GEORGIAN BAY
FOREVER
Protecting your water.

SUMMER 2018
VOL 9, ISSUE 2

WATER LEVELS, WATER QUALITY AND ECOSYSTEMS

CAGE AQUACULTURE: EXAMINING IMPACTS

In 1973, Experimental Lake 226 in the Kenora District was divided into 2 basins. **Extra phosphorus** was added to one side by scientists. As a result of this experiment, **phosphates were banned from detergents.**

Now, extra Phosphorus from **open cage aquaculture is a risk** to freshwater in Ontario. However, many areas of Georgian Bay are more dynamic than Lake 226. In some areas, Phosphorus nutrients are actually too *low* to support a healthy aquatic ecosystem.

To mitigate risk, it is **critical** for GBF to examine impacts from open cage aquaculture within more complex and diverse Georgian Bay sites.

Ecosystem impacts could **vary widely** — potentially negative in some areas, or positive in others. **GBF is at the forefront of finding out these impacts,** in order to inform improved regulation. Read on to learn what we've discovered so far.

Also Inside:

BY ANNE RANDELL

MESSAGE FROM THE CHAIR

My family has been fortunate to enjoy our Georgian Bay "piece of heaven" all winter long. We are excited that spring is finally here. Next will be summer on the Bay, and we are all looking forward to swimming, fishing, canoeing and more family times together!

All of this underlies my passion for Georgian Bay Forever's work. Its efforts help ensure the pristine waters of the Bay will be there for future generations to enjoy as much as we do.

In my last newsletter message, I shared that the GBF Board had been developing our Strategic Plan for 2018-2021. I am pleased to share the approved high-level strategies that we will be focusing on going forward:

- Analyze key environmental threats to the water of Georgian Bay
- Expand our impact through community involvement and partnerships
- Communicate our activities and findings to educate and create awareness
- Build organizational and financial capacity

My sincerest gratitude goes to our donors, sponsors, volunteers and partners for making our critical scientific work and research possible. We could not do it without you. Thank you for supporting Georgian Bay Forever's efforts to protect your water.

BY DAVID SWEETNAM, EXECUTIVE DIRECTOR

AVOIDING MISTAKES

Georgian Bay used to be filled to the brim with fish. Stories shared by the Elders from the Chippewas of Nawash describe water levels rising as fish chased the herring into the bay, and lake sturgeon ate cranberries from bushes along the shore. Sadly, through a number of naïve — and in some cases, greed-driven — decisions, those populations have been crushed to less than 1% of their historic level. The ecosystems in the outer waters (pelagic zone) of the lake are now described as a biological desert. Most top predators remaining are non-native introduced species, like brown trout and Coho salmon. And recreational fishers are even catching rainbow trout that have escaped from aquaculture operations.

Historically, the Bay was home to twelve unique species of lake trout. In the last century, ten have been exterminated by overfishing, habitat destruction and invasive species like sea lamprey. This is the result of only looking at the resource through one lens: exploitation.

Avoiding mistakes is much cheaper in both economic and environmental terms. Clean-up activities are extremely expensive. The US Congress just approved another 300 million dollars for its Great Lakes Restoration Fund despite the polarity of the US political landscape. Over a billion dollars of taxpayer clean-up money has already been spent.

Newer stressors in the Bay — like in-water wind turbines, road development, and open cage aquaculture — only compound the struggle for those of us still trying to fix the *previous* generation's mistakes.

To monitor such stressors, Georgian Bay Forever has been helping to fund a library of all organisms in the Bay. We are working with the University of Guelph to sample and genetically barcode all of the plants, fish, insects and other creatures living in and under the water.

Our recent Scientists Forum was inspired by the thoughts of keen, dedicated researchers looking at the Bay from their unique perspectives — physics, geology, fish, water quality, social structures, birds, invasive species, genetics and many other disciplines. What made this day unique was gathering these specialists together for an interdisciplinary perspective on our waters and ecosystems.

We are also looking at better, earlier ways of detecting stresses in the ecosystem. The complex interactions that can shift the balance in the ecosystem are often not apparent from simple measurements, but exciting new tools and ideas are in the works.

GEORGIAN BAY FOREVER

Georgian Bay Forever is a community response to the growing need for major research and education to sustain the Georgian Bay aquatic ecosystem and the quality of life its communities and visitors enjoy.

We help monitor the Bay's well being, throughout the seasons, year after year.

