

Running head: Restoration and Conservation of the Netley-Libau Marsh

**Restoration and Conservation of the Netley-Libau Marsh - An Ecosystem Management
Plan for Lake Winnipeg**

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ENVR 4050: Ecosystem Management

December 12th, 2017

Restoration and Conservation of the Netley-Libau Marsh

December 1, 2017

To whom it may concern,

We are pleased to share with you the enclosed report on our Ecosystem Management Plan for Lake Winnipeg. This report focuses on increasing the size and health of the Netley-Libau Marsh in Lake Winnipeg. This report presents findings from extensive research and discussions with people that have done some work on the Marsh. This document has been shaped by many voices and valuable opinions.

The Netley-Libau Marsh is important to the overall health of Lake Winnipeg as this large coastal wetland influences the quality of water that flows into Lake Winnipeg from the Red River. The Netley-Libau Marsh is not currently functioning as a healthy coastal wetland and the reasons for this are explained in this report. This report discusses our management strategies for the restoration and conservation of the wetland to enable it to return to a healthy state.

Thank you.

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Acknowledgements

This project required a huge amount of work, research and dedication. Completion of this report would not have been possible if we did not have the support of many individuals and organizations. Therefore, we would like to extend our sincere gratitude to all of them.

First of all, we would like to express our sincere gratitude and appreciation to Dr. Erin McCance and Mr. Rob Wheeldon for teaching us all we needed to know in order for us to successfully write this Ecosystem Management Plan.

We would also like to express our gratitude to the Gordon Goldsborough from the University of Manitoba for sharing his pearls of wisdom with us during our research; we appreciate the time he took to assist us and answer all the questions we had concerning the Netley-Libau Marsh. We would also like to give credit to Scott Beaton of the Manitoba Habitat Heritage Corporation for sharing his experience with conservation efforts on private land.

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Executive Summary

The goal of this Ecosystem Management Plan is to increase the health and size of the Netley-Libau Marsh in Lake Winnipeg. For this goal to be achieved we have four objectives and these are;

1. Identification of the importance and functions of the Netley-Libau wetland
2. Identification of the sources of degradation to the wetland and develop strategies for restoration.
3. Establishing and implementing strategies for the conservation of the Netley-Libau Marsh
4. Developing a framework for long term stakeholder involvement in wetland conservation and restoration in Lake Winnipeg.

It is essential to know how important the Netley-Libau Marsh is to Lake Winnipeg, then the reasons for wanting to increase its size and health will be properly founded. The importance of the wetland has been grouped into ecological, economic, and cultural importance. It is also very important to know the sources of degradation to the wetland, we found the most common sources of degradation of the Netley-Libau Marsh to be due to urbanization, agricultural practices, invasive species, river dredging and altered hydrology.

We have come up with several strategies for the restoration and conservation of the Netley-Libau Marsh. The restoration strategies discussed in this report are; the construction of a chain link fence, the construction of retention ponds, the use of GIS to monitor changes on the marsh, restricting shoreline development and granting incentives for the preservation of the wetland. In other to conserve the wetland we would create awareness on the functions and importance of the wetlands, educate the public on best use practices in other to prevent degradation of the wetland and by

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forming strong partnerships with various groups of people that are interested in protecting the wetland.

In order to increase the health and size of the marsh a long-term plan for restoration has been set up which is to run for 25 years, based on a 5-year management planning cycles within the 25 years.

Funding for this project would be gotten from government grants, non-governmental organizations, the University of Manitoba and the Lake Winnipeg Stewardship Fund.

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1.0 INTRODUCTION

Our group has been tasked with the creation of an ecosystem management plan for Lake Winnipeg. Research of Lake Winnipeg revealed a variety of threats to the present and future health of the lake including watershed-level pollution and the loss of productive natural habitat. These issues led to the identification of wetland degradation as a key problem in Lake Winnipeg. Given the complexity and cost of managing wetlands around the lake, our management plan will focus on the boundary of Netley-Libau Marsh. The goal of our ecosystem management plan is to increase the size and health of the Netley-Libau Marsh in Lake Winnipeg. Over the long term, we will utilize advocacy, stakeholder collaboration and the knowledge gained from management of our pilot site to increase the size and health of wetlands in areas around the lake.

To accomplish the goal of increasing the size and health of Netley-Libau Marsh, our management committee determined our objectives to be:

1. Identification of the importance and functions of the Netley-Libau wetland
2. Identification of the sources of degradation to the wetland and develop strategies for restoration.
3. Establishing and implementing strategies for the conservation of the Netley-Libau Marsh
4. Developing a framework for long term stakeholder involvement in wetland conservation and restoration in Lake Winnipeg.

Given the limited resources available for conservation in the wetlands of Lake Winnipeg, our short-term plan is centered around restoration and conservation efforts in pilot areas at Netley-Libau Marsh. In the long term, we will work towards our management goal by creating and overseeing the Lake Winnipeg Wetlands Conservation Committee (LWWCC), a non-profit committee with the mission of working with stakeholders around the lake to help to maximize

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conservation and restoration efforts, using our pilot area as a reference site for successful management practices. The stakeholder groups that have been considered in our plan include; First Nations, government agencies, private industries, activist groups and private citizens. The classification of stakeholders is based on the level of control, dependence or influence that each has on Netley-Libau Marsh (See Appendix A for a complete stakeholder lists).

Management action in our pilot area will be based upon minimizing the impacts of human activity, preventing loss of existing native wetland and implementing cost effective measures to increase the size of functional wetlands in our pilot site. Management of our pilot site will be based on five-year cycle, after which the success of our efforts will be evaluated and incorporated into the next five-year plan. Long term planning by the LWWCC will be based on 25 year working period. For the next 25 years, the committee will meet annually with stakeholders and the public in order to share progress, concerns or plans regarding the wetlands, and to continue to coordinate stakeholders to achieve policy goals and to maximize conservation efforts.

