Maine Aquaculture Occupational Standards for Land-Based RAS

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Standards produced by:

MAINE AQUACULTURE ASSOCIATION

In partnership with:

Gulf of Maine Research Institute
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INTRODUCTION

The Maine Aquaculture Occupational Standards specify the current workforce skills and training needs of Maine's aquaculture industry. They are intended to: (1) give education and training providers a clear and comprehensive understanding of the specific technical skills and knowledge that are critical for the most common careers in each sector; (2) standardize workforce training in the state; and (3) establish an industry-led process to align training with workforce needs as the industry and workforce needs evolve. They are based on direct industry input through extensive one-on-one interviews with commercial businesses across Maine.

This document, produced by the Maine Aquaculture Association (MAA), is specific to the workforce needs of land-based recirculating aquaculture systems (RAS). Occupational standards for marine shellfish and sea vegetables, marine finfish farms, and land-based shellfish hatcheries are available at https://maineaqua.org/education/.

The project team will update the occupational standards (OS) regularly to remain current with the ever-changing workforce needs of Maine's rapidly evolving aquaculture sector.

BACKGROUND

In 2020, The Gulf of Maine Research Institute (GMRI) and the Maine Aquaculture Association (MAA), in partnership with Educate Maine, and sponsored by FocusMaine, published the Maine Aquaculture Workforce Development Strategy – an in-depth analysis informed by direct input from Maine's aquaculture sector that documents the current and future labor needs of Maine's growing and developing aquaculture industry, and charts a course for Maine to establish a comprehensive workforce training system.

Occupational Standards to inform and standardize aquaculture workforce training are a pillar of the recommendations from the Maine Aquaculture Workforce Development Strategy.

To implement this recommendation, the Maine Aquaculture Association (MAA), which has over a 25-year track record of developing operating standards and best management practices (BMPs) for the Maine aquaculture sector, has worked with GMRI and Educate Maine to develop occupational standards that represent the needs of the sector, and are consistent with state educational standards.

MAA and GMRI built on top of the findings of the Maine Aquaculture Workforce Development Strategy by conducting a new series of interviews with a variety of commercial aquaculture producers and educational institutions to form the standards. The draft standards were then shared with the Maine aquaculture sector and educational community for final review and edits.

The occupational standards are segmented into several sections based on the sector, type of work, and job title, as outlined in the table of contents.

For questions, please contact Christian Brayden, Project Manager at the Maine Aquaculture Association, at christian@maineaqua.org.

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Land-based Standards

RAS HATCHERY – AQUACULTURE TECHNICIAN

This standard is intended to capture the core duties and skills involved in the operation of a RAS hatchery at the entry-level, or one step above entry-level, position, aquaculture technician. There are sometimes multiple levels within the technician role, including a junior or senior technician. The aquaculture technician will be responsible for the daily monitoring of the recirculating aquaculture system, along with performing health checks on and feeding the fish in their early stages of life. Much of the work involves following a checklist and reporting issues to the appropriate manager. Other duties may include vaccinating fish, collecting water quality samples, and cleaning tanks.

We broke standards into four segments with subsections: hatchery (aquaculture technician, manager), production (aquaculture technician, manager), quality control and assurance (technician, lab coordinator, and manager), and systems engineer (technician, director).

DUTIES

FISH CULTURE

Required:

1. Fish health and welfare
    a. Observe, record, and report fish behavior changes
    b. Record and remove mortalities from tanks
    c. Assist with vaccinations
    d. Adhere to farm biosecurity plan
2. Fish handling
    a. Aid in moving fish e.g. transfers between tanks, etc.
    b. Grade and sort fish
3. Broodstock and egg incubation
    a. Aid in spawning adults, perhaps including use of spawning aids e.g. implants, photo manipulation
    b. Egg incubation
4. Feed management
    a. Provide appropriate levels of feed, and at the correct time
    b. Record amount fed
    c. Manage and record feed levels
5. Water quality management
    a. Follow protocol for RAS water treatment processes: biofiltration, solid removal, oxygenation, pH control, temperature control and biosecurity.
    b. Monitor and record oxygen levels
    c. Collect water quality samples
    d. Note water levels and flow rates and report any variations from expected levels to manager
    e. Basic water quality analysis
6. RAS inspection
    a. Perform daily, routine checks and systems walkthrough, following protocols on checklist, to ensure proper operation of RAS and its components

   b. Daily operating routine – follow schedule of tasks that must be completed and in the specified order
7. Cleaning and biosecurity
   a. Clean floors and tanks
   b. Ensure general workplace and area surrounding equipment is clean and sanitary
   c. Implement and adhere to the farm biosecurity plan and protocols; report any deviations to management
8. Follow safety protocols
   a. Follow all standard operating procedures (SOPs) and safety protocol on system operation, including specific cautions on water and electricity, noxious gasses in confined spaces, and chemicals
   b. Identify safety hazards based on the safety manual
   c. Report any safety hazards to management
9. Data entry and interface
   a. Observe, record, and report on fish weight, fish condition, inventory, mortality, behavior, and overall health
   b. Understand and monitor control system software

Potential:
1. Egg care e.g. enumeration, hardening, disinfection, incubation, monitor survival, etc.

