

A Regulatory Analysis of

PROPOSED COMMERCIAL NET PEN AQUACULTURE

in the Great Lakes



Prepared by the QOL Commercial Aquaculture Team



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BACKGROUND

What is a Net Pen?

Net-pen aquaculture is the practice of raising fish in an underwater net (or solid structure cage) that serves as a pen, hence the name net pen.¹ It is important to draw a distinction between net pens that are used to grow fish for commercial purposes and the net pens that the Michigan Department of Natural Resources (MDNR) uses for very short periods for imprinting Chinook salmon or steelhead when stocking them. The discussion that follows entirely falls within commercial net-pen aquaculture.



Figure 1. Aquapod Net Pen, Photo courtesy of InnovaSea Systems, Inc.

Net pens are located in both marine and freshwater environments. They are anchored to the bottom of the ocean or lake and float in the close proximity of shore (i.e., shore based) or are located off shore reachable by barge. The size of a typical net pen is 40 to 50 feet square. The depth ranges from 40 to 60 feet. They are often installed in pairs and one net pen site may have up to ten pens connected by working platforms. The structure is comprised of steel pipe supporting nets constructed out of durable plastics with nylon and polyester resins. The net mesh size must not allow fish to escape. Siting of these pens must take into account currents which replenish the water in the nets and winds which cause waves that damage nets. Net pens can either be submerged in the winter to avoid the crushing effects of ice, or maintained in place until the pen is iced-in for the winter. Fish, typically rainbow trout of predetermined size, are placed into the nets. Each pen can hold approximately 35,000 fingerlings. Fish food pellets are distributed at the water surface. The fish are harvested by pulling up the nets and removing by hand or fish pumps.

Another type of containment system is one manufactured by InnovaSea Systems, Inc., called the Aquapod™ Net Pen (See Figure 1). It is comprised of triangular net panels fastened together in a spheroid shape ranging from 25 to 60 feet in diameter. These are designed for deep water aquaculture. Different mooring arrangements allow the Aquapod to be raised and lowered. The cage can be completely submerged to avoid high energy waves during storms or the damaging effects of ice. Feeding, harvesting, and cleaning can be done when completely submerged, but these activities are more efficiently performed when the Aquapod is partially submerged.

¹ www.ecy.wa.gov/programs/sea/aquaculture/netpen.html

STATE AND FEDERAL PERMITS AND LICENSES

There are five regulatory requirements that would address the activity of commercial net-pen aquaculture in the Great Lakes. Three are housed within the Michigan Department of Environmental Quality (MDEQ) (construction, bottomland conveyance, and water quality), one in the MDNR (fish stocking), and one in the Michigan Department of Agriculture and Rural Development (MDARD) (registration). See Figure 2.



Figure 2. The regulatory framework for both binding and nonbinding agreements applied to the issue of Great Lakes net-pen commercial aquaculture.

The following is a brief summary of permits, registration, and regulations applicable to all potential commercial net-pen facilities locating in the Michigan waters of the Great Lakes. It does not include regulations associated with the processing of fish for market or food safety. Depending on the site location and other ancillary activities, other regulations not identified in this document may apply.

Great Lakes Bottomland Construction Permit

Background

Placement and operation of commercial net pens for fish production in the Great Lakes is regulated pursuant to Part 325, Great Lakes Submerged Lands, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). Part 325 is administered by the Water Resources Division of the MDEQ. Part 325 requires permits for the placement of the net pens, mooring buoys, bottom anchors and other materials in the Great Lakes.

Permits are also required from the U.S. Army Corps of Engineers (USACE or Corps) for the placement of the net pens, mooring buoys, bottom anchors and other materials in the Great Lakes.

Construction Permit Application Process

Both the MDEQ and the Corps accept the same permit application (i.e., MDEQ/USACE Joint Permit Application) for construction activities in the Great Lakes, rivers, streams and wetlands. The Joint Permit Application can be submitted to either the MDEQ which will send a copy to the Corps or directly to both agencies simultaneously.

The application will be placed on public notice for 20 days for review and comment by various federal, state and local agencies; the general public; and other interested parties. The Corps will also place the application on a separate public notice in accordance with their regulations. The MDEQ may also hold a public hearing if the agency believes additional information would be best gathered through a hearing.

The processing time for the MDEQ to make a decision on a permit application once the application is deemed complete can be either 90 days or 150 days if a public hearing is held.

If one agency issues a permit and the other agency denies the application, then the proposed activity cannot be constructed.

Siting Considerations

The following information should be included in a permit application for placement of net pens in the Great Lakes to evaluate the impacts on the public trust, environment, and riparian interests of adjacent owners as required by Part 325 and associated administrative rules:

- Baseline physical characterization surveys or plans for such surveys, such as geological and geophysical surveys, to identify:
 - bottom type (such as mud, sand, silt, bedrock, or rock outcroppings)
 - water depths
 - currents
 - other relevant physical characteristics in the proposed area.
- Baseline biological surveys, or plans for such surveys, such as fish and wildlife monitoring studies or using side-scan sonar, sub-bottom profiler or other means as required by the MDEQ to characterize biological resources, including, but not limited to threatened and endangered species and associated habitat, benthic communities, and vegetation at the proposed area.
- Baseline archaeological surveys, or plans for such surveys, using side-scan sonar, sub-bottom profiler, magnetometer, ground penetrating radar or other means as required by the MDEQ to identify submerged cultural, historical, and archaeological sites, including abandoned property (shipwrecks) at the proposed area.