We fund the research needed to protect the environmental health of Georgian Bay and the surrounding bodies of water. Using our research findings, we inform and educate the general public and governments about threats to environmental health and propose possible solutions.

Through workshops, seminars and online, we are educating the Georgian Bay community. By teaming up with reputable institutions, we enhance the credibility of our research and strengthen our ability to protect what's at stake.

Georgian Bay Forever is a registered Canadian charity (#89531 1066 RR0001). We work with the Great Lakes Basin Conservancy in the United States, as well as other stakeholder groups all around the Great Lakes.

Deeply rooted and broadly drawn, Georgian Bay Forever is steered by lifelong devotees of the Bay. We are committed advocates, educators, environmentalists, realists, idealists, and of course, residents.

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Canadian citizens may send their donations to the address above.

U.S. citizens wishing to make a donation to support our work can do so by giving to:
Great Lakes Basin Conservancy
PO Box 504, Gates Mills, OH
44040-0504, USA

This newsletter is just a snapshot of our work. For the most up-to-date information on our projects, longer versions of newsletter articles and breaking news about Georgian Bay, please become a regular visitor to our website and Facebook page.
GBF.ORG

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CAGE AQUACULTURE: WHAT IS IT DOING TO THE BAY?

"Ontario is the largest rainbow trout producer with cage and land-based farms in Canada." [2]

Fish farming in Ontario used to be more land-based. Today, freshwater aquaculture occurs primarily within lakes and is a practice that involves rearing fish in cages suspended in a lake.[1] The government awards public water space and therefore free wastewater treatment to the cage industry. Noticeably, there was a shift to 88 percent cage production by 2010 - a good proportion of those happening in or on the borders of Georgian Bay. According to a Department of Fisheries and Oceans Canada (DFO) report[2] , in terms of freshwater, "Lake Huron is the site of most cage based aquaculture in Canada", although no new licences have been issued in Ontario since 2003.

HOW DOES AQUACULTURE COMPARE WITH COMMERCIAL FISHERIES IN ONTARIO?

In 2014, commercial fisheries caught over 11 thousand tonnes of fish, a decline of more than a half since 1990. Aquaculture has remained flat for the last 15 years with an average of 4 thousand tonnes.[3] Industry sees opportunity in net pen (cage) aquaculture and cites Iran as a jurisdiction to model for growth. In Iran, the industry has multiplied rapidly with government support, from 5

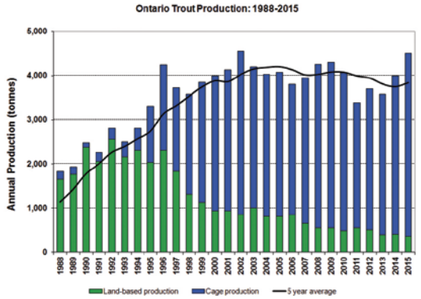


Figure: Comparison of Ontario's land-based and cage aquaculture production between 1988 and 2015. (Moccia and Bevan, 2015).[2]

thousand tonnes in 1978 to about 375,000 metric tonnes of fish in 2014. However, the Iranian example includes several species including Asian carp, shrimp, saltwater fish, as well as coldwater trout. With limited freshwater and different species, Iranian industry farming is also comprised of several different farming methods, including the use of raceways, ponds, and land-based systems. In addition those numbers include the fish fry the industry raises to help re-stock depleted fish populations to aid commercial fishing.[4] As growth is considered, some important differences arise around diversity of species, location, and methods.

WHY IS IT IMPORTANT FOR THE GEORGIAN BAY COMMUNITY TO BE ENGAGED?

Because there are opportunities and risks. On the opportunity side, there is a need for fish protein to meet growing population demands. For Canada and Ontario, governments see potential for the economy in general, and regionally for the North.

On the risk side, there are concerns about the impacts to water quality and ecosystems that are critical to shoreline communities.

Currently, Georgian Bay has 5 operators with 7 sites as well as a few unlicensed First Nations operations. The Ontario and Canadian Government seem in general committed to growing the industry, while simultaneously having the power to monitor and regulate the industry to protect the environment for future generations. This internally perceived conflict of interest has created some inertia, impeding their ability to create functional guidelines for cage aquaculture. Some in the industry blame the government for the lack of growth.

