Appendix G
Salmonid Fish Health Management Plan

Salmonid Fish Health Management Plan
Mowi Canada East
Version 8.2

Doc. ID #	Revision	Date	Responsibility
SFHMP – V 8.2		March 2025	Fish Health and Welfare Division

Change Log

SECTION	PAGE	DATE	UPDATE
Fish Health Management Plan 1.1	5	2022-12-19	Added note about vacancy of the Fish Health & Welfare Director
1.2	6	2024-01-26	Moved Information from section 8.2; updated vet email address
		2024-11-17	Update veterinarian information
1.3	6	2024-01-06	Moved Information from section 8.2; updated staff information
2.1, 2.4	9-10	2025-02-07	Added reference to NFACC
2.6	7	2022-05-06	Added reference to Canadian Code of Practice for the care and handling of Farmed Salmonids
2.9	7	2022-05-06	Updated language to include all escape situations and not just from the cage.
3.6	11	2022-05-06	Added bullet for new DO probes.
		2023-05-02	Updated description of probes on active sites
	12	2024-03-05	Updated monthly fish health sampling requirements
3.7	12	2022-05-06	Added bullet regarding COHFT
	12	2024-02-02	Updated freshwater testing procedures
3.9	13	2022-05-06	Added salinity
4.1	14	2022-05-06	Added disinfection when leaving site
4.3	15	2022-05-06	Added reference to SOP
	18	2025-02-27	Added reference to specific land-based net washing SOPs
4.4	16	2022-05-06	Added that tub lids need to be secured
4.5	17	2022-05-06	Added secured tub lids
	20	2025-02-07	Amended description of mortality transport
8.1	21	2023-05-02	Updated production/ponding sites
	21	2024-01-26	Removed specific information as it is provided in other gov. submission.
8.2	21	2022-12-19	Update veterinarian contact information
	21	2024-01-26	Deleted section, moved information to Section 1.2&1.3
Appendix 1 - IPMP 2.5.2	7	2022-05-06	Removed cleanerfish
Appendix 1 – IPMP	7	2022-12-02	Section 2.5.2 – Cleanerfish added for 2023 Trial
2.5.2	33	2025-02-27	Amended to state MCE does not currently employ cleanerfish
3.1	8	2022-05-11	Updated temperature info Added rationale and temperature depth for when sea lice counts occur
	8	2023-01-24	Changed temperature when counting is discontinued to be in line with industry standards for fish welfare
4.2	10-12	2022-05-06	Added temperature data for various therapeutants
		2022-05-11	Addition of sea lice treatment options for all BMAs
		2023-02-10	Updates to Therapeutant descriptions
4.2.2	11	2023-05-02	Updated the withdrawal period for Emamectin benzoate and CFIA ref.
4.2.4	11	2022-05-11	Updated maximum temperature for Azamethiphos use

		2023-05-02	Updated the temperature range for Azamethiphos use
	12	2024-01-24	Updated the maximum number of treatments for Azamethiphos
4.4	13	2022-05-06	Added info about euthanizing
		2022-05-11	Added reference to The NFACC Code of Practice for the Care and Handling of Farmed Salmonids (salmon, trout, charr)
6.1	13	2023-05-02	Updated progress on cage rigging
6.2	14	2023-05-02	Update on training for staff
6.3	14	2023-05-02	Update on efficient mortality removal – lift-up systems, mortality removal vessel
	14	2024-02-02	Update on efficient mortality removal – cones, foovers, vessels
6.4	15	2024-02-02	Update on bioassays. Not routinely completed. Done as required
6.5	14	2023-05-02	Update on new treatments in 2023 and future years
	15	2024-02-02	Removed project for Bays East to draw freshwater from local pond.
Appendix 2 – Biosecurity Plan	28	2022-05-06	Added Cleaning and Disinfection Protocols
1.1	45	2025-02-27	Updated language for predator control
1.3	46	2025-02-27	Added bullet on large vessels entering province adherence to AP 36
1.3	46	2025-02-27	Added reference to specific land-based net washing SOPs
1.4	48	2025-02-27	Removed reference to mortality specific gear and divers
1.6	49	2025-03-13	Amended description of mortality transport, added reference to Fish Disposal Plan
2.1	52	2025-02-27	Added information on effluent treatment during a quarantine order
Appendix 3	16	2023-05-02	Revised SOP for ATP Swab Test
Appendix 4	22	2023-05-02	Hatchery policy on water flow updated with new effluent treatment
Appendix 3 – Fish Disposal Plan – Appendix 1 Standard Operating Procedures – Ensilage on a Marine Site	16	2022-05-11	Added pH of 4 or lower. Added pH measurement to records.
Fish Disposal Plan – 3.3	77-78	2025-02-07	Added section on quarantine protocols
FDP – 2.3 Mortality Disposal	83-84	2025-03-13	Amended description of mortality transport for trucking and ensiling, provided more detail of C&D procedures
Mortality Removal Using Lift Up Devices Marine Sites	22	2023-05-02	Added use of catch nets to SOP
Appendix 2: Mass Mortality Contingency Plan 3.0	27	2022-12-08 2024-11-17	Updated contact information for the Emergency Management Team Updated contact information for Government Officials
2.0	26	2023-05-02	Updated number of active sites in 2023
	26	2024-01-26	Removed specific information as it is provided in other gov. submission.
3.0	26	2024-02-02	Updated contact for ADM for NL Depart of FFA
5.0	30	2023-05-02	Update on service provider for fat/debris containment
	30	2024-02-12	Update on skimmer technology in lieu of vacuum pump
6.12	34-35	2022-05-06 2022-05-13	Updated info on mortality retrieval Updated capacity of New World Dairy
6.22	40	2022-05-06	Updated info on mortality retrieval processes
6.22	40	2022-05-11	Updated reference for Fish Disposal Plan – Appendix 3
7.0	42	2022-05-06	Updated language on various sections within section 7.0
Appendix 1	48	2022-05-06	Updated 2022 maps
	47	2023-05-02	Updated 2023 maps
	47	2024-01-26	Removed maps and renumbered appendices
	47	2024-01-26	Renamed Service providers
Appendix 2	48	2022-05-06	Updated service providers
	51	2024-01-26	Renamed SOPs
Appendix 3	52	2024-01-26	Renamed Biosecurity
Appendix 4	56	2024-01-26	Renamed Disposal Guidance ECCM
Appendix 5	63	2024-01-26	Renamed Migratory Bird Response Plan
Appendix 4	155	2022-05-06	Added Plankton Monitoring Response Plan
	156	2024-02-02	Updated Harmful Plankton Response Chart
	161	2024-02-02	Updated lethal concentration for Chaetoceros
	170	2024-02-02	Updated lethal concentration for Pseudochattonella

	176	2024-02-02	Updated lethal concentration for Pseudo-Nitzchia
	180	2024-02-02	Updated lethal concentration for Alexandrium
	183	2024-02-02	Updated lethal concentration for Rhizosolenia

Salmonid Fish Health Management Plan

The Salmonid Fish Health Management plan (SFHMP) serves three purposes:

1) To outline good health conditions for cultured finfish raised By Mowi Canada East (MCE).
2) To reflect a commitment by MCE to comply with the principles, concepts, and required elements of fish health management when culturing finfish or gametes thereof in, or destined for, the marine environment, unless otherwise depicted by site-specific conditions of licence (i.e. culturing finfish in any open-water ecosystem) and;
3) To be used by MCE facility staff for training and for day-to-day interaction with the fish, and by other fish health staff who are responsible for maintaining and monitoring good health status of the fish, and by the Fish Health Unit, who makes decisions related to fish health.

The content located within this document pertains to Salmonids only. A separate document, the Cleanerfish Health and Welfare Plan, contains policies and procedures specific to cleanerfish.

These guidelines, along with the associated Biosecurity Audit Plan, Integrated Pest Management Plan, and Cleanerfish Health and Welfare Management Plan, will be reviewed by the Fish Health Unit on an annual basis.

Table of Contents

1.0 Personnel Duties and Responsibilities

1.1 Fish Health and Welfare Director

The Fish Health and Welfare Director acts as a team leader for the Fish Health Unit. The Fish Health and Welfare Director is responsible for giving direction to the Fish Health Unit, for approving fish health policies and procedures, and for prioritizing any fish health research/projects for the Fish Health Unit. Any fish health reporting that is required by Fisheries, Forestry and Agriculture (FFA), Fisheries and Oceans Canada (DFO), or other government agency will be done by the Fish Health and Welfare Director and/or the Development and Environmental Compliance Director only. Furthermore, the Fish Health and Welfare Director will provide comments relating to fish health to the Development and Environmental Compliance Director for any public reporting that is required.

The position of Fish Health and Welfare Director is currently vacant. Fish health management will temporarily be the responsibility of the attending veterinarian, contracted by MCE, until such time as the Director's position is filled. The contract veterinarian will report directly to the Managing Director. Contact information for this person is listed in Section 8.2.

1.2 Veterinarian

The attending Veterinarian (either staff or contract veterinarian), in conjunction with fish health staff, has agreed to be responsible in overseeing matters of fish health management for MCE. The Veterinarian is licensed in Canada and fosters a lawful Veterinarian-Client-Patient relationship with the company. The Veterinarian is responsible for disease diagnoses, interpretations, writing prescriptions and is expected to exercise good medical judgment in matters of fish health. Veterinary contact information is posted and available to on-site fish health staff.

Veterinarians	Dr. XXXXX XXXXX M: XXX-XXX-XXXX E:

1.3 Fish Health Manager/Technicians/Team

Job descriptions for the Fish Health Manager, Fish Health Technicians, Fish Health Biologist and other positions are available at the Head Office of MCE. This "Fish Health Unit" refers to those persons, including the Veterinarian, who are responsible for major fish health decisions. The Fish Health Unit is responsible for identifying and managing risks to maximize fish health.

Fish Health Manager	XXXXX XXXXXX
Fish Health Specialist	XXXXX XXXXXX
Laboratories	XXXXX XXXXXX

1.4 Facility Staff Play a Role

As per conditions of license, all facility staff have read and abide by this FHMP and relevant operational procedures, signed off, and practice appropriate hygienic procedures supportive of fish health. General farm staff may be assigned specific fish health duties from time to time.

1.5 Contact Names and Numbers

Contact names and numbers for key fish health personnel are posted in readily accessible location(s) at each facility.

2.0 Fish Handling Techniques

2.1 Routine Handling Techniques

MCE's fish handling procedures – including types of equipment used and equipment maintenance – are designed to minimize stress, injury, escape and disease. Observing fish during handling, and for a period after handling, ensures any negative effects are noted and steps are taken to mitigate impact. Staff minimize the time fish are exposed to stressful events such as crowding and out-of-water events (i.e. moving, counting, grading, tagging, injecting, etc.). Each handling event is logged. During all crowding events, staff will be continually assessing the population for Fish welfare or stress indicators as identified by NFACC Farmed Salmonids Code of Practice .

2.2 Harvesting

If fish are being live hauled to a processing plant, measures are taken to minimize their stress during handling and transport. If fish are stunned and bled at the containment array, they are stunned using humane procedures. Stress reduction is practiced to as great a degree as possible.

- Proper disposal and disinfection methods for equipment, waste and blood water will be used.
- Proper blood water containment, disinfection and disposal during fish harvesting must be observed to minimize environmental impact and negative effects upon fish health.
- As much as possible, blood water from harvesting operations will be contained and returned with harvested fish to contracted processing facilities where it is subject to blood water treatment.
- All equipment and/or waste resulting from or used for the harvest of farm stock will be cleaned, disinfected, treated and/or disposed of, using only approved chemical agents and in a manner which complies with all existing legislation, regulations, and guidelines, and which minimizes environmental impact, ensures farm stock health, and promotes food safety.

For specific diseases of concern (e.g. ISAv infections), specific harvest procedures apply.

2.3 Anaesthetizing and Sedating Fish

A variety of fish health procedures require that fish be sedated or anaesthetized for welfare and to minimize stress. Registered anaesthetics are obtained through a veterinarian.

Anaesthetized fish are always monitored closely. Adequate water quality of the anaesthetic bath, in particular available oxygen, is maintained.

2.4 Sea Lice Monitoring

Sea lice abundance (i.e. counts) requires monitoring to make effective control and management decisions. Monitoring will be conducted as per Mowi's procedures, or upon instruction by the Veterinarian, the Fish Health Management Team, the FFA Aquatic Animal Health Division or the aquaculture license requirements. For more specific policies and procedures surrounding sea lice management, **please see the "Integrated Pest Management Plan", Appendix 1.**
During lice counts, staff will be monitoring the population for Fish Welfare Indicators. These can be found at Farmed Salmonids Code of Practice . Any concerns will be raised to the Fish Health and Welfare Director.

2.5 Vaccinating Fish

Vaccines are biologic substances that are stored (refrigerated), handled, and applied as per manufacturer's instructions. MCE staff and contract vaccinators are appropriately trained prior to undertaking a vaccination procedure. Vaccines are administered at the hatchery site and occasionally at sea sites and form part of an integrated fish health management program. The type of vaccine administered will be decided by the Fish Health and Welfare Director, in conjunction with the Freshwater Production Director.

2.6 Euthanasia

In the uncommon event where numerous fish are euthanized (e.g. to facilitate specific fish measurements, sampling, mercy-killing, or culling), it is recorded and conducted in as humane a manner as possible, facilitating a rapid and irreversible loss of consciousness. All policies and procedures surrounding euthanasia will be written and approved by the Veterinarian. All methods of euthanasia will be in compliance with the Canadian Code of Practice for the Care and Handling of Farmed Salmonids (salmon, trout, charr) (acceptable methods accessible at: https://www.nfacc.ca/farmed-salmonids-code-of-practice#appI)

2.7 Fish Disease Outbreaks/Emergencies

A fish health emergency is any situation where the health of a fish population is suddenly at risk. This may be due to disease-causing agents (such as a pathogenic virus) or to abrupt water quality changes (such as plankton blooms, a toxin, or a sudden, severe decline in dissolved oxygen). Vigilant monitoring, record keeping, and early detection is key to good management of health emergencies.

An outbreak is defined as an unexpected occurrence of mortality or disease. Not all outbreaks are infectious or fish health emergencies. Infectious diseases may differ in how contagious they are and therefore how easy of difficult they are to control. Rapid response is essential but will be determined on a case-by-case basis in conjunction with the Veterinarian, the Fish Health Unit, and/or regulatory authority.

Once an outbreak/emergency has been recognized, specific steps are followed, depending on the type of outbreak/emergency. In the case of an infectious event, the objective is to keep the pathogen concentration (or load) as low as possible and to prevent the spread of the problem within or off the facility. Biosecurity is enhanced. **Please see the Mass Mortality Contingency Plan (included in the Fish Disposal Plan) for associated practices and reporting in the event of a disease outbreak/emergency.**

2.8 Escaped Medicated Fish

In the unlikely event of fish escaping, MCE's facility staff will immediately put into place notification and escape mitigation procedures as outlined in the Escape Prevention and Response Plan. In the specific case of medicated fish escaping, information on the medication and the stage of treatment will be reported with the escape information.

3.0 Fish Health Management

Prevention, Surveillance/Monitoring, Diagnosis and Disinfection are a mainstay of Fish Health and are essential in the prevention and control of disease.

3.1 Keeping Fish Healthy

- Fish will be routinely monitored for signs of normal health and disease. All staff should be familiar with normal fish appearance and behaviour. Early detection of altered activity is key to maintaining health and disease management so changes in behaviour and physical condition are logged and reported to facility managers upon discovery.
- To minimize stress and mortality, fish are held at cost-effective, species-specific densities.
- Predators include birds, other fish, and mammals. Reasonable, due diligent attempts are made to exclude predators from the facility and from interacting with the fish. MCE will follow mitigation procedures striving toward minimal predator interaction with the cultured fish.
- MCE will have healthy, hygienic delivery of feed to fish. Proper storage of feed is essential to maintaining its nutritional value. Feed is stored in structures designed to minimize spillage, spoilage, and wildlife's access to feed. Feed is also protected from extremes of heat, sunlight, and moisture.

3.2 Fish Ponding (FW)

MCE believes that the cornerstone to fish health is prevention. It is easier and more efficient to prevent any fish health issues from appearing then to try and manage an issue once it occurs. As such, the following protocols are in place:

- Fish will only be stocked in areas that are suitable for the species of fish being stocked.
- Only healthy fish will be reared at hatchery sites as per Federal and Provincial Transfer licenses, permits and approvals.

- Reduction of stress on the fish is an important factor in fish health and, as such, all consideration will be given to reducing stress to the fish during normal operations.
- Mortality numbers from any movement of fish/eggs will be monitored and used to evaluate the efficiency of the movement method, with the goal to continually improve the process**.**
- As operationally practicable, fish will be stocked at densities no greater than 75 kg/m^3

3.3 Fish Ponding (SW)

MCE believes that the cornerstone to fish health is prevention. It is easier and more efficient to prevent any fish health issues from appearing than to try and manage an issue once it occurs. As such, the following protocols are in place:

- Fish will only be stocked in areas that are conducive to the species of fish being stocked.
- Only healthy, vaccinated, tested, and approved smolt will be placed into the marine farm as per Federal and Provincial Transfer licenses, permits and approvals.
- Reduction of stress on the fish is an important factor in fish health and, as such, all consideration will be given to reducing stress to the fish during normal operations.
- Farm staff shall perform any function as may be required to ensure that transport and delivery of smolt to sea water is timely, to reduce stress on the fish.
- Mortality numbers from any fish transfers will be monitored and used to evaluate the efficiency of the transport method, with the goal to continually improve the transportation process.
- For bio-security purposes, farm staff should not board the delivery vessel and hatchery staff should not board the cages. If contact is required, full disinfection of gear and equipment will be performed.
- A member of the fish health unit will be present to monitor ponding at every site.
- Sites will only be stocked with a single year class of fish and in accordance with Bay Management Areas (BMAs).
- As operationally practicable, fish will be stocked as to have a density of less than 15 kg/m^3 at time of harvest.

3.4 Identifying Concerns

All staff are aware of any distinguishing signs of potential health problems. Any observed changes must be reported to both the site manager and fish health immediately:

- Physical Changes- skin darkening, scale loss, fungal or ulcerative lesions, gasping, obvious eye injuries or protrusions.
- Behavioral Changes- changes in swimming behavior, flashing, lethargy, reduced feeding response, gasping at the surface.

Below is a list of diseases of concern:

- Infectious Pancreatic Necrosis, IPN
- Infectious Salmon Anemia, ISA (including the non-pathogenic HPR0)
- Viral Hemorrhagic Septicemia, VHS4a
- Enteric Redmouth Disease, ERM
- Bacterial Kidney Disease, BKD
- Furunculosis
- Saprolegnia
- Vibrio species

Any diagnosis of the above diseases will be made by the licensed Veterinarian.

3.5 Pre-Transfer Testing

Pre-Transfer testing will include, at minimum:

- 20 fish per population
  - BKD IFATs
  - Kidney plated on SKDM, BA, and TSA
  - Cell culture (pools of 5 – heart, kidney, spleen, and gill); plated on ASK, CHSE, and EPC
  - Kidney PCR for ISAv
- Pre-Transfer testing may be increased depending on requirements from Provincial or Federal regulatory agencies.
  - All requirements that are set out in the Certificate of Health for Transfer (COHFT) will be followed for all transfers between the Atlantic provinces.
- The Fish Health and Welfare Director must review and approve all health testing results prior to the transfer of fish to a sea site.

3.6 Surveillance/Monitoring (SW)

Monitoring of fish and their environment is crucial in the fish rearing process since identifying any abnormalities can be the first step in identifying any fish health concerns. In general, the sooner an abnormality is detected, the sooner mitigation strategies can be put in place, minimizing any potential impacts on the fish.

