



S T A T E O F C O N N E C T I C U T

DEPARTMENT OF AGRICULTURE
BUREAU OF AQUACULTURE & LABORATORY



Policies and Guidance For the Permitting of Finfish Aquaculture

Introduction

The permitting of finfish aquaculture is a state, federal, and local agency collaboration with the lead agency in Connecticut being the CT Department of Agriculture, Bureau of Aquaculture (DA/BA, CT General Statute (CGS) Sec. 22-11d). Aquaculture, as defined in the CGS Sec. 22-11c, is the controlled rearing, cultivation, and harvest of aquatic plants and animals in land-based culture systems, tanks, containers, impoundments, floating or submerged nets or pens, and ponds. Federal, state, and local agencies shall have to evaluate each aquaculture venture, based on the specific aquaculture system, location, water source, effluent, and fish or plant species being cultured. Each agency has specific guidelines and requirements that may apply. Agencies that may need to evaluate aquaculture operations include CT Department of Energy and Environmental Protection (DEEP), CT Department of Consumer Protection (DCP), US Environmental Protection Agency (EPA), US Food and Drug Administration (FDA), US Fish and Wildlife, and National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries.

This document details the policies and guidelines of the DA/BA regarding finfish aquaculture. It is the responsibility of the owner or operator of the finfish aquaculture operation to apply for and maintain any necessary permits or licenses and follow all applicable health and environmental laws, regulations, and policies. Depending on the final product of the aquaculture operation, additional policy requirements may apply. Particular attention is needed for fish and fishery products whose intended purpose is human consumption and specific requirements shall apply (See Section Human Food Production).

Certificate of Aquaculture Operations

A certificate of aquaculture operation is required for each aquaculture operation. Each certificate will include the owners name or company name, the location of the operation, the dates the certificate is valid, the species and/or common name (or market name) of the fish and/or plant being grown, the number and size(s) of the rearing equipment, and the type of operation being conducted (baitfish, ornamental, food production, or stocking). The certificate

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may include additional information specific to a particular operation. The certificate will be effective from the date issued until December 31 of the same calendar year, unless otherwise noted on the certificate. The application can be denied if the information provided by the applicant is not complete, if it is determined that the facility or operation would have an adverse impact upon native and wild stock aquatic plants or animals or their natural habitats, or would endanger public health. The certificate can be suspended or revoked if it is determined that the facility or operation has an adverse impact upon native and wild stock aquatic plants or animals, or their natural habitats, or if the activity or products endanger public health.

New Certificate

A certificate for a new aquaculture operation can be obtained by completing and submitting an Application for Fish Aquaculture Production (DA/BA Form - AQ-FishProducerNew2015). After a complete application submission, the purposed operation will be evaluated prior to obtaining a certificate. An application can be obtained by requesting a copy via email, dept.agric@ct.gov or calling (203) 874-0696. Any incomplete applications will delay the issuing of any certificate.

It is recommended that first time applicants make an appointment with the Bureau of Aquaculture's Finfish Aquaculture advisor prior to completing the application.

Certificate: Renewal

The certificate must be renewed annually by completing and submitting the Application for Fish Aquaculture Production. Place a checkmark on "Renewal" under "Application Type" to indicate the application is a renewal. All renewal applications should be submitted prior to December 1st each year to allow enough time for processing the application.

Certificate: Notification of Changes

If the operation intends to make significant changes to their operations, a new certificate must be obtained prior to the changes. Significant changes can include, but are not limited to, size of the operation, operation location, water source usage, effluent discharge, and species being cultured. The Application for Fish Aquaculture Production must be completed, highlighting the changes, and submitted. A checkmark should be placed on "Addendum (change from original application)" under "Application Type". Any major changes may require a re-evaluation of the operation prior to re-issuing the certificate. If the aquaculture owner or manager are unsure if any changes in the operation require a new certificate, please contact the Dept. of Agriculture Bureau of Aquaculture.