2.0 BACKGROUND

Lake Winnipeg is the tenth largest freshwater lake in the world by surface area and the sixth largest in Canada (Government of Canada, 2017). The surface area of Lake Winnipeg is about 23,750 km² and covers about 3.7% of the surface area of the Province of Manitoba (Manitoba Government, 2017). The Lake Winnipeg watershed is the second largest watershed in Canada and it includes parts of four provinces and four U.S. states. Its drainage basin is nearly 1,000,000 km² in size and is home to more than 7 million people (Manitoba Government, 2017). Several major rivers flow into Lake Winnipeg including; the Red, Winnipeg, and Saskatchewan rivers. These three rivers make up on average more than 60% of the total river flow into Lake Winnipeg (Manitoba Government, 2017).

Wetlands can be defined as areas occupying a transitional zone between land and water (City of Calgary Parks, 2004). It is a land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment (Warner & Rubec, 1997). Wetlands are among the Earth's most productive ecosystems and they support a wide range of plant and animal. Wetlands are also one of the Earth's most threatened ecosystems as activities such as agriculture, residential development, pollution and industrial activities often led to its deterioration; these will be discussed further later on in this plan (Goldsborough, 2015).

Netley-Libau Marsh is the largest coastal wetland in Manitoba, at about 22,200 hectares, and is believed to be the largest in North America (Goldsborough, 2015). The marsh consists of a complex of shallow lakes, lagoons, and channels. It is situated at the confluence of the Red River into the south basin of Lake Winnipeg, behind a 25-kilometer barrier ridge along the south lakeshore. The marsh lying west of the river is referred to as Netley Marsh whereas the portion

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east of the river is the Libau Marsh; so Netley-Libau refers to the whole complex (Goldsborough, 2015). The Netley-Libau Marsh has experienced a significant loss of plant communities as well as wildlife and fish habitat and a gradual loss of aquatic vegetation and wetland area. Netley-Libau Marsh is not currently functioning as a healthy coastal wetland (Lake Winnipeg Foundation, 2014).

3.0 PROJECT GOAL AND OBJECTIVES

3.1 Goal

The goal of this project is to increase the size and health of the Netley-Libau Marsh in Lake Winnipeg.

3.2 Objectives

1. Identification of the importance and functions of the Netley-Libau wetland.
2. Identification of the sources of degradation to the wetland and development of strategies for restoration.
3. Establishing and implementing strategies for the conservation of the Netley-Libau Marsh.
4. Development of a framework for long term stakeholder involvement in wetland conservation and restoration in Lake Winnipeg.

3.3 Ecosystem Management Boundary

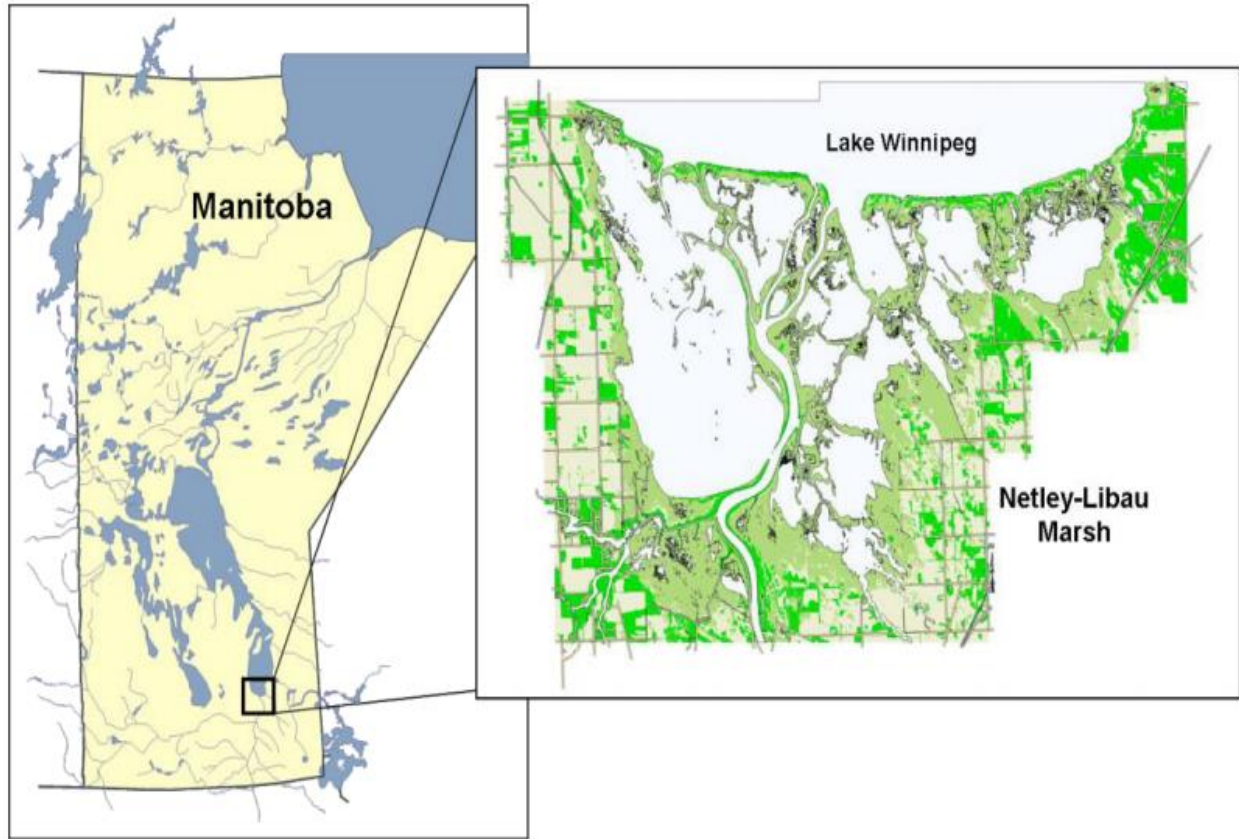


Figure 1. This figure shows the location of the Netley-Libau Marsh, the area in the square is the ecosystem boundary for this plan (Grosshans et al., 2012)

Research of Lake Winnipeg revealed a variety of threats to the present and future health of the lake. Two major issues that were identified were watershed-level pollution and the loss of productive natural habitat; these issues led to the identification of wetland degradation as a key problem in Lake Winnipeg. Management of wetlands around the lake would be complex, expensive and unrealistic given our resources; so in order to maximize impacts, we determined our management should focus on increasing the size and health of wetlands in a specific area.

