Comments concerning proposed Great Lakes Net Pen aquaculture

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I am a Board member of the Hammond Bay Area Anglers Association and our organization has concerns about the proposal to allow cage aquaculture in the Michigan waters of the Great Lakes.

Disease

I have reviewed the five reports on aquaculture issued by the State along with much other information. There are many aspects of cage aquaculture that could impact the wild fisheries and other uses of the waters but disease appears to be the largest threat. The State Science Panel Report (State, 2015b) provides the following recommended protocol for minimizing disease risks:

- Surveillance
- Reporting
- Prevention (biosecurity, best practices)
- Control (vaccinations, drugs, biologics and parasiticides)
- Eradication

It is mentioned in the Science Panel Report (State, 2015b) that when a large number of animals are concentrated in environments like fish cages, an outbreak of disease can be amplified. The five items above stated in the report are the suggested protocol for reducing and dealing with disease outbreaks in the Great Lakes, however, there was no discussion of the most debated and controversial aspect of cage aquaculture which is globally virulent fish diseases consistently plaguing cage operations with threats to wild fish populations (Ford, J. S. et al., 2008, Naylor R. et al, 2005 and Taranger G. L. et al., 2014). In addition, when fish or other species are crowded into unnatural environments like cages, the chances increase for a relatively benign disease organism mutating into a virulent form that could potentially spread to the wild fish populations (Godoy M G, 2014 and Pulkkinen, K et al., 2009).

Many proponents of the Michigan Aquaculture Association, 2014 Strategic Plan for a Thriving & Sustainable Michigan Aquaculture often use the Ontario Canada Lake Huron rainbow trout aquaculture industry as an example to show that there should be few problems if the industry is expanded in the Michigan waters of the Great Lakes. The operations in Ontario are very poor examples because the total cage fish production has been nearly stable and has annually averaged less than 8 million pounds over the last 15 years (Moccia R. D, 2015). On the other hand, the goal of the Strategic Plan which initiated the discussion of cage aquaculture in the Great Lakes, establishes an annual production goal of 1 billion dollars resulting in about ½ billion pounds of fish being produced yearly. The proposal is to reach this goal within 10 years with the majority of the fish raised in Great Lakes cages. In order to provide a realistic review, locations around the world with cage culture operations at high production levels must be evaluated and compared to the conditions in the Great Lakes.

Norway is an excellent example and has a large cage farming industry that produces annually about 2 billion pounds of mostly Atlantic salmon and rainbow trout. This industry has over 30 years of experience and in spite of a strict disease prevention protocol more stringent than the disease prevention protocol recommended above by the Michigan Science Panel, fish disease is a huge problem in Norway (Johansen R, 2013). Up to 15 to 20% of the cage fish production each year is lost to diseases which include: infectious salmon anemia (ISA), pancreas disease (PD), infectious pancreatic necrosis (IPN), skeletal muscle inflammation (HSMI), cardiomyopathy syndrome (CMS),

bacterial kidney disease (BKD), salmon lice, and other bacterial and viral diseases (Johansen R, Norwegian Veterinary Institute, 2010). Over 20 different diseases are being encountered.

It is very likely that if there is a major expansion of cage aquaculture in the Great Lakes, disease will become a serious concern. Since the cages placed in the Great Lakes would be open to the environment the disease organisms released by farmed fish through urine, feces and other fluids would accumulate in waste and water near the cage sites allowing wild fish to be exposed. In addition, it has been shown that disease organisms can be moved long distances from the cages by currents (Taranger G. L. et al., 2014).

A major shortcoming of the suggested State disease prevention protocol is the protocol focuses mainly on fish being disease free before they are placed in the cages. The protocol, however, does not discuss the problems of these caged fish being exposed to disease organisms that are naturally present in the environment around the open cages. Most of the diseases that currently cause problems with fish farms likely originate from wild fish (Taranger G. L. et al., 2014). Once infected, the large number of crowded fish in the cages increases the chances of disease outbreaks which can spread to the wild fish populations. In addition, these crowded cages provide a favorable environment for disease organisms to mutate.

Viral hemorrhagic septicemia (VHS) is an example of a disease present in the Great Lakes that exists worldwide in several strains (USDA, 2006). The most virulent strain originated in Europe and is prevalent in salt water. The strain present in the Great Lakes region has adapted to fresh water and it appears to have mutated from the European strain. The VHS virus is prone to mutating and it could change again. Another example is infectious salmon anemia (ISA) which devastated fish farms in Norway, Scotland, Chili, New Brunswick, Maine and other locations (The Center for Food Security and Public Health, 2010). The infectious salmon anemia virus has a tendency to mutate and evolve into virulent strains (Godoy M G, 2014) Currently, there is an intense unsettled debate that fish from cage farms in British Columbia are releasing infectious salmon anemia disease organisms into the rivers and infecting juvenile fish that are migrating to the ocean (Salmon Confidential documentary, 2013). A global assessment of the impacts of cage aquaculture on wild salmonids showed that in numerous areas wild salmonid numbers decreased steadily as cage farming increased (Ford, J. S. et al., 2008). Crowding fish together in cages increases the likelihood of diseases occurring and disease organisms mutating into virulent strains.