- Competing use surveys that identify the current uses in the vicinity of the proposed area and the location of the uses. Such uses may include, but are not limited to:
 - commercial, treaty and recreational fishing activity;
 - water intakes or outfalls;
 - utility lines;
 - military uses;
 - shipping lanes;
 - ferry routes;
 - recreational boating courses;
 - designated refuges;
 - bottomland preserves; and
 - special management areas in the vicinity of the proposed area.
- Proposed area identified by Global Positioning System (GPS) coordinates at the corners of the site.
- Other information such as distance offshore, total area proposed for occupation, anchor types, lighting, etc. proposed for the project.

Processing Time

Once a completed MDEQ/USACE Joint Permit Application is received, it takes up to 150 days from the time the application is deemed complete for the permit to be acted on.

The Corps will notify the following agencies about the project for review and comment:

- Tribal Organizations
- U. S. Fish and Wildlife Service
- U. S. Coast Guard (9th District Office in Cleveland, OH)
- U.S. Environmental Protection Agency (USEPA)

Unlike the state agency requirements, the federal requirements do not have a statutory completion deadline; however, the Corps usually completes their review within the same time frame utilized by the MDEQ (i.e., 150 days).

Bottomlands Conveyance

A proposed net-pen occupation of Great Lakes public trust bottomlands and waters would require a conveyance in the form of a private use agreement from the MDEQ pursuant to Part 325.

The conveyance application will also be placed on public notice for 20 days, normally during the same time as the permit application. The decision to approve the conveyance application utilizes the same criteria as the construction permit decision: minimal adverse impacts on the environment, public trust, and riparian interest of adjacent property owners. If the MDEQ can issue the permit for construction activity that meets these criteria, then the conveyance application will be issued also to authorize the occupation in the construction permit.

An annual lease fee will be required if the conveyance is approved. The conveyance could be issued for up to 50 years with two terms of 25 years each or for shorter periods of time as applicable. The conveyance will include specific conditions to regulate the use and operation of the activity.

A financial instrument such as a letter of credit or a surety bond will be required for the term of the agreement. A financial instrument is necessary in order to ensure the grantee complies with the conditions of the agreement and to provide funds for removal of all structures on the bottomlands in the event the grantee does not remove the structures upon leaving the site.

National Pollutant Discharge Elimination System (NPDES)

Background

The NPDES Program protects the surface waters of the state by assuring that discharges of domestic and industrial wastewater comply with state and federal regulations. NPDES permits are required under Section 402 of the Federal Clean Water Act and under Part 31, Water Resources Protection, of the NREPA. The state rules pertaining to NPDES permitting are found in Part 21, Wastewater Discharge Permits (Part 21 Rules). Authority to administer the program is delegated to the MDEQ, Water Resources Division.

Applicability

If a facility produces 20,000 pounds or more of cold-water species fish in a calendar year, and if it feeds more than 5,000 pounds of food during the calendar month of maximum feeding, it is required to obtain an NPDES permit. This permit is required before the 20,000 pound threshold is reached. In other words, if a facility is going to exceed 20,000 pounds as a matter of production, the permit would need to be received in advance of the activity.

Federal Rule for the Concentrated Aquatic Animal Production (CAAP) Industry

In 2004, the USEPA established technology-based effluent limitations guidelines (ELG) applicable to the CAAP industry. CAAP facilities subject to this rule are flow through, recirculating, and net-pen systems that directly discharge wastewater and produce at least 100,000 pounds of fish per year. The ELGs require best management practices and recordkeeping activities to control the discharge of pollutants in the wastewater from these facilities. This rule is implemented in the NPDES permit. When these requirements are applied in NPDES permits, they will help reduce discharges of conventional pollutants (mainly Total Suspended Solids), non-conventional pollutants (such as nutrients, drugs and chemicals) and, to a lesser extent, toxic pollutants (metals and PCBs)².

Antidegradation Demonstration

Rule 1098, Antidegradation, of the Part 4, Water Quality Standards (Part 4 Rules), applies to any NPDES permit action that will result in a new or increased loading of pollutants to the surface waters of the state. The applicant shall provide a demonstration identifying the social or economic development and benefits that would be forgone if the lowering of water quality is not permitted. These benefits could include the production of locally-produced food fish and modest increases in employment and community tax base.

Effluent Limitations and Monitoring Requirements

When the MDEQ reviews a proposed discharge, the effects of the discharge on the receiving water will be evaluated to ensure that water quality standards will be protected. Any requirement determined to be necessary to protect the receiving water will be incorporated into the NPDES permit. These requirements may include site-specific water quality-based effluent limitations, monitoring, notifications, reports, or discharge observations.

