement goose removal.

Lethal removal is a form of goose management conducted by trained wildlife professionals using humane euthanasia protocols. It requires both state and federal permits. If geese are causing property damage or a health and human safety issue, then the City can apply for a permit directly from the MNDNR since the state holds a federal permit for those issues. If the situation does not fall under the Minnesota DNR's USFWS federal permit, then a USFWS federal Canada goose removal permit will need to be acquired.

Goose removal has several advantages over the redistribution methods mentioned previously:

- **Targeted application**. Goose removal can be targeted towards specific locations where conflicts occur.
- **Immediate impact**. The effects of successful goose removal operations are immediate because they directly remove the source of conflict.
- **Conflict resolution**. Goose removal resolves conflicts at the location where they occur rather than

redistributing geese to alternate locations where conflicts may then arise.

Canada geese are typically captured by drive trapping, which entails surrounding the geese while they are on land or water, herding them to suitable location and capturing them with nets or inside of a temporary pen. Geese are then removed from the site and euthanized using humane protocols approved for Canada geese by the American Veterinary Association.

Depending on the specifications in the U.S. Fish & Wildlife Service permit, euthanized geese may be donated to scientific organizations for animal food or to a food shelf for human consumption. For example, the Lake Superior Zoo accepted geese that were captured during the 2021 goose roundup in Wisconsin. Adult goose meat can be processed and donated to food shelves if funding and an approved poultry processor is available. It should be noted that, in some cases, carcasses may be disposed of at a local landfill, as was the case in 2022 when a highly pathogenic avian influenza outbreak posed challenges for goose disposition to scientific organizations. In this case, goose carcasses were bagged and immediately transported to a local landfill where they were immediately buried. Translocating geese to other areas is prohibited by MN DNR due to the abundance of geese and existing conflicts in most suitable habitat.

Goose removal has proven successful for reducing the impact that Canada geese have on wild rice plantings in the Estuary. When implemented in tandem with goose exclosures, wild rice is released from herbivory pressure and is more likely to mature, flower, and set seed. In the context of wild rice restoration, goose removal has an immediate and prolonged beneficial impact. In Allouez Bay, for example, goose roundups conducted in 2021 were extremely effective. There was an immediate reduction of goose numbers, and the impact of removal was observed during the following wild rice growing season. Herbivory impacts were less pronounced and wild rice growth was greater than restoration sites in the Estuary where goose removal was more difficult to implement.

Hunting/Shooting

Hunting geese during the prescribed hunting season can serve as a cost-effective method of controlling goose populations. MN DNR has extended Canada goose seasons in late summer and fall, along with generous bag limits for hunters to reduce overall goose numbers in the state. However, firearm restrictions and limited access to hunting sites in urban settings can limit the efficacy of hunting as a means of reducing conflicts with the growing Canada goose population. Special-purpose shooting permits are available to landowners who have demonstrated an impact of Canada goose depredation and can be issued by the MN DNR outside of the normal hunting seasons.

In Duluth, a City firearms ordinance prohibits the discharge of all firearms within the city limits and much of the Minnesota side of the Estuary is within Duluth city limits. Hunting during prescribed seasons is allowed in waterfowl hunting areas in the City of Superior, Wisconsin. Should the City seek to implement a special goose hunt within city limits, the local MN DNR Area Wildlife Office provides technical assistance in managing hunts.

2.4 Public Information

An integral part of this Plan is providing information to the public on decisions regarding Canada goose management. A public information meeting was held by the City on May 23, 2022 to provide an opportunity

for the public to learn about the Plan. Information on the development and implementation of the Plan can be accessed on the Duluth City website under the Progress in the Parks page: https://duluthmn.gov/parks/parks-planning/progress-in-the-park/. News releases and social media posts can also be issued to inform the public of ongoing goose management activities, as determined by the City.

Implementation of population management techniques in the St. Louis River Estuary will be communicated by the City's partner agencies, as needed. All entities performing management activities will provide the public with accurate and thorough information on the objectives of the activity.

2.5 Partner Relationships and Permit Requirements

To obtain a permit for goose removal, an entity or an individual must provide justification for the action and must consider available non-lethal techniques for managing goose impacts before implementing lethal techniques. Implementing removal efforts on the Minnesota side of the river must be conducted by an entity permitted for goose removal by MN DNR and authorized under a Federal permit through the U.S. Fish and Wildlife Service.

Prior to applying for state permits for goose removal, municipalities are required to submit a Canada goose management plan for approval by MN DNR to implement removal protocols on lands located within city limits. The city must also provide opportunity for public input on that plan. For the cases that do not fall under the MN DNR's USFWS federal permit, a Form 37 must be acquired from the local U.S.D.A. Wildlife Services. The Form 37 is submitted in the city's application to the USFWS for a Federal Canada goose removal permit. Once the USFWS federal permit is secured, the city submits the federal permit with their application to the MN DNR for a state permit. When all permits are received, the removal effort may move forward following permitting guidelines. Canada goose management activities within the City will require documentation and reporting to both the City and MN DNR using the MN DNR Management Activity Documentation Form (Appendix B).