To deal with the waste and disease, the trend in Norway is to place the cages in deeper water up to about 1,000 feet deep (Taranger G. L. et al., 2014) in areas where the tides are strong. Water circulation near the cages is an important factor that is considered and the action of aggressive flushing with tides is vital. The State of Maine cage farming permitting protocol outlined in the State Regulatory Analysis report (State 2015a), stresses the importance of tides to facilitate removal of wastes. Cage permits are only issued in Maine for sites that experience a significant tide. Of course, in the Great Lakes the tides are minimal and flushing rates are much less. The main point to acknowledge is that even with heavy tidal flushing under the cages, disease and waste are still major problems globally.

Fish raised in cages are often bred to be more resistant to certain diseases (Johansen R, 2013 and Yanez, J. M., 2014) and this could make the wild fish populations more susceptible to virulent strains of disease organisms since the wild fish would have a lower level of resistance than the caged fish. The State Science Panel disease protocol did not address disease organisms genetically changing to more virulent strains in the crowded cages. As mentioned above, research has shown that the genetic mutation of disease organisms is a concern with fish cage farming (Godoy M G, 2014 and Pulkkinen, K et al., 2009). With the food web constantly changing and forage fish numbers fluctuating there is the potential of wild fish stocks being stressed from time to time and becoming even more susceptible to diseases released from the cages.

The Science Panel disease control protocol suggested by the report would only work effectively for closed recirculating systems and would not prevent disease organisms from escaping into the water from the open cages or diseases organisms in the environment from entering the cages. The Science Panel report notes that the prevention and control of diseases in wild populations is typically extremely difficult or impractical so once a disease spreads to the wild population there are usually few or no options.

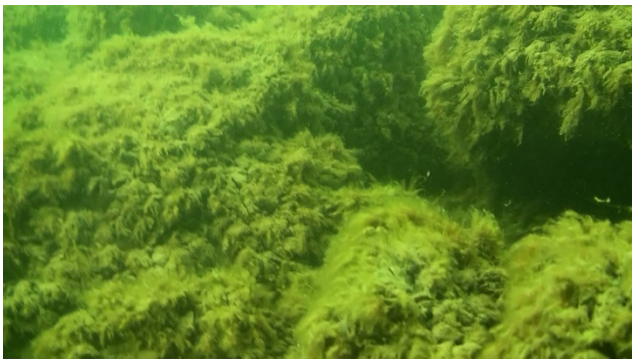
Flow-Ice and impacts of strong winds.

During the 41 years that I have lived in Rogers City, Lake Huron has never froze solid enough from Cheboygan to Alpena to safely walk on it. This includes the last two extremely cold winters. Flow-ice during the winter moves daily down Lake Huron and normally each day the pattern of the ice changes.

Contrary to the cage farm sites located in Ontario that are surrounded by land and shallow reefs, nearly all the Michigan shorelines along Lakes Michigan and Huron are wide open and exposed to violent waves. There is a reason that harbors and other facilities are protected by large rocky breakwalls; the waves and ice flows are brutal.

During the public aquaculture meeting held in St. Ignace on August 24, 2015 it was stressed by one of the largest cage aquaculture operators in Ontario that he thought there would probably be no more than 3 or 4 suitable locations for cage operations in Lakes Michigan and Huron because of the wide open nature of the shorelines and lack of protection from the ice and waves.

Benthification of Lake Huron



Cladophora enrichment on a reef off of Alpena

Cladophora Muck along the shore in Thunder Bay MI

If cage fish farming in the Great Lakes became established, most likely the operations would be concentrated in a few bays because of the brutal nature of the waves and flow-ice along the mostly open shorelines in lakes Michigan and Huron as mentioned above. This would concentrate the nutrients and other waste in the bays and possibly increase significantly benthification or the concentration of plant matter and other organic material on the lake bottom because of the waste being deposited there and the filtering action of the quagga mussels.

I worked for the District Health Department in Presque Isle County for over 34 years starting in 1974. For the first time beginning in 2005, I received complaints of cladophora muck being deposited in rows along the beaches in Hammond Bay and along the northern shore of Rogers City during the summer and fall. These layers, which were composed of Cladophora, Chara and other organic debris were often 12 to 18 inches high. Many property owners and others were concerned about wading through the muck to reach a clean swimming area. There was also much concern from adults about the safety of children and pets when they wandered into the material.

This condition is occurring in spite of the open waters of Northern Lake Huron being extremely oligotrophic or nutrient poor. The question is, would the placement of several aquaculture cages in an area intensify this localized problem of accumulating cladophora muck on the shoreline along with the fouling of reefs.

The two photos above show the impacts of nutrient enrichment after the quagga mussels became established in Thunder Bay.

Conclusions

According to the 2015 Aquaculture Industry Report, over the last 5 years the aquaculture industry has suffered competition and declining demand. Since seafood is more expensive than other forms of protein such as chicken, the cost conscious consumers during this era of declining income levels are often electing lower priced options. Therefore, with the strong competition worldwide and the difficult environmental conditions for raising caged fish in the Great Lakes there will be pressure to reduce operating costs which could reduce emphasis on environmental concerns.

The industry is beginning to move slowly toward enclosed land based recirculating systems since disease is much easier to control in these facilities and no waste is discharged to the environment. The Hammond Bay Area Anglers Association does not support cage aquaculture in the Great Lakes but we do support the expansion of aquaculture in Michigan with the use of closed recirculating operations.

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Thank you for this opportunity to provide comments.

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