² U.S. Environmental Protection Agency, *Effluent Guidelines – Aquatic Animal Production Industry, Final Rule – Fact Sheet*, water.epa.gov/scitech/wastetech/guide/aquaculture/fs-final.cfm

NPDES Permit Application Process

1. Receive application from permittee
2. Review application for completeness and accuracy
3. Request additional information as necessary
4. Develop technology-based effluent limits in accordance with the federal rule for CAAPs
5. Develop site-specific water quality-based effluent limits using application data and other sources to ensure attainment of the water quality standards.
6. Develop monitoring requirements for each pollutant and condition
7. Review the applicant's antidegradation demonstration
8. Develop special conditions
9. Consider variances and other applicable regulations
10. Prepare the draft permit, fact sheet, and other supporting documentation that identify the effluent limitations and monitoring requirements, and summarize the principal facts and the significant legal, methodological and policy questions considered in preparing the draft permit
11. Provide copies of the draft documents to the applicant for review
12. Place the draft permit on public notice; interested parties may submit comments regarding the draft permit
13. For some controversial permitting actions, a public meeting and/or public hearing may be held
14. Complete the review and issue the final permit, taking the public comments into consideration
15. Ensure permit requirements are implemented

Processing Time

The MDEQ must act on the permit within 180 days of receiving a complete application. The application will be placed on public notice for 30 days during which time the public can submit written comments. During the public comment period, interested parties can request that the MDEQ hold a public hearing. If the notice for the public hearing is not posted concurrently with the public notice of the draft permit, the notice for the public hearing will be posted for 30 days prior to the hearing.

Fish Stocking Permit

Fish stocking permits are required under Section 48735 of Part 487, Sport Fishing, of the NREPA. Authority to administer the program is delegated to the Fisheries Division of the MDNR.

All fish stocked into Great Lakes net pens must be certified as specific-pathogen-free (SPF) in accordance with the Great Lakes Fishery Commission's "Model Program for Fish Health Management in the Great Lakes (Model Program)³." In order to comply with the Model Program, the fish must be tested and certified as free of the following pathogens:

- *Aeromonas salmonicida* (furunculosis)
- *Yersinia ruckeri* (enteric red mouth disease)
- *Renibacterium salmonicida* (bacterial kidney disease)
- Viral hemorrhagic septicemia virus (VHSV)
- Infectious hematopoietic necrosis virus (IHNV)
- Infectious pancreatic necrosis virus (IPNV)
- *Onchorhynchus masou* virus
- *Myxobolous cerebralis* (whirling disease)

³ www.gffc.org/pubs/SpecialPubs/Sp14_02.pdf

The purpose of the stocking permit is to ensure that fish to be stocked are 1) healthy and will not pose a disease risk to the populations in the wild; 2) are a species that currently exist in the watershed and do not pose long term management problems; and 3) a species that are compatible with overall fishery management goals in the watershed.

Because fish stocked into commercial net pens will have fish escape at some level and are only separated from wild fish populations by the net pen mesh, they are subject to the same testing requirements as agency stocked fish.

Aquaculture Facility Registration

Background

An aquaculture facility registration is required under the Michigan Aquaculture Development Act, 1996 PA 199, as amended (Act 199). It is administered by the MDARD. **In Act 199, aquaculture facilities may only be registered if they are operating in privately controlled waters. Since the Great Lakes are not privately controlled waters, the statute does not allow the MDARD to provide a registration for a facility that would be located there.** Additionally, an aquaculture facility cannot be operated anywhere in Michigan without a registration under Act 199.

Species and Disease Management Plan

The MDARD regulates fish health through the Animal Industry Act, 1988 PA 466, as amended (Act 466) and Act 199.

Fish imported into Michigan destined for an aquaculture facility are required to have a certificate of veterinary inspection or a fish health certificate, signed by an accredited veterinarian. Disease testing for importation may also be required by MDARD.

In addition, certain diseases of aquaculture species are reportable to MDARD.

Because of the potential long-term impact of escaped fish on Great Lakes fish populations, the Model Program will need to be strictly followed.

All fish transferred into Great Lakes net pens will need to be certified by an approved fish health testing lab as free of listed pathogens (see Fish Stocking Permit on page 6).

Processing Time

The facility application must be submitted 60 days before the facility is operational. The MDARD shall not issue the registration until there has been an inspection to determine that the facility meets the standards of Act 199, including barriers to prevent escape of the aquaculture species into the public waters. The species being produced must also be on the list of approved species, and the owner must be provided with a copy of the Model Program. Within 30 days of the registration application, the MDARD must conduct an inspection, and if all requirements are met the registration must be issued with 60 days of the application.

TRIBAL NATIONS AGREEMENTS

The 2002 State-Tribal Accord

The 2002 State-Tribal Accord (Accord) provides a framework for a government-to-government relationship between the state and the 12 federally-recognized Indian Tribes in the state of Michigan. Through the Accord, each tribe and the state have recognized a process of consultation to permit representatives of the other to provide meaningful and timely input on matters that significantly or uniquely affect the interests of that government. State departments are required to engage in consultation with the tribes concerning state actions that may significantly affect tribal interests. The State-Tribal Accord is not a legally binding document.