- Every marine site will be visited a minimum of once per month by the company veterinarian or their designate to collect samples (as appropriate) for disease testing to sample and screen fish for the presence of bacteria, viruses, parasites, or other factors that may contribute to a decline in fish health. Elevated mortality or suspected disease will be reported to the Fish Health and Welfare Director immediately and will trigger additional visits and sampling, depending on suspected cause.

- The schedule for veterinarian visits may increase as determined by management or as required by the Newfoundland & Labrador Fish Health Surveillance Program.
- At minimum, the following samples will be collected monthly:
    - Virology - pool of organs from a minimum of five moribund fish per site.
        - Organs to be included: kidney, heart, spleen, gill
        - Cell lines: Chinook Salmon Embryo, Epithelioma Papulosum Cyprini and Atlantic Salmon Kidney
    - Pathogen specific testing
        - Kidney samples for molecular testing using polymerase chain reaction for Infectious Salmon Anaemia virus. Submitted in duplicate.
        - Kidney impression sides for test Infectious Salmon Anaemia virus using Immunofluorescent Antibody Testing. Submitted in duplicate
        - Kidney samples for archive at minus 80 degrees Celsius.
- Should cleanerfish be present on site, the Newfoundland & Labrador Cleanerfish Health Surveillance Program will be followed.
- All farm staff will observe fish behavior and appearance during normal feeding operations and communicate these observations to the site manager daily. Observations of abnormal behavior or appearance are to be recorded on the Daily Site Report (DSR) and reported to the Fish Health Unit.
- Farm staff will observe and record water temperatures, dissolved oxygen levels and environmental conditions daily into Mercatus Farmer.
- Probes have been installed on all active site that will measure dissolved oxygen and temperature at predetermined intervals and relay the information to the farm staff. This information is available through a real time monitoring network that is accessible remotely via star link internet that has been installed at our farms.
- Weekly dive information, as regards to mortality numbers and divers' observations will be recorded and communicated to Management through Mercatus Farmer.
- Where possible, mortalities should be classified as to the cause according to the mortality worksheet. This may require dissection over secured and leak-proof containers.
- Feed records for each cage will be entered into the database and examined regularly by site management, to observe feeding patterns, which may indicate fish health problems.
- At minimum yearly, the veterinarian or designate will conduct an audit of biosecurity and disinfection practices at each farm site (**see Biosecurity Audit Plan, Appendix 2**).

MCE will work in cooperation with all government agencies to be in compliance with regulations set forth by these government groups.

3.7 Surveillance/Monitoring (FW)

- Every freshwater site will be visited a minimum of once every 2 months by the company veterinarian or their designate to collect samples (as appropriate) for disease testing to sample and screen fish for the presence of bacteria, viruses, parasites, or other factors that may contribute to a decline in fish health. Elevated mortality or suspected disease will be reported to the Fish Health and Welfare Director immediately and will trigger additional visits and sampling, depending on suspected cause.
- The schedule for veterinarian visits may increase as determined by management or as required by the Newfoundland & Labrador Fish Health Surveillance Program.
- Diagnostic testing is completed routinely. The following tests are ordered upon the direction of fish health staff
    - Kidney tissue plated on SKDM, TSA, BA, and Cytophaga agars
    - Pooled organ sample (pools of 5 fish - kidney, spleen, heart, gill) for cell culture, plated on ASK, EPC, and CHSE
- All farm staff will observe fish behavior and appearance during normal feeding operations and communicate these observations to the site manager daily. Observations of abnormal behavior or appearance are to be recorded on the Daily Site Report (DSR) and reported to the Fish Health Unit.
- Where possible, mortalities should be classified as to the cause according to the mortality worksheet.
- Feed records for each tank will be entered into the database and examined regularly by site management, to observe feeding patterns, which may indicate fish health problems.
- At minimum yearly, the veterinarian or designate will conduct an audit of biosecurity and disinfection practices at each farm site (**see Biosecurity Audit Plan, Appendix 2**).
- Additionally, any testing required by the Certificate of Health for Transfer (COHFT) will be performed by the designated veterinarian.

MCE will work in cooperation with all government agencies to be in compliance with regulations set forth by these government groups.

3.8 Diagnosis and Treatment

- Diagnosis of any health issues will be made by a licensed veterinarian
- The veterinarian will keep a health record for each site, which will include all results from the surveillance visits, as well as results for any additional diagnostic testing that has occurred due to a fish health concern.
- Any drug treatments will only be given after a prescription from the licensed veterinarian has been received.

- Therapeutants will be from credible and responsible sources and will only be used when it is necessary for proper fish health. **All therapeutants will be approved by the Fish Health and Welfare Director prior to administration.**
- MCE will ensure that all therapeutants used will be in compliance with existing regulations, that any therapeutant residues in fish for human consumption are below the maximum reside limits set by the receiving country, that the environmental impact is reduced as much as possible, and that animal health is promoted through husbandry practices and judicial use of approved therapeutants.
- Treatment records for all therapeutants will be recorded in the fish health records, and will include the date, compound used, reason for use, dose, withdrawal period and harvest date.
- Prior to harvest, appropriate residue testing will be performed by an accredited laboratory facility (e.g. XXXXX XXXXX) and clearance declarations will be obtained from the prescribing veterinarian.

3.9 Monitoring Water Quality

MCE will routinely monitor and record water quality parameters at all sites to ensure optimal fish health. Minimal monitoring requirements of a saltwater site includes-– dissolved oxygen, water clarity, salinity, and temperature. Minimal daily monitoring requirements for a Freshwater Facility include- temperature, dissolved oxygen, pH, TAN, and Nitrite. Additional parameters vary depending on location and hydrographic specifics of the local environment.

In addition to water chemistry, saltwater sites should monitor for harmful algae blooms (HABs). At minimum, plankton/algae will be assessed once per week per site during the spring; with increased frequency occurring during high-risk periods (August through September, see Mowi Canada East's Plankton Monitoring and Response Plan – Appendix 5).

MCE maintains a contingency of procedures in the event of deterioration of water quality and procedures vary depending on cause. Cessation of feeding is immediate. Water quality monitoring is enhanced to determine the problem and to estimate how long the problem may persist. Fish are monitored more closely for the duration of the event and will not be handled until water quality is deemed acceptable. Records of these events, findings, and actions are kept. Additional mitigation measures to address adverse environmental conditions, such as aeration are listed in Table 2 and Appendix A (Operational Environmental Mitigation Plan) of the Environmental Management and Waste Management Plan. Details on the inventory of aeration systems, operation, maintenance and reporting as per FFA guidance is provided in an annual report. This report will be submitted to FFA during the aquaculture licence validation process. This submission will ensure information is current with MCE sea farm production planning.

3.10 Fish Health Records

Many records are computerized and form part of the integrated MCE record-keeping system. Backups are maintained. MCE provides adequate system training and documentation to authorized facility personnel, including data entry and report creation. Record-keeping, storage, reporting and MCE's Fish Health Unit review is followed as per MCE's policies and conditions of license.

All fish health records are compliant with province-specific veterinary clinic standards.

4.0 Biosecurity Policy and Practices - SW

Biosecurity is the ongoing process of identifying, evaluating and addressing actions or events in order to reduce the risk of disease transmission, to or from marine sites. ***These biosecurity practices may require modification with new information and technologies.***

4.1 General Daily Biosecurity Practices

- All feed boats and rafts are to be cleaned, scrubbed (with Greenworks or similar detergent) and disinfected (with Iodor or similar sanitizer) at the start and at the end of every day.
- Foot Baths are to be located for easy access and to be used by anyone boarding site vessels or work barges
- Footbaths are to be refreshed daily (Water should look like weak tea)
    - Iodor or any iodophor should be mixed at 100 to 200 mg/L with a ten-minute contact time. This contact time may be achieved through exposure to proper disinfectant concentration without rinsing with fresh seawater.
- As much as practicable, all site gear and personal gear should remain on site. All site gear, equipment or personal gear should be disinfected prior to leaving and before returning to the site.
- Any site gear, equipment or personal gear that is moved between sites MUST be cleaned and disinfected before leaving one site AND again upon arrival at another site.
- Inflow wharves (Pool's Cove, Hermitage, Hr. Breton, Milltown) are to be used for all 'clean' material being transported to farm sites. Vessels using inflow wharves will be cleaned and disinfected prior to use at these wharves, according to operational agreement with FFA for use of those facilities.
- At other mixed-use wharves or facilities, vessels and vehicles will be cleaned and disinfected to reduce transmission of pathogens.
- All site staff are required to clean and disinfect their personal gear at the end of every day prior to leaving the site.

Site biosecurity practices will be reviewed monthly by the Veterinarian or designate during their routine visit, as per the Biosecurity Audit Plan.

4.2 Farm Access

Vehicles, vessels, and visitors can be agents of contamination and can transmit disease from one farm to another.

- Access to farm sites will be controlled to provide a break between those outside influences such as predators, non-essential personnel, and vehicular traffic which may negatively affect the health of fish.
- The most efficient layout of farm sites will be used to facilitate the development and maintenance of controlled access zones.
- Exclusive 'in-flow' or 'clean' wharf facilities at Pool's Cove, and Hr. Breton will be used as per the Wharf User Agreements.
- No outside visitors will be allowed on site without prior approval from the Salt Water Production Director and/or the Fish Health and Welfare Director.

4.3 Large Equipment Cleaning and Disinfection

- For maximum efficacy of disinfection, all objects must be thoroughly cleaned and free of all organic material prior to disinfection, using either a detergent like Greenworks or a pressure washer.
- As operationally practicable, vessels and feed rafts will be site specific. If necessary to move between sites, they will be cleaned and disinfected before.
- Dirty nets being transported to shore will be transported in a manner to minimize loss or spillage of organic matter and only to designated outflow wharves. Pickup of dirty nets will be done in a manner to reduce risk of contamination with clean areas, using contained transport vehicles and containers. Transport vehicles or containers that are used to transport dirty nets will be cleaned and disinfected at the end of each day.
- Nets will be cleaned of all organic material before disinfecting. Disinfection will be done on land, as per government policies. Land-based net washing will be performed as per MCE SOP SW-008 NL C&D of Nets and Newfoundland Aqua Services (NAS) Standard Operating Procedure. In the event of ISA, NAS will follow NAS SOP for Sites Under a Quarantine Order due to ISA.
- To move vessels or large equipment from one BMA to another, prior approval is required from the Fish Health and Welfare Director (see Appendix 3: Biosecurity Plan).
- Vessels or large equipment can be moved from one site to another within the same BMA without prior approval, provided that the vessel is thoroughly scrubbed clean with Greenworks prior to disinfection with Iodor (250ppm for 10-minute contact time).
- For specifics, please see "Large Vessel Biosecurity Protocols" SOP in the Biosecurity Management Plan
- Transport trucks will be designated to haul dirty OR clean loads – NEVER both, unless they have had a thorough cleaning and disinfection which has been verified by Mowi staff.
    - Examples of dirty loads include:
        - Used site equipment – nets, weight balls, compensator buoys, etc.
        - Fish (harvest or processed)
        - Mortalities or Offal
        - Used pallets

        - Garbage
    - Examples of clean loads include:
        - Feed
        - Clean or new site equipment

4.4 Mortality Collection

- Daily mortality collection is done through the use of a Liftup system or ROV.
- At minimum, mortality is removed from the sea farms on a weekly basis.
- Alternative methods of mortality collection are used as needed.
- Divers will be accompanied or met on site-by-site management personnel.
- Divers should maintain separate dive suits and gear for each site or ensure thorough disinfection between sites where this is not possible. If dive gear is to be used on multiple sites, prior approval from the Fish Health and Welfare Director must be granted.
- Site crew should ensure that the dive vessels, personal apparel, and equipment of the divers is properly cleaned and disinfected before and after the dive at their site.
- Any gear not necessary for the mort dive should be removed from the dive vessel. All drains and scuppers in boats should be plugged for the duration of the dive to contain any spillage unless boat is equipped with flap-type scuppers. In this case, efforts will be made to contain any spillage and disinfect prior to discharge.
- Divers should be disinfected in between cages as soon as the diver exits the cage (to allow contact time between cages).
- The vessel and all gear and equipment onboard must be thoroughly cleaned and disinfected immediately **after** the mortalities have been removed from the vessel. If morts must be transported to a wharf, the vessel will be cleaned and disinfected after the dive (prior to leaving site) and then again after morts are removed.
- Mort totes or tubs
    - Must be in good condition (no cracks or breaks).
    - Mort totes should not be filled more than ¾ and not overfilled. Fish totes should be leak proof, free from damage and if drain stoppers are present, they should be sealed. The totes should be covered and secured before movement from the dive boat to a barge or transport vessel.
    - Mort totes should be clearly marked with company name
- No morts or moribund fish are to be released to the sea.
- Divers' suits and all dive gear must be disinfected upon completion of the dive.
- Cages with elevated mortality or known health issues will be dove last.
- If more than one site is to be dove per day, older sites or sites with known fish health issues will be dove last.

4.5 Mortality Disposal

- Following the dive, mort tubs will be taken to the wharf where they will be held for storage (a layer of clean sawdust may be added as a bulking and odour control agent if morts are destined for composting) or transferred to large, sealed containers for eventual transport to the designated mort disposal facility.

- NO material other than mortalities (i.e. kelp, plastic wrap, mussel or other shells) are to be mixed with morts that are destined to be ensiled.
- All mort totes or boxes MUST be thoroughly cleaned and disinfected before being returned to the site. In addition, any mort tubs that are damaged or cracked will be taken out of rotation and disposed of. Only undamaged, fully intact tubs will be used for mortality collection.
- Every effort should be made to avoid transporting mortalities from one BMA to another. If mortalities must be moved, they should only move from a younger BMA to an older BMA, not vice versa. Furthermore, mortalities should be stored in a separate area away from other wharf activities. Any mortalities that are being transported should be in leak-proof containers that have lids that can be secured. Every effort should be made to ensure that mortalities are contained during transport.
- Under normal circumstance, no mortalities should be moved from one site to another. It is the responsibility of each site crew to bring their own mortalities back to the wharf for disposal.
- In the event of ensiler breakdown at remote sites where daily mortality removal to a wharf is not feasible, mortalities may be transported to a neighboring site within the same BMA for immediate processing.
- For greater detail, **please see The Fish Disposal Plan, Appendix 3.**

4.6 Harvest Disinfection Protocols

- Deck and equipment of all harvest vessels will be cleaned and disinfected prior to loading the harvest tubs. Top holes must be used when strapping full tubs.
- All harvest tubs will be disinfected and inspected for cracks or missing plugs prior to use.
- All harvest tubs will only be partially filled (see Harvest Protocols) to prevent spillage during transport. Plastic wrap will be used to prevent spillage during transport to processing facilities.
- A disinfectant hose or sprayer will be kept on hand to treat any spillage.
- All operations will be carried out in a manner to avoid any spillage or leakage of blood, slime, or scales.
- Prior to site departure after a harvest, all harvest tubs, harvest equipment, rain gear, gloves, boots, free deck, and side of boat under the dewatering box will be cleaned and disinfected.
- After offloading, the deck and other gear will again be disinfected, as well as the surface of the harvest wharf.
- Fresh water (not seawater) will be used to wash equipment where contact with saltwater should be minimized (vehicles, forklifts etc.).
- Blood water will normally be contained in tubs with the fish, transported & disposed of in an approved manner at Harbour Breton processing plants.
- If harvesting via wellboat, the vessel will do a topside cleaning and disinfection after loading harvest fish, but before leaving site.

- If harvesting from a site with a known disease, the wellboat will use moving bulkheads to dewater back into the holds so the water can be disinfected with ozone prior to releasing into the sea.

4.7 Biosecurity Audits

Biosecurity audits will be conducted by the Fish Health Unit to ensure that proper biosecurity protocols are being followed by all MCE staff members. Specific procedures and frequency of audits are outlined in the Appendix 2 (MCE Biosecurity Plan).

4.8 Response Plan for a Biosecurity Breach

A biosecurity breach is any incident in which a pathogen is brought into a facility despite efforts to prevent as such. The movement of people, equipment and fish all have the potential to introduce pathogens. Mowi Canada East has strong procedures to prevent the introduction or movement of pathogens in facilities. MCE has implemented an Incident and Crisis Management System (Doc ID# SCP-v4.1).A biosecurity breach can be identified through routine surveillance sampling or increased sampling in response to a change in fish behavior or mortality levels. The identification of a fish pathogen or the identification of biosecurity procedures not being followed are reported through the Incident and Crisis Management System. Where biosecurity procedures were not followed, but did not result in cross-contamination of a fish pathogen, the incident is a near miss.

The following key information is reported through the Incident and Crisis Management System:

1. What happened?
2. How did it happen?
3. Why did it happen?
4. Other relevant information/development of the incident
5. Corrective actions

In the event that fish are infected as a results of a biosecurity breach, the response is the implementation of increased fish health surveillance, treatment, and reporting for the disease. Any affected units will undergo full C&D before being restocked. Also a review of the contamination source in order to implement corrective measures that will avoid a reoccurrence.

In the event of a procedural error or gap related to biosecurity practices, the response is a review of the biosecurity procedures, communications and training. If a gap or need for improvement is identified, the response will be to update procedures, communications or training as needed to prevent a reoccurrence.

5.0 Biosecurity Policy and Practices - FW

Biosecurity is the ongoing process of identifying, evaluating, and addressing actions or events in order to reduce the risk of disease transmission, to or from different systems or tanks. ***These biosecurity practices may require modification with new information and technologies.***

5.1 General Daily Biosecurity Practices

- Foot Baths and hand sanitizers are to be located at all entry points into a building and easily accessible for use by all site personnel.
    - Footbaths and hand sanitizers are to be checked daily to ensure that they are filled and at proper concentrations.
    - Virkon aquatic solutions should be mixed at 10 g/L with a ten-minute contact time.
- As much as practicable, all site gear should remain on site. All site gear, equipment, or personal gear that leaves site should be disinfected before leaving and before returning to site.

Site biosecurity practices will be reviewed monthly by the Veterinarian or designate during their routine visit, as per the Biosecurity Audit Plan.

5.2 Farm Access

Vehicles and visitors can be agents of contamination and can transmit disease from one farm to another.

- There will be limited access points to the facility where all staff, visitors and/or vehicles requiring entry onto site will undergo a disinfection process prior to entry.
    - Pedestrian access will be through limited, specific biosecurity checkpoints with foot dips and hand sanitizers
    - Vehicle access will be granted only after the vehicle undercarriage and tires have been sprayed with disinfectant.
- No outside visitors will be allowed on site without prior approval from both the Fresh Water Production Director and/or the Fish Health and Welfare Director.

5.3 Equipment Cleaning and Disinfection

- Water systems are to be separated by biosecurity barriers (footbaths, hand wash stations, and building specific PPE for staff).
    - Staff are required to go through a biosecurity barrier when moving from one system to another.
    - Whenever possible, staff should be assigned to a specific system so that movement from one system to another is limited.
- Each system will have designated equipment for use in that system only.
- Equipment must not be shared between systems to reduce the risk of cross contamination between fish groups.

- All equipment, including nets and brushes, must be disinfected with a 1% Virkon solution before and after every use.

5.4 Mortality Collection

- Mortality removal from tanks will be conducted daily, at minimum.
- Mortalities will be collected in system-specific buckets that are not used for any other purpose.
- At the end of every day, mortality buckets will be brought to the on-site holding tub for further removal.
    - Once emptied, mortality buckets will be cleaned with a detergent (ex. Greenworks or Mr. Clean), rinsed, and then disinfected with a 1% Virkon solution
- Mort buckets must be in good condition (no cracks or breaks).
- Mort buckets should be clearly marked.
- No mortalities or moribund fish are to be released into the environment.