KNOWLEDGE AND UNDERSTANDING

FINFISH CULTURE

Required:
1. How to understand and follow SOPs
   a. Use proper safety equipment and precautions
   b. Read a pressure gauge
   c. Read a flow meter
   d. Monitor control station interface (temperature, salinity, pH, flow, etc.)
   e. Be proficient in system management software
2. Basic understanding of the science involved in aquaculture, feed, fish health, water quality, and water chemistry
3. How to perform various activities linked to different life stages
4. Metric system, conversions, volume, dilutions, and flow rates
5. The characteristics and behavior of healthy fish, including warning signs of disease and illness
6. Level of care to be taken with fish in different life stages e.g. egg vs fry vs smolt
7. How care and handling of fish affects their mortality rate, stress levels, and quality

FOOD SAFETY AND REGULATORY COMPLIANCE

Required:
1. The relevant health and safety requirements associated with handling and transporting fish for human consumption
2. Basic understanding of all types of regulations (e.g. DEP) and when to report concerns or issues to manager

ESSENTIAL EMPLOYMENT SKILLS

Required:

1. Heavy work. More than 30 pounds of force/lifting
2. Ability to stand and be physically active for long periods of time.
3. Ability to withstand hot, cold, and humid temperatures and work in loud environments as well as lift heavy machinery and operate it
4. Timeliness and consistency – understanding the importance of showing up for work when scheduled, and on time, and how that can affect the time-sensitive processes of raising fish
5. How to listen to instructions and carry out tasks as directed, including speaking up if instructions are not understood
6. How to effectively communicate issues and concerns to manager, including the admission of mistakes
7. How to professionally engage with others in the community – be a good neighbor
8. How to work independently, without constantly being told what to do
9. How to work well as part of a team, previous crew-based work is helpful
10. Attention to detail
11. Problem solving – thinking on your feet, and thinking out of the box, sometimes under pressure
12. Follow-thru – farming live organisms require some jobs to be finished regardless of scheduled work time.
13. Emergency response – how to properly react in high stress situations
14. Recognize when you do not know the answer to a problem or situation and be willing to ask questions

Suggested:

1. How to maintain records via hand-written diagrams/charts or computer spreadsheets, and keep a time log
2. Basic math and writing skills, applied in an aquaculture context e.g. fish per tank

RAS HATCHERY - MANAGER

This occupational standard builds on top of the duties, knowledge, and understanding associated with the occupational standard for an RAS hatchery aquaculture technician. It is expected that a hatchery manager will possess the mastery of all expectations of a hatchery aquaculture technician, including the ability to teach and monitor these duties, the knowledge, and the understanding. A hatchery manager is also expected to communicate with the engineer production, and quality control arms of the operation.

DUTIES

FISH CULTURE MANAGEMENT

Required:

1. Fish health and welfare
    a. Monitor and evaluate technicians' logs on general fish health, growth, and inventory
    b. Make evidence-based decisions when necessary
    c. Analyze fish growth and mortality rates to meet production goals
    d. Interact with veterinarians to maintain good health management and biosecurity practices
    e. Train and monitor technicians in fish husbandry, welfare, and biosecurity
    f. Track maintenance, repairs, safety issues, and other issues to be resolved, and report to the systems engineer
2. Fish feeding
    a. Manage and analyze feeding, application of treatments, and quantification of growth and survival
3. Fish handling and care
    a. Use and demonstrate the safe use of equipment and tools, including vaccination machines, fish pumps, and fish graders
    b. Lead technicians in the weighing and sorting of fish
    c. Lead technicians in fish vaccination
    d. Spawn fish, including potential use of spawning aids e.g. implants, photo manipulation
    e. Direct team in proper transfer of fish
4. Water quality and cleanliness
    a. Make decisions based on water quality parameters
    b. Follow biosecurity protocol and maintain a clean, sanitary environment, including personal hygiene
    c. Work with veterinarian to create a sound program for water quality monitoring.
5. Fish culture improvements
    a. Track new science and technology and integrate it into operations
    b. Identify areas to be improved and efficiencies that can be attained

Potential:

1. Respond to the 24hr life-support monitoring program, and live nearby the facility
2. Manage or work with live feed team

OPERATIONS MANAGEMENT

Required:

1. Operations planning
    a. Create or update SOPs and checklists for technicians
    b. Manage multiple aspects and timelines of hatchery production, including but not limited to: broodstock collection, holding and spawning, phytoplankton/live food production and feeding, and larval and juvenile fish production
    c. Project fish inventory, feeding, growth, and mortality, and share with systems engineer or veterinarian when necessary
    d. Coordinate with veterinarian for preventative care and check-ins, and contact when needed for acute issues
    e. Create and distribute workplans for aquaculture technicians, ensuring that timelines and production levels align with those from the production, grow-out team
    f. Manage supply contracts
    g. Interact with the safety officer to implement a sound employee safety program
    h. Coordinate schedules with production
    i. Communicate and coordinate with engineering
    j. Conduct hatchery technician training in animal husbandry and biosecurity
2. Operations tracking and evaluation
    a. Track fish inventory, feeding, growth, and mortality, and share with grow out production manager, systems engineer, or veterinarian when necessary
    b. Ensure that mortality and production levels remain consistent with the plan from the production team
    c. Manage the hatchery budget
    d. Monitor key performance indicators e.g. accident and loss rate, marginal cost, production cost per stage, food conversion ratio, operating expense, cumulative mortality, efficiency (kg/smolt, ova eye/smolt)

TEAM MANAGEMENT

Required:

1. Create and distribute daily work plans
2. Train workers how to do each task safely and effectively
3. Hiring, scheduling, supervising, and evaluating of employees
4. Manage teams of workers with varying levels of RAS-based knowledge to implement plans to ensure safe, efficient completion of a series of tasks
5. Resolve conflicts between workers, and effectively communicate up and down the chain of command and between departments (production, engineering, processing, etc.)
6. Task delegation, including identifying efficiencies
7. Ensure compliance with all company protocols and standard operating procedure (SOP)
8. Monitor and ensure the safety of all site workers at all times
9. Encourage technicians to report any mistakes or issues with product or equipment, and either resolve the issue or contact the correct department
10. Problem solving, troubleshooting, and finding solutions, and communicating them
11. Set a good example by behaving professionally
12. Provide a continuous improvement mindset
13. Report notable performance, reliability, and leadership potential of employees

FOOD SAFETY & REGULATORY COMPLIANCE

Required:
1. Ensure compliance with HACCP and fulfill reporting requirements
2. Ensure compliance with OSHA and fulfill reporting requirements
3. Ensure compliance with DEP discharge rules and regulations and fulfill reporting requirements

Potential:
1. Procure sustainability certifications

KNOWLEDGE AND UNDERSTANDING

FISH CULTURE MANAGEMENT

Required:
1. Advanced understanding of the science of aquaculture, feed, and spawning
2. How to lead a team to spawn, stock, vaccinate, and transfer
3. How to incubate eggs and maintain broodstock
4. How to ensure healthy growth and low mortality rates
5. Fish life cycle, feeding levels, nutrition, and growth rates
6. Identifying areas to be improved and efficiencies that can be attained
7. Knowledge of how to handle fish at different early life stages, and how to illustrate it to others
8. Understanding of and experience in spawning and early rearing
9. How to produce phytoplankton/live feeds e.g. artemia
10. Fish feed performance

Suggested:
1. Knowledge of spawning and early rearing methods of multiples species

OPERATIONS MANAGEMENT

Required:
1. Project management, including developing project strategy and simultaneously managing several large projects across multiple realms of the business
2. Basic production planning including growth projections, and stocking strategies.
3. How to work in sync with other departments of the business e.g. aligning hatchery timelines and production levels with grow-out planning to ensure they fit in with projected sales numbers and timelines
4. Best management practices for production and operations management, including system design protocols and understanding logistics
5. Fluency in word documents, email, spreadsheets (e.g. Excel), perhaps including financial management (e.g. quickbooks)
6. Basic budgeting
7. Good recordkeeping practices

Suggested:
1. Detailed understanding of aquaculture, biology, and livestock/food production

TEAM MANAGEMENT

Required:

1. Basic human resources course
2. Ability to manage teams of 20 people
3. Team building, including creating an environment in which crew members and chiefs are comfortable to admit mistakes and report issues
4. Talent retention best practices
5. Conflict resolution and problem solving
6. Company culture, including how to train team members to be a good co-workers and representatives in the community
7. Excellent communication skills
8. Ability to work across hierarchy, from tech to CEO

FOOD SAFETY AND REGULATORY

Required:

1. Ensure compliance with egg importation requirements and quarantine release, working with DMR and complete paperwork
2. DEP compliance
3. HACCP certification
4. OSHA certification
5. First aid certified
6. Confined spaces training

RAS PRODUCTION TEAM – AQUACULTURE TECHNICIAN

This standard is intended to capture the core duties and skills involved in the operation of RAS production at the entry-level, or one step above entry-level, position, aquaculture technician. In some businesses, there may be an aquaculture technician and then a senior aquaculture technician at the production level. The production aquaculture technician will be responsible for the daily monitoring and care of the fish from post-hatchery to market size. This will include following a checklist, abiding by SOPs, partaking in daily operating routines, performing health checks on the fish, d feeding the fish, and recording data for managers.