Certificate: Discontinuing Aquaculture Operation

In the event of the closure of the aquaculture facility, the certificate should be returned and accompanied by a letter disclosing the closure of the facility to the Dept. of Agriculture Bureau of Aquaculture in Milford, CT.

Obtaining a Certificate of Aquaculture Operations

There are several key aspects that shall be addressed prior to the submission of a completed Application for Aquaculture Production. Applicants starting a new operation or facility should contact the Bureau to discuss site selection, production water source, system design, effluent discharge, and cultured species. Opening communications early in the process will allow the Bureau to make recommendations that minimize issues that can be costly and time consuming for the applicant. Early introduction of Agency and Departmental stakeholders into the process will curtail the time required for operational evaluations. Those operations that will be producing and/or processing fish and fishery products for human consumption will have additional requirements. These applicants will also need to obtain a Certificate of Aquaculture Production (See Section - Human Food Production).

Site Selection

Careful consideration should be made in the selection of the aquaculture site. Site evaluation should include sufficient water resources and water quality, waste water discharge options, reliable electrical power, and infrastructure such as roads and airports. The site should accommodate the system design and size. Applicants should consult with the DA/BA about the site selection including, but not limited to, the water source and effluent discharge options. It is recommended that the applicant contact the town of the proposed site to discuss any zoning issues, building requirements or permits, or local inland wetland commission restrictions. A detailed narrative site description shall be submitted with the application describing the site and operation.

Site history shall be investigated by the applicant to evaluate environmental chemical contamination. The US Environmental Protection Agency and the CT DEEP have site specific information including past site usage, chemical contamination, and remediation. If a site has a reasonably likely occurrence of environmental contamination, the site shall not be considered a viable option. Ground water from a contaminated site may be contaminated and shall not be used as a production water source. The site history shall be part of the site narrative that is prepared and submitted with the application.

Water Source

One of the key components of a successful aquaculture operation is the availability of production water of adequate quality for the intended use. Fresh water can be from wells, aquifers, lakes, ponds, storm water retention ponds, rivers, and stream sources. Saline production water can be from artificial salt water or marine sources. Applicants should determine if the quality of the water source meets aquaculture industry standards for the species being cultured or can be filtered and enhanced to meet industry standards. Water sources should be tested for contaminants that can cause stress or health issues and impact the final quality of the fish. The daily quantity of water (GPD) needed shall be estimated for the designed system and the source water should be evaluated to see if it meets those needs. The submitted application shall have the water source information and quantity of water being used by the system. The water source shall be included in the narrative site description. Best Management Practices for water quality, usage, and conservation should be implemented in the design and operation of the aquaculture system. Marine water sources should be filtered and treated to remove biological and physical contaminants. Marine water source inlet pipe(s) shall be evaluated to determine if CT DEEP and US Coast Guard permits are required.

Any water diversion from a water source will be evaluated. After consulting with the CT DEEP Bureau of Water Protection and Land Reuse's Inland Water Resources Division or Office of Long Island Sound Programs, a determination will be made as to the need for and type of permit, general or individual (CGS 22a 365-379 Connecticut Water Diversion Policy Act). It is recommended that the applicant enter into the process of water source evaluation early on in the site selection process. Early consultation with the CT DEEP will determine if an Inland Water Resources Division Pre-Application Guidance process or permitting application is needed, potentially reducing the processing time for water diversion and aquaculture permitting.

Those operations that will be producing and/or processing fish and fishery products for human consumption will have additional requirement (See Section - Human Food Production).