5.5 Mortality Disposal

- At the end of the day, all mortalities will be placed in holding tubs located on site for eventual transport to the designated mort disposal facility.
- No material other than morts shall be placed in mortality collection tubs.
- All mort tubs MUST be thoroughly cleaned and disinfected before being returned to site. In addition, any mortality tubs that are damaged or cracked will be taken out of rotation and disposed of. Only undamaged, fully intact tubs will be used for mort collection.

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6.0 Travel Between Different Areas

There may be times when staff are required to travel from one area of the business unit to another. From a fish health perspective, different areas include (with proper numerical designation):

1. Broodstock
2. Freshwater
3. Saltwater
4. Quarantined site for FH reason (Freshwater or Saltwater)
5. Processing Plant

- Staff that are required to move from one area to another should have a separate set of work gear for each area. Under no circumstances should any uncovered clothing or PPE be brought from one area to another.
- Staff can move from one area to an area with a higher number designation without any restrictions (for example there is no restriction to go from a FW site to a SW site).
- If staff need to move from one area to an area with a lower number designation (for example moving from a processing plant to a saltwater site), a site-free period of 72 hours must be observed prior moving to the second area.
- Vehicles (personal or work-related) should be used for salt water OR freshwater; never both
    - If staff are required to travel between two different areas of production, rental cars should be utilized for one of the areas.
- In addition to the numerical areas set above, an off-site period of 72 hours should be observed if staff are moving from a site in one province to a site in another (regardless of their numerical designations).
- If there are any questions as to whether a 72-hour off-site period must be observed, staff are instructed to consult with a member of the Fish Health Unit for advice.

- Exceptions to this rule will be on a case-by-case basis and MUST be approved by the Managing Director OR the Fish Health and Welfare Director AND either the Freshwater Production Director or the Saltwater Production Director.

7.0 Handling Drugs and Chemicals

Fish health and survival is sometimes optimized with judicious use of veterinary prescribed therapeutants. The Veterinarian attending MCE maintains a veterinarian-client-patient relationship to facilitate diagnosis and prescription treatments. These decisions are taken considering both the welfare of fish and the ecosystem.

7.1 Medicated Feed Storage, Administration, and Inventory

Medicated feed, if used, is stored in clearly marked container, easily distinguishable from non-medicated feed. The prescription number for the medicated feed will be marked on each container. The medicated feed is inventoried and recorded daily as the feed is offered to the fish according to a prescription. A Safety Data Sheet (SDS) for all medications used at the facility will be on-site and readily accessible. MCE ensures that all chemicals are handled safely and appropriately by trained staff, taking suitable precautions.

7.2 Treatment Records

Detailed records of medicated feed administration are kept on-site for the entire time the fish are present. In combination with inventory records, the fish groups that were treated are readily identifiable through treatment and withdrawal times. A copy of the treatment history will accompany the target fish to another containment array if the fish are subsequently moved. MCE does not harvest fish until they have cleared the withdrawal period prescribed by the Veterinarian. As per regulations and license conditions, when fish are delivered to a processing plant, a harvest release written by the attending Veterinarian will accompany fish to ensure seafood safety and wholesomeness.

7.3 Chemicals and Biologicals

Disinfectants and chemicals are stored in clearly marked containers. An SDS for each chemical at the facility is on-site and readily accessible. MCE ensures that all chemicals are handled safely by appropriately trained staff, taking suitable precautions.

All chemical therapeutants are used as directed by the attending Veterinarian and are handled safely by appropriately trained staff, taking suitable precautions.

Biologicals include vaccines. Where applicable, these products are stored refrigerated and handled as per manufacturer's instructions. A product insert for each vaccine at the facility is on-site and readily accessible.

8.0 Production Plan

8.1 Production/Ponding Plans

Three-year Site Stocking and Production Plans are submitted annually to FFA as part of the license validation process. Active sites and planned wharf usage for the current cycle are provided in that plan. All feed is sourced from Skretting feed mill and stored in onsite barges.

Appendix 1 – Integrated Pest Management Plan

Integrated Pest Management Plan
Mowi Canada East
Version 7.1

Doc. ID #	Revision	Date	Responsibility
IPMP V-7.1		Feb 2024	Fish Health and Welfare Division

The information contained in this document contains sensitive commercial information and trade secrets of MOWI Canada East (MCE) that is not publicly available. It is being provided to the Department of Fisheries, Forestry, and Agriculture in strict confidence. Disclosure of this information can harm significantly the competitive position of MCE and undue financial loss to MCE.

Table of Contents

1.0 Introduction

1.1 Components of the Plan

An effective integrated pest management plan consists of three key components: prevention, intervention and research and development. It is important to recognize that an integrated pest management plan should be constructed in a way that maximizes the utilization of prevention techniques and minimizes the emphasis on intervention therapies and maximizes the utilization of prevention techniques. The sea lice life cycle (section 1.2) exists in such a way that, without intervention, can become out of control in a short period of time. Therefore, every effort should be made to prevent the parasite from ever attaching to the host, thus stopping the life cycle before it even begins. In this fashion, prevention becomes the cornerstone to any pest management plan.

Constant monitoring is required to determine if sea lice prevention strategies are working. When prevention methods become overwhelmed, there may be a need to introduce intervention methods, but only as a last resort. Assessments should be made as to whether strategies (both preventative and therapeutic) are being effective. Anytime there is a determination that efforts are not being effective, changes should be made to try and improve success.

Finally, a pest management plan should include some avenue for research and development to ensure that methods are constantly being updated to the most new and effective means of control.

Thus, the major components of the plan become prevention, monitoring, intervention and research and development. Whenever there is a discrepancy between this plan and local Aquaculture Acts or Regulations, the local Acts and Regulations will take precedence and will be strictly adhered to.

1.2 Sea Lice Life Cycle

There are several species of sea lice, however on the east coast of Canada where Mowi Canada East operates, the main species of concern is *Lepeoptheirus salmonis*. Occasionally *Caligus sp*. can be found on salmon, but they are not found to be in great numbers, and do not appear to cause any damage. Care should be taken to include *Caligus sp*. in the monitoring program (section 3.0), if that this trend changes and the dynamics of these two species starts to change. Any mention of sea lice in this document will be in reference to *Lepeoptheirus salmonis.*

For the time being, only the life cycle of *Lepeoptheirus salmonis* will be presented (Figure 1). It is important to have a working knowledge of the life cycle of the parasite, as some therapies only target certain stages of the life cycle and will be completely ineffective on the non-target life stages.

There are 2 stages of nauplii. These two stages make up the planktonic stages of the life cycle. At these stages, the sea lice are free floating in the ocean; they can vary their depths in the water column but cannot choose the direction of travel as they must go with the water current.

The copepodid stage is next and is the stage of the life cycle that first attaches to the fish. From this stage, the louse will moult into the first chalimus stage of the louse.

The chalimus stages of the louse are attached to the fish by a frontal filament. Once the louse moults through all the chalimus stages, it becomes a pre-adult, and then an adult louse.

The pre-adult and adult stages of the life cycle are both mobile stages – meaning the louse can freely move around on the fish – and are the stages that result in the damage to the fish as the parasite feeds off the fish.

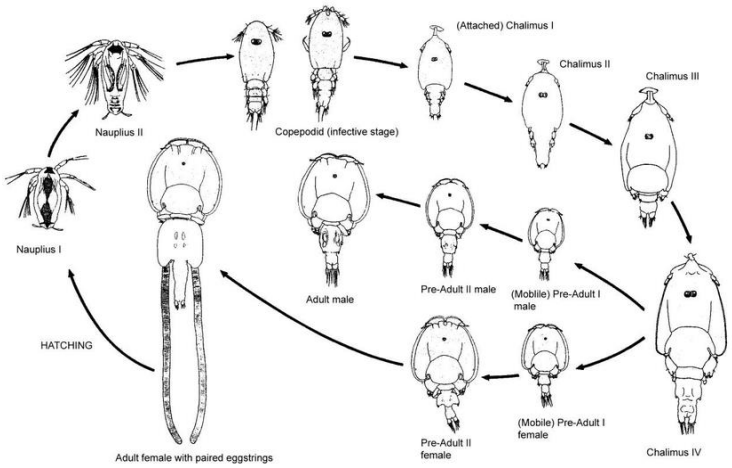


Figure 1:Life cycle of *Lepeoptheirus salmonis* *https://www.researchgate.net/figure/The-stages-in-the-life-cycle-of-the-sea-louse-Lepeophtheirus-salmonis-The-Nauplius-I_fig1_266489278*

In addition to recognizing the stages of the life cycle, it is also important to realize how much the effect of water temperature has on how quickly the louse progresses through its life cycle (Table 1). The lifespan of the louse is not known yet, but females have been known to live up to 210 days.

	5°C	15°C
Duration of egg stage	17.5 days	5.5 days
Duration of nauplius I stage	52 hours	9 hours
Time from attachment to sexual maturity	106 days	32 days

Table 1: Effects of temperature on life cycle (www.marine.ie)

1.3 Responsibilities

The Fish Health and Welfare Director is responsible for working with the Salt Water Production Director to ensure that the Integrated Pest Management Plan (IPMP) is implemented properly; to ensure that the IPMP is reviewed annually to keep strategies current; and to ensure that the Fish Health Unit (FHU) is properly trained and has the proper resources to fulfill their duties.

The FHU is responsible for providing direction to Mowi Canada East staff on any procedures relating to the IPMP. The FHU is responsible for assessing the IPMP and making decisions on how well therapies are working; deciding when an intervention therapy is required; scheduling of intervention therapies; and monitoring fish welfare during the lice season. The FHU is also responsible for ensuring all appropriate acts and regulations are followed.

The designated veterinarian plays a lead role in monitoring fish health and welfare of the fish at all times, including sea lice season. They are also responsible for monitoring lice levels and recommending intervention strategies to the FHU and area/site manager, should they be required.

The Development and Environmental Compliance Director is responsible for ensuring all appropriate site permits and licenses are in place.

The Freshwater Production Director is responsible for ensuring that high quality smolt are produced; for working with the Fish Health and Welfare Director to ensure that any freshwater facilities are properly set up for any intervention therapies that must be given during the freshwater phase; and for ensuring that freshwater staff are available to assist with any freshwater therapies, should there be a need.

The Saltwater Production Director is responsible for working with the Fish Health and Welfare Director to ensure that the IPMP is implemented properly and to ensure that saltwater staff have the proper training and resources to complete their responsibilities. They are also responsible for scheduling of vessels and resources required for treatments.

The regional manager is responsible for installing and maintaining any site equipment that may be required.

Each salt water area manager is responsible for ensuring saltwater staff have the proper training for sea lice monitoring. They are also responsible for ensuring all site managers in their area have a valid pesticide applicators license should the need for a pesticide intervention therapy arise.

Each site manager will be responsible for monitoring sea lice numbers and reporting these to the FHU. They are also responsible for monitoring and reporting any damage from sea lice on their fish.

Site staff are responsible for monitoring fish behavior and reporting anything of concern to their site manager.

2.0 Prevention

Prevention of sea lice settlements is always the main goal of the IPMP. Preventing infections from occurring results in healthier, stronger fish which in turn results in less need for intervention therapies. This is good for Mowi and good for the environment.

2.1 Location of Sites

Care will be taken to avoid siting any saltwater cage sites close to known wild salmon runs to avoid interaction of sea lice to/from wild fish.

2.2 Year Class Separation

All salmonid sites in NB and NL are subject to Bay Management Area (BMA) agreements. As part of these agreements, all sites will be stocked with one year-class only. Single year class sites assist in sea lice management by strengthening fish health, and easily allows for implementation of fallow periods (section 2.3). Healthy and strong fish are less susceptible to sea lice infections.

2.3 Fallowing

Fallowing refers to allowing a site to sit vacant of fish for a specified period. This allows for a break in the sea lice life cycle, thereby reducing the sea lice infection pressure in the area.

2.4 Husbandry

Good husbandry practices have a huge impact on fish health, and therefore can impact on the ability for fish to resist sea lice infection pressure. As such, Mowi Canada East will constantly strive to ensure that the best husbandry practices are instigated on their saltwater sites.

Examples of husbandry practices that can contribute to fish health include (but are not limited to) selective breeding, proper stocking densities, good nutrition and feeding practices, proper hygiene, and predator control.

2.5 Technology

Wherever possible, Mowi Canada East will invest in new technologies which aim to prevent sea lice settlements from occurring. Mowi will investigate new technologies as they become available to see if they are a fit for the IPMP (see section 5.0 Research and Development).

2.5.1 Lice Guards

Lice guards are a type of cage skirt that are designed to prevent the copepodid stage of lice from entering the sea cage, thus preventing them from attaching to the fish. This specialized piece of equipment has a mesh size that is small enough to prevent the free-flowing life stages (i.e. nauplius and copepodid) of lice from flowing through it.

Lice shields show no preference on which side they block the lice from (i.e. lice are blocked from flowing either direction). Care must be taken to time the installment of lice guards properly so as to install when there are no lice inside the cage (i.e. on the fish). If used

improperly, the lice guard can prevent nauplii or copepodids produced by lice inside the cage from exiting, thus creating a situation that amplifies the self-infection pressure within the cage.

2.5.2 Cleanerfish

The term cleanerfish refers to any species of fish that shows an affinity for removing ectoparasites (in this case, sea lice) from another fish. When choosing a species of cleanerfish, it is important to consider how well the cleanerfish reduces sea lice numbers, and how the pathogen profile of the cleanerfish overlaps with Atlantic salmon to ensure that there is minimal potential for pathogen transfer from cleanerfish to salmon.

Mowi Canada East is not currently employing the use of cleanerfish.

2.5.3 Mechanical "Treatments"

The term "Mechanical treatments" refers to any fish handling event where lice are removed from the fish by some type of mechanical equipment, rather than a chemotherapeutant. Examples of this type of technology include thermolicers, flushers, etc. The basic principle of these types of devices is that fish are pumped out of the cage and into the machine, the lice are separated from the fish, and then the fish are pumped back into the cage. In all of these types of equipment, lice are retained by some type of filter and disposed of on land (either composting facilities or biogenerator at New World Dairies). The mechanical treatments that Mowi Canada East utilizes are:

Thermolicer – the water that the fish enter inside the equipment is heated to a point where the fish can handle it but is lethal to the sea lice. It is important to realize that in thermolicers, it is not the water temperature itself that matters; rather, it is the change in temperature from ambient sea temperature to the heated water. In general, the change in water temperature should be 12 degrees Celsius or higher.

Flusher – the fish are pumped into a pipe that has water sprayers positioned all around the circumference of the pipe. These sprayers are pointed so that the spray is directed at the fish as it swims through the pipe. In essence, the sprayers act as a pressure washer to knock the lice off the fish.

3.0 Monitoring

3.1 Sampling Protocols

- Site Managers, with assistance from site workers, will normally conduct weekly (or as designated) sea lice counts.
- For counts, the fish will be anesthetized (TMS) to allow careful count detection of larval stages. Recognition of early life stages is essential for timely implementation of mitigation strategies.

- Ten fish from each cage will be sampled. These fish will be removed from the water and examined for lice and overall fish condition.
- Counts and observations as to life stages will be recorded and communicated to site management and the company veterinarian on the standard Sea Lice worksheet. The following categories will be counted and recorded for each fish:
    - Chalimus
    - Pre-Adult + Adult Males (PAAM)
    - Adult females (AF)
    - Caligus
- Water temperatures will be measured at 5 m below the surface to determine if counts can be performed.
- Minimum counts will be performed as follows, unless otherwise instructed by the FHU:
    - Lower than 5°C, counts will not be done to maintain the welfare of the fish during cold water temperatures (eliminate handling during high-risk period)
    - Higher than 5°C, counts will be done weekly
- In cold periods, handling fish to conduct sea lice counts can disturb the skin, scale and mucous layers of the fish being handled and lead to winter sores and secondary infections from *moritella* spp., *tenacibaculum* spp., etc.
- In periods of extremely high temperatures, handling of fish can cause excessive stress and mortality. In general terms, however, periods of extremely high temperatures tend to be short-lived and will only disrupt sea lice counting for brief periods of time.
- Given the importance of close monitoring of sea lice levels, we will generally err on the side of counting.
- Site staff will receive yearly training on identification of species, life stages and management strategies. Such training authority examples include (but are not limited to) government authorities, the Atlantic Veterinary College (AVC), and Mowi Canada East FHU (in house).

3.2 Data Reporting

Information regarding sea lice will be recorded as per the standard Sea Lice worksheet. This information will be used by the FHU to decide if any intervention methods are required.

Mowi Canada East participates in the Decision Support System (DSS) for the collection and study of sea lice settlement and treatment data with the Centre for Aquatic Health Services at the Atlantic Veterinary College (AVC) and other industry members both in NB and NL. This cooperative effort is intended to lead to a better understanding of the efficacy of sea lice management and control tools.

As part of this effort:

- Staff from AVC may visit from time to time to assist in sea lice counts.
    - All counts (completed by either AVC staff or site staff) will be submitted to the site management, the FHU and to the DSS system.
    - Site staff will provide transport to the site and give assistance to AVC staff, as necessary, to complete the counts
- Lice treatment data: date, method of treatment, compound used, and amount of compound used will be submitted to the DSS as the system develops.

Reporting will be done as per the Acts and Regulations in effect in the jurisdiction of the sites.

3.3 Count Audits

Any analysis of the IPMP is based solely on sea lice counts, thus it is critical that the sea lice counts are performed accurately. In addition to the sea lice count audits that the Atlantic Veterinary College may do, the FHU will perform sea lice count audits as well.

Annually, the FHU will perform a minimum of one sea lice count audit on every site. These audits will be entered into the DSS and any Mowi Canada East staff member who fails an audit will be required to undergo additional training prior to being allowed to conduct further sea lice counts. The type and amount of training required will be decided by the Fish Health and Welfare Director. As well, the Fish Health and Welfare Director has the final call as to when the staff member will be allowed to regain their role of performing sea lice counts again.

4.0 Intervention

The need for intervention will be based on accurate and timely lice counts and will only be under the direction of a company veterinarian.

4.1 Action Levels

Thresholds for control strategies will aim at preventing the development of gravid females.

Mowi Canada East will attempt to implement an intervention strategy if any of the following conditions is met:

- The average number of gravid females in a cage is 0.5 or higher
- The average number of mobile lice (PAAM + AF) is 3 or higher

Interventions will be made on a cage level, not a site level, and may be made sooner than the above situations if the FHU thinks it is necessary.

It is important to notice what different interventions are available for each BMA when choosing an intervention. For NL, the intervention strategies are as follows:

4.2 Therapeutants

Mowi Canada East will only use therapeutants that are authorized for use on food animal fish in the jurisdiction in which it is operating. Under no circumstances will a non-approved therapeutant be used. Furthermore, all withdrawal periods will be strictly adhered to. Under no circumstances will fish be sent for human consumption until all withdrawal periods have been met to ensure all seafood produced by Mowi Canada East is healthy and safe to consume.

Emamectin, salmosan, thermolicer and flushers are available in all BMAs. Generally, the thermolicer and flushers (described as mechanical treatments in Section 2.5.3) cannot work when air temperatures are significantly below freezing. Peroxide treatments are possible during Spring and Fall when sea water temperatures are between 8 and 12 degrees Celsius.

Any intervention therapy will be chosen by a licensed veterinarian, in consultation with the Fish Health and Welfare Director.

4.2.1 Lufeneron

Trade name: Imvixa®
Method of Action: Binds chitin synthase 1 in terrestrial arthropods causing inhibition of chitin biosynthesis of target louse; acts by preventing the louse from moulting to the next life stage. Effective against all moulting stages.
Method of administration: In-feed treatment fed at the freshwater stage for 7 days. It is severely toxic to aquatic life, so any solids excreted during the 1 week of treatment and the 1 week following treatment must be collected and disposed of properly.
Duration of action: ~9 months
Withdrawal period: 350 days
Special notes: Lufeneron is currently not approved for use in Canada. Available under Emergency Drug Release (EDR) from the Veterinary Drug Directorate (Health Canada).