REGULATORY LULL PROVIDES OPPORTUNITY TO BETTER UNDERSTAND IMPACTS

Right now, there is a critical opportunity for Georgian Bay Forever to work with partners to provide scientific research into potential interactions to further inform debate around sustainable aquaculture. We will be sharing this information with stakeholders and authorities. It is complex, and there is a range of stances on what "sustainable" means with respect to net pen aquaculture that are ever evolving as stakeholders lobby each other and more research becomes public. Some stances include: banning future net pen aquaculture growth (the Great Lakes Fishery Commission, US advisors)[5], another looks to improving regulations around site selection based on areas where more phosphorus inputs may not be problematic. It should be noted that Ontario is alone among Great Lakes jurisdictions in its allowance of open net pen aquaculture.

The DFO is currently investigating the possibility of creating an Aquaculture Act. The Canadian Aquaculture Industry Alliance observes that "The proposed Aquaculture Act represents a step forward in modernizing how Canada views, regulates, and enables growth of our industry. Rather than being regulated under a 150 year old Fisheries Act, the Aquaculture Act would recognize our industry as a farming activity – consistent with the approach of other leading jurisdictions around the world."[6]

WHAT HAS GBF FOUND?

GBF is committed to protecting the water and the biodiversity of its aquatic species with evidence based research. In 2017, we continued the partnership with the University of Guelph (U of G) and focussed on the following:

1. Synthesizing past net pen aquaculture research on freshwater impacts.
2. Using stable isotopes and fatty acids to determine if native fish were consuming aquaculture feed, with the potential to use DNA barcoding in future research.
3. Developing research questions and methodologies to fill in the gaps and address concerns to be able to implement a more sustainable policy.

TAKEAWAYS FROM PAST AQUACULTURE FRESHWATER IMPACTS RESEARCH

Under commission by GBF, the University of Guelph (U of G) looked at 56 research reference points to produce a summary, *Freshwater Aquaculture: A review of the Environmental Implications* (09/26/2017). The full report can be found on the GBF website, but it came to the conclusion that "If the net-pen aquaculture industry is to continue and expand in The Great Lakes, there needs to be improvement to policy regarding the establishment of cage aquaculture operation, and a better understanding of how freshwater cage culture affects lake ecosystems is required to meet this objective."[1]

The main issues generating environmental concerns fall under these categories:

WASTE PRODUCTION AND UPTAKE

WHAT IS IN THE EXCESS FEED THAT FALLS THROUGH CAGES, AND MOST IMPORTANTLY BY VOLUME, WHAT IS IN THE FAECAL MATTER? HOW ARE THESE ABSORBED BY SPECIES IN THE SURROUNDING WATERS? IS WATER QUALITY IMPACTED?

The main concern is nutrient subsidies of primarily phosphorus (in solid or liquid form) augmenting those found in the natural environment. This concern has been partially attenuated by industry through good husbandry practices, but certainly not entirely eliminated.

> In their Spring 2018 newsletter, the Georgian Bay Association recently revealed concerning information obtained under a Freedom of Information and Privacy Protection Act request. The obtained MOECC reports included information that the water quality in Lake Wolsey has deteriorated to below Provincial objectives, and that 45% of the phosphorus input to Lake Wolsey comes from the aquaculture operation.[10]
>
> **This provides further evidence that each site must be really carefully selected and rigorously evaluated; and that more research needs to be done on the criteria that makes a site sustainable.**

The 2 broader fallout concerns are as follows:

CONCERN 1: Excess phosphorus in the aquatic environment can result in "significant algal blooms and eutrophication"[1]. Eutrophication starves lakes of oxygen and leads to death of animals in that water body.

The good news is that phosphorus loading in aquaculture has been steadily reduced over the years due to changes in the make-up of the feed, and site selection. The feed is a huge expense for the industry, so reducing waste also reduces feed costs. Sites that have more dynamic water circulation and more depth are better than stagnant, enclosed bays. "In general, the reviewed literature supports the view that modern cage farms with good husbandry that are located in well-flushed, deep basins do not show significant, long-term effects on water column nutrient concentrations."[1]

CONCERN 2: Human derived subsidies of nutrients (extra feed and fish waste) can be consumed by native species, altering the food web and potentially impacting species health. "This organic material can act as a food source for invertebrate and fish species, and studies have shown that natural fish populations surrounding cage culture operations exhibit a shift in diet towards that of the released cage culture feed and waste (Fernandez-Jover et al., 2007a; Fernandez-Jover et al., 2011)."[1]

U of G further notes there have been some studies in small experimental lakes that have shown "increased abundances of benthic organisms, increased growth, reproduction and densities of invertebrates and small fish."[1] However, these cannot be directly applied to more dynamic and larger lakes that are more commonly chosen for aquaculture.