Waste Water Discharge

Waste water or effluent discharge shall be evaluated by the DA/BA and the CT DEEP for every aquaculture operation (CGS 22-11g). Some system designs, including recirculating and aquaponic systems, minimize effluent discharge but cannot eliminate the need for water changes, tank drainage for harvest, or system drainage for repairs. The CT DEEP Bureau of Waste Management and Compliance Assurance Permitting Division regulates discharges to waters of the State, including all surface waters, ground waters, and Publicly Owned Treatment Works (POTW, sewage treatment plants)(CGS 22a-430 and 22-11h). The CT DEEP will be consulted to evaluate the nature of the discharge, discharge frequency, amounts, discharge type, and treatment required. The CT DEEP issues discharge permit in three major categories, Surface Water Discharge Permit Program (administered through EPA National Pollutant

Discharge Elimination System (NPDES)), Ground Water Discharge Permit Program, and Pre-treatment Permit Program. It is recommended that the applicant enter into the process of effluent discharge evaluation as early on as the site selection process. Early consultation will determine what type of treatment and permit will be required, potentially reducing the processing time for discharge and aquaculture permitting. The applicant shall declare on the application the determined type and make-up of their effluent and estimated daily effluent amount being discharged. The applicant shall also state on the application the treatment used and type of discharge. Effluent treatment and discharge details shall be part of the narrative site description.

Biosecurity policies related to the discharge or accidental release of fish species, native or non-native, and their parasites and pathogens are discussed in the Biosecurity Section.

Solid Waste

Solid waste is an inevitable product of any enclosure based aquaculture system. Solid waste can be comprised of fish fecal waste, uneaten food, and fish remains. An evaluation of solid waste accumulation associated with the aquaculture system and a plan for disposing or utilizing such waste shall be proposed. The applicant must estimate the daily amount of solid waste being collected. The proposed method of collection, frequency of collection, and waste disposal plan shall be indicated on the application. Details describing the solid waste handling plan shall be part of the operational narrative submitted with the application (See Section - Aquaculture Operations).

Cultured Species and Importation

The species of fish or plant being cultured will be evaluated by the DA/BA and the CT DEEP for each aquaculture operation or facility. There are several environmental concerns associated with the accidental release of non-native fish or fish eggs, cultured strains of native fish, fish parasites or pathogens, and invasive plant species. These concerns require the importation of each fish species be evaluated by the CT DEEP to determine whether they can be imported or possessed with a permit. A permit must be obtained for each importation of fish and fish eggs (CT DEEP RCSA 26-55-1 "Importation, transportation or liberation of live fish or live fish eggs"). When importing fish, the CT DEEP will require three years of health reports from the facility from which the fish are purchased and/or raised. Fish species being imported from outside of the United States may require US Fish and Wildlife Service and/or NOAA National Marine Fisheries Service importation permits. It is the responsibility of the applicant, owner or manager to have any importation permits needed.

When plants are being imported for growing in aquaponic systems, the species of plant shall be evaluated by the DA/BA, the Department of Agriculture, Agriculture Experiment Station, and the CT DEEP to determine if it is on the list of banned invasive species or has the

potential to be an invasive species. The CT Agricultural Experiment Station and the CT DEEP will be consulted to assess the risk or importation status of any plant species being cultivated (CGS 22-11f-g). Applicants selling and/or shipping live aquatic plants shall obtain a nursery / dealer license from the CT Agricultural Experiment Station. Exportation and importation of live aquatic plants will need an evaluation by US Department of Agriculture Permitting Division to determine the need for a permit.

The applicant will list all species or common names (or FDA market names) of fish or plants that will be cultured at the facility on the application. The applicant shall also list all of the sizes or life stages of the fish including eggs, as well as, the name of the company from which the fish or plants are being purchased.

Aquaculture Operations

The operational details of a facility describes the purpose of the facility, design of the system, and end product. The application must declare the type of operation, end product, type of system, and the type and sizes of the components of that system such as tanks and raceways. Along with a completed application, a system design schematic shall be submitted. The schematic shall include at a minimum piping, location of tanks, water source filters or treatment, water treatment equipment, aeration systems, effluent treatment and discharge locations, settling ponds, solid waste settling and storage tanks or ponds, disinfection systems, and quarantine systems. Along with the site narrative, an operational narrative shall be included with the application package. This narrative should describe the nature of the operation, the system design, water treatment methods, solid waste removal plans, and the end product description. Include any details that are unique to your operation.

