

The Potential for Aquaculture in Canada

An exciting approach to development of the north and the creation of a new Canadian Industry

Article by: Guy Woods
5 Glenport Road,
Cochrane, AB
T4C 1G8

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If you look at a map of Canada, you will immediately notice the abundance of water bodies or lakes carved into the topography of this country. Yet, we don't have a booming freshwater aquaculture infrastructure in place. Just think of all of the potential jobs for indigenous folks that live all over the lake lands of Canada. It is part of their culture to trap, hunt and fish, so fishing would be something that some of them are naturally and comfortably inclined to do. It would be a totally natural path to help native peoples to thrive into the future, if a plan was made and executed.

There are winter roads out of the lake countries more heavily populated areas, so lots of stuff goes into communities but not a lot comes out, as far as supplies to live, building materials, food and such. So, my point here is that if winter netted fish could also be a return load for the truckers that supply the northern communities, it would make perfect sense to have something to haul out on the return trip to the south, right?

The following estimates for the number of lakes and related data were all collected online, with Stats Canada data included. The first thing I was interested in finding out was the number of lakes that we have in this country. All lakes are not necessarily capable of sustaining a fish population, but some can be made to do so with some type of aeration to make the lake habitable for fish, by providing the required oxygen levels for fish to survive the winter months. First, let us look at some of the related information that I collected. The first is out of the Atlas of Canada:

*“Canada has an extremely large number of lakes, with the number of lakes larger than three square kilometres being estimated at close to **31,752** by the Atlas of Canada. Of these, 561 lakes have a surface area larger than 100 km², including four of the Great Lakes.”*

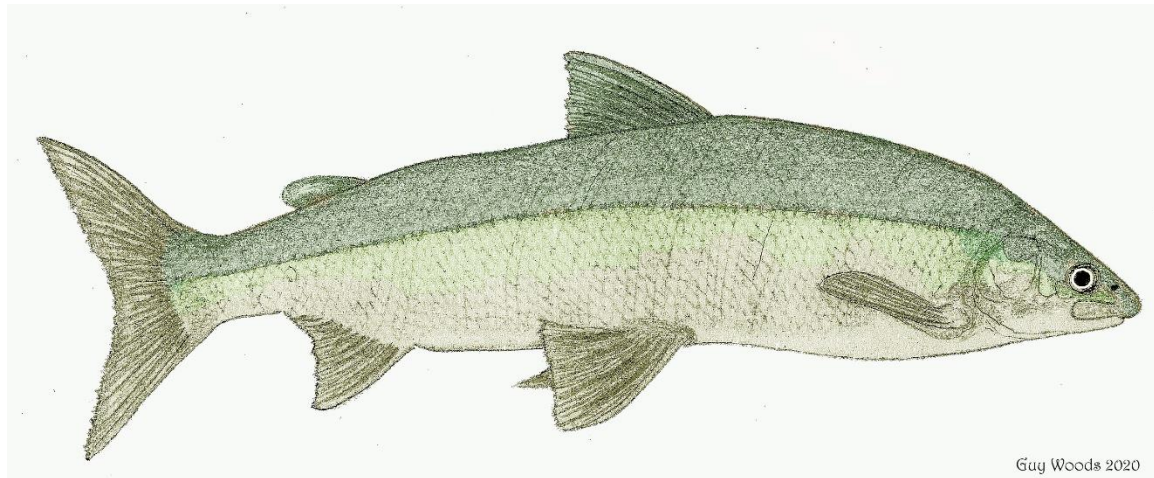
The Canadian Encyclopedia states: “Recent surveys suggest that there may be as many as 2 million lakes in Canada. About 7.6% of Canada's nearly 10 million km² is covered by fresh water; enough water is contained by these lakes and rivers to flood the entire country to a depth of over 2 m. Canada possesses nearly 14% of the world's lakes having surface areas over 500 km².”

The estimate made by the encyclopedia most likely includes all water bodies over a certain size, so the number of lakes smaller than three square kilometres has got to be significant. When a water body is smaller it may be called a pond or a slough. In any case, there are a lot of lakes and ponds in this country. So, the big question that I pose is why isn't aquaculture a big part of this country's major gross national product.

The potential for aquaculture has the potential to bring many more jobs and money into our economy, and it is all sustainable, if managed properly. In 2012, a Globe and Mail article written by Paul Waldie, a Europe correspondent, wrote the following:

The Globe and Mail article stated that “9,602 farms generate 49 per cent of Canada's \$51-billion in total gross farm receipts. And nearly all of them are family-owned corporations.”