The 2000 Great Lakes Consent Decree

The 2000 Great Lakes Consent Decree (Consent Decree) is a legally-binding agreement that governs allocation, management, and regulation of the state and tribal fisheries in the 1836 Treaty-ceded waters of the Great Lakes (see Figure 3). The Consent Decree was signed in August of 2000 by the Bay Mills Indian Community, the Grand Traverse Band of Ottawa and Chippewa Indians, the Little River Band of Ottawa Indians, the Little Traverse Bay Bands of Odawa Indians, the Sault Ste. Marie Tribe of Chippewa Indians, the state of Michigan, and the United States. The Consent Decree gives the signatory tribes co-management authority of the fisheries in these waters. The Consent Decree established a Technical Fisheries Committee (TFC), which is an intergovernmental body comprised of biologists that seeks to resolve issues using the best available science. The TFC strives for consensus in all matters brought before it; however, if consensus cannot be reached, the Consent Decree describes a dispute resolution process that is to be followed. When conditions in the lakes change from the management strategy that was agreed upon in 2000, the Consent Decree can be amended by consensus among the parties.

In 1836 Treaty waters, stocking plans (permits) or activities which deviate from the baseline 1999 stocking plan require TFC approval by consensus. New stocking proposals and any other changes that would materially affect an allocation of harvest opportunity set forth in the Consent Decree that are not approved by the TFC shall not be implemented unless and until the party proposing the change prevails in dispute resolution.

Although not affected by the Consent Decree, tribal commercial fishing also occurs in the 1842 Treaty waters of Lake Superior. Government-to-government consultations established in the Accord address processes and responsibilities among the parties regarding allocation, management, and regulation of the state and tribal fisheries in these waters.

Consultation and mediation are commonly used tools to address conflict between governments. Federal courts are a remedy of last resort in resolving treaty rights disputes between sovereign governments.