4.0 EXISTING NATURAL ENVIRONMENT

Climate

- The climate of the Netley-Libau Marsh is classified as cold continental, with arid conditions throughout, particularly over the warm season (Lindgren & Netley Marsh Waterfowl Foundation Inc., 2010).
- The mean monthly temperatures range from -19.8 °C in January to +19.1 °C in July (Lindgren & Netley Marsh Waterfowl Foundation Inc., 2010).
- The annual mean precipitation in the area is usually between 400 and 600 mm, but as low as 200 mm in some areas (Lindgren & Netley Marsh Waterfowl Foundation Inc., 2010).

Hydrology

- In Lake Winnipeg, water flows from south to north, meaning water flows out of the Netley-Libau Marsh (Goldsborough, 2015).
- The Netley-Libau Marsh is a complex of lakes and streams whose water levels are influenced by Lake Winnipeg (Lindgren & Netley Marsh Waterfowl Foundation Inc., 2010).

Vegetation

- The dominant plant communities in the Netley-Libau marsh comprises of 20% cattail (*Typha* spp.), 13% bulrush (*Scirpus* spp.), 4% river bulrush (*Scirpus fluviatilis*), 7% sedge (*Carex* spp.), and 3% reed grass (*Phragmites* spp.) (Lindgren & Netley Marsh Waterfowl Foundation Inc., 2010)
- Some other plant species found on the marsh include bur red, sago pondweed, flat stemmed pondweed, water plantain, arrowhead, Canada waterweed, couch-grass, slough-grass, reed

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grass, foxtail barley, northern reed grass, timothy and the field horsetail (Lindgren & Netley Marsh Waterfowl Foundation Inc., 2010).

Species

- About 114 avian species have been sited on the marsh. Some of which are the red-winged blackbird, mallard, cedar waxwing, Canada goose, American goldfinch, snow goose, marsh wren, yellow warbler, bobolink. American kestrel, common snipe, common yellowthroat, swamp sparrow, sora and the mourning dove.
- Some other species that can be found on the marsh are muskrat, beaver, raccoon, mink, striped skunk, red fox, coyote, red squirrel, woodchuck, east grey squirrel, snowshoe hare, meadow vole, whitetail deer, moose, river otter, whitetail jack rabbit and the franklin ground squirrel (Lindgren & Netley Marsh Waterfowl Foundation Inc., 2010).

Functional Relationships

- The ecosystem structure of the Netley-Libau marsh is defined by cattails and other wetland plants. Cattails bulrush and similar species account for the vast majority of plant cover in the marsh, acting as ecosystem engineers, similar to trees in a rainforest or an aquatic kelp forest. The roles that these plants play includes:
 - Acting as food and shelter for invertebrate species. These species are an important component of the food chain, which are supported by the structure that cattails provide.
 - Providing nesting material, shelter and protection from predators for migratory and non-migratory species of birds.

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- Supporting the beaver and muskrat population; cattails are a vital food source for these species, particularly during the winter months, when much of their food stores consist of cattails (Native Freshwater Plants - Cattails).

5.0 FUNCTIONS AND BENEFITS OF THE NETLEY-LIBAU MARSH

Before examining the functions and benefits of the marsh, it is important to note that many changes over the last century have occurred in Netley-Libau because of both natural and human-induced activities that have degraded the marsh, consequently, it is no longer the healthy coastal wetland it once was (Richard, E. G, 2012). The health of Lake Winnipeg is deeply linked with the health of its wetlands, and restoring the Netley-Libau Marsh will directly affect the health of Lake Winnipeg. Many of the historical ecological benefits the marsh offered to the fauna and flora in Lake Winnipeg have been lost or degraded (EGS, Olewiler 2004), but restoration strategies could help reverse much of this damage.

5.1 Ecological Importance

The Netley-Libau Marsh is very important as the wetland serves a lot of ecological functions, such as;

- Natural shoreline protection from erosion.
- Recharging ground water (Government of Canada, 1991).
- Providing habitat for a wide range of plant and animal species.
- Removing cycle nutrients such as phosphorus and nitrogen from water flowing into lakes, rivers, and groundwater (Packrats, 2010).
- Recharging local and regional ground water supplies (Government of Canada, 1991).

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- Minimizing impacts of droughts and flooding (Packrats, 2010).

5.2 Economic Importance

The Netley-Libau Marsh is also very important because as it serves many economic functions, such as;

- Providing major attractions for tourism and recreation.
- Being a hunting, trapping and fishing resource base (Government of Canada, 1991).
- It supports local agriculture, which contributes to a large part of the local economy (Government of Canada, 1991).
- Being a focus for scientific research (Government of Canada, 1991).

5.3 Cultural Importance

The Netley-Libau Marsh has some aesthetic values which it serves, including;

- Providing recreational opportunities such as bird watching and hunting (Packrats, 2010).
- Spiritual values, particularly to Aboriginal groups.

6.0 SOURCES OF DEGRADATION OF THE NETLEY-LIBAU MARSH

Today, the Netley-Libau Marsh resembles a shallow mucky lake as opposed to a healthy coastal wetland. Many of the ecological goods and services that the marsh could provide have been degraded or lost (EGS, Olewiler 2004). However, many of these benefits can be revitalized through marsh restoration and management. Presently, the most prominent problem occurring in Netley-Libau Marsh is the ever-increasing open water surface and the resultant loss of available uplands for emergent vegetation. The major sources of degradation include:

- Urbanization
- Agriculture

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- Invasive species
- River dredging and other related problems
- Altered hydrology (Dale & Goldsborough, 2011).

