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2013

Water Efficiency: Aquaculture

Aquaculture is the practice of raising fish in hatcheries and farms for food, sport, or release to the wild. Aquaculture operations generally use large quantities of water to maintain water levels in production tanks and raceways. The various requirements associated with different fish species and ages affect water reuse throughout the rearing system. For example, adult fish can better survive somewhat degraded water quality conditions than young fish, so recycling is more feasible in tanks containing older fish.

Since large volumes of water are required to maintain aquaculture systems, water efficiency practices are important to reduce the demands on source water. The water efficiency practices in this fact sheet involve active monitoring and control of source water supplies and application of these practices throughout the facility. A comprehensive audit can be performed to assess a facility's water system and identify locations where these practices can be employed to conserve water. Visit the fact sheets webpage at www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm and scroll to WD-DWGB-26-16, "Water Efficiency: Business or Industry Water Use and Conservation Audit."

- Determine minimum flow rates needed to maintain required tank/raceway conditions such as temperature, dissolved oxygen, and dissolved solids concentrations. Maintain these rates and regularly monitor specific tank conditions.
- Maintain or install accurate mechanisms to control flows throughout the aquaculture system. Devices include sealed weir boards and pipe valves.
- Install flow meters or sharp crested weirs for proper flow measurements. This allows for more accurate control of tank flow rates and water conditions.
- Minimize water use for tank and facility washing. Use pressurized culture water along with physical scrubbing, rather than clean source water, for cleaning.
- Routinely check for leaks in all areas of the facility, including domestic. Regularly repair leaking pipes, tanks and channels. Retrofit old channeled systems with valved pipes.
- Establish a routine maintenance program.
- Upgrade older infrastructure with newer tanks and piping as the old ones wear out.
- Circulate water from hatchery or early stage tanks to later fingerling or yearling tanks.
- Use state-of-the-art recirculation technology wherever possible. These systems often employ a technique called a swirl separator, comprised of a cone-shaped tank and whirlpool, to remove fish

wastes and are used in conjunction with treatment and aeration.

- Implement efficient alternative processes for culturing fish. Processes may include installing aeration systems to control dissolved oxygen levels and minimizing the flow required to maintain saturated conditions.
- Employ a pumping and treatment system to recycle water. Aquaculture treatment methods are designed to remove dissolved solids and reduce nitrate, nitrite and ammonia. Temperature and trace contaminants are also factors that must be considered when assessing the feasibility of a recycling system. The following is a list of treatment methods used in aquaculture.
 - Nitrogen/sulfide gas strippers.
 - Screens and particulate filters, e.g., cartridge, sock filters, remove large particles that could potentially damage pumps and plug pipes and valves.
 - Bio-filters, comprised of an appropriate media-filled container, remove nitrate, nitrite and ammonia.
 - Rapid sand filters remove nitrate, nitrite, ammonia and particulates.
 - Activated carbon filters/ion exchange systems remove nitrate, nitrite, ammonia and other cations.
 - Membrane filters, e.g., reverse osmosis, micro-, nano-, ultra-filtration, remove nitrate, nitrite, ammonia, salts and metals.
 - Ultra-violet radiation or ozone systems for pathogen loads in source water.
- Sweep or shovel floors, drives, parking lots, and walkways rather than them hosing down.
- Wash fleet vehicles less often. Consider using spent culture water for washing purposes.
- Use hose nozzle shutoff devices.
- Use low-flow plumbing and equipment in bathrooms and other domestic areas.
- Minimize high water use landscaping. Use natural plantings. Most native plants are drought-resistant and hardy, requiring no additional water application. For more information related to landscaping, visit the fact sheets webpage (see below) and scroll to the “Water Efficiency” fact sheets at the bottom of the page.

For Additional Information

Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at <http://des.nh.gov/organization/divisions/water/dwgb/index.htm>. The bureau’s fact sheets are online at <http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm>. More information about the DES Water Conservation Program can be found at http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/index.htm.

Reference

New England Interstate Water Pollution Control Commission; *MRI Water Conservation Technical Bulletin # 3, Water Conservation Best Management Practices for Aquaculture*; NEIWPCC, Lowell, MA; 1996.

Note: This fact sheet is accurate as of February 2013. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.