4.2.2 Emamectin benzoate (EMB)

Trade name: SLICE®
Method of Action: It disrupts chloride ion movement and, hence, transmission of nerve impulses. The parasite stops feeding, becomes paralyzed and dies.
Method of administration: In-feed treatment fed at the saltwater stage for 7 days.
Timing of treatment: As needed throughout the lice season.
Duration of action: ~30 days (or less)
Withdrawal period: If used according to label directions, there is no withdrawal period in Canada. To ensure tissue residues do not exceed the maximum residue limit, Atlantic salmon should not be treated more than once in the 60 days prior to the first fish being harvested for human consumption (https://inspection.canada.ca/animal-health/livestock-feeds/medicating-ingredients/emamectin-benzoate/eng/1521217897188/1521217949734).
Special Notes: Sea lice have shown resistance to emamectin benzoate, thus if used, it is often used at doses higher than label instructions. Because of this, caution must be used when

determining withdrawal periods; lengthening the withdrawal period is recommended, as well as testing tissue samples prior to slaughter to ensure EMB residues are below MRLs.

4.2.3 Hydrogen Peroxide

Trade name: Interox® Paramove® 50, Aquaparox 50

Method of Action: Reactive oxidizer – Oxygen bubbles form within sealice causing temporary paralysis in lice. Does not kill lice, but rather dislodges motile stages of lice only. Also reduces egg string viability.

Method of administration: Bath treatment for 20-30 minutes; well boat or tarpaulin.

Timing of treatment: Spring and fall cleanup.

Duration of action: No residual effect. Re-infestation can occur immediately.

Withdrawal period: None

Special Notes: Hydrogen peroxide is hard on gill health; it should not be used if the gill health of the fish is already compromised. In addition, hydrogen peroxide should not be used if water temperatures are under 3°C or over 13°C. A pesticide applicators license is required.

4.2.4 Azamethiphos

Trade name: Salmosan®

Method of Action: Organophosphate that blocks acetylcholinesterase, causing paralysis and death.

Method of administration: Fully enclosed bath treatment recommended for 60 minutes (up to a maximum of 180 minutes); well boat or tarpaulin.

Timing of treatment: As needed throughout the lice season. Effective against motile preadult and adult lice only. Juveniles that may be present with the pre-adult and adult stages will develop in 10 to 20 days, when another population count should be performed to show whether a second treatment is necessary.

Duration of action: No residual effect.

Withdrawal period: 48 hours.

Special Notes: This product should be used as part of a rotational strategy in the medicinal treatment of sea lice to avoid development of resistance. Maximum 10 applications may be applied to a fish population per year, with a minimum 7 day reapplication interval between treatments.. A pesticide applicators license is required. "Azamethiphos should not be used under 5°C or over 17°C unless directed by a veterinarian. Use under 5°C should only be done in exceptional circumstances based on feedback from divers and general observations of fish behavior that lead to lice counts."Azamethiphos should be applied to salmon suffering from infestations with pre-adult and adult sea lice, before the stage at which serious skin damage is evident. Careful management and monitoring of oxygen levels is critical during treatment.

4.2.5 Therapeutant assessment

The FHU will assess the efficacy of each intervention treatment. Any treatment that results in clearance of over 75% of targeted life stages will be considered an effective treatment.

Any treatments that have resulted in less than a 75% clearance of targeted life stages will trigger an investigation as to why the clearance levels are less than expected. There are a variety of reasons why a treatment may have resulted in sub-optimal clearance:

- Incorrect dose
- Incorrect mode of administration
- Incorrect water temperature
- Spoiled product – incorrect storage or expired product
- Incorrect therapeutant choice for the targeted life stage
- Inaccurate lice count – Pre or post treatment
- Resistance

Note that resistance cannot be proven by any single treatment. Rather, resistance is shown by tracking trends of treatments over time. Therefore, the DSS becomes a valuable tool for assessing effectiveness of treatments. To avoid resistance, proper treatment rotation should be utilized (instead of relying on one single treatment), and the proper effective dose of each therapeutant should be used.

4.3 Harvest

Mowi Canada East will always place top priority on the welfare of the fish under its care. If ever the FHU determines that the lice levels on a given cage have increased to the point that the welfare of the fish is in jeopardy, and none of the available treatments are able to decrease the lice load to an acceptable level, then an early harvest is warranted. The decision to harvest a cage of fish early will be made by both the Salt Water Production Director and the Fish Health and Welfare Manager, with the final decision resting with the Fish Health and Welfare Director.

4.4 Euthanasia

In the extremely rare circumstance that the lice levels in a cage are high enough that the welfare of the fish is jeopardized, and no treatments can bring the lice levels down to a reasonable level, but the fish are not cleared for harvest because they have not met all withdrawal periods of their treatments, then the fish will be humanely euthanized. If a large-scale euthanasia event is warranted, it will be conducted in as humane a manner as possible, facilitating a rapid and irreversible loss of consciousness. All policies and procedures surrounding euthanasia will be written and approved by the Veterinarian. Although the method of euthanasia may vary depending on the circumstances, all methods of euthanasia used will be in compliance with the Canadian Code of Practice for the care and handling of Farmed Salmonids:

Table I.1 – Methods that are Acceptable or Unacceptable at Different Weight Classes

Primary Method	Secondary Step Required?	Fish Weight[1]		
		≤1 g	1g–500g	>500g
Maceration	No	Acceptable	Unacceptable	Unacceptable
Intentional overdose via immersion in anesthetic bath	Conditional[2]	Acceptable	Acceptable	Acceptable
Blunt force trauma to the head	Yes[3]	Unacceptable	Acceptable	Acceptable
Percussive stunning device	Conditional[4]	Unacceptable	Unacceptable[5]	Acceptable
Electrical stunning	Conditional[4]	Acceptable	Acceptable	Acceptable
Pithing	No	Unacceptable	Acceptable	Acceptable
Secondary Steps	pithing, exsanguination, decapitation, cervical transection, immersion in ice slurry			

The NFACC Code of Practice for the Care and Handling of Farmed Salmonids (salmon, trout, charr) will determine the indices for depopulation due to animal welfare concerns.

5.0 Research and Development

Mowi Canada East places a high priority on research and development. It is understood that the more tools that are used in the treatment rotation in the IPMP, the less likely that sea lice will develop resistance to any single treatment. Mowi Canada East will work with research partners in both academia and government to better understand sea lice dynamics and management tools. As with the rest of the IPMP, an emphasis will be placed on research into preventative methods rather than intervention methods.

6.0 Additional Operational Procedures

With the increase in water temperatures that the South coast of Newfoundland has been experiencing in the last few years, there has been a noticeable increase in the lice pressures at sea sites. For this reason, changes must be made to both operational and treatment strategies to counteract this growing pressure.

6.1 Cage Rigging

All cages, regardless of size, have been rigged to allow the deployment of tarp treatments on the cage. **Redacted – Commercially sensitive strategic procedural details that are registered with FFA.**

6.2 Training for Operational Staff

In line with 6.1 Cage Rigging, Mowi Canada East staff have received hands-on operational training. **Redacted – Commercially sensitive procedural details that are registered with FFA.** .

6.3 More Efficient Mortality Removal

To treat an entire pen and ensure that every last fish has been treated, a pen must be corked. This process cannot be completed if there is mortality collecting at the bottom of the net pen, as it weighs down the net and causes issues with the corkline. Thus, a delay in mortality removal also causes a delay in lice treatments. Strategies that will allow for more efficient mortality removal include:

- All nets have been modified with 15m cone, to allow for more efficient mortality removal in the bottom of the cone.
- All nets have been installed as to allow for diverless mortality removal systems.
- Lift-up systems have been modified to function properly, efficiently and reliable. This was accomplished through input with Mowi colleagues in other Business Units. Additional farms have access to ROV Foover systems for mortality removal as needed.
- A new mortality-specific vessel Equipped with large wells, totaling 108T capacity was brought under contract in 2023 (for period of 5 years), to be used in addition to other vessels in the event of a mass mortality incident.
-

6.4 In-house Bioassay Program

The FHU has underwent special training so that they can start doing in-house bioassays. This will allow the unit to do bioassays in the future, as required. In turn, this will better inform treatment selection decisions as more options become available to the industry.

6.5 Deployment of New Treatments

There are a few new treatments that MCE is exploring and hoping to trial in the 2023 season and future years:

- Freshwater treatments **– Redacted - Commercially sensitive procedural details that are registered with FFA.**
- Extended salmosan treatments **– Redacted - Commercially sensitive procedural details that are registered with FFA.**

Appendix 2 – Biosecurity Plan

Salmonid Biosecurity Management Plan
Mowi Canada East
Version 4.1

Doc. ID #	Revision	Date	Responsibility
SBMP – V 4.1		May 2023	Fish Health and Welfare Division

The information contained in this document contains sensitive commercial information and trade secrets of MOWI Canada East that is not publicly available. It is being provided to the Department of Fisheries, Forestry and Agriculture in strict confidence. Disclosure of this information can harm significantly the competitive position of MCE and undue financial loss to MCE.

Table of Contents

1.0 Biosecurity Policy and Practices - SW

Biosecurity is the ongoing process of identifying, evaluating and addressing actions or events in order to reduce the risk of disease transmission, to or from marine sites. ***These biosecurity practices may require modification with new information and technologies.***

1.1 General Daily Biosecurity Practices

- All site vessels are to be cleaned, scrubbed (with Greenworks or similar detergent) and disinfected (with Iodor or similar sanitizer) at the start and at the end of every day.
- Foot Baths are to be located for easy access and to be used by anyone boarding site vessels or work barges
- Footbaths are to be refreshed daily (Water should look like weak tea)
    - Iodor or any iodophor should be mixed at 100 to 200 mg/L with a ten-minute contact time. This contact time may be achieved through exposure to proper disinfectant concentration without rinsing with fresh seawater.
- As much as practicable, all site gear and personal gear should remain on site. All site gear, equipment or personal gear that leaves the site should be disinfected before returning to the site.
- Any site gear, equipment or personal gear that is moved between sites MUST be cleaned and disinfected before leaving one site AND again upon arrival at another site.
- Inflow wharves (Pool's Cove, Hermitage, Hr. Breton, Milltown) are to be used for all 'clean' material being transported to farm sites. Vessels using inflow wharves will be cleaned and disinfected prior to use at these wharves, according to operation agreement with FFA of use of those facilities.
- At other mixed-use wharves or facilities, vessels and vehicles will be cleaned and disinfected to reduce transmission of pathogens.
- All site staff are required to clean and disinfect their personal gear at the end of every day prior to leaving site.
- All feed will be stored in the proper wells on sites that have Steinsvik feed barge (or similar). On sites that do not have feed barges, feed must be stored in a cool, dry place and must be contained and always covered when not being administered to the fish.
- Predator control must be in place at all sites. In the marine environment this would include engineering controls (e.g. reinforced containment nets) and bird nets on the top of the cage.

Site biosecurity practices will be reviewed monthly by the Veterinarian or designate during their routine visit, as per the Biosecurity Audit Plan.

1.2 Farm Access

Vehicles, vessels, and visitors can be agents of contamination and can transmit disease from one farm to another.

- Access to farm sites will be controlled to provide a break between those outside influences such as predators, non-essential personnel, and vehicular traffic which may negatively affect the health of fish.
- A login sheet will be used at all sites to document any visitors (ie. non-site staff) to the site. This includes any Mowi Canada East employees who are not regular workers on site. See Appendix 4.1 for the SW Visitor Orientation and Sign in sheet.
- Any transport vessels coming to site will tie up at a designated spot (on sites with a feeding barge, vessels will tie up to the barge), and then use site specific vessels to access the site.
- Staff will be designated to a BMA. In the event that relief staff are required (ex. Sick leave, vacation coverage, etc), relief staff can only work in their designated BMA.
- The most efficient layout of farm sites will be used to facilitate the development and maintenance of controlled access zones.
- Exclusive 'in-flow' or 'clean' wharf facilities at Pool's Cove, Hermitage, Hr. Breton, and Milltown will be used as per the Wharf User Agreements.
    - BMA 1,2, and 3 will be serviced by Pools Cove Wharves
    - BMA 4 will be serviced from Wreck Cove and Harbour Breton
    - BMA 5 will be serviced from Harbour Breton
    - BMA 10, 11, and 12 will be serviced from Seal Cove or Harbour Breton
- No outside visitors will be allowed on site without prior approval from both the Saltwater Production Director and the Fish Health and Welfare Director. This includes service vessels such as wellboats.

1.3 Large Equipment Cleaning and Disinfection

- For maximum efficacy of disinfection, all objects must be thoroughly cleaned and free of all organic material prior to disinfection, using a detergent like Greenworks.
- As operationally practicable, vessels and feed rafts will be site specific. If necessary to move between sites, they will be disinfected before and after leaving the site.
- Dirty nets being transported to shore will be transported in a manner to minimize loss or spillage of organic matter and only to designated outflow wharves. Pickup of dirty nets will be done in a manner to reduce risk of contamination with clean areas, using contained transport vehicles and containers. Transport vehicles or containers that are used to transport dirty nets will be cleaned and disinfected at the end of each day.
- Nets will be cleaned of all organic material before disinfecting, either by a manual net cleaner on site, or by a Remote Operated Net Cleaner (RONC). Disinfection will be done at a facility using approved methods, presently at Newfoundland Aqua Services in Head, Bay d'Espoir. Land-based net washing will be performed as per MCE SOP SW-008 NL C&D of Nets and Newfoundland Aqua Services (NAS) Standard Operating Procedure. In the event of ISA, NAS will follow NAS SOP for Sites Under a Quarantine Order due to ISA.
- Large vessels entering from other provinces/countries will receive C&D prior to use in operations in NL. C&D and notifications will be performed, as required by AP-36 – Aquaculture Motor Vehicle, Vessel, Boat and Barge Biosecurity. Further guidance for third party vessels is provided in Appendix Biosecurity: Large Vessel Biosecurity Protocols (SW).

- To move vessels or large equipment from one BMA to another, prior approval is required from the Fish Health and Welfare Director.
- Vessels or large equipment can be moved from one site to another within the same BMA without prior approval, provided that the topside of the vessel is thoroughly scrubbed clean with Greenworks prior to disinfection with Iodor (250ppm for 10-minute contact time).
- Alternative products for cleaning and disinfection can be found in Table 1. If other products outside of the table are to be used, prior approval from the Fish Health and Welfare Director MUST be granted.
- Transport trucks will be designated to haul dirty OR clean loads – NEVER both.
    - Examples of dirty loads include:
        - Used site equipment – nets, weight balls, compensator buoys, etc.
        - Fish (harvest or processed)
        - Mortalities or Offal
        - Used pallets
        - Garbage
    - Examples of clean loads include:
        - Feed
        - Clean or new site equipment
- At the end of every production cycle, all the equipment on a site will be properly cleaned and disinfected:
    - Cages will be steam cleaned
    - Vessels and barges will be cleaned as vessels (see section 2. Travel Between Areas if the vessel or barge is to be moved to a different BMA)
    - All equipment will be cleaned and disinfected prior to be moved off of site, even if the equipment is just to be moved into storage until the next production cycle at the same site.
- All Cleaning and Disinfection processes are subject to biosecurity audits by the Fish Health Unit (FHU) – see section 1.7 Biosecurity Audits.

Table 2: Cleaning and Disinfection products

Disinfectant	**Strength**	**Dilution**	**Contact time**
Iodor, Premise, Wescodyne etc	250ppm	300mls/20liters	10 mins
Javex (cannot be used at marine site)	1,000 ppm	500mls/20liters	10 minutes
Virkon (can only be used with fresh water)	1%	250 grams/25liters (freshwater only)	10 minutes
Oxygerm (hydrogen peroxide/acetic acid/peracetic acid)	0.4%		5 minutes
Cleaning	**Strength**	**Dilution**	**Contact time**

Detergents	Green Works, Mr. Clean or similar	Strong	Use prior to disinfecting
Hot water & High Pressure	>65°C	N/A	>10 minutes

1.4 Fish Transfers

- Prior to transferring any fish, a pre-transfer health assessment must be completed and signed off by the designated veterinarian for the site. If fish are to cross a provincial border, then a Certificate of Health for Transfer is required.
- Transfer permits must accompany every lot of fish and be available for inspection.
- If trucks are to be used during the transfer, they must be thoroughly cleaned and disinfected prior to the transfer, between different sources of fish (ie. between different hatcheries), and after all transfers are over. See Appendix 4.2 for the SOP for Truck Tanker Disinfection.

1.5 Mortality Collection

- Daily mortality collection is done through the use of a Liftup system or ROV.
- At minimum, mortality is removed from the sea farms on a weekly basis.
- Alternative methods of mortality collection are used as needed.
- If divers are used, they will be accompanied or met on site-by-site management personnel.
- Site crew must wear site specific PPE. These items must be cleaned and disinfected at the end of mortality removal and stored on site. See Table 1 for cleaning and disinfection products.
- If divers are used, all associated equipment will be cleaned and disinfected prior to and after completion of their assigned tasks.
- Site crew should ensure that the collection vessels, personal apparel, and equipment used during the mortality collection is properly cleaned and sanitized before and after completion.
- Any gear not necessary for the mort collection should be removed from the collection vessel. All drains and scuppers in boats should be plugged for the duration of the collection to contain any spillage unless boat is equipped with flap-type scuppers. In this case, efforts will be made to contain any spillage and disinfect prior to discharge.
- If divers are used, divers should be disinfected in between cages as soon as the diver exits the cage (to allow contact time between cages).
- The vessel and all gear and equipment onboard must be thoroughly cleaned and disinfected immediately **after** the mortalities have been removed.
- Mort totes or tubs
    - Must be in good condition (no cracks or breaks).
    - Mort totes should not be filled more than ¾ full and the bungs are to be checked for tightness (or sealed by spot-welding) and proper fit to prevent spillage.
    - Mort totes should be clearly marked with company name

- No morts or moribund fish are to be released to the sea.
- Divers' suits and all dive gear must be disinfected upon completion of the dive.
- Cages with elevated mortality or known health issues will be dove last.
- If that more than one site is to be dove per day, older sites or sites with known fish health issues will be dove last.
- For specific information and SOPs on mortality collection, **please see the Fish Disposal Plan**

1.6 Mortality Disposal

- Following the collection, mortalities will be taken to the wharf (either as whole fish or as silage) where they will be held for storage (a layer of clean sawdust may be added as a bulking and odour control agent if morts are destined for composting) or transferred to large, sealed containers for eventual transport to the designated mort disposal facility.
- NO material other than mortalities (i.e. kelp, plastic wrap, mussel or other shells) are to be mixed with morts that are destined to be ensiled.
- All mort totes or boxes MUST be thoroughly cleaned and disinfected before being returned to the site. In addition, any mort tubs that are damaged or cracked will be taken out of rotation and disposed of. Only undamaged, fully intact tubs will be used for mortality collection.
- Every effort should be made to avoid transporting mortalities from one BMA to another. Mortalities should be stored in a separate area away from other wharf activities. Any mortalities that are being transported should be in leak-proof containers that have lids. Every effort should be made to ensure that mortalities are contained during transport.
- Under normal circumstance, no mortalities should be moved from one site to another. It is the responsibility of each site crew to bring their own mortalities back to the wharf for disposal.
- In the event of ensiler breakdown at remote sites where daily mortality removal to a wharf is not feasible, mortalities may be transported to a neighboring site within the same BMA for immediate processing.
- For greater detail, **please see The Fish Disposal Plan, Appendix 3.**

1.7 Bath Treatments

- Staff must recognize that bath treatments, and associated equipment, pose a potential risk of pathogen transfer.
- Wherever possible, equipment should be BMA specific (tarps, oxygen lines, etc).
- When not possible, equipment should be thoroughly cleaned and disinfected when moving from one site to another.
    - Well boats must be topside Cleaned and Disinfected. All wells must be cleaned, disinfected, and rinsed. Note that well boats are a vessel and as such, are subject to Section 2. Movement Between Areas

1.8 Harvest Disinfection Protocols

- Deck and equipment of all harvest vessels will be cleaned and disinfected prior to loading the fish.
- All harvest tubs will be disinfected and inspected for cracks or missing plugs prior to use.
- All harvest tubs will only be partially filled (see Harvest Protocols) to prevent spillage during transport. Plastic wrap will be used to prevent spillage during transport to processing facilities.
- A disinfectant hose or sprayer will be kept on hand to treat any spillage.
- All operations will be carried out in a manner to avoid any spillage or leakage of blood, slime, or scales.
- Prior to site departure after a harvest, all harvest tubs, harvest equipment, rain gear, gloves, boots, free deck, and side of boat under the dewatering box will be cleaned and disinfected.
- After offloading, the deck and other gear will again be disinfected, as well as the surface of the harvest wharf.
- Fresh water (not seawater) will be used to wash equipment where contact with saltwater should be minimized (vehicles, forklifts etc.).
- Blood water will normally be contained in tubs with the fish, transported & disposed of in an approved manner at St. Alban's or Harbour Breton processing plants.