6.1 Urbanization & Altered Hydrology

Urbanization and development can substantially alter the dynamics of wetlands (Amanda, L. A. & Richard, R. H., 1997). Hydrologic changes can exert large and immediate effects on the physical conditions within a wetland, including the depth, duration, and frequency of inundation of the wetland (Amanda, L. A. & Richard, R. H., 1997). Ever since the 1930s Lake Winnipeg has experienced a fewer dry periods (Dale, W. & Gordon, G., 2011), this has led to a slow consistent loss of vegetation in the coastal wetland areas. Dry periods are essential to the life cycle of Lake Winnipeg's wetland as it provides upland areas that will allow new emergent vegetation to germinate. Coupled with the few dry periods that have been experienced over the last century, the regulation of Lake Winnipeg's water levels by Manitoba Hydro has significantly altered the hydroperiod in Lake Winnipeg. This creates a positive feedback loop and further prevents low water levels from occurring on the wetlands, contributing to further loss of vegetation via the erosion and submersion of upland areas. The erosion of upland areas has caused the joining of lakes with areas of the wetland to create a vast shallow lake in Netley-Libau (Herbert, 2011). Goldsborough and Wrubleski proposed that for the restoration of Netley-Libau Marsh to be possible, a decrease in water levels of approximately two feet (2ft) for two years is necessary to allow for the re-establishment of emergent vegetation. Goldsborough and Wrubleski claim that this has not only been attempted, but has shown to be effective in similar studies done at Delta Marsh (Goldsborough and Wrubleski, 2015).

6.2 Agriculture

Agricultural activities are another factor leading to the degradation of the Netley-Libau Marsh. This threat arises from the construction of drains and dikes, encroachment, peat removal, grazing by livestock, and resource extraction (trees, fish, and other products) (Goldsborough, 2015). This threat applies to coastal wetlands near agricultural land where pesticides, fertilizers, manure, and other chemicals are used; these chemicals move from areas of application, either in surface flow or aerial drift, into nearby wetlands and this leads to its degradation. These chemicals can potentially increase the amount of nutrients and organic matter in the wetland which lead to eutrophication (Goldsborough, 2015).

6.3 Invasive Species

Another factor degrading the Netley-Libau Marsh is the flow of invasive species into the Marsh. It has been observed that wetlands with a clear connection to the lake are prone to invasion by non-native species. These invasive species can displace the current native species inhabiting the marsh, while they displace native species they do not substitute for their ecological roles (Goldsborough, 2015). Common examples of the non-native plant species which plague the marsh are hybrid cattail (*Typha X glauca*), reed canary grass (*Phalaris arundinacea*), invasive phragmites (a variant form of *Phragmites*) and purple loosestrife (*Lythrum salicaria*). Some invasive animal species on the marsh are the Rainbow Smelt, Common Carp and the Zebra mussel (Lindgren & Netley Marsh Waterfowl Foundation Inc., 2010). When these species invade the marsh, it loses its biodiversity; these species get to the Marsh from the Red River through channels, which have continued to grow overtime (Goldsborough, 2015).

6.4 River Dredging and other related problems

Goldsborough and Wrubleski in 2011 identified four main factors that are responsible for degradation in Netley-Libau Marsh. The first to be identified was the dredging of what is known as the Netley Cut in 1913, which is a small channel cut into the upland ridge which separates Netley-Libau Marsh from the Red River that connected the two bodies of water. The second is the cessation of river dredging in 1999, which has also contributed to degradation in Netley-Libau Marsh causing the channels once again became shallower. The final factor identified was the current efforts in Red River flood mitigation. The artificial cutting or breaking of ice on the Red River to increase drainage so that potential flood damage will reduce. This practice increases the volume of water that moves through the Netley Cut, further increasing the degradation of the marsh.

7.0 RESTORATION STRATEGIES FOR THE NETLEY-LIBAU MARSH

The Manitoba provincial government began action towards the degradation of Netley-Libau in 2009, when the government established the Provincial Wetlands Working Group. This was set up to address restoration strategies for both Netley-Libau and Delta Marsh (Goldsborough G, 2015). Notwithstanding, the following has been put forth:

7.1 Construction of a Chain Link Fence

The major strategy to reduce the degradation caused by invasive species is to limit the flow of the Red River into the channel named “The Cut”. A blockade consisting of a chain link fence can be constructed along the channel. The Cut was dredged in 1913 by the Federal Government and was originally about 80 feet in width. This cut has widened in the past years to about 1475 feet in width.

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The blockade will be about 1400 feet in width to get the cut back to its initial size. (Goldsborough, 2016). This is an expensive approach as the fencing system could cost around \$10 million dollars. (Hasler, 2010). This fencing system allows for the flow of water but moderates the influx of non-native species into the wetland. Because of the scale, complexity and cost of this project, it will be lobbied to the Provincial Government in hopes that funding can be granted. If funding is available, the strategy will be carried out over a time frame of 5 years. In the first year, detailed planning would be done, appropriate measurements would be taken and materials needed would be purchased. In the following year construction of the chain link fence would begin and for the next 3-5 years the site would be monitored so as to ensure the success of the fence. After this time, the strategy can be evaluated and its effectiveness will be determined. The construction of this fence will interrupt fishing along that channel for the duration of the construction.

Adaptive Strategy:

If the fencing system is not successful, the next step will be the harvesting of the carp, the carp is the major invasive species on the marsh. The carp can simply be fished out of the Marsh. The excess fish that isn't sold can be donated to the hungry.

7.2 Construction of Retention Pods

To reduce the draining of the wetland, the retention of water on agricultural land needs to be encouraged as this reduces the risk of flood. Retention pods can be created so excess water can be drained into the pond instead. Retention ponds cost around an estimated \$52,000 (maintenance included) for about 2000m³ of land (Canada Mortgage and Housing Corporation, 2017). This plan will have to be lobbied to the government for funding as it is quite expensive as well. If the funds are available, it will follow a similar time frame to the chain link fence. The retention pods will

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increase mosquito population in the area as the water will be stagnant and this is the major issue with this strategy. There is also a potential for geese population increase in the area.

Adaptive Strategy:

If the retention pod method is not productive, a tile break can be used. "A "tile break," involves removing a section of underground agricultural tile that is draining a wetland basin." (Minnesota Department of Natural Resources, 1999) The drain tile is usually made of clay or perforated plastic and is buried roughly two to six feet in the ground. A backhoe is used to crush about 50 ft. of tile downstream. The downstream outlet pipe is then plugged with a clay fill and the trench is filled. This is a more expensive method as tile drainage could cost about \$1.20 per square foot. (Country Guide, 2015) This will remove excess water from below soil surface keeping the soil at an optimal level for plant growth. This is more efficient than the total draining of the land as the water level is maintained.