Biosecurity

Biosecurity is the protection of agricultural animals from any type of infectious agent and includes viral, bacterial, fungal, and parasitic. A biosecurity plan is a set of procedures and practices that controls or prevents the introduction of disease causing organisms. A biosecurity plan shall encompass all aspects of introduction into the aquaculture system and facility. In an aquaculture facility, biosecurity can include the exclusion of unwanted plants, fish species, invertebrates, and chemical contaminants. Biosecurity applies to all personnel (staff and management), to all visitors, and equipment.

A biosecurity plan shall be created for each site. The plan shall include information about the importation and quarantine of healthy disease-free stock, testing of the source water, sanitization plan for gear and equipment, the exclusion or sanitization of off-site equipment and vehicles, exclusion or sanitization of visitors, adequate feed storage to prevent pest and fungal growth leading to mycotoxin formation, and excluding pets and livestock from

the facility. The biosecurity plan shall also describe the methods, Best Management Practices (BMPs), Standard Operating Procedures (SOPs), and equipment used to prevent the introduction of biological organism to the facility or transportation vehicles.

Escapement Prevention Plan

Releases of fish and pathogens from an aquaculture facility can have severe consequences for ecosystems and native plants and animals. An Escapement Prevention Plan that prevents the release of non-native fish, cultured strains of fish, fish parasites and disease, and plant species into the environment shall be developed by the applicant for each facility. The plan shall identify points of escapement and describe the methods, BMPs, SOPs, and equipment used to prevent the release of any biological organisms from a facility.

Feed and Feeding

One of the principal factors impacting fish health, growth, and survival is the type and quality of the feed. Best management practices shall be determined and followed when choosing the feed, amounts of feed purchased, feed storage, feeding amounts, and feeding practices. The type, size, ingredients, and manufacturer shall be included on the application or be provided separately using manufacturers documentation. If using the manufacturer's documentation, indicate on the application and include with the application packet.

The nutritional requirements for optimal growth of the species being cultured following industry standards should be determined by the applicant. For species of fish that do not have specifically manufactured feed, the best nutritional diet should be determined and the feed that best meets those requirements should be used. The feed should be purchased from a reputable manufacturer to ensure quality and availability. Industry standard feed conversion rates should be utilized to determine type, amount, and size of the feed. The amount of feed purchased should be determined based upon the feeding rates of each species and life stage and the manufacturer's shelf life of the feed.

The storage of the feed is critical to maintaining the nutritional content, avoiding spoilage and mold formation, and excluding pests. Feed should be stored in an easily accessible closed area, up off the floor, and feed from opened bags shall be placed in a sealable plastic or rubber container. Feed shall be discarded if it is old (expired), wet, or moldy. Moldy feed can introduce mycotoxins which can impact the health of the fish and the quality of the marketable product. Feed inventory and tracking records should be kept and include lot numbers, type and size of feed, quantities, location, and expiration dates.

Best Management Practices shall be determined and followed for all feeding activities. The type and amount of feed should be calculated for each tank and allocated over time. Feeding should be done over the span of a day and not at a single feeding. Do not over feed the

fish. Over feeding can impact water quality negatively and increase stress on the fish. Feeding carefully can reduce excess feed accumulation that can impact water quality. Uneaten feed shall be removed regularly. Daily feeding records should be maintained and include time of feeding, amount fed, type and size of the feed, and feeding activity. During feeding, observations should be made and recorded to identify any potential health issues.

Final Product

The most important outcome of aquaculture production is a marketable product. Many important questions need to be answered in order to evaluate the operation. In what state, live or dead, will the product leave the facility? Is the applicant shipping live product out of the United States? Who is the direct purchaser of the product? Where is the product going? What is the intended use and consumer of the final product? Is the applicant planning to process the fish for the consumer market? Does the applicant have a sanitary facility? The applicant must disclose information regarding the end product on the submitted application. A product narrative should be submitted with the application describing the product, market, intended customers or consumers, permits obtained, shipping, processing, and packaging plans.