DUTIES

FISH CULTURE

Required:

1. Fish health and welfare
    a. Follow daily checklist of fish monitoring
    b. Observe, record, and report fish behavior and appearance changes
    c. Weight sampling
    d. Adhere to farm biosecurity plan
    e. Health sampling and disease screening
    f. Record and remove mortalities from tanks
    g. Seining, grading, and moving
    h. Harvesting
    i. Monitoring of fish welfare and vaccination equipment during vaccination procedures
2. Fish handling and care
    a. Assist with vaccinations
    b. Aid in moving fish e.g. transfers between tanks, etc.
    c. Grade and sort fish
    d. Aid in fish culling/euthanasia
    e. Aid in fish harvest
3. Feed management
    a. Provide appropriate levels of feed, and at the correct time
    b. Record amount fed
    c. Manage and record feed levels
4. Water quality management
    a. Follow protocol for RAS water treatment processes: biofiltration, solid removal, oxygenation, pH control, temperature control and biosecurity.
    b. Monitor and record oxygen levels
    c. Collect water quality samples
    d. Note water levels and flow rates and report any variations from expected levels to manager
    e. Basic water quality analysis
5. RAS inspection
    a. Perform daily, routine checks and systems walkthrough, following protocols on checklist, to ensure proper operation of RAS and its components
    b. Daily operating routine – follow schedule of tasks that must be completed and in the specified order
6. Cleaning and biosecurity
    a. Clean floors and tanks

   b. Ensure general workplace and area surrounding equipment is clean and sanitary, following SOP
   c. Implement and adhere to the farm biosecurity plan and protocols
   d. Report any deviations from biosecurity plans and protocols to management
7. Follow safety protocols
   a. Follow all standard operating procedures (SOPs) and safety protocol on system operation, including specific cautions on water and electricity, noxious gasses in confined spaces, and chemicals
   b. Identify safety hazards based on the safety manual
   c. Report any safety hazards to management
8. Data entry and interface
   a. Observe, record, and report on fish weight, fish condition, inventory, mortality, behavior, and overall health
   b. Understand and monitor control system software
   c. Maintain appropriate housekeeping and sanitation procedures, ensuring proper protocol and required

Potential:
1. Assist with fish sampling and research projects as needed
2. Load and unload fish at processing plant
3. Respond to alarms
4. Operate fish stunning, killing, and gutting processing system

KNOWLEDGE AND UNDERSTANDING

FISH CULTURE

Required:
1. How to understand and follow SOPs
   a. Use proper safety equipment and precautions
   b. Read a pressure gauge
   c. Read a flow meter
   d. Monitor control station interface (temperature, salinity, pH, flow, etc.)
   e. Be proficient in aquaculture management software
2. Basic understanding of the science involved in aquaculture, feed, and fish health
3. How to perform various activities linked to different life stages
4. Metric system, conversions, volume, dilutions, and flow rates
5. How to perform various activities linked to different life stages
6. Metric system, conversions, volume, dilutions, and flow rates
7. The characteristics and behavior of healthy fish, including warning signs of disease and illness
8. Level of care to be taken with fish in different life stages e.g. egg vs fry vs smolt
9. How care and handling of fish affects their mortality rate, stress levels, and quality

Suggested:
1. Experience from aquaculture, fish handling, or net fishing

FOOD SAFETY AND REGULATORY COMPLIANCE

Required:

1. The relevant health and safety requirements associated with handling and transporting fish for human consumption
2. Basic understanding of all types of regulations (e.g. DEP) and when to report concerns or issues to manager

ESSENTIAL EMPLOYMENT SKILLS

Required:

1. Heavy work. More than 30 pounds of force/lifting
2. Ability to stand and be physically active for long periods of time.
3. Ability to withstand hot, cold, and humid temperatures and work in loud environments as well as lift heavy machinery and operate it
4. Timeliness and consistency – understanding the importance of showing up for work when scheduled, and on time, and how that can affect the time-sensitive processes of aquaculture
5. How to listen to instructions and carry out tasks as directed, including speaking up if instructions are not understood
6. How to effectively communicate issues and concerns to manager, including the admission of mistakes
7. How to work well as part of a team, previous crew-based work is helpful
8. Attention to detail
9. Problem solving – thinking on your feet, and thinking out of the box, sometimes under pressure
10. Follow-thru – farming live organisms require some jobs to be finished regardless of scheduled work time.
11. Emergency response – how to properly react in high stress situations
12. Recognize when you do not know the answer to a problem or situation, and be willing to ask questions

Suggested:

1. How to maintain records via hand-written diagrams/charts or computer spreadsheets, and keep a time log
2. Basic math and writing skills, applied in a aquaculture context e.g. fish per tank

RAS PRODUCTION TEAM - MANAGER

This occupational standard builds on top of the duties, knowledge, and understanding associated with the occupational standard for an RAS production aquaculture technician. It is expected that a manager will possess mastery of all expectations of a production aquaculture technician, including the ability to explain, train, and monitor those duties, the knowledge, and the understanding. The manager must be able to manage multiple teams and ensure the proper organization teams and work in the operations of the business to bring fish from post-hatchery to market size.