1.9 Biosecurity Audits

Biosecurity audits will be conducted by the Fish Health Unit to ensure that proper biosecurity protocols are being followed by all Mowi Canada East staff members.

- All marine sites will have a thorough Biosecurity Audit once per calendar year. This includes:
    - Site inspection for cleanliness and adherence to procedures
    - Tracing of everything coming into site – staff, feed, treatments, etc
    - Tracing of everything leaving site – staff, mortalities, garbage, etc
    - Analyzing traffic patterns listed above to identify any potential cross track and mitigation measures for when cross track cannot be prevented.
- All major equipment moving between BMAs must be approved by the Fish Health and Welfare Director prior to movement. In order for this to occur, an Application to Move must be submitted to, and subsequently signed by, the Fish Health and Welfare Director. See Appendix 4.3 for the SOP for ATP Swabs.
- All sites are subject to the FFA Biosecurity Audit Plan. Visits for audits will be arranged through the Fish Health and Welfare Director.

1.10 Response Plan for a Biosecurity Breach

A biosecurity breach is any incident in which a pathogen is brought into a facility despite efforts to prevent as such. The movement of people, equipment and fish all have the potential to introduce pathogens. Mowi Canada East has strong procedures to prevent the introduction or movement of pathogens in facilities. MCE has implemented an

Incident and Crisis Management System (Doc ID# SCP-v4.1).A biosecurity breach can be identified through routine surveillance sampling or increased sampling in response to a change in fish behavior or mortality levels. The identification of a fish pathogen or the identification of biosecurity procedures not being followed are reported through the Incident and Crisis Management System. Where biosecurity procedures were not followed, but did not result in cross-contamination of a fish pathogen, the incident is a near miss.

The following key information is reported through the Incident and Crisis Management System:

1. What happened?
2. How did it happen?
3. Why did it happen?
4. Other relevant information/development of the incident
5. Corrective actions

In the event that fish are infected as a results of a biosecurity breach, the response is the implementation of increased fish health surveillance, treatment, and reporting for the disease. Any affected units will undergo full C&D before being restocked. Also a review of the contamination source in order to implement corrective measures that will avoid a reoccurrence.

In the event of a procedural error or gap related to biosecurity practices, the response is a review of the biosecurity procedures, communications and training. If a gap or need for improvement is identified, the response will be to update procedures, communications or training as needed to prevent a reoccurrence.

2.0 Biosecurity Policy and Practices – FW

Bio-security is the ongoing process of identifying, evaluating and addressing actions or events in order to reduce the risk of disease transmission, to or from different systems or tanks. ***These biosecurity practices may require modification with new information and technologies.***

2.1 General Daily Biosecurity Practices

- Foot Baths and hand sanitizers are to be located at all entry points into a building and easily accessible for use by all site personnel.
    - Footbaths and hand sanitizers are to be checked daily to ensure that they are filled and at proper concentrations.
    - Virkon aquatic solutions should be mixed at 10 g/L with a ten-minute contact time.
- As much as practicable, all site gear should remain on site. All site gear, equipment, or personal gear that leaves site should be disinfected before returning to site (see Table 1).

- Each system will have system-specific colour-coded gear. As much as possible, each tank within a system will have tank-specific nets. Separate nets should be used for mortality collection and live fish handling.
- A third-party contractor will look after pest control for every building on site. This contractor, as with every contractor, will be subject to guest protocols as outlined in Section 2.2 Farm Access
- No moist food will be permitted on site. All food will be dry, pelleted food that is contained small lot bags. Every effort will be made to store food in the system that it is destined for.
- All incoming well water will be degassed and all outgoing effluent water will have solids separated prior to release (see Appendix 4.4 for Stephenville's Policy on Water Flow)
- In the case of a quarantine order, a Licence to Move will be obtained prior to solid waste removal by a third party contractor. Specific protocols will be provided in the LTM application for approval before commencing removal of the material.

Site biosecurity practices will be reviewed monthly by the Veterinarian or designate during their routine visit, as per the Biosecurity Audit Plan.

2.2 Farm Access

Vehicles and visitors can be agents of contamination and can transmit disease from one farm to another.

- There will be limited access points to the facility where all staff, visitors and/or vehicles requiring entry onto site will undergo a disinfection process prior to entry.
- A sign will be posted at the entrance which notifies visitors that the site is a Biosecure Area and that visitors will be received by appointment only.
    - Pedestrian access will be through a biosecurity building with foot dips and hand sanitizers
    - Visitors will be given site specific guest boots and guest lab coat to be worn while on the property
    - Vehicle access will be granted only after the vehicle undercarriage and tires have been sprayed with disinfectant.
- No outside visitors will be allowed on site without prior approval from both the Fresh Water Production Director and/or the Fish Health and Welfare Director.
- A sign in sheet will be used to document all people entering the site (see Appendix 4.5 for the Land Based Sign in Sheet)
- All staff will change into site specific footwear upon entrance to the facility.
- Staff will all enter the facility through the same entrance, change into their site-specific gear and proceed to their designated system.
    - Lunch will be taken in designated lunch areas only
        - Fry, Smolt 1 and Smolt 2 facilities will use the lunchroom in the Fry building
        - Smolt 3 staff will use the lunchroom in Smolt 3
        - Post smolt staff will use the lunchroom in the Post smolt building

2.3 Equipment Cleaning and Disinfection

- Water systems are to be separated by biosecurity barriers (footbaths and hand wash stations).
    - Staff are required to go through a biosecurity barrier when moving from one system to another.
    - Whenever possible, staff should be assigned to a specific system so that movement from one system to another is limited.
- Each system will have designated equipment for use in that system only.
- Equipment must not be shared between systems to reduce the risk of cross contamination between fish groups.
- All equipment, including nets and brushes, must be disinfected with a 1% Virkon solution before and after every use.
- Once a system is emptied of all its fish, it will undergo a thorough cleaning and disinfection process:
    - All tanks and accessible equipment will be pressure washed
    - Caustic soda will be added to the system until the pH is 12.
    - The caustic soda solution will be allowed to run through the system (including biofilter) for a minimum of 24 hours prior to emptying into wastewater system
    - The system will be pressure washed again to remove any residuals
    - The system will be disinfected with Virkon
    - Once this process has been finished, it must pass an ATP swab test prior to new fish being ponded into the system (see Appendix 4.3 for SOP on ATP Swabs)
- Every effort should be made to avoid moving used equipment into the facility.
    - If it is required to do so, the equipment must be thoroughly cleaned, disinfected prior to entry into the site (see Table 1). Prior to installation into a system, it must have completed and passed an ATP swab test.

2.4 Fish Transfers

- Prior to transferring any fish, a pre-transfer health assessment must be completed and signed off by the designated veterinarian for the site. If fish are to cross a provincial border, then a Certificate of Health for Transfer is required.
- Transfer permits must accompany every lot of fish and be available for inspection.
- If trucks are to be used during the transfer, they must be thoroughly cleaned and disinfected prior to the transfer, between different sources of fish (ie. between different hatcheries), and after all transfers are over. See Appendix 4.2 for the SOP on Tanker Truck Disinfection.
- Fish movements through the facility must always be in the following order:
    - Incubation room
    - Fry systems
    - Smolt systems
    - Pumped onto transport trucks
- See Appendix 4.6 for the Stephenville Facility Site Plan

- Any hoses or pumps that are used for transferring fish from one system to the other (or from one system onto a transport truck) must be cleaned and disinfected between different lots of fish (see Table 1).

2.5 Mortality Collection

- Mortality removal from tanks will be conducted on daily.
- Mortalities will be collected in system-specific buckets that are not used for any other purpose.
- At the end of every day, mortality buckets will be brought to the on-site holding tub for further removal.
    - Once emptied, mortality buckets will be cleaned with a detergent (ex. Greenworks or Mr. Clean), rinsed, and then disinfected with a 1% Virkon solution
- Mort buckets must be in good condition (no cracks or breaks).
- Mort buckets should be clearly marked.
- No mortalities or moribund fish are to be released into the environment.

2.6 Mortality Disposal

- At the end of the day, all mortalities will be placed in holding tubs located on site for eventual transport to the designated mort disposal facility.
- No material other than morts shall be placed in mortality collection tubs.
- All mort tubs MUST be thoroughly cleaned and disinfected before being returned to site (see Table 1). In addition, any mortality tubs that are damaged or cracked will be taken out of rotation and disposed of. Only undamaged, fully intact tubs will be used for mort collection.
- For more details, **please see the Fish Disposal Plan, Appendix 3.**

2.7 Biosecurity Audits

Biosecurity audits will be conducted by the Fish Health Unit to ensure that proper biosecurity protocols are being followed by all Mowi Canada East staff members.

- All land-based sites will have a thorough Biosecurity Audit once per calendar year. This includes:
    - Site inspection for cleanliness and adherence to procedures.
    - Tracing of everything coming into site – staff, feed, treatments, etc.
    - Tracing of everything leaving site – staff, mortalities, garbage, etc.
    - Analyzing traffic patterns listed above to identify any potential cross track and mitigation measures for when cross track cannot be prevented.
- All sites are subject to the FFA Biosecurity Audit Plan. Visits for audits will be arranged through the Fish Health and Welfare Director.

2.8 Response Plan for a Biosecurity Breach

A biosecurity breach is any incident in which a pathogen is brought into a facility despite efforts to prevent as such. The movement of people, equipment and fish all have the

potential to introduce pathogens. Mowi Canada East has strong procedures to prevent the introduction or movement of pathogens in facilities. MCE has implemented an Incident and Crisis Management System (Doc ID# SCP-v4.1).A biosecurity breach can be identified through routine surveillance sampling or increased sampling in response to a change in fish behavior or mortality levels. The identification of a fish pathogen or the identification of biosecurity procedures not being followed are reported through the Incident and Crisis Management System. Where biosecurity procedures were not followed, but did not result in cross-contamination of a fish pathogen, the incident is a near miss.

The following key information is reported through the Incident and Crisis Management System:

1. What happened?
2. How did it happen?
3. Why did it happen?
4. Other relevant information/development of the incident
5. Corrective actions

In the event that fish are infected as a results of a biosecurity breach, the response is the implementation of increased fish health surveillance, treatment, and reporting for the disease. Any affected units will undergo full C&D before being restocked. Also a review of the contamination source in order to implement corrective measures that will avoid a reoccurrence.

In the event of a procedural error or gap related to biosecurity practices, the response is a review of the biosecurity procedures, communications and training. If a gap or need for improvement is identified, the response will be to update procedures, communications or training as needed to prevent a reoccurrence.

3.0 Travel Between Different Areas

There may be times when staff are required to travel from one area of the business unit to another. From a fish health perspective, different areas include (with proper numerical designation):

6. Broodstock
7. Freshwater
8. Saltwater
9. Saltwater (quarantined for FH reason)
10. Processing Plant

- Staff that are required to move from one area to another should have a separate set of work gear for each area. Under no circumstances should any uncovered clothing or PPE be brought from one area to another.

- Staff can move from one area to an area with a higher number designation without any restrictions (for example there is no restriction to go from a FW site to a SW site).
- If staff need to move from one area to an area with a lower number designation (for example moving from a processing plant to a saltwater site), a site-free period of 72 hours must be observed prior moving to the second area.
- Vehicles (personal or work-related) should be used for salt water OR freshwater; never both
    - If staff are required to travel between two different areas of production, rental cars should be utilized for one of the areas.
- In addition to the numerical areas set above, an off-site period of 72 hours should be observed if staff are moving from a site in one province to a site in another (regardless of their numerical designations).
- If there are any questions as to whether a 72-hour off-site period must be observed, staff are instructed to consult with a member of the Fish Health Unit for advice.
- Exceptions to this rule will be on a case-by-case basis and MUST be approved by the Fish Health and Welfare Director and either the Freshwater Production Director or the Saltwater Production Director.

Appendix Biosecurity: SW Visitor Orientation and Sign in Sheet

All visitors must be made aware of the following 4 categories.
Complete the checklist as individuals are presented with all necessary information.

1. PERSONAL PROTECTIVE EQUIPMENT (MANDATORY while on site) (√)

Personal Flotation Device (PFD)	
Hard Hat	
CSA Approved Safety Boots	

2. BIOSECURITY

Use of foot dip **immediately upon entering vessel** and as directed by NHSF staff	
Notification of any Aquaculture site(s) visited in previous 72 hrs **If yes to the above, please list site(s) by signature below.**	

3. LOCATION OF SAFETY EQUIPMENT

Life Raft		Emergency Flares	
Fire Extinguisher		Eye Wash Station	
First Aid Kit		Washroom Facility	

4. LOCATION OF EMERGENCY INFORMATION BINDERS

Material Safety Data Sheets (MSDS/SDS)	
MCE (NHSF NL Ltd./MHAC Inc.) Policies and Procedures	

By signing below, all parties acknowledge and understand the boat _____ orientation
(Vessel name)

that was presented at _____ on _____ by
(Site) **(Date)**

_____
(Employee Name, please print)

Appendix Biosecurity: SOP for Transport Tankers Disinfection

Transport Tankers Disinfection

Rationale
This procedure is used to disinfect tankers/box holds prior to fish transfers between freshwater sites and also prior to transfers between hatcheries and saltwater/well boats.

Responsibility
All staff preparing tankers/box holds for fish transfers will be responsible for the following procedure.

Description
Advance preparation

- Use a transport company dedicated to MCE transports.
- Use trailers and smolt transfer tanks dedicated to MCE transports only.
- Tractor unit is to be washed and disinfected prior to arrival at freshwater shipping station.
- The complete disinfection process is to be repeated for each individual freshwater facility or location (ex. Northampton, Cardigan, Dover, Stephenville NH Smolt ect.).
- The plan for transport personnel responsible for loading fish is to remain at originating site and separate personnel at receiving site.
- Designated 'clean' raingear, gloves and boots are to be worn by transport personnel.

Procedure (Tanker/Box holds and lines)

- Using a dosatron system and a 1% J-12 solution spray all exterior surfaces of the Truck and Tanker/box holds.
- Mix a 1% J-12 solution (i.e. 100ml J-12 in 9L water) in a portable sprayer.
- Spray all interior holding surfaces with the 1% J-12 solution while using a brush to scrub away any residue. Let sit for 10 minutes.
- Rinse interior surfaces with well water at the transport site.
- Over fill tanker with well water allowing all air lines and diffusers to be fully submerged. Add enough J-12 to reach a 1% solution and mix thoroughly allowing solution to overflow the overflow outlet valves and the inlet valves. Let sit for 1 hour.
- Drain and rinse the J-12 solution from tanker by filling with well water at the transport site.
- Isolate and fill lines/pipes with a 1% J-12 solution (i.e.100mL J-12 in 9L water). Let sit for ten minutes minimum, drain and flush with well water at transport site.

Procedure (Additional Items/Locations)

- After cleaning tanker holds, use a 1% J-12 solution and scrub brush to clean the 6" outlet tubes from both top and bottom.
- Use a brush and scrubbie with the 1% J-12 solution to clean the aluminum camlock caps.
- Test sterility level with ATP swabs and meter. Any test area reading >500RLU must be re-cleaned, disinfected and tested again.

Equipment

- New brushes, cleaning tools
- PPE including proper gloves (butyl rubber or nitrile), eye protection, clean raingear.
- Suitable chemical sprayer with clearly marked liter levels.
- Measuring cup
- ATP swabs and meter

Recordkeeping

- Disinfection logs with a place for a check mark verifying that each step has been done- then signed off at the bottom.
- Safety Data Sheets for products used.
- Chemical mixing directions.

Appendix Biosecurity: ATP Swab Test

Mowi Canada East

Standard Operating Procedure

ATP Swab Test

Date Effective: April 2023

Purpose

This Standard Operating Procedure (SOP) must be followed when completing an ATP Swab test on any equipment (boat, truck, tanks, barge, grader, counter, net etc.) that will be moved from one site or year class to another or coming in from external. The swab test will be done after cleaning and after disinfection.

Biosecurity internal and external/ risk of spreading pathogenic biological matter/ spread of disease: *Equipment should be site/year class specific, and movements should be avoided. Movements should only occur where absolutely necessary, at a high standard of biosecurity control.*

Accompanying Documents: "Application to Move Equipment" form

See Appendix A, this document must be partially completed online prior to the ATP Swab Test. It must be filled out by the manager of the location sending the equipment. Once the ATP testing has been carried out and passed by a trained member of staff and the results added to the application, the item is cleared for movement. The document must be emailed to the relevant parties detailed below. This document can and will be used to confirm the results of the test and will be kept as reference.

Responsibilities

- Site Managers must submit the Application to Move Equipment form and send completed document to relevant parties including but not limited to: Receiving Site Manager, All Health Team, Production Director (seawater and/or freshwater)
- Trained staff to perform the swabs and complete the Application to Move Equipment form

Health and Safety

Mowi Canada East is a strong advocate and supporter for safety in the workplace, therefore, the protocol for personal protective equipment is extensive. You should identify which items are required for the circumstance and speak to your manager if you are unsure.

- Hard hat
- Steel toe/ composite rubber work boots
- Personal flotation device with crotch strap (if vessel is in water)
- VHF handheld radio (working over water)
- Winter suit/Waterproof rain gear
- Gloves (if necessary)

Description

BEFORE GOING TO THE SITE

This process is started when a Site Manager submits an "Application to Move Equipment" form. Once the form is submitted, a trained member of staff will schedule a swab test.