SEDIMENTATION

DO SOLID WASTES FROM NET PEN AQUACULTURE ACCUMULATE TO AN EXTENT THAT RISKS MORE RELEASE OF PHOSPHORUS INTO THE WATER COLUMN AND IS THERE A SIGNIFICANT REDUCTION OF OXYGEN LEVELS AS THE WASTE DEGRADES?

This is an unresolved issue. The concern with excessive phosphorus (P) is that it is the limiting nutrient in freshwater lakes and can lead to toxic and non-toxic cyanobacteria blooms resulting from eutrophication.

However, there is a wide range of potential P release from sediments depending on conditions, including one reference noting a 7% to 64% spread.[1] The U of G summary noted that "the factors affecting the rate and total proportion of P that is recycled from sediment into the water column have not been well studied in Ontario or with current feed formulations and practices. Since P is the nutrient limiting primary production in lakes, and that the solid waste portion of P is the largest component of P lost to the environment, this knowledge gap significantly hinders our ability to predict the effects of aquaculture activities on lake productivity (Temporetti and Pedrozo, 2000)."[1]

Providing some needed insight into the complexities around release of phosphorus from sediment is a 2014 study by L.A. Molot et al., entitled "*A novel model for cyanobacteria bloom formation: the critical role of anoxia and ferrous iron*"[7] published in Freshwater Biology that was partially funded by GBF.

> **RESEARCH THAT MATTERS:**
>
> The academic article, *A novel model for cyanobacteria bloom formation: the critical role of anoxia and ferrous iron* (Molot, and others) that GBF partially funded, was cited by the Department of Fisheries and Oceans (DFO) in a 2017 report, *Freshwater Cage Aquaculture: Ecosystems Impacts from Dissolved and Particulate Waste Phosphorus.*[2]
>
> GBF won't stop looking for gaps and supporting research that lead to more informed decisions. Read on to see our next research questions on this topic.

MOLOT CHALLENGES THE PRIMACY OF PHOSPHORUS (P) AS AN EXCLUSIVE FOCUS TO MANAGING RISK OF CYANOBACTERIA FORMATION.

The major argument is that ferrous iron (Fe^{2+}) regulates the ability of cyanobacteria to compete with its eukaryotic [non-toxic, non-photosynthesizing algae] competitors due to its increased iron requirements to support photosynthesis among other important environmental considerations. Therefore, cyanobacteria dominance emerges under more specific lake circumstances than previously widely considered. For example, it provides rationale that deep lakes are less susceptible to cyanobacteria bloom. The anoxic zone (low oxygen) is so deep that it falls below the mixing zone where anoxic sediments, Fe^{2+} and the euphotic zone (where photosynthesis occurs) could interact with cyanobacteria. Inshore regions or shallower lakes could be more prone. Furthermore, the report challenges where anoxia can develop, noting that it is not limited to eutrophic systems.

In short, GBF believes the Molot paper highlights the need to not look in isolation at P sediment build-up from aquaculture sites, but examine other environmental circumstances and potential management solutions that effect cyanobacteria formulation. (Read the report at https://bit.ly/2uWS4sg)

In the meantime, there have been some mitigation measures and potential solutions offered that could decrease the accumulation of sediment that contains P. These include: sediment regulations, fallowing, and more efficient feed formulations and technological cage innovations that can capture some of the waste.

ECOLOGICAL AND GENETIC INTERACTIONS THAT MAY OCCUR BETWEEN ESCAPEES AND INDIGENOUS SPECIES

Recent news reports on our ocean shores show that this is a risk. A most recent example is an incident last summer involving a fish farm owned by Cooke Aquaculture Pacific. Pens collapsed under high winds letting up to 263,000 Atlantic salmon escape into the Pacific where they became invasive species with potential consequences for native salmon.[9]

The same Globe and Mail article notes escapes that have happened on the East Coast resulted in some hybrids that are less capable of survival. According to Globe and Mail source Neville Crabbe of Canada's Atlantic Salmon Federation, "Wherever the open net-pen industry is established on the east coast of North America, the wild salmon populations have plummeted."