7.3 Using GIS to Monitor Changes in Netley-Libau Marsh

A study should be undertaken on the measurement of changes in other coastal wetlands over the same period that marked changes in Netley-Libau Marsh. A study of this kind would help us to distinguish the relative contributions of the Red River versus Lake Winnipeg on coastal marsh ecology. Monitoring of the Netley-Libau Marsh is very key and should be undertaken if we want to have sound scientific basis for management and restoration. More research and mapping of coastal wetlands is of the utmost importance. As at 2011, there is very little information available, both historically as well as on the year-to-year changes in the coastal wetlands surrounding Lake Winnipeg (Herbert, 2011). Year to year mapping must be undertaken in a greater capacity to increased future monitoring of water levels, quality, and vegetation (Herbert, 2011). Also, Goldsborough and Wrubleski recommended archival research be done, to compile past literature

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on Netley-Libau marsh to create a thorough bibliography on the subject. There is aerial photography of the marsh available starting in 1948 and continues at irregular intervals to the 1970s. A chronological analysis of such imagery will provide us with data on the spatial distribution and extent of open water versus emergent vegetation. The cost for consulting a GIS team to run analysis for a five-year period will be about \$90,000.

7.4 Retention of Water on the Agricultural Landscape

To help restore the wetland we would embark on approaches to reattempt filling in Netley Cut (Herbert, 2011). By addressing high water levels at the location where they are most visible, such as Netley-Libau Marsh, the flows into the Red River and its tributaries could be greatly reduced right at their sources (Herbert, 2011). This would require an increased local water retention and treatment from agricultural and urban sources. In the case where there is a greater retention of water on the landscape, then the need for the use of coastal wetlands as floodwater storage would be greatly reduced (Herbert, 2011). In the case where we have less runoff going directly into the river, but is instead gradually released over time, the water levels in Netley-Libau may be reduced enough so that vegetation can re-emerge (Herbert, 2011).

7.5 Restricting Shoreline Development and Granting Incentives for Preservation

Another step in reducing coastal wetland degradation will lie in restricting forms of shoreline development that degrades coastal wetlands (Herbert, 2011). Many a time, wetlands are seen as cheap real estate on which to develop, because there is little preparation work that needs to be done prior to development, such as land clearing. Higher economic value should be placed on wetlands as a disincentive, so that development is not so quick to utilize them (Herbert, 2011). One way this can be accomplished is by the provision of funding incentives by the provincial government for farmers and developers to institute best management practices, thus setting aside wetlands for

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preservation instead of for development (Herbert, 2011). Our organization can manage a similar program through a conservation agreement program with local landowners. This program would be based on the existing conservation agreement program that is administered by the Manitoba Habitat Heritage Corporation. Due to the focus of some funders, such as Ducks Unlimited, on preservation of prairie pothole wetlands, conservation agreements are more rare around Lake Winnipeg. Using grant funding, we will enter into a partnership with the MHHC to protect privately owned wetlands in the Netley-Libau region at a price of \$200 per acre (Beaton, personal correspondence, Nov. 21, 2017). Coupled with the incentives, those involved in commercial fishing could also be offered similar incentives to harvest common carp over other native species, and thereby reducing the impact of carp on the state of the coastal wetlands (Herbert, 2011).

8.0 CONSERVATION STRATEGIES FOR THE NETLEY-LIBAU MARSH

It is very necessary to have conservation strategies for the Netley-Libau wetlands because once the wetlands are restored it would be very essential to keep them in good condition in order to prevent degradation. These conservation strategies will be used to conserve the Netley-Libau wetlands and in the long run it would be used to conserve other wetlands around Lake Winnipeg.

8.1 Strategy 1 – Awareness

For this strategy, public awareness on the importance of wetlands would be enhanced. One of the greatest challenges to wetland conservation is the limited value that the society places on the functions, services and benefits that the wetlands provide (Ontario Government, 2016). If people are aware of the functions of the Netley-Libau wetland they would be empowered and inspired to value and conserve it. To accomplish this strategy, we will:

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- Evaluate existing communication materials and outreach initiatives about wetlands and assess the gaps in the techniques
- Hold seminars and community meetings annually to talk to the people that live around the Netley-Libau marsh; we will talk to them about the benefits that the wetlands provide to them
- Work with Indigenous communities and organizations to develop targeted initiatives and materials (Ontario Government, 2016)

These awareness actions will primarily be carried out by volunteers, these volunteers can be gotten from schools and nonprofit organizations such as Fort Whyte Alive. It would cost about \$2,000 annually to carry out this strategy; the amount of money would be used to rent a hall for the seminar or meeting, to create flyers for the event and to transport the speakers to the venue.

8.2 Strategy 2 – Education

For this strategy, people will be educated about the Netley-Libau wetlands, including its status, functions, threats and ways of conserving it (Ontario Government, 2016). If the people living in the region are properly educated and informed about the wetland and the things that are degrading the wetlands they would be more careful. Essential knowledge is important as it would make decision making easier and more effective. To accomplish this strategy we will:

- Identify the current and emerging threats to the wetland (Ontario Government, 2016).
- Identify the ecosystem services and economic value provided by the Netley-Libau marsh to the local population.
- Determine farming practices that can be applied to local agriculture to benefit Netley-Libau (Manitoba Eco-Network, 2016).

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- In order to educate stakeholder groups, we will hold annual interactive seminars targeting specific stakeholder groups to provide them with the information we've identified.

These actions will also be primarily carried out by volunteers and members of our group, these volunteers can be recruited from schools and nonprofit organizations such as Fort Whyte Alive; they would help out with the educational programs and seminars.

8.3 Strategy 3 – Partnerships

For this strategy, partnerships will be established and strengthened to focus and maximize conservation efforts for the Netley-Libau wetlands. Many public and private agencies, organizations and institutions are involved in the conservation of wetlands for example, provincial government, federal government, municipalities, conservation authorities, non-government organizations, local community interest groups, and many more (Ontario Government, 2016). The overall goals of these groups are usually similar but they do not always work together. The conservation of the Netley-Libau wetland requires collaboration and that is what this strategy would help achieve. For this strategy we will:

- Clarify roles and responsibilities of the various agencies involved in the conservation of the wetland (Ontario Government, 2016).
- Build partnerships with academic institutions to gain help researching more effective techniques for wetland conservation.
- Develop partnerships with the agricultural community, Indigenous communities and private landowners to promote wetland conservation practices.
- Use the partnerships we form to pressure Manitoba Hydro into implementing dry periods into its next Water Power Regulation License application, as this affects the wetland (Manitoba Hydro, 2016).