DUTIES

FISH CULTURE MANAGEMENT

Required:

1. Fish health and welfare
    a. Evaluate logs on general fish health, growth, and inventory and take decisive actions when necessary
    b. Track maintenance, repairs, safety issues, and other issues to be resolved, and report to the systems engineer
    c. Interact with veterinarians to maintain good health management and biosecurity practices
    d. Analyze fish growth and mortality rates to meet production goals
    e. Manage storage and inventory of all chemical and pharmaceuticals on site
    f. Train and monitor technicians in fish welfare and biosecurity
2. Feeding
    a. Monitor and evaluate logs on fish feeding levels and feed conversions
    b. Manage feed and feed storage, including projections and inventory
3. Fish handling
    a. Use and demonstrate the safe use of equipment and tools, including vaccination machines, fish pumps, fish graders
    b. Lead technicians in the weighing and sorting of fish
    c. Lead technicians in fish vaccination or other application of treatments
    d. Direct team in proper transfer of fish
    e. Implement and teach proper culling/euthanasia techniques, following SOPs
    f. Direct purging of fish
    g. Lead harvest of fish
4. Water quality and cleanliness
    a. Make decisions based on water quality parameters
    b. Create or update biosecurity protocol and maintain a clean, sanitary environment, including personal hygiene
    c. Work with veterinarian to implement a water quality monitoring program
5. Fish culture improvements
    a. Track new science and technology and integrate it into operations
    b. Identify areas to be improved and efficiencies that can be attained

Potential:

1. Respond to the 24hr life-support monitoring program, and live nearby the facility
2. Train and lead operation of stunning, killing, and gutting processing system

OPERATIONS MANAGEMENT

Required:

1. Operations planning
    a. Manage multiple aspects and timelines of fish production, including but not limited to: transfer from hatchery, vaccination and treatment application, harvest date, and production goals
    b. Communicate and plan with sales, distribution, and processing managers
    c. Create workplans for aquaculture technicians, ensuring that timelines and production levels align with those from the hatchery and processing teams
    d. Create biosecurity, disease, and pest management protocols
    e. Coordinate preventative care and check-ins with veterinarian, including contacting the veterinarian when acute issues arise
    f. Coordinate schedules with hatchery
    g. Contact engineering department when necessary
    h. Manage supply contracts and multiple vendors e.g. feed suppliers
    i. Conduct hatchery technician training in animal welfare and biosecurity
2. Operations evaluation
    a. Ensure that mortality and production levels remain consistent with the plan from the production team
    b. Track fish inventory, feed, feeding, growth, and mortality, and share with systems engineer or veterinarian when necessary
    c. Manage the grow out budget
    d. Monitor key performance indicators e.g. food conversion ratio, opex, marginal cost, cumulative growth, harvest weight

TEAM MANAGEMENT

Required:

1. Lead teams of up to 20 employees
2. Train workers how to safely and effectively complete each duty
3. Create and distribute a daily workplan for technicians
4. Organize efficient use of several crews of teams, and communicate decisions and protocols up and down the chain of command, and across departments
5. Hiring, training, scheduling, supervising, and evaluation of employees
6. Interact with the safety officer to implement a sound employee safety program.
7. Manage teams of workers to implement plans to ensure safe, efficient completion of a series of tasks
8. Resolve conflicts between workers, and effectively communicate up and down the chain of command, including the use of radios
9. Task delegation, including identifying efficiencies
10. Ensure compliance with all company protocols, and SOP
11. Monitor and ensure the safety of all site workers at all times.
12. Encourage technicians to report any mistakes or issues with product or gear, and then report these issues to the manager
13. Problem solving, troubleshooting, and finding solutions, and communicating them
14. Report notable performance, reliability, and leadership potential of employees to company manager
15. Set a good example by behaving professionally
16. Provide a continuous improvement mindset

FOOD SAFETY AND REGULATORY COMPLIANCE

Required:
1. Ensure compliance with HACCP and complete reporting requirements
2. Ensure compliance with OSHA and complete reporting requirements
3. Ensure compliance with DEP discharge rules and regulations and complete reporting requirements