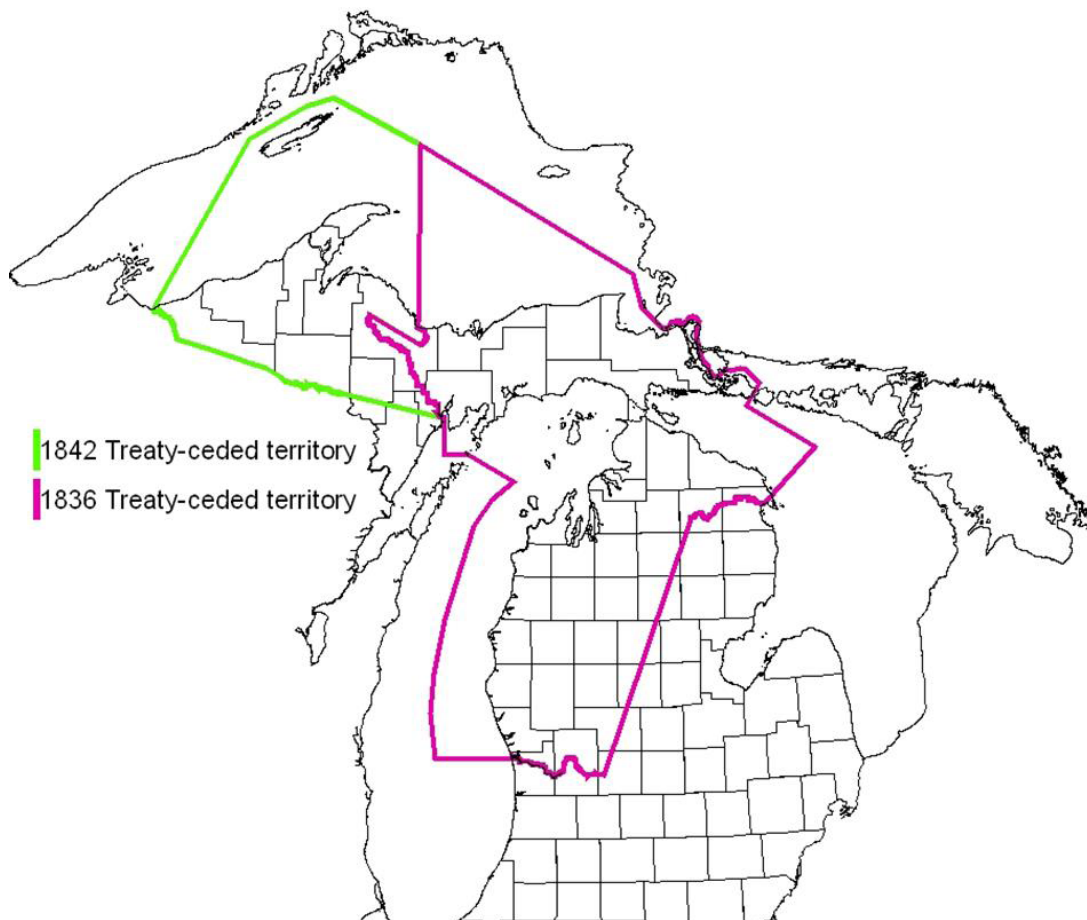


Figure 3. Michigan's Treaty-ceded waters of the Great Lakes

BI-NATIONAL AGREEMENTS

Great Lakes Water Quality Agreement

The MDEQ, through its Office of the Great Lakes, works within the structure established by Canada and the United States in the “Great Lakes Water Quality Agreement (GLWQA 2012)⁴” to regulate nutrient loading and in-lake nutrient concentrations. Two key parts of this process include 1) Annex 4 of the GLWQA, which sets nutrient loading targets for each lake and, in some cases, specific locations in each lake and 2) the Lakewide Action and Management Plan (LAMP)⁵ process. Cooperators on each lake develop an action plan to assess, restore, protect, and monitor the ecosystem function of each lake. Lake partnerships coordinate the work of federal, state, provincial, tribal, and non-governmental partners to improve the status of each lake ecosystem with respect to chemical, biological, and physical goals established by the LAMP document. A public consultation process ensures that each LAMP addresses public concerns.

Great Lakes Commission

The Great Lakes Commission (Commission) is an interstate compact agency that promotes the orderly, integrated and comprehensive development, use and conservation of the water and related natural resources of the Great Lakes basin and St. Lawrence River. Its members include the eight Great Lakes states with associate member status for the Canadian provinces of Ontario and Québec. The Commission was established by joint legislative action of the Great Lakes states in 1955 (the Great Lakes Basin Compact) and granted congressional consent in 1968. The Great Lakes Commission is a public agency established by the Great Lakes Basin Compact in 1955 to help its Member states and provinces speak with a unified voice and collectively fulfill their vision for a healthy, vibrant Great Lakes – St. Lawrence River region. Issues that can affect other jurisdictions are often taken up through the Great Lakes Commission process.

Great Lakes Fishery Commission

The MDNR is signatory to “A Joint Strategic Plan for Management of Great Lakes Fisheries (Great Lakes Fishery Commission 2007)⁶.” This document outlines the strategic procedures by which fishery management agencies throughout the Great Lakes have agreed to cooperatively manage fishery resources. As such, each lake is managed by a lake committee comprised of senior fishery managers from each jurisdiction with management authority on that lake. When decisions in one jurisdiction may affect fisheries in the lake, all jurisdictions must come to consensus about a proposed management action before any decision is implemented. This cooperative process is facilitated by the Great Lakes Fishery Commission.

DISCUSSION WITH OTHER STATES AND ONTARIO

The Quality of Life (QOL)⁷ Commercial Aquaculture Team contacted the agencies responsible for regulating commercial net-pen operations in both marine and freshwater environments. Below is a summary of that discussion.

Alaska⁸

The farming of finfishes in Alaska has been banned since 1990. Competition with commercial salmon fishing is the primary reason for the ban. The salmon fishery is a significant industry in Alaska, both economically and culturally. The only type of farming that is allowed is the production of salmon smolts that are reared in pens and then released and allowed to free-range in the ocean. They are harvested when they return reaching sexual maturity. This practice is referred to as “salmon ranching” and may be limited to not-for-profit organizations. Salmon ranching is allowed to occur because those fish are also available to the commercial fishers for harvest.

Maine⁹

Net Pen Facility Description

As of the date of this report, there are approximately 10-12 net-pen farms in operation off the coast of Maine. Cooke Aquaculture USA, Inc., is the company that operates all of the net pens in Maine. Cooke Aquaculture is a Canadian

⁴ www.ijc.org/en_/Great_Lakes_Water_Quality

⁵ epa.gov/greatlakes/lamp/index.html

⁶ www.glfc.org/fishgmt/jsp97.pdf

⁷ The Michigan Departments of Agricultural and Rural Development, Environmental Quality and Natural Resources are referred collectively as the Quality of Life departments.

⁸ Jeff Milton, Alaska Department of Fish and Game, interview by Ed Eisch, MDNR, August 2015.

⁹ Bill Hinkel, Maine Department of Environmental Protection, interview by the QOL Commercial Aquaculture Team, August 2015.

company that has net-pen operations in Maine, New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland, Chile, Spain and Scotland.

The net pens are located relatively close to shore. A barge with a small heated building used to manage facility operation is moored at the net pen facility during the 14-18 month grow-out period. A lease to operate must be obtained from Maine's Department of Marine Resources. Leased sites may be up to 100 acres in size but the net pens may only occupy 10 to 15 acres. The extra space is needed to maneuver the barges and facilitate general maintenance and operations of the net-pen array.

Jurisdiction and Regulatory Program

The Maine Department of Environmental Protection (MeDEP) received delegation from the USEPA to issue NPDES permits in 2001. Permits issued under this delegation are called Maine Pollutant Discharge Elimination System (MEPDES) permits. A MEPDES General Permit for net-pen aquaculture was initiated in 2002 and finalized in 2003. The General Permit was renewed in 2008 and again in 2014 with each reissuance containing significantly revised conditions based on new information and understanding of the industry over time.

The General Permit identifies the area of coverage eligible for application under the General Permit. Additionally, it excludes from eligibility certain portions of the coast that are considered more susceptible to impacts from aquaculture due to less tidal flushing and greater impacts from organics and nutrients. An applicant who does not qualify for coverage under the General Permit may apply for an individual MEPDES permit. The MeDEP will evaluate individual applications and apply all applicable water quality standards and permitting criteria in making a decision on the application. Generally, the permit conditions would be the same or very similar except that more frequent monitoring may be required to ensure permit compliance.