Adaptive Management

In an event that this strategy does not yield favourable results, we would;

- Use the same partnership to lobby provincial government for legislative action requiring implementation of dry period into Manitoba Hydro's water level regulation in Lake Winnipeg.
- This could be in form of an amendment to the Water Power Regulation Act or by making a law.

9.0 ESTABLISHING A FRAMEWORK FOR LONG TERM STAKEHOLDER INVOLVEMENT IN LAKE WINNIPEG WETLAND CONSERVATION

9.1 Timeframe

The actions that this plan has established as necessary for accomplishing our goal will not be possible without collaboration and assistance by the key stakeholders of Lake Winnipeg. The direct actions overseen by this committee will focus on restoring and conserving wetlands specifically within our pilot area, while the actions necessary to conserve wetlands lake-wide will hinge on our committee's ability to coordinate with other stakeholders. To accomplish this, it was determined that the most effective action is the creation of the Lake Winnipeg Wetlands Conservation Committee. This committee will operate on 25-year planning periods to enact the management strategies defined in this plan, based on five-year management planning, with the progress made determining planning for the next five years. Our initial five-year planning term will strive to accomplish this time frame:

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Year 1: Identify and secure access to management sites within Netley-Libau, secure grants for conservation restoration and education, establishing partnerships for conservation and research, and begin community engagement to ensure management of the wetlands is socially equitable.

Year 2: Begin restoration work, site monitoring, continuation of community meetings.

Year 3, 4 and 5: Continuation of management efforts.

At the end of every management period, the LWWCC will conduct and publish a review of its work to provide in-depth answers to these questions:

- 1) How have the structure, size and function of wetland ecosystems in our managed areas changed in the last five years?
 - a) How do these changes compare the health of wetlands outside of our management areas?
- 2) Which management practices generated the best outcomes for wetland size and health?
- 3) Has work to educate stakeholders and increase stakeholder involvement resulted in positive changes in this ecosystem?
- 4) Have our management practices provided the best results possible?
 - a) If not, what new strategies should be considered for the next five years?

9.2 Increasing the health and size of functional wetlands in Netley-Libau Marsh

The management of Netley-Libau will be based on five-year management periods. Work to meet our goal will take the form of education, mitigation and prevention of hydrological degradation and control of invasive species.

The scale of the Lake Winnipeg Wetland Conservation Committee's direct wetland restoration will be limited by funding and our ability to generate working partnerships. As a result, the LWWCC will also work to maximize stakeholder involvement via education and working with local communities, as outlined under 'Conservation Strategies'.

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Management work will be based on work on public and private lands, which will necessitate different approaches to land management. Management of private lands will proceed using a conservation agreement system, where the LWWCC and our partners will gain permission from landowners to enact our wetland restoration strategies on their land. To maximize the amount of private land that can be conserved, the LWWCC will actively pursue collaboration with the Manitoba Habitat Heritage Corporation on building a conservation agreement program focused on Lake Winnipeg's wetlands. In the event that we are unable to secure sufficient funding or partnerships for our conservation agreement program, we will shift resources towards restoration work on public lands, as well as our education efforts.

Building viable long-term strategies

In order for the Lake Winnipeg Wetland Conservation Committee to achieve our long-term goal of enhancing wetlands across Lake Winnipeg, it will be necessary to collaborate with other regional stakeholders to maximize impacts. This will involve several different efforts.

Improving restoration strategies for Lake Winnipeg's wetlands

To generate the most benefit from our work in Netley-Libau, we will use the experience gained from each five-year management period to improve management strategies for projects around the lake. To allow other parties to benefit from our work, the LWWCC will release an in-depth report on each five-year management period review, providing a base of management actions to inform future conservation work.

9.3 Stakeholder coordination for lake-wide wetland conservation

The number and diversity of stakeholder interests in Lake Winnipeg makes coordination for conservation difficult, while many of the threats to the lake's wetlands cannot be efficiently

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mitigated through the actions of individual groups. To improve the health of wetlands around the lake, the LWWCC will work to bring stakeholders together to increase education, identify threats and challenges, and to mount coordinated efforts to improve the health of wetlands around the lake.

The keystone of stakeholder coordination will be based on annual gatherings of private industry, non-governmental organizations, scientific organizations, first nations, government agencies and private citizens. These meetings will allow stakeholders to present their work, and learn from the progress others have made, and spur collaboration on threats to wetlands in Lake Winnipeg. This will take the form of a general town hall forum, in addition to smaller, stakeholder-run seminars on specific issues. These conferences will be administered by the LWWCC, but will strive to allow all groups an equal voice. One of the main goals of these meetings will be to coordinate stakeholder groups to affect change at an institutional scale. Two of the most significant sources of degradation of Lake Winnipeg's wetlands are the regulation of water levels by Manitoba Hydro and human development in/around wetlands (Goldsborough, 2015).

To affect change on these issues, the LWWCC will harness public pressure using our network of stakeholder groups to provide public comments on proposed actions and to lobby the provincial government to implement legislative change. The regulation of Lake Winnipeg by Manitoba Hydro is sanctioned by Manitoba Water Stewardship, which requires that water level within the lake be regulated to stay between 711 and 715 feet (Lake Winnipeg Regulation, n.d.). As discussed above, this was found to inhibit the germination of wetland plant species, damaging the structure of wetlands (Goldsborough, 2015). This license is set to expire in 2026, and a new license will be issued, though neither Manitoba Water Stewardship nor Manitoba Hydro are accepting public comments on Lake Winnipeg regulation. Our stakeholder network will work

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together to educate the public and to lobby the provincial legislature on this issue in order to increase public pressure to require low water periods in Lake Winnipeg.