Live Product

Transportation, Liberation, and Exportation

The transportation, liberation (stocking), or exportation of live product must be preceded by the appropriate permits. The transportation and liberation of live fish or eggs within the State is regulated by the CT DEEP (CT DEEP RCSA 26-55-1 “Importation, transportation or liberation of live fish or live fish eggs”). Fish being stocked into CT waters will require a liberation permit. Exporting live product to other states may require permits and the applicant, owner, or operator are required to have any additional permits required by the receiving state. Exporting live fish or fish eggs outside the United States may require an inspection and permit from the US Fish and Wildlife Service. The applicant, owner or manager of the aquaculture operation should consult with the US Fish and Wildlife Service Office of Law Enforcement for guidance concerning the exporting of live product (contact by phone 703-358-1949 or email lawenforcement@fws.gov).

The transportation and handling of live fish shall be conducted using BMPs. Best Management Practices shall be documented, followed, and should include, but not limited to, the use of proper industry equipment, limited out-of-water times, water quality, proper hauling densities, aeration equipment, and a biosecurity plan.

Baitfish

Aquaculture facilities producing fish for the baitfish market shall have a CT DEEP Baitfish dealer's license. For further information, contact DEEP Inland Fisheries Division at (860) 424-3474 or write to Inland Fisheries Office, 79 Elm Street, Hartford, CT 06106 or e-mail at deep.inland.fisheries@ct.gov.

Live Aquatic Plants

Live aquatic plants, such as aquatic moss for the ornamental aquarium trade, shall be evaluated by DA/BA, CT Agricultural Experiment Station and/or US Department of Agriculture (CGS 22-11i). Plants that are on the list of CT invasive plants or that are determined to have the potential to be invasive shall not be grown in CT aquaculture facilities. The CT Invasive Plants List can be found at <http://cipwg.uconn.edu/wp-content/uploads/sites/244/2014/12/CT-Invasive-Plant-List-2014Scientific-Name.pdf>. The importation, transportation, sale, purchase, cultivation or distribution of a number of invasive plants is currently prohibited by state statute (CGS 22a-381d).

A nursery / dealer license shall be required and obtained from the CT Agricultural Experiment Station for sale of live aquatic plants in CT. The importation of seed stock from outside of the U.S may require an importation permit. Exportation of product outside the U.S. may also require an export permit. An application for both permits can be obtained from the U.S Department of Agriculture. Contact Permit Services at <https://www.aphis.usda.gov/> Telephone (301) 851-2046 or (877) 770-5990 (Toll-Free Automated System); Fax (301) 734-5786; Email: plantproducts.permits@aphis.usda.gov.

Human Food Production

Any aquaculture facility engaging in the growing of fish for human consumption shall obtain a Certificate of Aquaculture Production (CGS 22-11i (b)) by submitting a completed application (DA/BA Form - AQ-FishProducerNew2015) to the DA/BA. The information provided on the application shall indicate the species of fish being raised for human consumption, the final product, method of slaughter, the intended use and consumer of the product , and if aquaculture drugs or therapeutant are likely to be used. A narrative shall accompany the application describing the operation, final product, consumer, and plans for processing, packaging, and shipping.

The Certificate of Aquaculture Production will be effective from the date issued until December 31 of the same calendar year, unless otherwise noted on the certificate. Each certificate will include the owners name or company name, the location of the operation, the dates the certificate is valid, the species and/or common name (or market name) of the fish and/or plant being grown, and the number and size(s) of the rearing equipment. The certificate

may include information specific for a particular operation. Renewal, notification of changes, and discontinuing of aquaculture operations will follow the policies for the Certificate of Aquaculture Operations (See Section - Certificate of Aquaculture Operations).