Potential:
1. Procure sustainability certifications

KNOWLEDGE AND UNDERSTANDING

FISH CULTURE MANAGEMENT

Required:
1. Detailed understanding of science involved in aquaculture, feed, fish nutrition, and fish health
2. Detailed understanding of raising fish to prime size and composition according to processing capabilities and consumer preferences
3. How to raise fish during multiple stages of life
4. Knowledge of aquaculture and fish handling across life stages of fish
5. How to detect issues with fish both on paper and via visual observation
6. How to identify areas for improvement
7. How to illustrate proper techniques for culling/euthanasia, vaccination, and harvest
8. Knowledge of potential diseases and biosecurity risks and how to minimize these risks
9. Fish welfare

Suggested:
1. Understanding of RAS for other species
2. Stay up to date on sector research, including opportunities for R&D

OPERATIONS MANAGEMENT

Required:
1. Project management, including developing project strategy and simultaneously managing several large projects across multiple realms of the business
2. Basic production planning including growth projections, and stocking and harvesting strategies.
3. How to work in sync with other departments of the business e.g. aligning hatchery timelines and production levels with grow-out planning to ensure they fit in with projected sales numbers and timelines
4. Best management practices for production and operations management, including system design protocols and understanding logistics
5. Fluency in word documents, email, spreadsheets (e.g. Excel), perhaps including financial management (e.g. quickbooks)
6. Basic budgeting
7. Good recordkeeping practices

Suggested:
1. Detailed understanding of aquaculture, biology, and production

TEAM MANAGEMENT

Required:

1. How to manage teams of 20 size
2. Basic human resources course
3. Team building, including creating an environment in which crew members and chiefs are comfortable to admit mistakes and report issues
4. Talent recruitment and retention best practices
5. Conflict resolution and problem solving
6. Company culture, including how to train team members to be a good co-workers and representatives in the community

FOOD SAFETY AND REGULATORY

Required:

1. HACCP and OSHA certification
2. DEP regulatory compliance
3. First aid certified
4. Confined spaces training

QUALITY CONTROL – TECHNICIAN

This standard is intended to capture the core duties and skills involved in the quality control department at the technician level. The quality control technician will be responsible for collecting or receiving samples, organizing samples, and performing basic lab work – recording the results to be reported up the chain of command.

DUTIES

LAB WORK

Required:

1. Follow SOPs and daily checklists to ensure proper operation of lab equipment and samples
2. Collect or receive and organize samples
3. Record data
4. Use lab equipment e.g. microscope, instrument for quality testing below
5. Ensure that the lab remains a clean, organized, and safe working environment
6. Perform lab tests and analysis concerning
    a. Fish health
    b. Feed quality
    c. Product quality
    d. Water quality

KNOWLEDGE AND UNDERSTANDING

LAB WORK

Required:

1. Basic understanding of working in a lab
2. Basic understanding of fish health and feed quality
3. Water and environmental chemistry
4. How to follow SOPs and safety protocols for lab work
5. Metric system, conversions, volume, dilutions, and flow rates
6. Pipetting, sample preparations, microscopy

ESSENTIAL EMPLOYMENT SKILLS

Required:

1. Heavy work. More than 30 pounds of force/lifting
2. Ability to stand and be physically active for long periods of time.
3. Ability to withstand hot, cold, and humid temperatures and work in loud environments as well as lift heavy machinery and operate it
4. Timeliness and consistency – understanding the importance of showing up for work when scheduled, and on time, and how that can affect the time-sensitive processes of aquaculture
5. How to listen to instructions and carry out tasks as directed, including speaking up if instructions are not understood

6. How to effectively communicate issues and concerns to manager, including the admission of mistakes
7. How to professionally engage with others in the community – be a good neighbor
8. How to work independently, without constantly being told what to do
9. How to work well as part of a team, previous crew-based work is helpful
10. Attention to detail
11. Problem solving – thinking on your feet, and thinking out of the box, sometimes under pressure
12. Follow-thru – farming live organisms require some jobs to be finished regardless of scheduled work time.
13. Emergency response – how to properly react in high stress situations
14. Recognize when you do not know the answer to a problem or situation and be willing to ask questions

Suggested:

1. How to maintain records via hand-written diagrams/charts or computer spreadsheets, and keep a time log
2. Basic math and writing skills, applied in an aquaculture context e.g. parts per million

QUALITY CONTROL – MANAGER

This standard is intended to capture the core duties and skills involved in the quality control department at the manager level. This standard is cumulative, and it is expected that the manager will have a mastery of all duties, knowledge, and understanding required at the technician and lab coordinator levels. The manager will coordinate between multiple labs and with other departments, using lab results to make evidence-based decisions. The manager will also ensure adequate supplies and services to complete lab work in the appropriate timeframe and budget. The lab manager will receive samples, ensure proper analysis, and share results with the appropriate team.