While not an exhaustive list of all the factors that could impact native ecosystems and water quality, the above is a summary of issues that were found by the GBF/UofG background research project. For more information, please check the GBF report.

NEW EVIDENCE OF IMPACTS: 2017 GBF COMMISSIONED RESEARCH PRODUCES PROOF OF FOOD WEB INTERFERENCE.

GBF's partner U of G conducted a research project using stable isotope and fatty acid bio-tracers (information from the tissue of fish) to determine if aquaculture waste was being consumed by species in the natural environment in Parry Sound.

It is. The research found that pelagic or offshore native fishes, both an intermediate consumer (cisco) and a top predator (lake trout), were consuming the excess feed. Furthermore, the project also found that these fish had higher n-3 fatty acids levels in their tissue in comparison to other Lake Huron sites. These n-3 fatty acids have been shown to impact fish health by increasing survival and reproductive success.

These results indicate more research needs to be done on aquaculture waste and its interaction with natural species.

NEW RESEARCH QUESTIONS WILL FILL GAPS OF CONCERN AND LEAD TO MORE INFORMED SUSTAINABLE POLICY.

This GBF commissioned research project and its background compilation of freshwater research, as well as relevant Lake Wolsey disclosures, have clarified these research needs that GBF and U of G will be tackling in 2018.

THE BIG QUESTIONS GBF MUST TACKLE NEXT

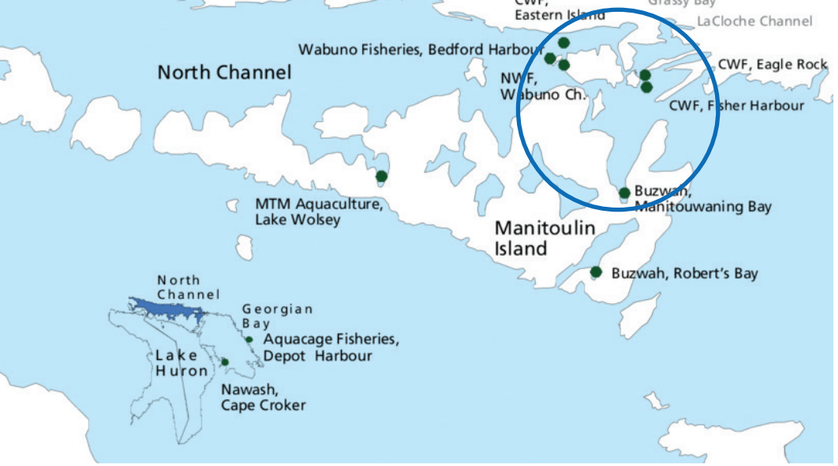
a) What are the impacts to local ecosystem structure and function, particularly local native fish populations?

b) How do the human derived subsidies of excess feed and faecal matter impact the food web in Georgian Bay Aquaculture locations?

c) How do the effects of aquaculture vary among sites that differ in placement (e.g. depth and exposure) and management practices (e.g. feeding regimes)?

To help answer those bigger questions, here is a breakdown listing of the individual projects.

CONTINUED ON NEXT PAGE...



Proposed sites for sampling cage aquaculture effects for the summer of 2018 (within circle). These sites are in addition to the already sampled Aqua-Cage site in Parry sound, which will be revisited this year. Figure adapted from Silva, Sena & Phillips, Michael. (2007). *A review of cage aquaculture (excluding China)*. Cage Aquaculture - Regional Reviews and Global Overview. 18-48.

(CONTINUED)

1. HOW DOES NET PEN AQUACULTURE IMPACT TOP PREDATOR FEEDING BEHAVIOUR?

Using stable isotopes and fatty acids analysis in Parry Sound vs. other regions of L. Huron, the project will examine if top predators like lake trout, walleye, and small mouth bass are consuming waste and feed from cage operations. This biotracer approach will be carried out in concert with SONOR surveys around cages to quantify the abundance and distribution of predators around net pen areas.

2. WHAT ARE THE CHANGES AT THE BOTTOM OF THE FOOD CHAIN – MACROINVERTEBRATES?

These species are good bio-indicators of ecosystem health. Researchers will be looking at the difference in macroinvertebrate composition (ie. what species are present) between aquaculture sites vs. control sites in L. Huron to see if there is a difference in species diversity due to aquaculture waste input.