Farming already plays a major role in our economy, and the products derived from it are usually in high demand. We know that protein that is sustainable and plentiful is almost a guaranteed market for the future of Canadians. Fish is highly prized for its health benefits in a human diet and its high-quality flesh is a tasty treat. Some varieties of freshwater fish are very tasty indeed! Actually, Canada was once a major fresh water fisheries exporter, but the mismanagement of the resource led to its demise.



The Lake Whitefish was Canada's most popular freshwater commercial fishery.

Since those times in the past, fisheries management knowledge is so much further advanced and we now know that if a population of fish is to be sustainable, there needs to be well design regulation of the harvest in a fishery. We also have excellent technology in hatchery and operational supply, which is vital to sustaining an aquaculture industry. Marketing of the product is a solid investment in the future, once things get rolling along.

For much of the larger water bodies in the north country, there already exists varieties of marketable fish, such as pike, lake whitefish and walleye. Trout are also present, along

with members of the char family. Some of these varieties of trout, char and whitefish have already been proven to be very marketable fish for an aquaculture industry.

In Scott and Crossman's "Freshwater Fishes of Canada" the lake whitefish was considered to be the most valuable commercial freshwater fish in Canada. They also pointed out that the Great Lakes once produced a harvest of 17.5 million pounds of lake whitefish, to a low of 3.5 million pounds in 1969. The main reason that the fishery collapsed was due to over harvest and also a disruption of the Great Lakes eco-system. So, what's new?

Where to Start

There are two major objectives to set for this to work. First, the government led Department of Fisheries and Oceans has the professionals that can help out with both aquaculture and management infrastructure. The aquaculture technology is necessary for stocking programs, aeration of lakes and processing and shipping of fish. The management infrastructure's objectives are to assess existing fisheries and set down regulations and fishing quotas to follow, to sustain an ongoing fishing industry. Also, DFO can be very helpful in determining which lakes could be modified to support a fishery, usually by aeration, to prevent winter kill, from oxygen depletion.

Then the ministry of trade and industry can step in and find markets, and help the private sector with setting up the infrastructure for processing the final product. This can easily be explained by the packaging and branding that goes with marketing a product. The fishers can actually do the initial processing of the fish, such as cleaning and freezing the product for transportation to packaging facilities.

In the case of indigenous fishers, the best approach would be to have the primary processing equipment on site to clean the fish, produce fillets and stack the fillets in freezing containers. All harvesting is done in the winter months, when the product can be fresh frozen, very quickly outside. A nice warm trailer could be used to keep everyone warm while cleaning processing fish, so the entire operations of fishing and processing would provide employment for remote communities. Work always brings people together and everyone is a key player in the success of such a program.

Northern Canadians also have other means of accessing remote lakes, with modern day snow machines that can travel thru the environment of a snow-covered winter terrain, without doing permanent damage to that environment. If there is no snow, a quad four-wheeler will do the job. Just leave it to native ingenuity to take care of business. There is nothing like a challenge for those that are true believers in a cause, to get the job done.

Some More Fish Facts

Of all of the fish that are historically harvested for commercial use, in this country, the Lake Whitefish has been studied extensively, partly to understand why the previous

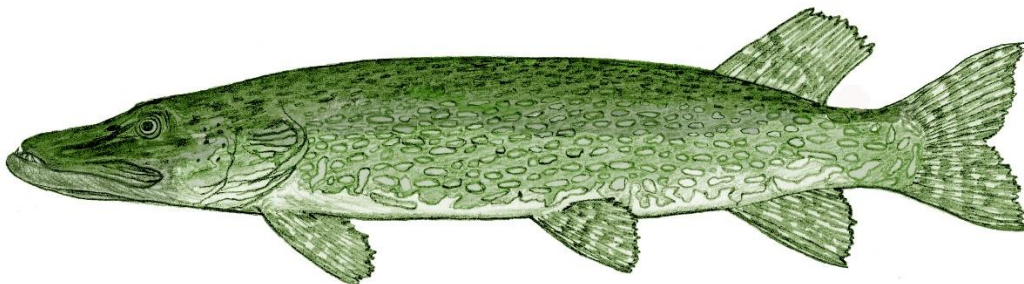
commercial fishery collapsed, but also because there is a commercial whitefish fishery active even today. On prairie lakes, the annual winter netting commercial fishery for Lake Whitefish is a real money maker for some folks and businesses. The amount of study already completed on the Lake Whitefish is a very valuable tool in understanding of how to properly manage the fish for further future propagation and harvest.

With Lake Whitefish as a good example for a very marketable fish, we can make a few pretty good points on why they would be one of the many good choices of commercial fish to focus on for any future Canadian commercial fisheries plans.