Prepare a test kit to bring to the site

a. Place an ice pack into the bottom of a small cooler
b. Place several paper towels over the ice pack
c. Lay a pack of hygiena UltraSnap ATP Surface Test swabs on top of the layer of paper towel.
d. Bring the Hygiene SystemSure Plus.
e. Bring the Application to Move Equipment Form that was submitted by production staff

AFTER ARRIVING AT THE SITE

1. Review photos in Appendix 1 for guidance on SystemSure Plus
2. Locate the piece(s) of equipment that needs to be tested.
3. Give the equipment a thorough look over
    a. Make notes of the overall cleanliness on Part B of the "Application to Move Equipment" form
4. Turn on the Hygiena SystemSure Plus by pressing the red power button on the top left corner
5. A MINIMUM of FOUR swab test must be completed with each piece of equipment after cleaning and again after disinfecting
6. Choose 2 areas on the outside of the equipment and 2 areas on the inside of the equipment of perform the test
    a. Particular attention should be paid to areas of high traffic, e.g. handling, contact with fish (pipes, chutes)
    b. These areas should be spaced out over the equipment
    c. These areas may be in places that the person performing the test believe are hard to clean

7. Open a swab and rub the cotton tip along the surface being tested, only for a few seconds. Adequate pressure must be used to ensure thorough contact between the swab and the equipment surface. An area of 4 inch by 4 inch or 10cm x 10cm should be swabbed. Please see the instruction manual of the Hygiena SystemSure Plus for further instructions.
8. Put the swab back into the plastic casing and crack the top of the swab (opposite end of the cotton tip) where the solvent is held; squeezing the bulb several times to ensure ALL the solvent goes into the bottom with the tip of the swab
9. Gently shake the swab for TEN seconds
10. Place the swab, in the plastic casing, into the top of the Hygiena SystemSure Plus, close the top and press the OK button in the center
11. After 15 seconds the Hygiena SystemSure Plus will give a reading. Record this reading on the result page of the "Application to move equipment" file.

    AFTER CLEANING:

    - A reading **BELOW 40** is automatic PASS
    - A reading **ABOVE 40** is automatic FAIL

    AFTER DISINFECTANT

    - A reading **BELOW 10** is automatic PASS
    - A reading **ABOVE 30** is automatic FAIL

A reading between **11 and 29** is subject to approval from the Health Team, based on type of equipment and the area the equipment is moving from/to.

12. Complete steps 7-11 with at least other three swabs
13. Once the "Application to Move Equipment" form has been completely filled, send it to the relevant parties outlined above.

If the item passes the swab test, it is cleared for movement.

Notes:

If there is ANY DOUBT about whether an item should pass based on its physical condition, visible cleanliness or swab results, speak to a member of the Health Team

If there is ANY DOUBT regarding sampling locations, speak to ether Site Manager or a member of the Health Team

If the equipment fails the swab test, notify the manager that it did fail and that the whole equipment

must be cleaned and disinfected again before another swab test can be performed.

Review photos below for guidance on ATP swab use

Records: Application to Move Equipment form

Appendix 1

Step 1 – Turn on machine
and locate swab

Step 2 – Remove swab from tube
and swab a 4x4inch area applying gentle pressure.

Step 3 – Replace swab in tube and
bend the bulb over to release the liquid

Step 4 – Swirl the liquid around the swab for 10seconds

Step 5 – Insert swab into device

Step 6 – Press 'OK' and system will count down from 15 to give a reading

Appendix Biosecurity: Stephenville Policy on Water Flow

Northern Harvest Smolt Ltd.
Stephenville Hatchery

Policy Name: Flow of Water from Well to Effluent
Policy Number: 034
Date: 2016-09-30
Date Reviewed or Revised: 2024-11-17
References: Andrew Skanes

Policy Statement: Northern Harvest Smolt Ltd. (NHS) Stephenville hatchery uses well water as regulated by the provincial Government of Newfoundland and Labrador issued Water Use Licenses WUL-23-13191. NHS hatchery is a 98% recirculating system.

Purpose and Scope: The purpose of this standard operating procedure is to describe the flow of water from the well through the systems and finally to the effluent building.

Definitions and Clarifications: N/A

Procedure: Northern Harvest Smolt Ltd. (NHS) uses three separate wells to access water in an aquifer. Each well contains a pump which can be activated using a variable speed drive control located in a central well house.

Once pumped from the well the water continues gravity fed to the facility. Each of the three buildings has a well water line which is separated into each of the 8 isolated systems. The water is introduced into the reservoir of each system. From the reservoir the water is then pumped to a degassing chamber. The unwanted gas e.g. carbon dioxide has been removed from the water oxygen is then gravity fed to the water with a low head oxygenator (LHO). From the LHO the water is gravity fed separately to each of the system tanks. The water exits each tank through the swirl separator then to a drum filter. From the drum filter (Fairvre) the water is channeled through a moving bed bio-filter where ammonia is removed before returning to the reservoir. In addition to the filtration mentioned above each reservoir has installed in a side stream configuration, a bead filter (Aquaculture Engineering) which filters water, treats it with Ultra Violet (ETS) light and returns it to the reservoir.

All waste water or excess water is shed from each system via an overflow pipe in the reservoir or the bottom drain on each swirl separator. This water travels through underground pipe to the waste water building at the rear of the property. In the waste water building, the water is filtered through a 80µM micron drum filter. After filtration through the primary waste water building, the water is piped underground a second time to a secondary waste water building for polishing. The water is filtered through a 37µM micron drum filter and UV disinfected before travelling through a discharge pipe into Bay St. George. The waste gathered by the drum filters are stored in 2 3785 litre storage tanks which are pumped out by Gales Septic Cleaning Ltd as needed or on a quarterly basis. The waste from each storage tank is taken to Gales own facility where it is prepared and disposed of as per local regulations. Gales introduce certain additives to the lagoon in order to bread down any waste. The remaining waste material is not removed from their site.

Authority: Aaron Bennett **Signature:**

Appendix Biosecurity: Land Based Sign-In Sheet

Date: _____

Biosecurity Sign In Sheet

Name	Company	Reason For Visit	Time In	Time Out	Radio #	Radio Returned

Northern Harvest Smolt Ltd.
P.O. Box 39, 15 Connecticut Dr., Stephenville, NL, A2N-2Y7
[redacted]

Appendix Biosecurity : Large Vessel Biosecurity Protocols (SW)

Large Vessel Biosecurity Protocols (SW)

This document has been drafted to provide third party suppliers a guide on what Mowi Canada East expects from you when visiting our marine sites. If anything is unclear, do not hesitate to reach out to our Fish Health and Welfare Director to clarify any questions you may have.

1. Prior to Accessing Site

The following items are required to be complete prior to entering our site boundaries:

- Allow 72 hours between visiting a different aquaculture company and a Mowi site.
- Ensure that your vessel is cleaned and disinfected according to Section 2: Vessel Protocols prior to entering site boundary.
- Mowi specific personal gear is to be worn on any of our sites. Personal gear refers to personal flotation device, rubber boots, hard hat and rain gear (if required). If items have been worn on a different company's site, they should not be brought onto site with you, even if you will not be wearing them.
    - Furthermore, if your staff will be working directly with fish, then BMA specific gear should be worn.
    - All personal gear should be clean and free of debris before starting each day. If handling fish, then it should be cleaned and disinfected at the end of the day (if you are unsure, please ask the site manager).
- Be aware that if you are accessing our site with your own vessel or gear, Mowi reserves the right to do a biosecurity audit of your vessel or gear. This may include taking swabs to verify cleanliness of the item prior to arriving on our sites.

Upon entering site, you will need to fill out a Visitor's Orientation.

2. Vessel Protocols

Depending on the Operational Circumstance, various levels of cleaning / disinfection will be required on your vessel, as outlined below:

OPERATIONAL CIRCUMSTANCE	Stage 1	Stage 2	Stage 3
Arrival and departure from Canadian waters	√	√	√
Within BMA – Operating on a site / between cages	√		
Within BMA – Moving between sites	√	√	
Between BMA's – Moving from one BMA to another	√	√	
Moving between provinces	√	√	√

Stage 1:

- Brush / clean solids from all surfaces.
- Use either a mild detergent solution (Greenworks or Dawn) or a hot-water pressure clean (greater than 2000 psi at a temperature greater than 60^{o}C with detergent/degreaser) to remove organic material from the following areas:

- deck and railings
- wells and pumps (if applicable)
- equipment

- After cleaning, spray the above items with a disinfectant (see approved list below) and either leave on permanently, or wait 10 minutes prior to rinsing off.
- Clean and Disinfect personal gear
- Complete the checklist

Stage 2: Complete Stage 1 and carry out the following additional tasks:

- Internally inspect, clean, and disinfect any fish pumps or fish lines, being sure to clean all organic material from it before carrying out the normal disinfection procedure.
- Disinfectant is recycled through pump for a contact time of 10 minutes
- Steam clean and disinfect the deck, well and hull above the waterline.
- Deck lines are submerged in disinfectant for >10 minutes
- Complete the checklist
- Sign the checklist with copies to be retained/distributed as follows:
  - Retained In the vessel disinfection log and kept on board at all times
  - Copied to site manager and Fish Health and Welfare Director for auditing

Stage 3: Complete all of Stages 1 and 2 plus the following additional tasks:

- Slip the vessel, clean and disinfect the hull below the waterline.

Other Requirements:

- If a disease is detected on a site, the Fish Health and Welfare Director will provide instructions on how your vessel may or may not interact with that site. Any special biosecurity protocols will be given at that time.
- The Fish Health and Welfare Director must be given as much notice as possible when a Stage 3 cleaning is anticipated so that a biosecurity audit can be arranged.
- Approval must be granted from the Fish Health and Welfare Director prior to the vessel moving between provinces and/or countries.

Approved Disinfectants

- Iodophor (ex. Wescodyne, Iodor) at minimum of 100ppm
- Peroxide/Peracetic Acid (ex Oxygerm) at a minimum of 0.5%
- Sodium hypochlorite (ex Javex) at a minimum of 100ppm
  - Note – cannot dispose of this disinfectant at sea; only use on land or if disinfectant can be contained and brought back to land
- Potassium Peroxymonosulfate (Virkon Aquatic) at a minimum of 1%
  - Note – can only be mixed with freshwater. Cannot be mixed with saltwater

3. Checklist (if you have your own vessel specific checklist, this can be used as well)

Stage I	Sign	**Stage II & III**	Sign
Cleaning		**Disinfection**	
MSDS sheets present and crew have been informed		MSDS sheets present and crew have been informed	
Hull below waterline		Hull below waterline	
Hull above waterline		Hull above waterline	
Wells		Wells	
Grid plates		Grid plates	
Pumps (including vacuum pump)		Pumps (including vacuum pump)	
Bilge pumps		Bilge pumps	
Sea valves		Sea valves	
Deck		Deck	
Railings		Railings	
Bulkhead/casing		Bulkhead/casing	
Hatches and covers		Hatches and covers	
Derrick		Derrick	
Crane		Crane	
Ladders		Ladders	
Counting table		Counting table	
Ballast tanks		Ballast tanks	
Other equipment (specify): O_2 Monitoring Systems		Other equipment (specify): O_2 Monitoring Systems	
COUNTERS		COUNTERS	
Water temperature used:		**Detergent used:**	
Disinfectant used:		**Contact Time:**	
Disinfectant concentration measured:		**How measured:**	

***If stage III see veterinary report and verification from shipyard.**

I, ……..……. (Name & Signature) Skipper of the vessel:…….., have overseen the Cleaning and Disinfection procedures outlined above:

SIGNED :.....(Person responsible for cleaning)

NAME: …… (Printed)

DATE : ……

Appendix Biosecurity: Cleaning and Disinfection Protocols

CLEANING AND DISINFECTION PROTOCOLS

I. Purpose

The purpose of these protocols is to minimize the risk of spreading disease both within the site itself and minimize the risk of spreading infectious disease between sites within the same geographical area.

II. Process

Clean the item with either a steam pressure washer or a detergent based solution (as listed in Table 1).

After all of the organic materials have been removed from the item, disinfect the item with a disinfectant as listed in Table 1.

For specific instructions on items, please see Table 2.

Table 1: Disinfectant / Cleaning alternatives

Disinfectant	**Strength**	**Dilution**	**Contact time**
Iodor, Premise, etc	250ppm	300mls/20liters	10 mins
Javex (cannot be used at marine site)	1,000 ppm	500mls/20liters	10 minutes
Virkon (can only be used with fresh water)	1%	250 grams/25liters (freshwater only)	10 minutes
Cleaning	**Strength**	**Dilution**	**Contact time**
Detergents	Green Works	Strong	Use prior to disinfecting
Hot water & High Pressure	>65°C	N/A	>10 minutes

Table 2: Disinfection Process

Procedure	
Disinfection of PPE	Clean with detergent. Rinse. Spray down with Iodor (250ppm) and let soak for 10 minutes
Disinfection of Deck and Gunwales of vessel	Clean with detergent. Rinse. Spray with Iodor(250ppm) then scrub in with brush and let soak for 10 minutes
Foot Dips	Step in with both feet (Iodor bath at 250ppm), stop for 10 seconds then step out of bath
Disinfection of mort bag (between cages)	Soak in an Iodor (250ppm). Alternate bags for each cage so each bag soaks for 10 minutes between uses.
Mask, fins and dive tank disinfection	Clean with detergent. Rinse. Submerse in Iodor (250ppm) bath for 10 minutes
Mort pans	Clean with detergent. Rinse. Spray with Iodor (250ppm) and brush around and let soak for 10 minutes

Appendix 3 – Fish Disposal Plan

Fish Disposal Plan
Mowi Canada East
Version 4.1

Doc. ID #	Revision	Date	Responsibility
FDP – V 4.1		May 2023	Fish Health and Welfare Division

The information contained in this document contains sensitive commercial information and trade secrets of Mowi Canada East that is not publicly available. It is being provided to the Department of Fisheries, Forestry and Agriculture in strict confidence. Disclosure of this information can harm significantly the competitive position of MCE and undue financial loss to MCE.

Table of Contents

1.0 Introduction

This Fish Disposal Plan includes all options available to Mowi Canada East for mortality disposal. The standard practice for mortality disposal at MCE sites in BMA's 1, 2,3,4 and 5 is to ensile mortalities and then transport silage to New World Dairy.

2.0 Fish Disposal – Normal Activities

Mortalities from normal activities will be disposed of at New World Dairies (NWD) anerobic digestor. NWD can accommodate 170 mt of material per week and accepts silage and whole fish. NWD has a Certificate of Approval from the Department of Municipal Affairs and Environment to accept waste from aquaculture facilities.

2.1 Mortality Collection (Freshwater)

- Mortality collection will be conducted at least once each day. Every effort will be made to collect mortalities from tanks twice or more per day, as time allows.
- Nets and equipment used for mortality collection should be system-specific
- Nets and equipment used for mortality collection should be disinfected between each tank
- Unless approved by the site manager, staff will be designated to a specific system, and therefore only retrieve mortalities from their own designated system.
- The gear and equipment must be thoroughly cleaned and disinfected immediately **after** the mortalities have been removed.
- Mort totes or tubs
    - Must be in good condition (no cracks or breaks).
    - Mort totes should not be filled more than ¾ full and the bungs are to be checked for tightness (or sealed by spot-welding) and proper fit to prevent spillage.
    - Mort totes should be clearly marked as "Mortalities Only"
- Care should be taken to ensure that all mortalities are placed into the mortality collection tubs, and not onto the floor surrounding the mortality collection tub.

Tanks with elevated mortality or known health issues will be collected last.

2.2 Mortality Collection (Saltwater)

Diving

- Daily mortality collection is done through the use of a Liftup system or ROV.
- At minimum, mortality is removed from the sea farms on a weekly basis.
- Alternative methods of mortality collection are used as needed.
- Mortality dives will be conducted at least once each week, provided weather, water temperature and other environmental conditions are suitable. Every effort will be made to dive all sites twice a week, logistics depending. Diving SOP can be found in Appendix 1.
- Divers will be accompanied or met on site-by-site management personnel.

- Divers should maintain separate dive suits and gear for each site or ensure thorough disinfection between sites where this is not possible. At minimum, a separate dive suit per BMA is required.
- Site crew should ensure that the dive vessels, personal apparel, and equipment of the divers is properly cleaned and sanitized before and after the dive at their site.
- Any gear not necessary for the mort dive should be removed from the dive vessel. All drains and scuppers in boats should be plugged for the duration of the dive to contain any spillage unless boat is equipped with flap-type scuppers. In this case, efforts will be made to contain any spillage and disinfect prior to discharge.
- Divers should be disinfected in between cages as soon as the diver exits the cage (to allow contact time between cages).
- The vessel and all gear and equipment onboard must be thoroughly cleaned and disinfected immediately **after** the mortalities have been removed.
- Mort totes or tubs
    - Must be in good condition (no cracks or breaks).
    - Mort totes should not be filled more than ¾ full and the bungs are to be checked for tightness (or sealed by spot-welding) and proper fit to prevent spillage.
    - Mort totes should be clearly marked with company name
- No morts or moribund fish are to be released to the sea.
- Divers' suits and all dive gear must be disinfected upon completion of the dive.
- Cages with elevated mortality or known health issues will be dove last.
- If more than one site is to be dove per day, older sites or sites with known fish health issues will be dove last.

Lift-up systems

- Mortality collections will be conducted at least twice each week, provided weather, water temperature and other environmental conditions are suitable. Every effort will be made to collect mortalities daily, logistics depending. Lift-up System SOP can be found in Appendix 1.
- Site crew should ensure that the mortality collection vessels, personal apparel, and equipment used for mortality collection is properly cleaned and sanitized before and after the dive at their site (see Biosecurity Plan).
- Any gear not necessary for the mort collection should be removed from the vessel. All drains and scuppers in boats should be plugged for the duration of the collection to contain any spillage unless boat is equipped with flap-type scuppers. In this case, efforts will be made to contain any spillage and disinfect prior to discharge.
- The vessel and all gear and equipment onboard must be thoroughly cleaned and disinfected immediately **after** the mortalities have been removed.
- Mortality totes or tubs
    - Must be in good condition (no cracks or breaks).

    - Mort totes should not be filled more than ¾ full and the bungs are to be checked for tightness (or sealed by spot-welding) and proper fit to prevent spillage.
    - Mort totes should be clearly marked with company name
- No mortalities or moribund fish are to be released to the sea.
- Cages with elevated mortality or known health issues will be collected last.

2.3 Mortality Disposal

Trucking

- Following collection, mortalities collected in tubs will be taken to a collection area where they will be held for storage (a layer of clean sawdust may be added as a bulking and odour control agent if morts are destined for composting) or transferred to large, sealed containers for eventual transport to the designated mort disposal facility. Trucking SOP can be found in Appendix 1.
- All mort totes or boxes MUST be thoroughly cleaned and disinfected before being returned to the site. In addition, any mort tubs that are damaged or cracked will be taken out of rotation and disposed of. Only undamaged, fully intact tubs will be used for mortality collection.
- Every effort should be made to avoid transporting mortalities from one BMA to another. If mortalities must be moved, they should only move from a younger BMA to an older BMA, not vice versa. Furthermore, mortalities should be stored in a separate area away from other activities. Any mortalities that are being transported should be in leak-proof containers that have lids. Every effort should be made to ensure that mortalities are contained during transport.
- Within one BMA, for efficient use of resources, a single vessel may be used to collect mortalities from all sites for delivery to the wharf. If this is required, the vessel will not perform any other operations other than mortality transport. Once mortalities have been offloaded to the wharf, the vessel will perform a full C&D before returning to site.
- Once enough mortality tubs have been collected to constitute a full truck load, a third-party transport truck will be loaded with mortality tubs via a forklift.
- The truck will travel to the disposal site for dumping.
- Once mortalities are dumped, the truck and all mortality tubs will be cleaned and disinfected prior to returning to the wharf.

Ensiling

- Following collection, mortalities collected in tubs will be taken to the ensilage location where they will be immediately ensiled according to the site's Ensiling SOP, Appendix 1.
- NO material other than mortalities (i.e. kelp, plastic wrap, mussel or other shells) are to be mixed with morts that are destined to be ensiled.
- All mort totes or boxes MUST be thoroughly cleaned and disinfected before being returned to the site. In addition, any mort tubs that are damaged or cracked will

be taken out of rotation and disposed of. Only undamaged, fully intact tubs will be used for mortality collection.