The CT Department of Agriculture, Bureau of Aquaculture shall require the owner or operator (or a person in a supervisory role) of an aquaculture facility growing fish for human consumption to obtain a Seafood Hazard Analysis Critical Control Point (HACCP) certification from the Seafood HACCP Alliance (or equivalent as determined by the DA/BA). A facility HACCP plan shall be developed and followed for the production/growing of fish that includes critical control points for the exclusion of adulterants like chemicals and pesticides, exclusion of pets and pests, and the application of aquaculture drugs and/or therapeutants. The facility will also be required to register with the U.S. Department of Health and Human Services, Food and Drug Administration and obtain a Food Facility Registration Number (CGS 22-11i (b)). Registration information can be found at

<http://www.fda.gov/Food/GuidanceRegulation/FoodFacilityRegistration/ucm2006832.htm>.

Water used in aquaculture production, such as production tanks, shall be tested for contaminants that can accumulate in fish tissue. Water testing should include heavy metals such as lead, cadmium, mercury, and arsenic. Water being used in the processing of fish and fishery products must meet certain criteria determined by the FDA 21 CFR Part 110. All food process water must be safe and suitable for its intended use (21 CFR Part 110.37 (a)). The water supply shall be sufficient for the operations intended and shall be derived from an adequate source. Water being used for washing, rinsing, and conveying food shall be safe and of adequate sanitary quality (21 CFR Part 110.80 (a) (1)).

Fish Processing and Fishery Products

The processing of fish and fishery products requires sanitary facilities and handling practices. An aquaculture fish production facility shall be considered a processor of fish and fishery products when the facility meets the criteria defined by the Code of Federal Regulations (CFR) Title 21 – 123 Fish and Fishery Products. A production facility that deheads, eviscerates (guts), and packages fish and fishery products shall be considered a processor. The processing facility shall meet all processing standards and inspection procedures for seafood processing facilities, including but not limited to, compliance with the provisions of 21 CFR 123 – Fish and Fishery Products and the U.S. FDA’s Food Code (CGS 22-11i (b)). If the processing is done at the aquaculture facility, the aquaculture facility will be required to meet FDA 21 CFR 123 provisions. These provisions include the development of a processing HACCP plan that follows the guidance for species, product, and hazards in the FDA’s Fish and Fishery Products Hazards and Controls Guidance Fourth Edition April 2011 (<http://www.fda.gov/FoodGuidances>). The facility shall meet sanitation items as part of the facility’s Sanitation Standard Operating Procedures (SSOPs). The CT Department of Consumer Protection (CTDCP) shall conduct an inspection of the

processing facility (CGS 22-11i (b)) and HACCP plan review prior to the facility receiving a Certificate of Aquaculture Production and the facility shall comply with all applicable regulations and policies of the CTDCP including product transportation.

Aquaculture Drugs and Therapeutant

The use the aquaculture drugs and therapeutants may be necessary to maintain the health of the fish being cultured. The use of such drugs and therapeutants shall be limited to the current list of approved drugs maintained by the FDA's Center for Veterinary Medicine (FDACVM, <http://www.fda.gov/AnimalVeterinary>). A licensed veterinarian shall be consulted to prescribe drugs that require a prescription or for extra- label uses currently allowed by the FDA. Extra-label use is the actual or intended use of an FDA-approved drug in a manner that is not in accordance with the approved label directions. The FDA may allow extra-label use of approved drugs if the use is by, or on the order of, a licensed veterinarian when a valid veterinarian-client-patient relationship exists. Drugs that are allowed under the FDACVM Investigational New Animal Drug (INAD) program shall be used only by participants of the INAD program with written authorization for the species and life stage which it is intended. Aquaculture operators shall reference the FDA and The American Fisheries Society Fish Culture Section "Guide to Using Drugs, Biologics, and Other Chemicals in Aquaculture" when determining the use of an approved drug or therapeutant. Drugs and therapeutants shall be used in accordance with the labeling and manufacturer documentation. The dosages and application shall follow the manufacturer labeling and guidelines.