Although the scope of the General Permit is all fish species, the net pen facilities currently operating in Maine raise only Atlantic salmon. In November 2000, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (jointly referred to as "the Services") issued a final rule listing Atlantic salmon populations in certain Maine rivers and streams as "endangered" under the federal Endangered Species Act. Consequently, genetic testing of Atlantic salmon to be placed in marine net pens is required by the General Permit. The objective of testing is to prevent genetic "contamination" of native North American Atlantic salmon by non-North American Atlantic salmon in the event of a fish escape from a net pen facility. The testing protocol was approved by the Services and incorporated into the General Permit by the MeDEP. Escapement has not been a significant problem to date. Fish contain markings that are unique to the specific net pen facility.

MeDEP established two mixing zones: (1) a Water Column Mixing Zone, and (2) a Sediment Mixing Zone. The mixing zone extends out 30 meters beyond the perimeter of a net pen in all directions on the surface, and down to the sea floor/water column interface. Outside the designated Mixing Zones, discharges from the facility must not cause or contribute to conditions that are hazardous or toxic to aquatic life, or that would impair the uses designated by the classification of the receiving waters. Within the designated mixing zone, the discharge must not cause or contribute to conditions that are lethal to passing organisms indigenous to the receiving water.

The bottom of the ocean beneath the pens typically does not accumulate excessive quantities of solids, except that tidal action or benthic features may cause eddies or otherwise result in accumulation of organic matter in particular portions of the net pen site. In these areas, sulfide monitoring results are used to determine the relative impact of the aquaculture activity on the benthic community. If sulfide results exceed a certain action threshold, additional monitoring of the actual benthic community is required to assess compliance with applicable water quality standards.

The fish are provided antibiotics in their feed as necessary to control disease and as approved by a licensed veterinarian. The use of therapeutic chemicals is regulated by the U.S. Food and Drug Administration; however, the discharge of drugs or residuals is still regulated under the Clean Water Act and through the MeDEP's General Permit. There are two basic methods to treat fish with drugs: 1) tarp treatments and 2) well boats. Tarp treatments encapsulate the net pen by placing tarps along the sides and bottom of the net pen and then add the drug in this temporary containment area. This method is typically less expensive and has a lower fish mortality risk because the fish are not directly handled. Well boats are specialized vessels used to pump fish from the net pen into a boat that has a well where the drug is applied in a bath type treatment. Treated fish are pumped back to the net pen and the wastewater is discharged. This method puts more stress on the fish due to the increased handling but provides for a much more controlled discharge of wastewater containing residual drug concentrations.

Ice formation is not a threat to Maine’s aquaculture; however, a condition known as superchill is a potential serious threat to marine net-pen aquaculture. Superchill is a condition where the water temperature falls to the level where fish blood freezes, which is about -0.7 Celsius, causing mortality. The industry has many temperature probes up and down the coast to monitor water temperatures.

Ontario¹⁰

Ontario is the only jurisdiction along the Great Lakes Coast that allows commercial net pen operations in public waters. Currently there are six licensed operations in Ontario: one in Parry Sound and five in the North Channel off of Manitoulin Island. The six licensed sites in total generate about 8.8 million pounds of rainbow trout annually. All are operating in compliance with their license conditions. The fry take about 18 months to be harvested. They will weigh three to five pounds upon harvest. There are fish escapements, most are due to severe weather events causing infrastructure failure, but vandalism has also occurred. All facilities operate on a year round basis including some harvesting taking place during the winter months. Fish are fed during the winter but given much less food than at other times of the year.

Facts about Licensing

- The total processing time for new site applications will vary depending on the scope and nature of the application as well as the resulting need for data collection and analysis and consultation that may be triggered. Generally new or expansion of existing sites can take up to two years and in some cases, longer.
- The Ministry of Natural Resources and Forestry (MNRF) has received five new applications for aquaculture sites in the last two years. Three of the five new applications are currently in the review process. The other two applications are currently not being pursued by the applicant.
- The Ministry of Environment and Climate Change (MOECC) provides the water quality standards (i.e., dissolved oxygen, phosphorus, sediment) to MNRF to include in the license that the MNRF issues.
- One of the conditions of the license requires the reporting of the amount of medicated and un-medicated feed used and the number of fish mortalities. Current licenses do not require fallowing but the operators do it for various reasons. For example, a shortage of fry could delay the production cycles leaving pens empty.
- The fish production is regulated by the amount of feed (i.e., maximum feed quota in tons) the operator can use in a year.
- Starting in 2015, sediment quality monitoring requirements were instituted. The collected samples typically performed by a consultant hired by the operator are analyzed by an accredited lab and the results (in the form of a report) are reviewed and approved by MNRF and MOECC staff. If the sediment monitoring that was conducted was not satisfactory, the licensee provides a process to resolve problems.
- The licenses are issued once every five years. The operators of commercial net pens have to obtain a license to occupy the lake bottom which is similar to the approvals required by Part 325, of the NREPA.