DUTIES

LAB WORK

Required:

1. Monitor and evaluate daily checklist reports from technicians, and make evidence-based decisions when necessary
2. Demonstrate and train workers on proper use of lab equipment and handling of samples
3. Lay out methods and SOPs for data recording
4. Aid technicians when help is needed
5. Coordinates all sample submissions, analysis, and reporting
6. Oversee proper use of lab equipment and handling of samples
7. Write SOPs, including periodic review of them
8. Set up new equipment, maintain calibration of equipment
9. Analyze lab tests and make evidence-based decisions
10. Prepare samples for external labs
11. Monitor lab supplies and equipment, ordering more when necessary

OPERATIONS MANAGEMENT

Required:

1. Plan schedules and timelines for regular and acute testing needs
2. Inventory management of lab supplies, including managing vendors
3. Work across departments within the company
4. Work with other labs within and outside of company
5. Ensure all labs work together
6. Track key performance indicators
7. Budget development and management
8. Train technicians in lab safety, chemical safety, and proper technique
9. Identify areas of lab where efficiency can be improved, or new technology integrated
10. Maintain results reporting software and database

TEAM MANAGEMENT

Required:

1. Manage a team of up to six technicians

2. Train all workers how to safely and effectively complete all duties
3. Ensure that team members are properly trained in safety and SOPs
4. Lead hiring and evaluation of worker performance

KNOWLEDGE AND UNDERSTANDING

LAB WORK

Required:

1. Advanced understanding of lab science: fish health, water quality, and feed quality
2. Advanced understanding of managing multiple types of labs
3. How to analyze results and reports to make critical decisions
4. Advanced understanding of fish necropsy, microscopy, and gross examination
5. Advanced understanding of lab safety and chemical use

OPERATIONS MANAGEMENT

Required:

1. Basic understanding of working with multiple departments on a timeline
2. Manage communication with colleagues from different departments
3. Basic budgeting
4. How to organize schedules and sampling procedures
5. Attention to detail

TEAM MANAGEMENT

Required:

1. Basic human resources understanding
2. Leadership qualities, including how to effectively delegate and communicate effectively
3. Strong time management
4. How to resolve conflict between workers

SYSTEMS OPERATION AND MAINTENANCE - TECHNICIAN

This standard is intended to capture the core duties and skills involved in the entry-level of systems operation – technician. The technician will follow checklists and SOPs to inspect and monitor the system, performing small repairs as need be. The technician will also work with the engineering director to identify and report concerns, and plan next steps.

DUTIES

SYSTEMS OPERATION

Required:

1. Inspection and monitoring
    a. Follow a daily checklist to record observations and evaluate system performance, including water quality, water intake, electricity use, filtration and effluent treatment, and discharge
    b. Report system performance logs to manager
    c. Strictly adhere to the safety manual
2. Installation and repairs
    a. Follow a basic maintenance schedule
    b. Perform small repairs, including checking seals, replacing small parts, etc.
    c. Respond to requests and concerns from other departments
    d. Replace pumps, filters, screens, hoses, and tank materials
    e. Aid in the installation of new equipment and systems
3. Central control interface
    a. Follow SOPs to monitor and operate the central control interface
    b. Aid manager in testing and troubleshooting the system
    c. Communicate with other engineers
    d. Communicate with other departments

KNOWLEDGE AND UNDERSTANDING

SYSTEMS OPERATION

Required:

1. Strong understanding of RAS dynamics
2. Familiarity with design details and equipment of RAS
3. Knowledge of testing protocols and analysis of results
4. Advanced plumbing and electrical
5. Metric system, conversions, volume, dilutions, and flow rates

Suggested:

1. Basic carpentry and mechanical skills

FISH CULTURE

Suggested:

1. Basic understanding of fish health and the science of aquaculture

ESSENTIAL EMPLOYMENT SKILLS

Required:

1. Heavy work. More than 30 pounds of force/lifting
2. Ability to stand and be physically active for long periods of time.
3. Ability to withstand hot, cold, and humid temperatures and work in loud environments as well as lift heavy machinery and operate it
4. Timeliness and consistency – understanding the importance of showing up for work when scheduled, and on time, and how that can affect the time-sensitive processes of aquaculture
5. How to listen to instructions and carry out tasks as directed, including speaking up if instructions are not understood
6. How to effectively communicate issues and concerns to manager, including the admission of mistakes
7. How to professionally engage with others in the community – be a good neighbor
8. How to work independently, without constantly being told what to do
9. How to work well as part of a team, previous crew-based work is helpful
10. Attention to detail
11. Problem solving – thinking on your feet, and thinking out of the box, sometimes under pressure
12. Follow-thru – farming live organisms require some jobs to be finished regardless of scheduled work time.
13. Emergency response – how to properly react in high stress situations
14. Recognize when you do not know the answer to a problem or situation and be willing to ask questions