The City of Duluth is under no obligation to coordinate, provide funding for or otherwise participate in any goose management activities performed by entities other than the City under this Plan. Any agencies or organizations intending to use the City's Plan to support a goose management permit application to the MN DNR must comply with all federal, state and local laws and must independently acquire all required federal, state and local licenses and permits to conduct the proposed activity. All permit holders will operate independently from the City and will comply with all permit requirements including the submittal of required reports and logs of management activities to the MN DNR. Future management activities undertaken by other entities within the city that include goose removal would require city approval and further public input.

3.0 Summary

This Plan was developed and approved the Duluth City Council to provide direction on Canada goose management within the City of Duluth. The Plan provides the City, and its citizens, with specific direction for

managing Canada Goose conflicts. It also addresses the MN DNR requirement of having an approved Goose Management Plan for issuance of a Canada Goose removal Permit.

This Plan was approved by the Duluth Natural Resources Commission on September 7, 2022 and by the Duluth City Council on _____.

4.0 References

1854 Treaty Authority. 2021. St. Louis River Estuary wild rice restoration monitoring (2015 – 2021). Technical Report 21-09. https://www.1854treatyauthority.org/management/biological-resources/fisheries/reports.html?id=247&task=document.viewdoc

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Appendix A

Wild Rice Restoration and Canada Goose Management in the St. Louis River Estuary – 2021 Goose Roundup Report

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Updated: 21 July 2021

PROJECT SUMMARY

The Wisconsin Department of Natural Resources (WDNR) conducted a Canada Goose (*Branta canadensis*) roundup as part of on-going efforts to restore wild rice (*Zizania palustris*) in the St. Louis River Estuary. Once abundant throughout the estuary, wild rice has been reduced to a few remnant stands and areas where restoration efforts have been implemented. Research in the estuary has determined that Canada goose herbivory is the most significant impediment to successful establishment of self-sustaining wild rice beds. A variety of techniques have been used to reduce the impacts of geese that include hazing, egg addling, mylar flashing, swan decoys, and exclosures without a sufficient reduction in herbivory. Wildlife professionals from the WDNR and Animal and Plant Health Inspection Service (APHIS) implemented the goose roundup at strategic locations in the estuary in proximity to wild rice restoration sites. A total of 187 geese were removed over the course of the two-day roundup effort.

PROJECT BACKGROUND

Wild Rice Restoration Goals -- The restoration of wild rice (*Zizania palustris*) in the St. Louis River

Estuary is of cultural and ecological significance. Restoration goals developed in the Wild Rice

Restoration Implementation Plan for the St. Louis River Estuary ("Wild Rice Plan"; Minnesota Department of Natural Resources 2014) include the establishment of 275 acres of self-sustaining rice beds. This work was conducted with funding provided by the Great Lakes Restoration Initiative and administered by the U.S. Environmental Protection Agency. These efforts will contribute to the removal of beneficial use impairments for the St. Louis River Area of Concern (BUI 9 – Loss of Fish and Wildlife Habitat).

Figure 1. Sign of Canada goose herbivory on wild rice in the St. Louis River Estuary (Photo Credit: WDNR).

Canada Goose Herbivory -- Wild rice restoration efforts in the St. Louis River Estuary are hampered by Canada goose (*Branta canadensis*) herbivory (Figure 1). Monitoring data, camera traps and anecdotal observations have documented heavy browse by Canada geese during late spring and summer months when wild rice is in the floating leaf and early emergent stages of its life cycle (Schwartzkopf 1999; Figure 2). This important phase of the wild rice life cycle coincides with an abundance of molt migrant and resident nesting geese (and their offspring) occupying wild rice sites in the estuary. Efficient foraging by geese inhibits wild rice flowering and seed head production.

A variety of techniques have been implemented to reduce the impacts of Canada goose herbivory (e.g., adapting restoration techniques, hazing, egg addling, mylar flashing, swan decoys, and goose exclosures). Despite these efforts, the impact of Canada goose herbivory has not been sufficiently reduced to allow for the establishment of self-sustaining wild rice beds.

Figure 2. Canada goose exclosure experiments have identified goose herbivory as the primary impediment to wild rice restoration in the St. Louis River Estuary (Photo Credit: Lake Superior National Estuarine Research Reserve).

Canada Goose Roundup -- The WDNR, in partnership with the City of Superior and the Animal and Plant Health Inspection Service (APHIS) – Wildlife Services, coordinated a Canada goose roundup on the Wisconsin side of the St. Louis River in July 2021. Personnel from WDNR, APHIS – Wildlife Services, Minnesota Department of Natural Resources (MNDNR), 1854 Treaty Authority, Superior Police Department, and the Lake Superior National Estuarine Research Reserve (LSNERR) participated in the goose roundup effort at five locations within the estuary (Figures 3 - 6).