3. WHAT IS THE IMPACT OF FALLOWING ON MACROINVERTEBRATES AS PRACTICED IN PARRY SOUND?

While this practice is a recommended husbandry technique to mitigate sediment build-up, the impacts on the individual fallowing areas chosen need to be understood to see if further adjustments need to be made (i.e. choosing an appropriate site to fallow to reduce environmental impacts)

4. ARE THERE IMPACTS ON FISH HEALTH FROM NET PEN AQUACULTURE?

And does it vary by location of aquaculture?

Lake Trout is a model species for monitoring cumulative effects such as habitat degradation, contaminant load, changes in food web structure, and eutrophication because their health and physiology reflect changes in the environment. Lake trout liver size (a metric of contaminant load), gonad (a measure of reproductive potential), stomach (feeding success), muscle tissue samples (biotracers), and brain size (foraging strategy) will be compared between aquaculture sites and control sites. Using lake trout as 'multi-meters' of cumulative stress will provide novel and important insights into the effects of aquaculture on the surrounding environment.

5. IS THERE AN EFFICIENT TOOL TO HELP MEASURE RELEVANT WATER QUALITY INDICATORS?

GBF is also raising money to support the purchase of an autonomous underwater vehicle that could rapidly and efficiently measure dissolved oxygen, chlorophyll, and pH levels that are concerns.

A WAY FORWARD - SUSTAINABILITY BASED ON FURTHER EVIDENCE

Major stakeholders have stated an interest in developing a sustainable industry. GBF strongly believes that sustainability policy should be steered by scientific evidence based on research collaboration. Georgian Bay Forever will be following other important research, actions, and policy initiatives of stakeholders, while actively working with U of G to bring forth the answers to the identified research questions that can inform better regulatory decision-making.

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INVADING PHRAGMITES, HERE'S YOUR WARNING:

Community Phragbusters, from all across the Bay, are ready, willing and able to wage war against you — invasive Phragmites — and we just got a whole lot of extra help! A huge thank you to these eight funders - Patagonia, the Great Lakes Guardian Community Fund through the Ministry of Environment and Climate Change, the Land Stewardship & Habitat Restoration Program through the Ministry of Natural Resources and Forestry, The Schad Foundation, Township of Georgian Bay, Tay Township and the Honey Harbour and Cognashene Cottagers Associations - for recognizing and providing critical funding to ensure we can continue to fight against this invasive, killing terminator-type reed! Their contributions, combined with support from donors, will ensure that all of the committed Phragbusting teams that work alongside our eight summer students will continue to have the means to map, cut and restore wetland habitat from Parry Sound to Collingwood.

Grantors and granting programs like these require committed investment from the organization applying, both in the form of financial commitment, and in establishing gift-in-kind support from partner organizations before considering any grant requests for the applied-for project. Thanks to the many donations from individuals, corporations and family foundations that GBF receives over the course of a year, we were able to match the necessary funds required in order to receive the funding.

Without gifts in support of Georgian Bay's most urgent needs, GBF would not be able to leverage these donations to receive additional funds for projects related to protecting water and habitats. The grants your donations have enabled us to get will also support numerous efforts to engage, educate, train and build more critical water Guardian task forces.

Thank you! Let's keep the momentum going until all Phragmites are removed from Georgian Bay.

Patagonia awarding GBF a grant for phragbusting at their King Street W. store in Toronto.

FRASER DANE – MAKING A DIFFERENCE

Georgian Bay Forever would like to welcome our newest monthly donor - Fraser Dane! Fraser has had a connection to the water of Georgian Bay ever since he was born. His family has co-owned a cottage on Hamilton Island in Killarney since the 1980s. He grew up loving all things outdoors and even chose to become an environmental scientist, working all over Canada to protect our extraordinary and precious wild spaces!

> For me, it's about ease and convenience and knowing that my monthly gift helps GBF plan for future projects more easily.

However, Fraser's most favourite wild space is, and always will be, Georgian Bay and its iconic water. When we asked Fraser why he chose to donate to our water protection projects monthly, instead of annually, he simply said: "I wanted to do something meaningful for Georgian Bay, but needed a simple, easy way to ensure my continuing impact. Monthly giving helps me spread my giving over twelve months and allows me to budget better for the entire year. The monthly amount I selected gets charged to my credit card the same way my Netflix and music subscriptions do. The best part is that I can actually give a little more this way than if I make an annual donation at the end of the year. For me, it's about ease and convenience and knowing that my monthly gift helps GBF plan for future projects more easily."