- Every effort should be made to avoid transporting mortalities from one BMA to another. If mortalities must be moved, they should only move from a younger BMA to an older BMA, not vice versa. Furthermore, mortalities should be stored in a separate area away from other activities. Any mortalities that are being transported should be in leak-proof containers that have lids. Every effort should be made to ensure that mortalities are contained during transport.
- Under normal circumstance, no mortalities should be moved from one site to another. It is the responsibility of each site crew to bring their own mortalities back to the wharf for disposal.
- In the event of ensiler breakdown at remote sites where daily mortality removal to a wharf is not feasible, mortalities may be transported to a neighboring site within the same BMA for immediate processing. If this is necessary, the mortality transport containers will be subject to C&D before entering the neighboring site for ensiling. While the mortalities are entering the ensiler, the deck of the transport vessel will be C&D. Once the containers are empty and all mortalities have been ensiled, they will be C&D and moved back onto the transport vessel to return to the original site.
- Once mortalities have been ensiled, the ensilage will be transported via trucking in IBCs to the mortality disposal site.

3.0 Fish Disposal – Reportable Disease Events

3.1 Reporting

- For a list of Federally Reportable Diseases, please see: https://inspection.gc.ca/animal-health/aquatic-animals/diseases/reportable-diseases/eng/1322940971192/1322941111904
- As soon as a reportable disease is suspected, both the Canadian Food Inspection Agency and the Chief Aquaculture Veterinarian will be notified.

3.2 Self Quarantine

- The designated site veterinarian should institute self-quarantine procedures until the suspected disease is either confirmed or disproven.
- If a site is confirmed to have the suspected disease, then SOPs will be submitted to the province for approval by the Chief Aquaculture Veterinarian.
    - SOPs will change depending on the disease suspected/confirmed and will vary by site and life stage of the fish diagnosed.

3.3 Official Quarantine

- Depending on the disease diagnosed, either the CFIA or the FFA will place a quarantine on the site.
- All SOPs and protocols that have been approved by the regulating body will be strictly followed at all times.

- No staff or equipment will move to/from the site without approval from the Fish Health and Welfare Director
    - Approvals will be only granted once a License to Move has been received from the regulating body

- Mortality removal under quarantine conditions will be subject to a site-specific approved SOP but will adhere to the following basic principles:
    - Lowest mortality cages morted first
    - Equipment that has contact with cage or it's contents (divers, ROV, dip nets etc) will be disinfected between cages
    - Mortality storage containers will have secure lids/closure during storage and be subject to full C&D.
    - Transport to the wharf will only occur upon receipt of an LTM.
    - During transport of mortalities to the wharf, containers will be full C&D once on the transport vessel. After offload, the vessel deck and topside will be subject to full C&D.

    - If mass mortality removal is required during a quarantine situation, then the general process in Fish Disposal: Mass Mortality Contingency Plan, section 6.12 will be followed but with disinfection of any equipment between cages and starting at the lowest mortality cage first.
    - If, under quarantine conditions, a large-scale euthanasia event is warranted, it will be conducted in as humane a manner as possible, facilitating a rapid and irreversible loss of consciousness. All policies and procedures surrounding euthanasia will be written and approved by the Veterinarian. Although the method of euthanasia may vary depending on the circumstances, all methods of euthanasia used will be in compliance with the Canadian Code of Practice for the care and handling of Farmed Salmonids. Farmed Salmonids Code of Practice. All equipment used during a cull under quarantine conditions will be subject to full C&D between cages and will include but is not limited to: dip nets, seine and exactics. When task is completed, the topside of vessel and all equipment used will be fully C&D.

Appendix Fish Disposal: Standard Operating Procedures

Mortality Removal by Divers Marine Sites

Purpose

The purpose of these protocols are to remove mortalities by the means of diving at a marine site in a manner that promotes biosecurity.

Responsibility and Authority

- The Fish Health and Welfare Director will review these procedures annually and make changes if necessary.
- Site managers are responsible for ensuring mortality removal is conducted at least once per week as per the Fish health Management Plan and that the following procedures are followed.
- Site staff must brief the dive team on any known hazards or special instructions prior to commencing the dive. The Dive Leader must ensure that the divers are following all provincial regulations.

Personal Equipment

In addition to standard safety equipment required for all MOWI employees the additional equipment is required for mortality removal:

- Rubber pants and rubber jacket
- Rubber gloves

Description

Preparing for the dive

- The divers are contacted the day before via email by the dive coordinator to schedule the dive.
- The divers arrive at the site and tie up to the feed barge and wait for the vessel they are diving from to pick them up
- The site crew must have on all the PPE listed above before starting the mortality dive.
- Any equipment that is not required for the dive will either be removed (ideal) from the dive vessel or covered (if it cannot be removed).
- The dive gear is transferred from the transport vessel to the dive vessel.
- The weight belts and fins are placed in a tote box filled ¾ full of an Iodor solution consistent with strong tea.
- Two tote boxes are filled ¾ full of an Iodor solution consistent with strong tea.
- In each of the totes with the Iodor solution, a mortality retrieval bag is placed for disinfecting. The purpose of two is so that they can be rotated between cages giving each one more contact time in the Iodor solution.
- The divers will don their gear in preparation for the dive.

During the Dive

- The dive vessel ties up to the cage they are going to dive on.
- The site crew unties and pulls back the bird net.
- The fish net is untied and left hooked on to the hooks on the rail of the cage.
- Before the diver enters the cage he is disinfected with an Iodor solution (250 ppm).
- The site crew now lowers the fish net down to allow the diver to enter the cage.
- The diver is handed one of the mort retrieval bags from the tote containing the water and Iodor solution.
- Once the diver is in the cage, the fish net is then raised and hooked to the rail of the cage.
- When the diver resurfaces the fish net is lowered and the site crew take the mort retrieval bag containing the mortalities and place them in a tote box. This is done either by hand or by using the crane depending on the number of mortalities.
- The mortality retrieval bag is placed back in the tote containing the Iodor solution.
- The diver then exits the cage and gets back in the boat where he or she is again disinfected with an Iodor solution.
- The site crew ties the fish net and the bird net to the rail of the cage.
- The vessel is untied and moved to the next cage to be dove on.
- While the diver is diving in the next cage, the mortalities are classified by the site manager (or trained designate) and recorded on a mortality classification sheet. They are then placed in a mortality tub that has no cracks and a tight fitting bung so that there are no leaks.
- These steps are repeated until all cages have been dove and the dive is complete.

Finishing the Dive

- The dive is now complete.
- The outside of all of the mortality totes is scrubbed with a mild detergent showered with Iodor solution using the watering can and carried back to the wharf.
- The divers scrub their gear with a mild detergent (such as Green works) and then are disinfected with an Iodor solution.
- They remove their dive gear and place it in a tote that contains a water and Iodor solution.
- After a 10-minute contact time, the gear is removed from the iodor solution and placed in transport containers.
- The site staff scrubs their gear with a mild detergent (such as Green Works) and then are disinfected with a Iodor solution (250 ppm).
- The staff scrubs all equipment used for the dive, (mort bags, totes, deck of the boat) with a mild detergent (such as Green Works) and then are disinfected with a Iodor solution (250 ppm).
- The outside of the containers are scrubbed with a mild detergent (Greenworks) and disinfected with an Iodor solution (250 ppm) and placed into a transport vessel.
- Any Iodor solution is neutralized with sodium thiosulfate prior to dumping:
    - Add sodium thiosulfate to the Iodor solution. Once the solution turns colour from brown to clear/white, the titration is complete and the solution is neutralized.

- The dive supervisor fills out the dive sheet and it is signed by him or her and signed by the site manager or designate.
- The divers and the mortality tubs are transported back to a designated wharf.
- At the wharf, the totes containing the mortalities are transported using forklift by a certified forklift driver to a designated holding spot until such a time they can be picked up and transported to a disposal facility.
- The forklift is then steam cleaned and disinfected with a Iodor solution (250 ppm).
- The fork lift operator cleans his PPE with a mild detergent (such as Green Works) and disinfects with a Iodor solution (250 ppm).
- The transport vessel is then scrubbed with a mild detergent (such as Green Works) and disinfects with a Iodor solution (250 ppm).
- Once back on land, the site manager will enter the mortality data into Mercatus.

Records

- Mortality Dive Worksheet
- Dive Company Dive Reports
- The number of mortality tubs filled will be recorded on the Daily Site Records (DSR).

Approved by FLR Jan 31, 2020

Mortality Removal Using Lift Up Devices Marine Sites

Purpose

The purpose of these protocols are to remove mortalities in a biosecure manner by means of a lift up at a marine site.

Responsibility and Authority

- The Fish Health and Welfare Director will review these procedures annually and make changes if necessary.
- Site managers are responsible for ensuring mortality removal is conducted at least once per week as per the Fish health Management Plan and that the following procedures are followed.

Personal Equipment

In addition to standard safety equipment required for all MOWI employees the additional equipment is required for mortality removal:

- Rubber pants and rubber jacket
- Rubber gloves

Description

Preparing for mortality removal

- The site crew must have all the PPE listed above before starting the mortality collection.
- The vessel that is to be used for the mortality collection must have any gear removed (ideal) or covered (if it cannot be removed) that is not being used for the mortality removal

Removing the mortalities

- The vessel ties up to the cage where the lift up hose is located.
- The compressor on the boat is started.
- The dewatering table is placed in position.
- The lift up hose is attached to the dewatering table.
- The air hose from the compressor is attached to the air hose on the cage.
- The valve on the compressor supplying the air is turned on.
- The water and mortalities start to flow in the dewatering table.
- The water flow continues for 5 minutes to ensure all mortality is removed.
- The mortalities are now classified by the site manager (or trained designate) and put in totes.
- The air supply valve is shut off.
- The lift up hose and the air supply hose is detached from the dewatering table.
- The dewatering table, lift up hose and air supply hose is now showered with a Iodor solution (250 ppm) consistent with strong tea.
- The boat is untied and moved to the next cage and the process is repeated.

- After each cage, Green Works detergent is sprayed in and around the dewatering table, deck, and rain cloths. There is also a doser connected to a garden hose. The doser is drawing iodore and is sprayed in the same manner. If the doser/hose is frozen, a bucket is used to mix the iodore and pour it is poured in a watering can and sprayed around the area.
- Once the collection is over, the collection boat and all associated collection equipment is scrubbed clean with a mild detergent and disinfected with an iodor solution (250 ppm).
- Tubs containing the mortalities are then securely fastened closed and transported to the feed barge for disposal in the ensile located on the stern of the barge.If there is a spill on the barge, the mortalities or silage will be cleaned up and put back in the ensiler. The are will then be cleaned with a mild detergent and disinfected with an iodor solution (250 ppm).
- The site crew scrubs their PPE with a mild detergent (such as Green Works) and then disinfects with an Iodor solution.
- The site crew scrubs all equipment as well as the boat that was used in the mortality retrieval.
- Once all clean up is complete, the site manager will enter the mortality data into Mercatus.

Records

- MHAC Mortality Dive Worksheet
- The number of tubs collected and brought to the wharf will be recorded on the Daily Site Record (DSR).

Transporting Mortalities By Truck - Newfoundland Marine Sites

Purpose

The purpose of these protocols is to ensure biosecurity during truck transport of mortalities to designated sites for disposal.

Responsibility and Authority

- The Fish Health and Welfare Manager will review procedures annually and update if necessary.
- The Operations Manager or designate schedules the activities and ensures procedures are being followed.

Health and Safety

In addition to standard safety equipment required for all MOWI employees the additional equipment is required for loading mortalities onto trucks:

- Rubber pants and rubber jacket
- Rubber gloves

Description

Transporting the Mortalities in an Enclosed Trailer

- The truck with an enclosed trailer is backed into a loading ramp and the doors opened.
- The safety chains on the ramp are fastened to the truck to prevent the ramp from moving away from the truck.
- A certified forklift operator begins by unloading the empty mortality tubs from the truck and placing them in a designated clean area.
- Once unloaded, he begins to load the tubs containing the mortalities by placing them side by side and double stacked in the trailer.
    - Note that tubs with mortalities can mean either whole fish in xactic tubs, or ensiled fish in IBC tubs.
- When the truck is loaded the chains on the ramp are unfastened from truck.
- The Operations Manager or designate signs a way bill that is provided by the truck driver representing the trucking company verifying the load.
- The truck closes its doors and proceeds to the disposal site.
- The ramp and fork lift are then steam cleaned and disinfected with a Iodor solution (250 ppm).
- The fork lift operator cleans his PPE with a mild detergent (such as Green Works) and disinfects with a Iodor solution (250 ppm).

Transporting mortalities on an Open Deck Trailer

- The truck is parked on a level area.

- A certified forklift operator begins by unloading the empty mortality tubs from the truck and placing them in a designated area.
- Once unloaded he begins to load the tubs containing the mortalities which are placed side by side and double stacked on the trailer.
    - Note that tubs with mortalities can mean either whole fish in xactic tubs, or ensiled fish in IBC tubs.
- The driver of the truck fastens the tubs down using straps that are located on the side of the trailer.
- The operations manager or designate signs a way bill that is provided by the truck driver representing the trucking company verifying the load.
- The truck proceeds to the disposal site.
- The forklift is then steam cleaned and disinfected with a Iodor solution.
- The fork lift operator cleans his PPE with a mild detergent (such as Green Works) and disinfects with a Iodor solution.

Records

- The number of tubs, and what site each tub came from will be documented
- The way bill for the truck will be kept that indicates how many tubs on the load were shipped, and where they were shipped to.

Ensilage on a Marine Site

Purpose

The purpose of these protocols are to ensile mortalities on a marine site using biosecure protocols.

Responsibility and Authority

- The Fish Health and Welfare Director will review annually and make changes if necessary.
- Site managers must ensure procedures are followed.
- The Operations Manager must ensure that silage containers (IBC) are picked up and sent to the disposal site in a timely manner. Mortalities will not be returned to the Seal Cove wharf – only ensiled material will leave the site.

Health and Safety

In addition to standard safety equipment required for all MOWI employees the additional equipment is required for ensiling mortality includes:

- Rubber pants and rubber jacket
- Rubber gloves

Description

- When the mortality collection is complete, the mortalities are taken to the feed barge where they will be ensiled.
- Containers with mortalities will be lifted onto the tank area via crane.
- Lift the ensiling tank cover open.
- Dump all mortalities into the ensiling tank.
- If there is a spill, the mortalities/silage will be picked up and placed in the ensiler. The area will then be cleaned with a mild detergent (such as Green Works) and then disinfected with an Iodor solution (250 ppm).
- Place the covers back down.
- Ensure that the pump valves are set as follows:
  - The "Recirculating" valve is set to ON
  - The "Removal" valve is set to OFF
- Press the start button for the Chopper Pump
- Set timer for ~27 minutes
- Acid will be added automatically to maintain a ph of 4, so do not do anything else with the system while it is running
  - Ph is measured weekly and will be recorded.
- If the ensiling tank is less than ¾ full, proceed to the "Cleanup" steps
- If the ensiling tank is ~3/4 full or higher, proceed to the "Pumping Steps"
- Emptying of the silage tanks occurs every 3-4 months.

Pumping

- Once the ensiling tank is ¾ full, it will need to be pumped off.
- The ensiled mortalities are pumped in 1 cubic metre IBC containers.
- Ensure that the pump valves are set as follows:
    - The "Recirculating" valve is set to OFF
    - The "Removal" valve is set to ON
- Hook the pumping hose onto the coupling, located immediately next to the valves
- Place the end of the hose into one of the IBC containers
- Turn the Chopper pump ON
- Once the IBC is almost full, turn the Chopper pump to OFF
- If there is still material in the ensiling tank, fill other IBCs in the same manner until the ensiling tank is empty.
- Once full, the containers are scrubbed with a mild detergent (such as Green Works) and then disinfected with an Iodor solution (250 ppm).
- Filled containers are transported to the Seal Cove wharf.
    - Note that this may not take place immediately after ensiling. It will be done when logistically efficient.
- Once at the wharf, a certified forklift driver will move the containers via forklift to a truck that will deliver the containers to Pools Cove where they will be held until adequate quantities of mortalities/silage to ship to NWD.
- The forklift is then steam cleaned and disinfected with a Iodor solution.
- The fork lift operator cleans his PPE with a mild detergent (such as Green Works) and disinfects with a Iodor solution (250 ppm).
- The transport vessel is then scrubbed with a mild detergent (such as Green Works) and disinfects with a Iodor solution (250 ppm).

Clean Up

- Once mortalities have been ensiled, the Ensiling barge and all associated equipment (including the mortality collection containers) will be scrubbed clean with a mild detergent (such as Greenworks) and disinfected with an Iodor solution (250 ppm).
- The site staff will then clean their rubber gear with a mild detergent (such as Greenworks) before disinfecting with a 250ppm Iodor solution

Records

- The date, amount of IBCs and the site name will be recorded. Ph of silage will be recorded.

Mass Mortality Removal with Seiners Marine Sites

Application & Purpose

- To ensure a quick and effective response/removal of a mass mortality event using a seiner
- To maintain compliance with regulatory authorities AP 23- Fish Disposal.

Responsibility and Authority

Mass Mortality removal operations will be managed under the MCE/MCE Incident and Crisis Management System and through collaboration with regulators through the external emergency management team. The efficient and effective removal of mass mortalities via seiner is the responsibility of site and operations management, as well as third party seiner companies, with oversight by the MCE/MCE internal Emergency Management Team (EMT).
Communication of progress to the EMT is the responsibility of the Area and Site Manager.

Description

Support

- Regional manager will contact Barry group Inc and arrange seiner boat(s)
- Arrange for divers
- Arrange for disposal at rendering site

Procedure

- Seiner will be instructed which cage to tie up to and will secure the vessel to the side of the cage. Divers' vessel must also be tied to the affected cage.
- In the event of fat and debris on the water during pumping, a 36" boom will be deployed around the seiner and area of the cage being pumped.
- The 10' hose, provided by the seiner and used for pumping the mortalities, will be deployed by the crew into the cage
- Once the hose is inside the cage, the diver(s) will enter the cage and secure the end of the hose and suction bell to the bottom of the cage
- The diver confirms with the seiner Captain that the hose and bell are secured via communication device. The diver remains at the bottom of the cage with the suction bell.
- The seiner Captain controls the pump from the vessel wheelhouse, starting and stopping as needed through instruction provided by diver in cage
- Depending on the condition of the mortalities, the diver may have to maneuver/reposition the hose and suction bell to ensure effective pumping of all mortalities
- The mortalities are sucked up through the hose, across a dewatering table, and directly into the containment hole of the vessel
- The seiner and divers will continue this procedure until the seiner reaches compacity

- Once capacity is reached, the seiner will do a top side cleaning and disinfection, as per protocols outlined in the MCE Salmonid Biosecurity Management Plan and leave site. The seiners will maximize distance from other aquaculture sites on route to Burgeo, weather dependent.

- All mortalities are sent to Burgeo Rendering Facility for further processing. The seiner will then follow the Biosecurity Protocols for the facility.

Records

Records of all necessary information (seiner vessel, dive company (divers), number tubs removed, start/stop times, etc.) will be maintained on site and submitted to the EMT by site management for reporting as per the Mass Mortality Contingency Plan.

Mass Mortality Removal with Portable Air Lift System Marine Sites

Application & Purpose

- To ensure a quick and effective response/removal of a mass mortality event using a portable air lift system.
- To maintain compliance with regulatory authorities, specifically AP 23 – Fish Disposal, Mass Mortality Plan

Responsibility and Authority

Mass Mortality removal operations will be managed under the MCE/MCE Incident and Crisis Management System and through collaboration with regulators through the external emergency management team. The efficient and effective removal of mass mortalities via seiner is the responsibility of site and operations management, as well as third party seiner companies, with oversight by the MCE/MCE internal Emergency Management Team.
Communication of progress to the EMT is the responsibility of the Site Manager.