One of the real important things about lake whitefish, is their ability to survive on a totally aquatic invertebrate diet. However, they will grow faster if there are minnows or small fish to provide the whitefish with added protein. To reach marketable size, the whitefish must be at least 2 pounds weight. In some lakes they can attain this by their third year. This rapid growth is a big factor in a successful aquaculture fishery. Conservative harvest limits can lead to a very productive fishery, then ready for harvest. These survival qualities of the lake whitefish make it a prime candidate for stocking in lakes that are modified to support a fish population, thru processes like lake aeration, or lakes that are ideal for seasonal harvest.

Many lakes may not support a fishery, but they will provide a tremendous aquatic invertebrate population, so seasonal stocking with winter harvest could be considered. If lake whitefish in their second year of growth, grown at a farm, could then be stocked early in the spring, on a lake without fish, and then be harvested in December, before winterkill occurs. This is just another option open to aquaculture opportunities. It would be like a rancher moving his herd into a spring, summer and fall pasture, before moving them on to a feed lot or other pasture.

If you know the north, you know that there is an endless supply of bugs, for fish food, especially mosquitoes. This forage base of bugs makes this type of aquaculture a lot more different in scale than the ranchers and farmers that need to feed their livestock to fatten them up for market or build a herd. In northern lakes there is already an abundant supply of food for most commercially viable fish populations. Pike are not an important marketable fish, but they are sellable. Walleye is a very tasty and marketable fish, along with trout and char, so the options are wide ranging.



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The northern pike is a very popular eating fish and it is a commercially marketable fish.

Aeration of Lakes

The best way to start experimenting with some northern aquaculture is to do it on lakes that don't already support wild fish populations at the moment, such as those that are already fisheries, as well as those that are marketable fisheries. There are a surprising number of lakes that don't have marketable fish in them, yet either with just a simple well managed stocking program and an aeration program, combined with a quota program, both are good options. The aeration option is getting more and more realistic every year, with further developments in lake aeration technology, including cost reductions on capital investment.

Aeration systems using ice preserving laminar flow, which introduces oxygenated water, can now be build on remote lakes, using both solar and wind generated systems. It is all now possible! The ice preserving method is a safe and very efficient system. Sometimes, an aeration program can involve a one- or two-day program, depending on the size of the lake. One published method is a cascade pumping system, where you pump water out of the pond or lake and then let it cascade down over a diffuser, back into the lake, using a laminar flow generator. The diffuser is simply a slope agitator that causes the white water to absorb oxygen from the air. Any excess bubbles of air are allowed to dissipate before the flow re-enters the lake.

The laminar flow system uses directional tubing to take in water and then redirect the flow back into the lake in a one directional flow, of oxygenated water, without the bubbles that would cause air pockets below the ice. Excess natural air and gas formation below the ice surface, can escape ice thru cracks and pressure ridges. Smaller additional volumes of air should not upset the normal natural formation and maintenance of ice.

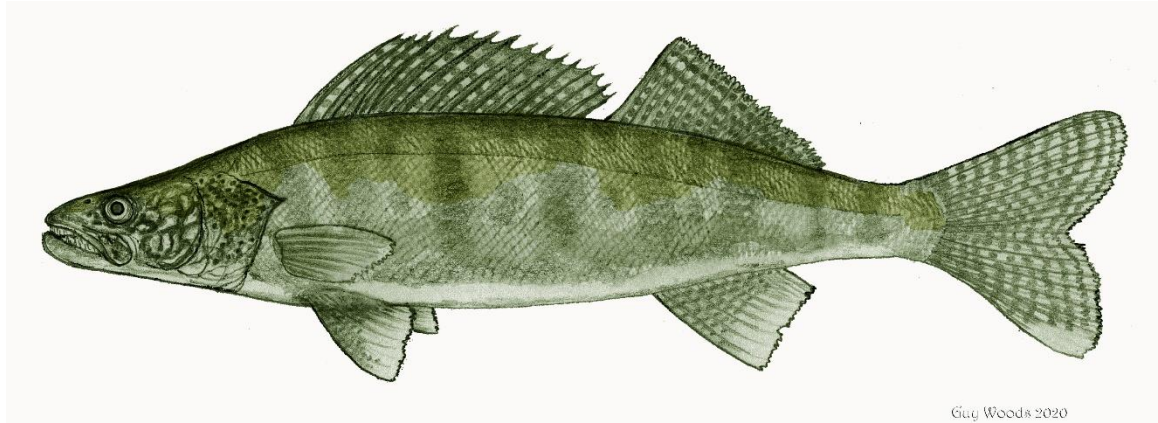
There may be a remote lake where the depth and size make it ideal for raising fish, but it doesn't support a wild fish population, due to winter kill. These types of lakes would require aeration equipment to be hauled into the lake, to provide the necessary aeration operations, but this could be a one-time investment if a very viable market and employment opportunities come in the package. Having a successful aquaculture operation could mean trips to remote lakes to operate aeration systems in months of low oxygen levels, ranging from January to early March. This is an important part of the success of the business, keeping the lake a healthy growing medium.