We deployed motorboats and kayaks to locate and herd geese towards designated capture sites where APHIS – Wildlife Services personnel captured and processed geese following standardized control methods. Geese were euthanized using carbon dioxide, a method of euthanasia approved by the American Veterinary Medical Association. All geese were donated to the Lake Superior Zoological Society in Duluth to be utilized as food for resident carnivores.

Figure 3. Wild rice restoration sites near the 2021 Canada goose roundup location at Oliver Landing.

Figure 4. 2021 Canada goose roundup locations near the Clough Island wild rice restoration site.

Figure 5. 2021 Canada goose roundup locations near the Allouez Bay wild rice restoration sites.

PROJECT OUTCOME

Canada Goose Roundup -- A total of 187 Canada geese were removed from the St. Louis River (Table 1). Captures in Allouez Bay (*n* = 98) comprised a significant proportion of geese that inhabit the wetland areas of the bay that are likely to browse planted rice. Upriver sites west of Oliver Landing proved to be more difficult in terms of locating and successfully herding geese to the capture location. Considerable effort was made to roundup geese from areas near Foundation Bay and Oliver-Bear Island sites.

Table 1. Canada goose capture results during the July 2021 roundup.

Date	Location	Site	Adult	Juvenile	Total
7/1/2021	Arrowhead	Arrowhead Landing & Hendrick's	8	14	22
7/1/2021	Allouez bay	Power Squadron	35	16	51
7/1/2021	Upriver	Oliver Landing	34	0	34
7/2/2021	Upriver	Oliver Landing	13	0	13
7/2/2021	Allouez Bay	Plover Site	15	32	47
7/2/2021	Upriver	Oliver Landing	20	0	20

Although we had some success at these “upriver” sites (*n* = 67), there is a substantial number of geese that evaded capture. We also captured geese (*n* = 22) from Arrowhead Landing and a nearby residential site (i.e., “Hendrick’s”), a site that is approximately 2 miles (3.22 km) from the nearest wild rice restoration site on the eastern side of Clough Island (Figure 3).

CONCLUSIONS & NEXT STEPS

General Conclusions -- This first effort at rounding up Canada geese from the St. Louis River Estuary was a success. Personnel from multiple organizations came together to implement a direct management action that will benefit wild rice restoration. In addition, we verified that this type of management action can be done efficiently and effectively. The roundup was conducted discretely, was met with strong support from members of the public that were encountered and will likely improve the likelihood of successful wild rice seed production.

Quantifying the Impact of Removal -- We will not be able to quantify the impact of removing 187 geese on wild rice seed production until monitoring efforts are completed in the fall of 2021. We hope to observe monitoring locations with greater biomass, density and seed production. Similarly, we expect to see fewer monitoring locations with evidence of goose browse when the monitoring results are made available. Heavily browsed vegetation was observed prior to the roundup. It is likely that wild rice restoration sites in closer proximity to roundup location will experience a greater reduction in goose herbivory that sites which are more distant to roundup locations. We intend to examine monitoring data to evaluate this first year's impact.

Expanding to Minnesota -- Many of the prime round up locations in the upriver sections of the project area are located on the Minnesota side of the river. Future capture efforts will be more effective at reducing goose herbivory on upriver restoration sites when capture operations can be conducted in Minnesota as well as Wisconsin. The City of Duluth is currently exploring the development of a city-wide goose management plan that would allow the MNDNR to permit specific management actions to reduce impacts to wild rice and other resources. Until the MN plan is in place, round up efforts will take place exclusively on the Wisconsin side of the river.

Continued Management -- Effective goose management that benefits of wild rice restoration relies on cooperation among a diverse group of stakeholders each of whom plays an important role. Opportunities to educate the public on the cultural and ecological importance of wild rice will help garner continued support for goose management. Higher seeding rates (~200lbs/acre) combined with goose exclosures and annual round ups will go a long way towards achieving the wild rice restoration goals established in the "Wild Rice Plan" (MNDNR 2014). We anticipate that goose roundups will be implemented in subsequent years and that management triggers for Canada goose roundups will be incorporated into a future Wild Rice Plan revision. However, we believe that as restoration goals are met, Canada goose roundups in the St. Louis River Estuary will end. Continued monitoring will inform the effectiveness of these tools and the need for future action.

Research Opportunities -- There are a few key research questions that have been developed in the process of planning for, and carrying out, this initial round up effort.

1. How much time are geese spending in wild rice restoration sites compared to other locations in the estuary? Is the amount of time spent in a restoration site proportional to the amount of rice present?
2. How far will geese move within the Estuary to access wild rice restoration sites? Do restoration sites near capture locations see a greater benefit than sites more distant (e.g., improved biomass seed production, higher density rice stems, etc.)?
3. Is there a wild rice density and/or patch size where rice beds become more resilient to goose herbivory? Can we establish a set of metrics that define a resilient stand of wild rice in the St. Louis River Estuary?

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Appendix B

MN DNR MANAGEMENT ACTIVITY DOCUMENTATION FORM

DATE	Time	Name	Activity/Method	Location	Notes