9.4 Project Funding

Initial funding for the management of the Netley-Libau Marsh and lake-wide activism and education will come from a variety of governmental and private grants. Additionally, the LWWCC will actively pursue partnerships with universities, local government and non-governmental organizations to ensure long term funding for management at our pilot sites, GIS monitoring for loss of wetlands, and coordination of stakeholders for the achievement of policy goals.

The Manitoba Fish & Wildlife Enhancement Fund provides grants for project proposals that will enhance the populations and habitats of fish and wildlife. The benefits that wetland enhancement hold for wildlife and fish populations (Rewa, 2007) would make restoration and conservation efforts in Netley-Libau Marsh a viable project for funding by this organization ("FWEF-About the Fund", 2017). This will act as a source of funding for conservation agreements and restoration of functional wetlands. Some projects of similar scale have received funding in the range of \$10,000 ("FWEF-Projects,"2017). The Lake Winnipeg Foundation offers up to \$10,000 in funding to eligible projects such as education or community organizing, and will act as a source of funding to enact our goals for education and stakeholder engagement ("LWF-Grants Program", 2017). The Lake Winnipeg Basin Stewardship Fund generally offers grants of one third of costs for projects within the watershed, with some projects receiving funding for up to two thirds of total costs (Environment & Natural Resources Canada, 2016). This grant will be used to implement our restoration actions and GIS monitoring. In an ideal scenario, these grants could provide roughly \$30,000 for the first year of our plan.

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A key source of funding will be stakeholder partnerships. Conservation work, monitoring wetland health, and accomplishing political action will be greatly enhanced through collaboration. The efficacy of many of our wetland restoration strategies have not been studied at a large scale in Lake Winnipeg. This creates an opportunity for the LWWCC to form research partnerships to study the effectiveness of the various wetland management strategies that will be utilized. The University of Manitoba, Ducks Unlimited, various levels of the Canadian government, and various other public and private organizations have been active in research efforts in Lake Winnipeg and will be considered as potential research partners ("Research Partners," 2013). Additionally, we will work to generate a cost-sharing program with the MHHC for conservation agreements in the Netley-Libau marsh region. This program would effectively double the amount of privately owned wetlands that could be preserved.

10.0 CONCLUSIONS

The Netley-Libau Marsh which is the largest coastal wetland in Manitoba, situated at the confluence of the Red River into the south basin of Lake Winnipeg is very pivotal to the health of Lake Winnipeg. The health of Lake Winnipeg is dependent on the health of the marsh. The marsh has experienced a deterioration with a significant loss of plant and wildlife communities, as well as fish habitat and aquatic vegetation. Degrading sources such as agriculture, presence of invasive species, river dredging, and other related problems have undermined the abilities of the marsh to protect Lake Winnipeg. To save the marsh, a long-term plan for restoration has been set up which is to run for 25 years, based on a 5 year management planning cycle within the 25 years. It is expected that the Netley-Libau Marsh is restored back to health conditions if the plan is followed diligently. Finally, after restoration, conservation strategies will be implemented, where intensive collaboration will be done with various stakeholders to maintain the restored marsh. This marsh

Restoration and Conservation of the Netley-Libau Marsh

will be used as a pilot for the restoration and conservation of all coastal wetlands around the Lake Winnipeg watershed. The restoration of these coastal watersheds around the lake equates to a restoration of the lake.

11.0 RECOMMENDATIONS

To ensure the health of the Netley-Libau marsh as well as wetlands around Lake Winnipeg, this report has identified several key actions that must be undertaken:

- **Mitigation of invasive species:** depending on the amount of funding available, this could range from subsidizing the fishing of invasive carp to the construction of physical barriers to prevent species movement.
- **Education:** Communities around the lake have a high degree of influence on the health of local wetlands, increasing knowledge of the value of these areas and providing the information necessary for community-based conservation represents a cost-effective conservation strategy.
- **Collaboration between stakeholder groups:** Collaboration between relevant stakeholders is essential for the sustainable development of Netley-Libau, and wetlands around Lake Winnipeg.
- **Implementation of natural hydroperiods into Lake Winnipeg water level regulation:** Stable water levels have been identified as a barrier to wetland plant germination, Manitoba Hydro should incorporate drought simulation into its regulation of the Lake.

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Abbreviations

LWWCC: Lake Winnipeg Wetland Conservation Committee

MHHC: Manitoba Habitat Heritage Corporation

Appendices

Appendix I: Netley-Libau Stakeholder Table

Government Agencies	Non-Profit Organizations	First Nations	Private Interest Groups
Parks Canada	Lake Winnipeg Foundation	Brokenhead Ojibway Nation	Manitoba Hydro
Environment Canada	Nature Conservancy of Canada	Peguis First Nation	Commercial fishermen
East Interlake Conservation District	Ducks Unlimited		Local Farmers
Rural Municipalities	Delta Waterfowl		Coastal Land Owners
Manitoba Sustainable Development	University of Manitoba		Urban Area Residents
	International Institute for Sustainable Development		Temporary residents (Tourism, Recreational Hunting/Fishing)
	Save Our Lake		
	Manitoba Habitat Heritage Corporation		
	Council of Canadians		
	Nature Manitoba		

Table 1. A listing of primary (purple), secondary (Dark blue) and tertiary (Light blue) stakeholders in Netley-Libau Marsh, divided by stakeholder category.

Appendix II: Correspondence

Gordon Goldsborough

1.) what species are most important for maintaining ecosystem structure in lake Winnipeg wetlands

- the most important is the common cattail
- provide habitat
- food animals eat them
- Absorb chemicals from the environment
- fish species, commercial fisheries
- fur bearing animals e.g., muskrats beavers
- birds
- duck geese

2.) Is there any Urban development going on around the Lake?

- On the east.
- Yes, a marina, residential homes
- Effects: fertilizer, fuel from boat engines
- People live there for fishing, boating etc.

3.) What really degrades the lake besides farming practices?

- Alteration of their hydrology caused by hydro. The movement of the water
- Anything that changes the movement affects the wetland
- Low water levels are important.

4.) Any method to fix wetland besides what we already have

- No plan by govt
- No developments on the edge of natural wetlands
- Prone to flooding
- Change Manitoba hydro operating procedures to change water level. Will affect species eg fish

5.) Who plays the most active role in the wetland Conservation

- Ducks
- U of M
- PROVINCIAL DEPARTMENT OF SUSTAINABLE DEVP
- Envr. and climate change Canada (fed govt)
- Dept. of fisheries and oceans

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6.) Funding and Time for the conservation.