Suggested:

1. How to maintain records via hand-written diagrams/charts or computer spreadsheets, and keep a time log
2. Basic math and writing skills, applied in a aquaculture context e.g. fish per tank

SYSTEMS OPERATION AND MAINTENANCE - DIRECTOR

This standard is intended to capture the core duties and skills involved in the planning, design, and operation of a recirculating aquaculture system (RAS) at the systems operation and maintenance director, or engineer, position. The systems operations director will be an engineer responsible for designing, monitoring, assessing, repairing, and improving the RAS. It is expected that the director will have a mastery of all duties, knowledge, and understanding of the technician. They will also be responsible for working with other teams within the hatchery, production, and harvesting to ensure that the fish are healthy, growing at the proper rates, and arriving to specifications. The systems engineer director will train others in the proper identification and reporting of issues, including minor repairs that can be done by technicians.

DUTIES

SYSTEMS OPERATION

Required:

1. System design
    a. Draft new recirculating systems or provide improvements to current system based on capacities, space, budgets, and other specifications
    b. Select appropriate HVAC, pumps, filters, screens, hoses, and tank materials for fish health and production costs
    c. Test and troubleshoot system
    d. Identify new areas for further improving biological RAS performance
2. Inspection and monitoring
    a. Review daily reports from technicians and make evidence-based decisions when necessary
    b. Monitor water quality, water intake, filtration and effluent treatment, and discharge, taking critical action when necessary
    c. Respond to alarms and calls, at all hours of the day
    d. Manage waste treatment
    e. Manage electricity use
3. Installation and repairs
    a. Create and oversee basic maintenance schedule
    b. Lead and train technicians in small repairs and maintenance
    c. Lead installation and large repairs
    d. Respond to maintenance, repair, and replacement requests in other departments
4. Central control interface
    a. Create and update SOPs on how to monitor and operate the central control interface
    b. Test and troubleshooting the system
    c. Communicate with other engineers
    d. Communicate with other departments

OPERATIONS MANAGEMENT

1. Manage several concurrent, large projects
2. Ensure projects stay within timelines and budget
3. Coordinate maintenance, repairs, and upgrades with schedules of hatchery, grow out, and processing teams, and outside contractors
4. Strategic thinking and interaction with management to project equipment depreciation and replacement schedules

5. Work with outside contractors to source and purchase appropriately sized equipment, install equipment, and meet timelines
6. Manage the budget of the engineering department
7. Ensure safety protocols are visibly posted, understood, and followed
8. Analyze system metrics
9. Manage repair and back-up inventory of all tools, equipment, and supplies for streamlined function of facilities

TEAM MANAGEMENT

Required:
1. Lead teams of up to 5
2. Train technicians on all aspects related to systems operation
3. Provide mechanical and maintenance staff with training and resources on how to troubleshoot and resolve issues
4. Encourage thinking on improvements to system
5. Receive and implement feedback from those using the system

OPERATIONS MANAGEMENT

Required:
1. Manage several concurrent, large projects
2. Ensure projects stay within timelines and budget
3. Coordinate maintenance, repairs, and upgrades with schedules of hatchery, grow out, and processing teams, and outside contractors
4. Manage multiple vendors

Potential:
1. Work with hatchery and production teams when help is needed in altering the system
2. Serve as safety officer

KNOWLEDGE AND UNDERSTANDING

SYSTEMS OPERATION

Required:
1. Detailed understanding of RAS dynamics
2. Familiarity with power tools and small repairs
3. How to create and follow safety manual standards and SOPs
4. Advanced plumbing and electrical
5. Advanced understanding of construction and mechanical systems and methods
6. Advanced understanding of OSHA rules and building codes
7. Advanced understanding of compliance with DEP and reporting requirements

FISH CULTURE

Suggested:
1. Detailed understanding of fish health and the science of aquaculture
2. Knowledge of aquaculture and fish handling across life stages of fish
3. How to identify areas for improvement
4. Knowledge of potential diseases and biosecurity risks

OPERATIONS MANAGEMENT

Required:

1. Project management, including developing project strategy and simultaneously managing several large projects across multiple realms of the business
2. How to work with in sync with other departments of the business e.g. aligning hatchery timelines and production levels with grow-out planning to ensure they fit in with projected sales numbers and timelines
3. Best management practices for production and operations management, including system design protocols and understanding logistics
4. Fluency in word documents, email, spreadsheets (e.g. Excel), perhaps including financial management (e.g. quickbooks)
5. Basic budgeting
6. Good recordkeeping practices

Suggested:

1. Detailed understanding of aquaculture, biology, and production
2. Waste treatment certification