



Aquaculture and Water Pollution Control

Aquaculture, or fish farming, can be an important agricultural enterprise for Minnesota. The Minnesota Pollution Control Agency (MPCA) works with potential large-scale aquaculturists to share information about water quality planning and environmental protection. The agency and fish farmers share many interests and goals in ensuring that our valuable water quality is protected. This brief summary reviews water quality concerns, water quality planning considerations, and MPCA permitting for aquaculture in Minnesota.

Water Quality Concerns

Intensive aquaculture, in which large amounts of feed are provided to fish, is essentially an “aquatic livestock” rearing operation. Like other large-scale livestock operations, large-scale aquaculture generates large amounts of manure: the rate of manure generation is roughly proportional to the feeding rate. Well-managed manure is a valuable soil amendment. Poorly managed manure can cause water pollution, an important problem that must be addressed. Manure can pollute Minnesota waters with these pollutants:

- Suspended solids and turbidity (cloudiness of the water)
- Oxygen depletion (biochemical oxygen demand)
- Nitrogen (particularly un-ionized ammonia and nitrate)
- Phosphorus

Aquaculture discharges also can cause water quality concerns related to residual chemical additives and water temperature changes.

Water Quality Planning Considerations

Site selection is the most critical environmental management decision. The more flexibility fish farmers have to consider alternative sites, the easier their environmental management, and related costs, are likely to be. Siting flexibility is a key to good environmental planning.

Indoor, recirculating flow systems can improve wastewater management. Those developing these systems, and others that generate relatively low wastewater flows, should consider the wastewater treatment advantages of locating in a municipality: the local sewage treatment system may have the capacity to handle their wastewater. Drainfields are not appropriate wastewater management systems for aquaculture facilities, particularly those generating high flow rates.

Regular, efficient, manure removal and storage systems are critical for any type of large-scale aquaculture design. The MPCA can provide guidelines for the design, operation and maintenance of manure holding structures. The collected manure is best applied at agronomic rates to suitable farmland, where the nitrogen and phosphorus can be recycled into crop production. Effective manure management is critical to the development of environmentally sound aquaculture.

Materials management can be important in controlling water pollution impacts. The use of low phosphorus, high-energy feeds, and improvements in the feed conversion ratio, for example, can provide significant water quality benefits. Minimizing or eliminating the application of chemicals, such as formaldehyde, also benefits downstream water quality.

MPCA Permitting

The MPCA reviews and approves Manure Management Plans for the large-scale storage and land application of aquaculture manure, using the same criteria as for other livestock manures. The agency has developed a general permit for the land application of manure from large-scale fish farms. This permit is available to those aquaculturists wanting to use land application.



Minnesota Pollution Control Agency

A National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) permit, for a land application and/or surface discharge aquaculture system, is required from the MPCA for warm or cool water species fish farms producing more than 100,000 pounds/year of fish. This permit is similarly required for cold water species (trout, salmon, char) operations producing more than 20,000 pounds/year of fish, or feeding more than 5,000 pounds/month of feed.

For these larger scale aquaculture operations, complete permit applications, including Manure Management Plans when appropriate, should be provided to the MPCA at least six months before the mandatory permitting threshold is exceeded. The fish farmer thus can help to ensure that the MPCA permit is in effect at the time production exceeds the regulatory threshold.

Smaller operations that have long-term expansion plans also should contact the MPCA before choosing a site for their initial operation. In this way, potential environmental concerns and costs can be addressed upfront, to avoid expensive retrofitting later during expansion. Good early communication with the MPCA in planning aquaculture development can be very valuable in the overall development plans.

Water quality permits include requirements for properly collecting and treating fish manure wastes to minimize their impacts on Minnesota's lakes, streams and other waters. The design and construction of the manure storage and treatment systems requires the assistance of a professional engineer experienced in wastewater treatment and/or manure management.

For waste discharges from large-scale aquaculture to lakes, streams, wetlands or other surface waters, the

NPDES/SDS permits have limits on certain pollutants. The permits require regular water quality management and monitoring to ensure that these limits are met.

Please contact the MPCA for more information on NPDES/SDS permitting.

DNR Approvals

Some water-related activities at aquaculture operations also require additional, separate, regulatory approvals from the Minnesota Department of Natural Resources (DNR).

DNR-Fisheries

For information on DNR licensing, technical information on fish rearing, and other questions you may have about aquatic farming in Minnesota, please contact the DNR Fisheries Program Coordinator at (651) 296-3325.

Water withdrawals

Surface or ground water withdrawals that exceed 10,000 gallons per day or one million gallons per year require a DNR water appropriation permit. Recirculation flow systems are encouraged and may help eliminate the need for a permit or reduce DNR water use reporting fees. A DNR water appropriation permit is not required if the water is taken from a municipal or other source of water for which a valid appropriation permit is already in effect. Information on DNR water appropriation permits is available from the DNR at (651) 296-4800.

Riprap and Discharge Outlets

The DNR Division of Waters also has some requirements on the placement of riprap and erosion protection at discharge outlets. Information on these requirements, and DNR protected waters permits, is available from the DNR at (651) 296-4800.

For more information, please contact the MPCA, 520 Lafayette Road, St. Paul, MN 55155 [telephone (651) 296-8481]