Fraser's monthly gift will do just that! Monthly gifts help GBF evaluate core funds available that can be directed towards necessary research projects. (Visit our website to learn more about these projects). Monthly giving provides flexibility and sustainability so that we can react to immediate or long-term threats to Georgian Bay efficiently and effectively.

We encourage you to become a monthly donor - give regularly without the year-end rush, budget more easily and provide sustainable funding to GBF. Help us to fund critical research to protect the pristine waters of Georgian Bay!

Call Amber now at 905-880- 4945 ext 3 to become our next monthly donor!

GBF is pleased to recognize the members of the Georgian Bay Forever Circle

Honoring our loyal supporters for their cumulative donations of $15,000 or more to April 1, 2017

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USING THE ENCLOSED ENVELOPE, SEND IN YOUR DONATION TODAY!

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Controlling invasive Phragmites on shoreline properties

What is invasive Phragmites? Phragmites australis subspecies australis (also known as the European common reed) is an invasive grass that grows into dense monocultures that can grow as high as 5 m. Stands of Phragmites severely impair wetlands, threaten biodiversity, reduce habitat, damage municipal and private property, and impede access to recreational activities.

How can I distinguish the native plant from the invasive? There are differences between the two; some that require experts or having the different plants side by side, which is rare. To find out more about identification and see more pictures, please visit GBF.org or this url: http://bit.ly/IDphrag

One of the more obvious differences is seen at the base of the stalks in mature stands. Native Phragmites tend to have a red colour, and be smooth. The plants in a native stand are often more scattered. Mature stands of invasive Phragmites are very dense, and the base of the stalks is beige in colour and feels a little rough.

Native Phragmites: Red shiny at base

Non-native Invasive Phragmites: Tan, dull at base

What can I do on my shoreline?

You cannot apply herbicides. Use a manual cut process where only invasive Phragmites stalks are removed. Tools and resources needed depend on the size of the stand, and you need to plan accordingly. There are instructions and recommended tools for large and small stands at GBF.org or url http://bit.ly/shorelineprocess. Find a short summary of the process on the next page.

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(Summary of process continued)

Most stands are small enough to manage with some volunteers and hand cutters. Here is an outline:

Note that this volunteer is only cutting Phragmites in this mixed wetland. Leave other plants and bushes alone. Reach below the surface as close to the sediment as safely possible to cut the stalk.

Kathryn Davis twining stalks of cut invasive Phragmites.

1. Gather the equipment: hand held cutters, natural twine, scissors, heavy soled shoes that can go in the water, gardening gloves, eye protection, a hat, appropriate clothes that can get wet and protect from elements, PFD, some yard waste bags, and friends to help as needed.
2. How to remove invasive Phragmites and timing:
   - The timing to remove the stalks is between mid-July and mid-August before seed heads emerge.
   - Cutting: Review safety tips here: http://bit.ly/safetyphrag. If there are seed heads, remove them first and put the heads into yard waste bags to be burned in a burn barrel. To start on the stalks, begin on the outside and work inwards. Cut each stalk underwater as close as safely possible to the sediment level (not just below the surface). You are only removing the stalks and attached leaves - do not try to disturb the roots – they are extensive, and uprooting them will contribute to the spread. Keep watch for floating pieces of Phragmites and gather them up as best you can to prevent spread.
   - Disposal: Do not leave stalks and debris in or near the water. On your property, find a designated spot where cut stalks can decay (best with sunlight). Wrap 20-40 stalks piled end to end in natural twine to prevent them from blowing away. Check the site next year to ensure that nothing has sprouted. It is unlikely, but it is very critical to monitor these sites, and dispatch anything that may grow.
   - Follow-up: This is a 2-5 year annual process depending on the size of the stand. Each year the Phragmites stand will come back much diminished. Keep vigilant about the site, and the disposal site. The process works, and you will be rewarded with native plants returning and habitat being restored.

Where can I get more help or ask questions?
There may already be a volunteer Phrag community champion in your area to help you. Please contact either Georgian Bay Forever at gbf.org, the Georgian Bay Association at georgianbay.ca, the Georgian Bay Biosphere Reserve at gbbr.ca, or the Georgian Bay Land Trust at gblt.org to find further assistance.