Washington¹¹

History of Permitting

The Washington Department of Ecology (WDOE), water quality program issues aquaculture NPDES permits for commercial and state net pen operations. Commercial salmon net pens in Puget Sound preceded NPDES permitting. USEPA was going to sue the state of Washington if they did not develop a program. A programmatic “Fish Culture in Floating Net Pens Environmental Impact Statement (EIS)” was completed by the Department of Fish and Wildlife (WDFW) in 1990 as a precursor to the NPDES permit. It was determined that impacts would be minimized with proper siting guidelines.

Washington’s first NPDES permits were issued in 1996. The permit conditions include a sediment impact zone (SIZ). When the permits were first issued, most if not all of the facilities could not comply with the standards, acceptable impacts, and SIZs.

The permit has been appealed each time it has come up for renewal by the Wild Fish Conservancy. Their concern is that Atlantic salmon interferes with the native Pacific salmon. (Atlantic salmon are classified as pollutants by the Puget

¹⁰ Ken Lacroix, Ministry of Natural Resources and Forestry, interview by David Fiedler, MDEQ, September 2015.

¹¹ Cedar Bouta and Lori LeVander, Washington Department of Ecology, interview by the QOL Commercial Aquaculture Team, September 2015.

Sound Pollution Control Hearings Board). Since 1897, 52 attempts to introduce Atlantic salmon were made, none were successful. The National Oceanic and Atmospheric Administration (NOAA) concluded in its 2002 technical memorandum reviewing effects of Atlantic salmon on endangered Puget Sound salmon that there is little risk of Atlantic salmon colonizing Puget Sound habitats (Waknitz, F. W., et al. 2002, p. 9-21 and 65-66).

Washington includes a significant level of oversight on fish escapement in the permit requirements. The permit includes an Accidental Fish Release Response Plan and a Fish Release Prevention and Monitoring Plan. These conditions require the permittee to implement technologies to minimize fish losses, notify the agencies if there is a significant release of fish, and recapture as many fish as possible. Permittees are required to report monthly on losses and submit annual summary reports.

Closed systems have been found to be too expensive. American Gold Seafoods, a subsidiary of Icicle Seafoods, Inc. is not required to do closed containment systems because the costs are prohibitive and they do not meet all known, available and reasonable methods of prevention, control and treatment (AKART) standards of the NPDES permits.

WDFW discourages the commercial net pen industry from growing Pacific salmon species due to concerns with disease, genetic dilution and competition from escapees. As of January 2004, the WDFW requires that all salmon reared in the state are marked. This is conducted by removing the adipose fin from all hatchery salmon.

The current pens are in compliance with all of their NPDES permits. No new commercial net pen sites have been permitted since 1997, although there has been expansion at some of the existing sites.

Net Pen Studies

In 1986, the WDOE in collaboration with the Departments of Fisheries, Natural Resources and Agriculture published “Recommended Interim Guidelines for the Management of Salmon Net-Pen Culture in Puget Sound” which provided guidance on siting pens and managing environmental risks. The interim guidelines were based on industry operations, state regulatory framework, and available literature of the time, and were not adopted into state code. WDOE has been supplementing the outdated interim guidelines from 1986 with new science and tighter management standards. WDOE is working with the National Centers for Coastal Ocean Science (NCCOS) for Coastal Fisheries and Habitat Research to secure funding for updating the guidelines given technology, operations, and procedures have changed significantly in the last 30 years.

In addition, the Department of Natural Resources (WDNR) completed a “Potential Offshore Finfish Aquaculture in the State of Washington” technical report in 1999 for state-owned aquatic lands, which is where all commercial net pens and many enhancement pens are located.

The WDOE referenced a 2013 Canadian Report: “Closed Containment Salmon Aquaculture (Canadian Parliament, 2013)¹².”

Current Net Pen Operations

Commercial pens of Atlantic salmon: Eight commercial net pens of Atlantic salmon encompassing 21 surface acres and 173 acres of leased bottomland are operated in Puget Sound by American Gold Seafoods. All eight pens are located on state-owned aquatic lands.

Cameras typically are used to monitor during feeding periods. The operators also monitor the passage of algae blooms through the net pens and adjust feeding rates accordingly. The operators also monitor dissolved oxygen and temperature continuously. These requirements are not specified in the permit. The permittees currently conduct this monitoring voluntarily, but some of these conditions (e.g., video monitoring during feeding) may be added to the reissued permit.

Once the pens are sited, they are not moved. American Gold Seafoods tried moving a pen in the late 1990s and ended up ripping a hole in the net, resulting in one of their largest releases. Salmon typically spend their entire rearing time in one net pen.

¹² www.parl.gc.ca/content/hoc/Committee/411/FOPO/Reports/RP5994887/foporp03/foporp03-e.pdf

Fallowing of the pens is done voluntarily by American Gold Seafoods; it is not a condition of the permit. Fallowing for two to four months post-harvesting allows the benthic area to recover.

