

Compliance Guide for the Concentrated Aquatic Animal Production Point Source Category

Chapter 11: Maintenance for Flow-through, Recirculating, and Net Pen Facilities

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<http://www.epa.gov/waterscience/guide/aquaculture>

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Maintenance

Flow-through, recirculating, and net pen systems should be well-maintained, managed efficiently, and operated in compliance with all applicable laws and regulations. This will improve long-term economic performance and reduce environmental impact. As such, the following management practices are simply part of good management.

Examples of Maintenance Practices

1) Maintain structures and equipment to ensure staff safety and protection of the environment



Routinely inspect flow-through and recirculating production systems and wastewater treatment systems to identify and promptly perform repairs or replacement, as necessary.

Some of the system components that should be considered for routine inspection of flow-through and recirculating systems include:

- Drains—make sure that all of the parts of the drain structure are properly functioning; look for the proper placement of stand pipes, dam boards, and animal exclusion devices (for example screens across pipe openings); check that valves and other critical drain components are working properly; check for broken parts and repair when necessary.
- Production units—make sure that tanks and raceways are structurally sound; repair cracks as necessary; all

plumbing components are installed and working properly.

- Life support systems—routinely inspect oxygen equipment, filters, heaters, and any other life support equipment used to maintain optimal growing conditions.
- Feeding equipment—test automatic and mechanical feeders periodically to ensure that they are delivering the proper amounts of feed; check demand feeders for proper operation and adjust as necessary; inspect all feed storage areas to make sure that the feed is not contaminated by foreign substances, is not easily accessible to rodents and insects, and check for excess moisture and water leaks to prevent mold from forming.
- Solids control equipment and systems—check quiescent zones for proper function; inspect drains for clogging; and make sure that all settling basins are working properly and that the structures are safe and secure to prevent spills and accidental discharges of collected solids due to cracked or damaged basin structures.

Routinely inspect net pen systems to identify and promptly perform repairs or replacement of nets.

Some of the system components that should be considered for routine inspection at net pen facilities include:

- Nets—inspect for holes and physical damage to the nets and make sure that nets are securely attached to

floating structures; if present, maintain predator control nets and devices to ensure proper operation.

- Floating structures—inspect for physical damage that may lead to structural failure during storms or periods of icing; check all mooring lines and anchor points for proper function and physical damage.
- Feeding equipment—test automatic and mechanical feeders periodically to ensure that they are delivering the proper amounts of feed; check demand feeders for proper operation and adjust as necessary; inspect all feed storage areas to make sure that the feed is not contaminated by foreign substances, is not easily accessible to rodents and insects, and check for excess moisture and water leaks to prevent mold from forming.

An example log for documenting routine inspections and repairs is available in Appendix P.

2) Periodically conduct a systematic review of your current facility to identify any problems that would lead to environmental impacts; when considering modifications to existing facility components or operations, include a review of the type and extent of probable environmental impacts that may occur as a result of the new methods



3) Clearly mark all net pen sites in accordance with the farm's permit for fixed private aids (buoys, navigation lights, etc.) to navigation from the U.S. Coast Guard and appropriate state authorities; make sure all net pen sites continue to be clearly marked in accordance with U.S. Coast Guard marking regulations



4) When installing net pens and their associated mooring systems, give careful consideration to their potential impacts on water circulation patterns; gear deployment should seek to optimize circulation patterns and maximize water exchange through the pens, thereby improving fish health and reducing benthic impacts



5) Design, operate, and maintain all holding, transportation, and culture systems to function as designed



For flow-through systems, screens of appropriate size and strength should be installed at the intake from the source and outlet to receiving waters to prevent loss and escape of cultured species. Occasionally check screens to ensure that debris is not blocking them.

For recirculating systems, barriers of appropriate size and strength should be installed on the facility discharge and on the make-up water entry into the facility. A procedure or mechanisms should also be identified to prevent debris from plugging the barriers, thus preventing water from overflowing or bypassing the screens.

6) Avoid siting facilities in areas prone to frequent flooding



Floods that overflow flow-through and recirculating systems result in loss of cultured animals and are usually catastrophic for the farmer. Facilities adjacent to surface waters should be constructed to minimize the possibility of flood waters entering the facility.