- Change the way industry operates
- Shoreline areas should be protected
- About 20-50 years
- Funds mainly from taxpayer (govt)
- Private organizations and donors

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Scott Beaton (Regional Coordinator for the Manitoba Habitat Heritage Corporation)

RE: Lake Winnipeg coastal wetlands

Scott Beaton <sbeaton@mhhc.mb.ca>

Wed 11/29/2017 11:39 AM

To: Samuel Smith <smiths25@myumanitoba.ca>;

Hey there,

Yes, you bet we would entertain something like that when a non-profit is able to secure funds and allow us some delivery money if the target fits our mandate, which something like that would.

From: Samuel Smith
<smiths25@myumanitoba.ca> **Sent:** Tuesday,
November 28, 2017
12:06:59 AM **To:** Scott
Beaton
Subject: Re: Lake Winnipeg coastal wetlands

Hey Scott,

Thanks for the information! Our area of focus is definitely far away from yours unfortunately. However, if a non-profit had access to some yearly funds, would the MHHHC ever enter into a collaborative conservation agreement program specifically for Lake Winnipeg? Specifically, our plan will include entering into conservation agreements with landowners in the vicinity of Netley-Libau marsh, which I believe is recognized as an Important Bird Area.

This plan is purely hypothetical, but we're just hoping to write a realistic plan. Thanks for your help,
Sam Smith

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From: Scott Beaton
<sbeaton@mhhc.mb.ca>
Sent: Tuesday, November
21, 2017 9:38:12 AM **To:**
Samuel Smith

Subject: RE: Lake

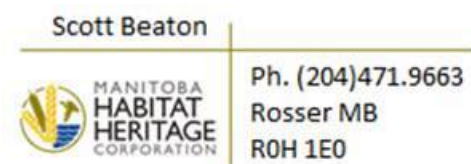
Winnipeg coastal

wetlands

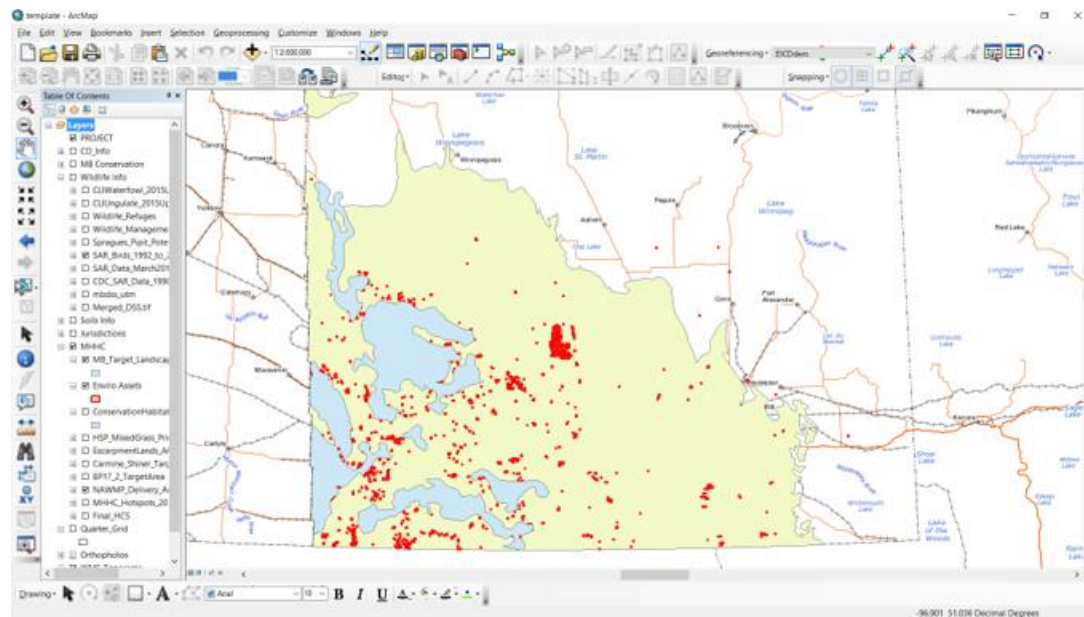
Hi Sam,

We do have a conservation agreements program designed to protect existing wetlands. That program helps to conserve wetlands generally west of neepawa and south west of Glenboro, so I imagine this program might be too far upstream for you to be interested in. Feel free to research more about those easements, as I feel as though they are a good tool for restricting development in sensitive areas – likely something that should be part of your plan along the lake.

I am able to deliver wetland restoration projects closer to the lake, but not right to the lake boundary. The map below details the areas that are eligible for CA's – Blue, and the yellow area is eligible for wetland restoration projects. The boundaries are a function of breeding bird densities, and area defined the way they are because some of the money for the projects comes from organizations with interests in duck habitat. Their interests aren't the only consideration in the value of the project, but they do pay enough to help us do the work, and so projects are generally limited to these areas. The red dots are projects. As you can see, there are a few outside of the area, but there aren't currently any agreements on coastal wetlands of Lake Winnipeg. I would suggest that if a project came up, I could likely find a way to fund it, but am not actively searching for projects in that area.



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From: Samuel Smith
<smiths25@myumanitoba.ca>
Sent: Monday,
November 20, 2017
11:38:03 PM **To:** Scott
Beaton
Subject: Lake Winnipeg coastal wetlands

Good evening,

My name is Sam Smith, I'm an environmental science student at the University of Manitoba, and I was hoping I could find out about any work that your organization does with conservation of wetlands around Lake Winnipeg. Myself and four other students are building an ecosystem management plan for the conservation of coastal wetlands on Lake Winnipeg, and we're looking to learn as much as we can about ongoing work by conservation groups in the area so that we can integrate them into our long-term plan. I saw through your website that the MHHHC works to conserve wetlands on private property using conservation agreements and restoration of drained wetlands, but I was curious what the scope of these projects was specifically in the lake Winnipeg region.

I look forward to
your reply,
Sincerely,
Samuel Smith