The aquaculture operation shall determine and disclose any aquaculture drugs being used in the operation on the application form. Department of Agriculture, Bureau of Aquaculture shall also be notified of any use of aquaculture drugs not disclosed on the application. The notification shall include the drug being administered, the name of the veterinarian prescribing (if the drug requires veterinarian approval), the disease or pathogen being treated, the species of fish, number of fish treated, and withdrawal times (if applicable).

When fish are produced for human consumption or fish being stocked that could be caught and consumed, careful attention should be made to application dates, dosage, and withdrawal times. Certain drugs require metabolic purging of live fish to render the fish safe for consumption. Application records shall be maintained, and subject for review, for the application time, dosage, tank or lot numbers, and withdrawal times. Enclosures, such as tanks, that have been treated using aquaculture drugs shall be clearly labeled on or adjacent to the enclosure that states drug used, dosage, precautions, and the date and time the fish can be harvested.

Best Management Practices

Best Management Practices are methods or techniques found to be the most effective and practical means in achieving a healthy quality fish while minimizing environmental impacts, reducing time and costs, and maximizing water quality. Each operation should develop a Best Management Practices (BMP) document for their facility following industry standards. The Bureau of Aquaculture has BMP guidelines and templates to aid in the development of these document. The U.S Environmental Protection Agency (EPA) has BMP templates in EPA-821-B-05-001 publication Compliance Guide for the Concentrated Animal Production Point Source Category. The EPA BMP template is located in Appendix E1 and E2 Plan Template and Example BMP Plan, respectively. A copy of this document can be obtained at http://water.epa.gov/scitech/wastetech/guide/aquaculture/upload/2006_05_03_guide_aquaculture_guidance_full-final.pdf. Best Management Practices shall be developed for the following areas of aquaculture operation:

- Fish health and diseases
- Water quality
- Transportation and handling
- Feed and feeding practices
- Biosecurity
- Escapement prevention.

Standard Operating Procedures

Standard Operating Procedures (SOPs) are methods or techniques that will be followed while performing a given task in an aquaculture facility. Several aspects of aquaculture facility operation require consistent and standardized procedures. Standard Operating Procedures shall be developed for the following aquaculture operation areas:

- Water quality management and monitoring
- Fish health management and monitoring including quarantine
- Cleaning and disinfection of enclosures, equipment, and vehicles as part of the biosecurity plan
- Escapement prevention
- Feed and feeding
- Solid waste removal
- Drug and therapeutant usage

Emergency response SOPs should be developed to handle power outages, equipment failures, large fish mortalities, and accidental fish escapement. Examples of SOPs can be

obtained at <https://store.extension.iastate.edu/Product/Standard-Operating-Procedures-Water-Quality-Management-for-Recirculating-Aquaculture>.

Record Keeping

Accurate and consistent record keeping for monitoring and other activities can help detect problems or issues at an early stage. Records should be retained by the operator and be made available for review by the regulatory agencies. Aquaculture activities that should be recorded include:

- Fish inventory, location, and movement records
- Fish health monitoring
- Feeding practices monitoring
- Feed inventory
- Water quality monitoring
- Aquaculture drugs and therapeutant application
- Equipment maintenance.

Example monitoring sheets can be obtained from the DA/Ba or at <https://store.extension.iastate.edu/Product/Standard-Operating-Procedures-Water-Quality-Management-for-Recirculating-Aquaculture>.

Employee Training

An important aspect of successful aquaculture facility operation is having competent, well-trained, and responsible personnel. Personnel should be adequately trained in key aspects of the operation of the facility. Training should be provided in emergency procedures, record keeping, feeding, biosecurity, water quality monitoring, fish health monitoring, cleaning and disinfecting, and solid waste removal and disposal.