7) *Transfer fish (stocking, grading, transfer, or harvest) in appropriate weather conditions and under constant visual supervision of at least one person; use appropriate equipment for the weather and cage designs; use shields or additional nets to prevent stray fish to escape during transfer (where necessary or appropriate)*



8) *Only obtain nets from a manufacturer or supplier whose equipment design specifications and manufacturing standards meet generally accepted standards prevalent in the aquaculture industry*



Net design and specification should be commensurate with the prevailing conditions of the site. Stress tests should be performed on all nets with more than three years of use in the marine environment when the net is pulled out and cleaned. All nets in use should be UV-protected.

9) *Only obtain net pen structures from a manufacturer or supplier whose equipment design specifications and manufacturing standards meet generally accepted standards prevalent in the aquaculture industry*



Net pen structure design, specification, and installation should be commensurate with the prevailing conditions and capable of withstanding the normal maximum weather and sea conditions.

10) *Install jump nets to prevent aquatic animals from jumping out of the primary containment net*



Jump nets should be an integral part of the primary containment net or joined to it in a fashion that prevents aquatic animal escape

between the primary net and the jump net. Jump nets should be of a height appropriate to the jumping ability and size of aquatic animals they are containing. In areas with extreme winters, cages may sink slightly due to ice loads from freezing spray. This is a temporary condition that abates as the ice melts during submergence. In areas where winter icing occurs regularly, bird nets should be exchanged for winter cover nets. These nets should be constructed of netting designed to withstand the rigors of icing and with mesh sizes appropriate to contain the aquatic animal size being reared.

11) *Secure nets to the appropriate attachment point, such that the attachment bears the strain and not the handrail of the cage*



Net weights, when used for net tensioning, should be installed in a manner to prevent chafing. A second layer of net should be added one foot above and below wear points. The use of net weights should be encouraged when strong currents or tides are present at the net pen site.

12) *Develop a preventative maintenance program for nets*



The program should have the ability to track individual nets, and schedule and document regular maintenance and testing. Nets that fail testing standards should be retired and disposed of properly. An example log for recording maintenance is available in Appendix P.

13) *Mooring system designs should be compatible with the net pen systems they secure*



Mooring systems should be installed in consultation with the net pen system manufacturer or supplier. Mooring system design, specification and installation should be commensurate with the prevailing conditions of the site and be capable of withstanding the normal maximum conditions likely to occur at a site.

14) Regularly inspect and adjust mooring systems as needed



Rigging tension should be maintained to installation standards. New components should undergo their first inspection no later than 2 years after deployment. A diver or remote camera should regularly visually inspect subsurface mooring components. Special attention should be given to connectors and rope/chain interfaces. Chafe points should be identified and subject to more frequent inspection and removal of marine growth. With the exception of rock pin anchors, mooring systems should be hauled out of the water for a visual inspection of all components at least every 6 years. When considering what inspection method to employ, net pen operators should consider the relative risks and benefits associated with the inspection method. On sites frequently exposed to severe weather or where it is difficult to set anchors, breaking out anchors for visual, above-water inspection may represent a greater risk for mooring failure than regular underwater inspections. An example log for recording maintenance is available in Appendix P.

15) Shackles used in mooring systems should be either safety shackles, wire-tied, or welded to prevent pin drop-out



16) Develop a preventative maintenance program for net pen and mooring systems



The program should monitor maintenance of individual cages, and schedule and document regular maintenance, the nature of the maintenance, date conducted, any supporting documentation for new materials used, and who conducted the maintenance. An example log for documenting routine inspections and maintenance is available in Appendix P.

17) Use bird nets (where appropriate) to cover net cages to reduce any impacts due to bird predation; bird nets should be constructed using appropriate materials and mesh sizes designed to reduce the risk of bird entanglement



Contact manufacturers and suppliers of aquaculture netting for more information.

18) Develop a Standard Operating Procedure (SOP) for all routine vessel operations



Vessel operations around a net pen site can damage nets or the structures. All vessel operators should receive appropriate training in the operation of the vessel. The SOP should minimize the risk of damaging nets and/or mooring system components with the propeller of the vessel. When mooring barges on a permanent or semi-permanent basis, local current and wind patterns should be considered. The mooring location should be selected so that in the event of a vessel breaking free of its moorings the chance of the vessel impacting a net pen system is minimized.