Biofouling of nets and lines by mussels, kelp, anemones, etc. are a maintenance issue. The nets are cleaned after each harvest as part of the fallowing process. If they aren't, they will bind and the tidal current could rip them from their mooring. The nets are lifted in the air to dry and taken to land for power washing. Cleaning is not allowed over water as it causes significant suspended solids and turbidity problems.

USEPA issues the permits for net pens operated by the tribes in eastern Washington and along the lower Columbia River. The tribes have co-management authority in the state under treatment in the same manner as a State (TAS) which allows the tribes to set their own water quality standards. Pacific Seafood operates net pens in a reservoir created by a dam on the Columbia River. They have good flow of water under the pens.

Forty to fifty commercial aquaculture farms under the 20,000 pounds of fish threshold operate in Washington. These sites can show significant sediment impacts, including significant populations of pollution tolerant worms.

Washington has only experienced two minor disease problems, sea lice and infectious hematopoietic necrosis (IHN). One commercial net pen facility had a mild issue with sea lice. By the time they received approval to use 'slice' for treatment, the problem dissipated and it was never applied. (Washington's waters have a lower salinity level which limits sea lice.) One pen had an outbreak of IHN. Once it was detected, WDFW required the company to empty the pen and landfill the fish, but it took the company 5-6 weeks to complete the process. For this reason, WDFW now requires a Fish Disease Response Plan be established by the permit. Using gill nets, WDFW collected 125 wild fish samples from the area surrounding the net pen but didn't detect any IHN in the wild population. Washington has greater concerns about diseases with fish in the hatchery system as wild fish are captured and brought to the hatcheries for stocking.

ADDITIONAL RESOURCES

Great Lakes Bottomland Construction Permit and Bottomland Conveyance

Laws and Rules

www.michigan.gov/deq | Water | Great Lakes | Submerged Lands | Laws & Rules

Submerged Lands Program

www.michigan.gov/deq | Water | Great Lakes | Submerged Lands

Construction Permit and Bottomland Conveyance Applications (Electronic)

www.mi.gov/miwaters

On August 17, 2015, the DEQ's Water Resources Division launched a new information system called MiWaters. MiWaters is a state-of-the-art, comprehensive, Web-based permitting and compliance database. MiWaters establishes a streamlined electronic permitting process, allowing Michigan to fulfill federal electronic reporting requirements and provide an online component for access to public information. The focus of MiWaters is permitting and compliance, including NPDES, storm water, groundwater discharge, aquatic nuisance control, Part 41 construction, and land and water interface permits. It also includes electronic reporting of untreated or partially treated sanitary wastewater.

One of the focuses in developing MiWaters was to create a system that makes it easier for the Water Resources Division to communicate with, and provide services electronically to the regulated community. Below is a list of some of the functions and features that MiWaters provides:

- Permit applications are submitted electronically.
- The current Electronic Environmental Discharge Monitoring Reporting (e2-DMR) system has been replaced with a more sophisticated system that provides additional validation and feedback to permittees, and helps detect and prevent errors prior to submittal.
- All permit-required submittals are submitted electronically.
- Those with a MiWaters account are able to manage permissions, deciding who can view, edit, and submit applications or submittals.
- MiWaters provides near real-time notifications, to the permittee, of any violations determined by the system or by staff, providing permittees with an early "heads up" and opportunity to correct problems.

Since implementation of MiWaters, paper applications for NPDES and groundwater permits are no longer be accepted.

Construction Permit Application (Hard Copy)

www.michigan.gov/deq | Water | Great Lakes | Submerged Lands | MDEQ/USACE Joint Permit Application

Bottomland Conveyance (Hard Copy)

www.michigan.gov/deq | Water | Great Lakes | Submerged Lands | Great Lakes Bottomland Conveyance

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National Pollutant Discharge Elimination System

Laws and Rules

www.michigan.gov/deq | Water | Permits | Surface Water | NPDES Permits

NPDES Application

www.mi.gov/miwaters (see MiWaters discussion on page 13)

Antidegradation

www.michigan.gov/deqnpdes | How to Apply for an NPDES Permit | Procedure 14 – Antidegradation

Concentrated Aquatic Animal Production (CAAP) Effluent Limit Guidelines (ELG)

water.epa.gov/scitech/wastetech/guide/aquaculture

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Fish Stocking Permit

Permit Application

www.michigan.gov/dnr | Fishing | Doing Business: Permits, Applications & Reporting | Public Waters Stocking Permit

Contact

MDNR Fisheries Management Unit Office

www.michigan.gov/dnr | Fishing | Doing Business: Permits, Applications & Reporting | Public Waters Stocking Permit

Aquaculture Facility License

Aquaculture in Michigan

www.michigan.gov/mdard | Licensing, Certification & Registration | Animal Related Licensing | Aquaculture | Aquaculture in Michigan

Licensing

www.michigan.gov/mdard | Licensing, Certification & Registration | Animal Related Licensing | Aquaculture

Importing

www.michigan.gov/mdard | Animal Health & Care | Bringing Animals into Michigan | Aquaculture (Fish)

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Discussions with Other States and Ontario

MeDEP's General Permit http://www.maine.gov/dep/water/wd/atlantic_salmon_aquaculture/index.html