These are the sort of programs where the government could be easily persuaded to participate with some grants. At least this is my thoughts in the matter. When the government knows that jobs and revenue opportunities in northern communities are involved, they should be really playing a major role in getting things going.

Aquaculture Pen Raised Fish

Many northern communities are located right on the shores of a large lake, so other options are open for consideration. On the west coast, pen raised salmon farming has been a major controversy, and for good reason, but the profits must still be satisfactory for them to continue growing and selling salmon. However, the coastal salmon farming

operations are posing threats to the wild salmon fishery. Such things as disease and infestations have plagued the industry. In an inland freshwater fishery, there are no problems with consequential impacts, for the most part. Each fishery is a closed operation, except for those lakes where tributary outflows into streams or rivers are limiting factors.



The Walleye is a very tasty fish for the table. Lake Winnipeg still maintains a good walleye commercial fishery.

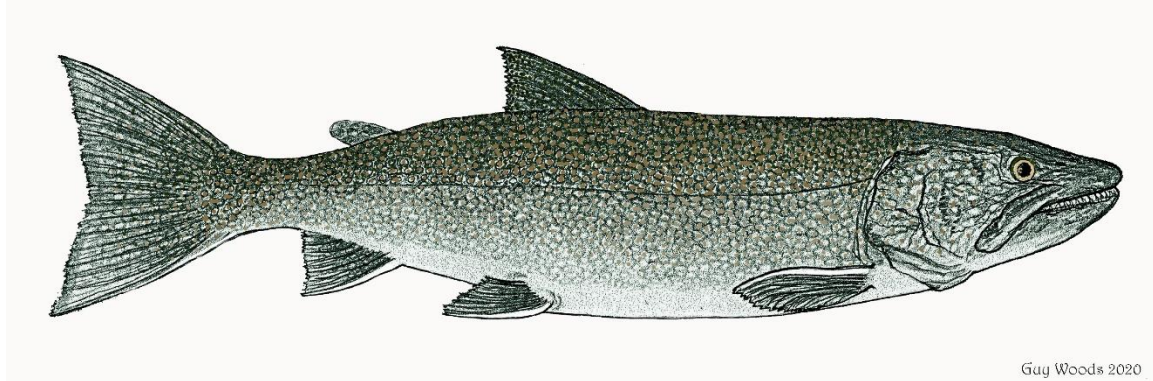
Tributaries and outflows on lakes restrict the type of fish raised in the lake. It all depends on whatever is or was in the lake, historically, this is often provided any documentation that is available to determine this. If not, the rivers or streams flowing in or out can reveal what the predominant fish could have been, thru electro fish survey or at least what is locally known native to the area. These are the type of studies that are contracted out to consultants or compiled by DFO staff. It is very important to maintain the natural biodiversity of the area, and for other good reasons. Sea lice are not a problem in freshwater, but there are other natural parasites that should be of concern, if studies show them active in the area. So, this is where the knowledge of DFO comes into play. Once a good direction has been established and full fisheries program can be designed to fit the circumstances of the lake or area and DFO can do this for any Canadian venture.

Personally, if pen-raised fish are not the only last choice, I prefer to see a native fishery maintained, it only makes perfect sense to lean in that direction. The reason for these personal thoughts, are that where there is a risk of disease from closely bunched fish, there is a major threat of a sudden and total shut down, if things go in that other wrong direction. However, where there is opportunity and closely monitored science, all options are on the table.

In Summary

In my mind, the aquaculture industry is inevitable in this country, so why not get the ball rolling right now, when we need a sustainable non-polluting industry to be developed, to solve other problems or challenges that face remote communities in the north part of

this country. Harvesting many thousands of tonnes of fish annually can help provide food for all of us, both here and abroad. This type of northern development would help set the stage for self sufficiency in the north and help boost employment in the south at the same time.



The Lake Trout is actually a member of the char family. It is also known as the Gray Trout.

The first steps involve either a study of the topic, by DFO, or a compilation of previous studies. Then there is always the option of having a good consulting firm prepare an assessment of the option, kind of an exploratory study, including community input, in areas where it should be considered. Hearing what the local indigenous population has to say about the idea, is crucial to whether this boat floats.

With approximately 7.6 % of Canada's 10,000,000 square kilometres is covered by water, why is it that Canada's aquaculture industry is moving ahead at a snail's pace? Think of the opportunities of employment in the north and the amount of food we could produce for the world. Yes, the idea is that big, but just remember that once the ball is rolling, things can move and happen fast!

The End