Description

<u>Important considerations prior to removal</u>

- Ensure all necessary air lift equipment is available and properly functioning
    - Dewatering table
    - Air compressor
    - Rigid hose
    - Lay flat hose with suction bell
    - Air supply hose
- Ensure divers are scheduled to assist and necessary transport is provided
- Confirm that the necessary number of xactic tubs are available and on site for storage and containment of mortalities
- Ensure the required number of transport vessels are scheduled to move full tubs to the designated wharf for pick up.
- All gear that is non-essential to the mortality collection must be removed
- Required amount of disinfectant solution is on site to facilitate proper cleaning and disinfection of all gear, according to protocols outlined in the MCE Salmonid Biosecurity Management Plan.

<u>Air Lift Set-up</u>

- Utility barge, or other vessel with required capacity, transports all required air lift equipment to site and ties up to affected cage. Divers' vessel must also be tied to the affected cage.
- Divers enter cage and install lay flat hose and suction bell to bottom of the cage.

- On the deck of the vessel, the rigid hose is connected to the dewatering table. The hose is then secured to a point close to the cage (handrail, gunnal) and is connected to the lay flat hose via camlock fitting

- The air supply hose is connected to the air compressor and the diver takes the end of the hose to the bottom of the cage where it is attached to the suction bell.

Removing the mortalities

- Empty xactic tubs are placed by the dewatering table. Transport vessels are put in place to receive full tubs.
- The compressor is turned on, as well as the compressor valve, to supply the diver with suction for vacuuming the mortalities
- Using the valve on the suction bell, the diver within the cage controls the amount of air (via air supply hose) required to suction the mortalities
- Mortalities are received on the dewatering table and counted, if possible, with consideration of the condition of the mortalities, prior to entering the xactic tub.
- Once a xactic tub is full, it is sealed and moved to the transport vessel. An empty xactic tub is then put in place in the system.
- Transport vessels rotate as they are filled.

Disassembly and disinfection of system

- Once all mortalities are moved from a cage, the air supply valve is shut off.
- The airlift hose and the air supply hose are detached from the dewatering table.
- The diver detaches the lay flat hose from the net and removes the hose as well as the suction bell.
- The dewatering table, airlift hose and air supply hose are cleaned and disinfected, according to protocols, prior to moving to next cage.
- Process is repeated at each cage until all mortalities at the site are removed.
- At end of day, all gear, including PPE, vessels, and air lift equipment, is cleaned, and disinfected according to protocol.
- Prior to leaving site, transport vessels disinfect full xactic tubs using Iodor and according to procedures outlined in above mentioned protocols.
- Full, sealed xactic tubs are then transported to the wharf to be ensiled or transported to rendering plant.

Records

Records of all necessary information (dive company (divers), number tubs removed, start/stop times, etc) will be maintained on site and submitted to the EMT by site management for reporting as per the Mass Mortality Contingency Plan.

Mass Mortality Removal with Wellboats – NL Marine Sites

Application & Purpose

- To ensure a quick and effective response/removal of a mass mortality event using a Wellboat
- To maintain compliance with regulatory authorities AP 23- Fish Disposal.

Responsibility and Authority

Mass Mortality removal operations will be managed under the MCE/MCE Incident and Crisis Management System and through collaboration with regulators through the external emergency management team. The efficient and effective removal of mass mortalities via wellboat is the responsibility of site and operations management, as well as third party wellboat companies, with oversight by the MCE/MCE internal Emergency Management Team (EMT).
Communication of progress to the EMT is the responsibility of the Area and Site Manager.

Description

Support

- Arrange for divers
- Arrange for disposal at rendering site

Procedure

- Wellboat will be instructed which cage to tie up to and will secure the vessel to the side of the cage. Divers' vessel must also be tied to the affected cage.
- In the event of fat and debris on the water during pumping, a 36" boom will be deployed around the wellboat and area of the cage being pumped.
- See SOP Mass Mortality Removal with Portable Air Lift System Marine Sites.
- Once the hose is inside the cage, the diver(s) will enter the cage and secure the end of the hose and suction bell to the bottom of the cage
- The diver confirms with the wellboat Captain that the hose and bell are secured via communication device. The diver remains at the bottom of the cage with the suction bell.
- The wellboat Captain controls the pump from the vessel wheelhouse, starting and stopping as needed through instruction provided by diver in cage
- Depending on the condition of the mortalities, the diver may have to maneuver/reposition the hose and suction bell to ensure effective pumping of all mortalities
- The mortalities are sucked up through the hose, across a dewatering table, and directly into the containment hole of the vessel
- The wellboat and divers will continue this procedure until the wellboat reaches compacity
- Once capacity is reached, the wellboat will do a top side cleaning and disinfection, as per protocols outlined in the MCE Salmonid Biosecurity Management Plan and leave site. The

wellboats will maximize distance from other aquaculture sites on route to Burgeo, weather dependent.

- All mortalities are sent to Burgeo Rendering Facility for further processing. The wellboat will then follow the Biosecurity Protocols for the facility.

Records

Records of all necessary information (wellboat vessel, dive company (divers), number tubs removed, start/stop times, etc) will be maintained on site and submitted to the EMT by site management for reporting as per the Mass Mortality Contingency Plan.

Freshwater Mortality Removal SOP

Rationale

This procedure is used for mortality removal of a routine or mass-mortality scale at the Stephenville Hatchery location.

In the event of a mass mortality, this SOP is applied in conjunction with MCE Incident and Crisis Management System to support an effective response, and includes practices that are consistent with procedures approved in the past for mortality and quarantine events.

In the event of a mass mortality or large depopulation event the removal of mortalities can take several weeks depending on the scale of the event.

Responsibility

Freshwater production staff are responsible for the removal of mortalities from all tanks on a daily basis.

Fish Health personnel are responsible for fish welfare and ensuring biosecurity protocols are followed at all times.

Advance preparation (i.e., in the event of a quarantine)

- Ensure a valid License to Move has been granted for all mortalities leaving the quarantine zone.
- Temporary hot zones will be created to accommodate mortalities – one will be for smolt and post smolt mortalities. No fry mortalities will be disposed of in the smolt or post smolt mortality area nor will any smolts be disposed of in the fry mortality area.
- The location of the areas will be set up in the yard according to Figure 1.
- Each area will be clearly marked with high visibility tape
- A Rubbermaid tote will be placed inside each area which contains:
    - Disposable gloves
    - A Tyvek lab coat
    - A small garbage bag for used gloves

- A roll of pallet wrap

- A bucket of gentle detergent and a bucket of disinfectant will be placed just inside the collection area – each with a scrub brush. For list of detergents and disinfectants, please see approved SOP – Biosecurity: Cleaning and Disinfection Protocols.
- A foot dip filled with Virkon will placed at the entrance of each area
- Holding containers will be placed inside each area
  - Containers will be leakproof and free from any damage
  - Appropriate lids will be available – also free from damage with rubber hold downs in place at each of the 4 corners
- Outside each area will be a holding area for clean attire (e.g. coat rack)
- For each water system holding fish, a "Morts only" mortality transport container will be provided
  - Container will have a tight-fitting, leak proof lid available
  - Container will be leakproof and free from damage
  - The container will either be colour coded to match the system it belongs to, or it will be labelled with the system name to ensure transport containers always return to the same water system

Procedure

1. **Mortality Collection**

- Remove mortalities from the tank using a system specific dip net (6m/7m) or uplifting system (12m and 18m)
- Place mortalities in tank specific 'Mort Only' buckets/containers. Containers should contain a TMS solution to humanely euthanize any moribund fish removed from the tank.
- Remove mortalities from the TMS solution one fish at a time and place into the 'mort only' transport container
  - Remove one fish from the TMS solution
  - Record it on the mortality record sheet
  - Place the fish into the transport container
  - Repeat until all fish are removed from the TMS solution
- Count and record total mortalities per tank.
- Repeat as necessary throughout the day with a minimum of one picking in the morning and one in the afternoon.
- At the end of the day, the lid should be securely fastened onto the mortality transport container to prevent spillage of material.

- A designated staff member will exit the building with the transport container through the staging area according to the most recent approved MCE Biosecurity Plan.

2. Entering Mortality Collection Areas

- Staff will then walk the transport container to the designated mortality collection area
  - If mortalities are post-smolts, proceed to the post-smolt ensiling area
  - If mortalities are smolts, proceed to the smolt ensiling area
  - If mortalities are fry, proceed to the fry mortality collection area
- Once at the area, but prior to entry, staff will remove any clean outer clothing
- Immediately staff will put on the Tyvek lab coat from the Rubbermaid container and a fresh pair of disposable gloves.

3. Transferring Mortalities into Holding Containers

- Staff will carefully open the lids of both the holding container and then the transport container
- They will slowly dump mortalities from the transport container into the holding container.
  - Care will be taken to ensure all mortalities and fluids wind up in the holding container.
  - If any mortalities spill onto ground, the mortalities will be picked up and placed into the holding container. Afterwards, the affected ground will be sprayed with disinfectant using the garden sprayer.
- Lids of both the transport container and the holding container will be replaced and fastened.

4. Exiting the Mortality Collection Areas

- If any equipment was brought into the area, for example a transport container, staff will scrub the exterior with a mild detergent solution. Afterwards they will cover the equipment with disinfectant.
- Once any equipment have been cleaned and disinfected, staff will remove their gloves and place into the garbage bag within the Rubbermaid container. They will remove the Tyvek lab coat and carefully place inside the Rubbermaid container. They will then step inside the foot dip, taking care to slosh solution to ensure the solution covers the entire top of the boot.
- Once 10 minutes has passed, staff will step out of the foot dip and back into the clean area of the yard. They will then put on any of their clean PPE and return the transport container (if applicable) to the appropriate staging area for its designated water system.
  - The transport container will remain in the staging area, unopened, until the next shift where staff will collect it and bring through the staging area back into the hot zone.

5. **Mortality Disposal**

- When the holding containers are full, or at least once a week, the holding containers will be removed and sent to the disposal facility.
- To start the process, a designated staff will enter each mortality collection area (as per Procedure 2: Entering the Collection Area) to prepare the holding container
    - The lid will be checked to make sure it is securely fastened at each corner
    - Pallet wrap will be wrapped around the container where the lid meets the container to create a seal
    - Using a garden sprayer, the outside of the xactic will be sprayed with disinfectant and the appropriate contact time will be observed prior to removal from the area
- Once the holding containers are ready for transport, a loader with forks previously cleaned and disinfected will drive up to the collection area.
- Only the forks of the loader will enter the mortality collection area; the body of the loader will remain on the clean side.
- Using the forks, the loader will pick up the xactic full of mortalities.
- Mortalities will then go to their designated disposal area:
    - If the facility is not under quarantine, post smolt or smolt will go to New World Dairies as whole fish – see "Trucking of Mortalities" below
    - If the facility is under quarantine, post-smolt or smolt will go to the ensiler for ensiling – see "Silage on a Quarantine Site – Tanker" SOP
    - Fry (will go to New World Dairies as whole fish – see "Trucking of Mortalities" below

6. **Trucking of Mortalities**

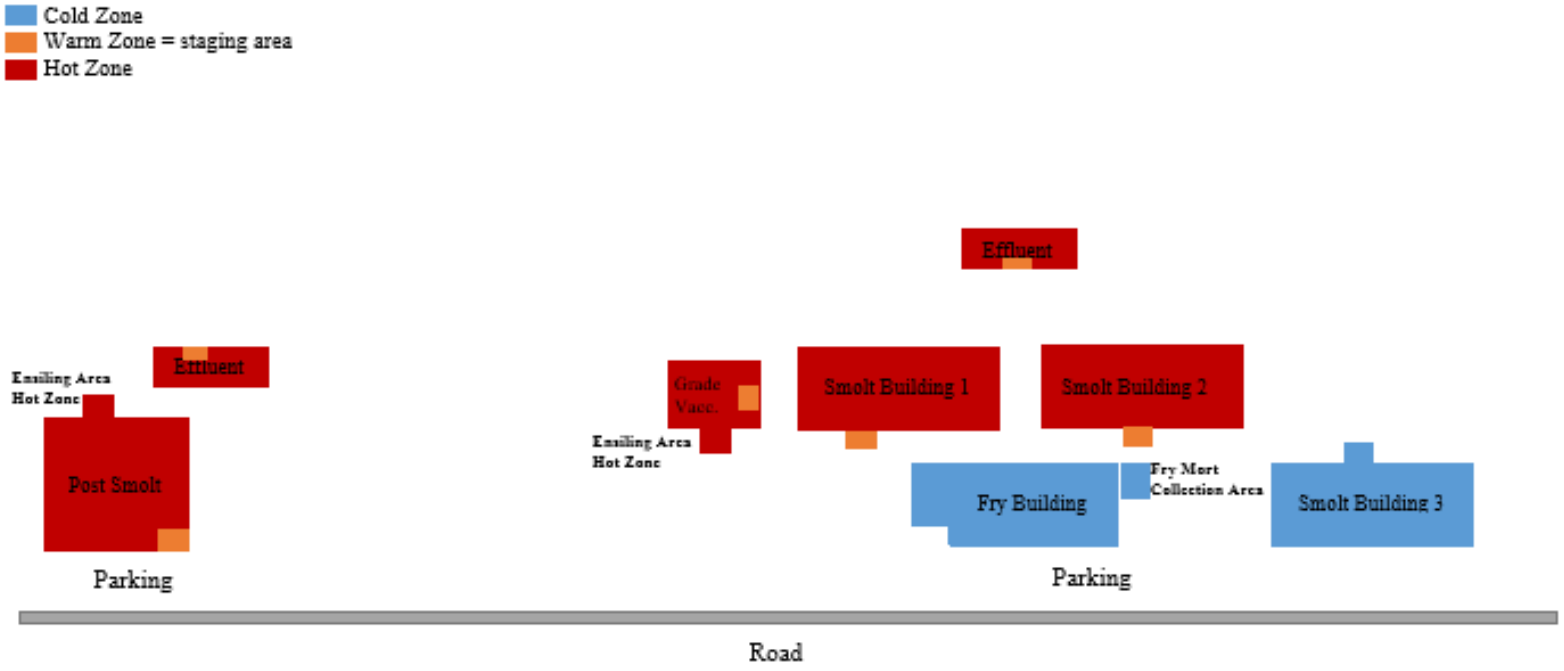
- The loader will drive to the edge of the yard and place the xactic onto a transportation truck.
- These steps will be completed until all mortalities to be shipped are loaded onto the truck
- Once completed, the staff inside the mortality collection areas will exit the collection areas (as per Procedure 4: Exiting the Collection Areas) and the forks of the loader will be sprayed with J-12 or Virkon solution and a contact time of 10 minutes will be observed.
- The truck will then drive to the disposal facility (New World Dairies).
- At the disposal facility, the xactics will be removed from the truck one at a time and dumped directly into the biodigester.
- Once all xactics have been removed from the truck, the inside of the container will be sprayed with a J-12 solution and a contact time of 10 minutes will be observed before any clean xactics are placed back into the truck.
- In the meantime, while the truck is observing it's contact time, staff from the New World Dairies facility will steam pressure wash the xactic tubs so they are cleaned prior to returning to the Stephenville hatchery.
- Once the contact time of the truck has been observed, the clean xactics will be loaded back onto the truck and transported back to the Stephenville facility.
- The truck will not enter the Stephenville property. It will offload the xactic tubs just outside of the facility gate.

- A hatchery staff member will then spray the outside of the xactics with an OxyGerm (peroxyacetic acid) solution and a contact time of 10 minutes will be observed prior to the xactics entering the facility.
- Once the contact time is up, the loader will load the clean xactics onto the forks and drive to the mortality collection areas.
- With the help of a designated staff member inside the collection area (who entered via Procedure 2: Entering the Mortality Collection Areas), the loader will place the clean xactics back into the mortality collection area.
    - Again, the body of the loader will stay on the clean side; only the forks of the loader will enter the mortality collection area.
- Once the xactics are placed into the mortality collection area, the forks of the loader will be sprayed with J-12 or Virkon and let sit for 10 minutes.
- The staff member inside the mortality collection area will exit the area.

Recordkeeping

- Record mortality numbers per tank/classification on the Daily Worksheets.

Figure 1: Location of Mortality Collection Areas (i.e., in a quarantine event)



Appendix Fish Disposal: Mass Mortality Contingency Plan (SW)

Mass Mortality Contingency Plan (SW)

Prepared By:

Mowi Canada East

Doc. ID #	Revision	Date	Responsibility
MMCP V-6.1		Nov 2024	Environment and Development Division

Table of Contents

1.0 Objective

The Mass Mortality Contingency Plan (MMCP) describes Mowi Canada East (MCE) plan to address high/mass mortality events at the marine sites. The objective of this plan is to have a plan in place that can be executed quickly and in a biosecure manner by MCE in conjunction with regulatory agencies with jurisdiction in aquaculture management. This plan addresses high or mass mortality events resulting from environmental events as well as disease events, including handling, transportation of fish products and environmental management of removal activities. This plan will be reviewed and updated annually at minimum and more frequently as necessary.

2.0 Scope and Authority

This plan applies to all active sea site operations of MCE. Three-year Site Stocking and Production Plans are submitted annually to FFA as part of the license validation process. Active sites for the current year are provided in that plan.

This plan is responsive to policy requirements and conditions of aquaculture licenses enabled under the province of Newfoundland and Labradors *Aquaculture Act*. Specifically, Aquaculture Policy (AP) 2 – Aquaculture Requirements, AP17 – Public Reporting, AP 23 – Fish Disposal, AP 23 – Fish Health Reporting and AP33 - Aquatic Animal Health Contingency Plan.

3.0 The Emergency Management Team (EMT)

All mass mortality events will trigger MCE Incident and Crisis Management System (ICMS – as per AP 2 and 17)). ICMS requires both internal and external reporting and the establishment of a crisis or emergency management team. The internal Emergency Management Team is comprised of Senior Management Team members of MCE including:

Managing Director
Fish Health Director
Saltwater Director
Fresh Water Director
Development and Environmental Compliance Director
Processing Director

Depending upon the level of the event, government representatives may be invited to participate on an external emergency management team. Participation is at the discretion of the government agencies invited. Participation of government agencies in collaboration with industry will allow for a comprehensive response that includes permitting and regulatory controls and smooth flow of information between industry, government, and the public. In the event of a mass mortality response, the following will be invited to join the external EMT:

- Aquatic Animal Health (AAHD) and Aquaculture Development Divisions (ADD), Fisheries, Forestry and Agriculture, Government of Newfoundland and Labrador
- Ecosystem Management Division, Fisheries and Oceans Canada (DFO)
- National Environmental Emergencies Centre, Environmental Protection Operations Directorate
- Environment and Climate Change Canada (ECC)
- Canadian Wildlife Service, Environment and Climate Change Canada (CWS)
- The Canadian Food Inspection Agency (CFIA)

A representative of the Newfoundland Aquaculture Industry Association (NAIA) may also be invited to take part in the external EMT.

MCE Emergency Management Team Contact Number:

Position	Name	Cell Phone Number
Managing Director (Team Leader)		**Private contacts redacted**
Development & Environmental Compliance Director		**Private contacts redacted**
Processing Manager		**Private contacts redacted**
Fish Health and Welfare Director		**Private contacts redacted**
Saltwater Production Director		**Private contacts redacted**
Freshwater Production Director		**Private contacts redacted**

Regulatory Authorities/External Management Team Contacts:

Position	Name	Phone Number
Assistant Deputy Minister FFA		709-729-3765 (office)
Aquaculture Development Division Director, FFA		709-538-3725
Aquatic Animal Health Division Director, FFA		709-729-6872
Regional Aquaculture Coordinator, DFO		709-772-6674
District Veterinarian, Canadian Food Inspection Agency		709-687-9012
Senior Officer, Preparedness Environment and Climate Change Canada		709-772-4285
Emergency Response Coordinator, Canadian Wildlife Services		902-426-6405
NAIA		
Spill Response Line	N/A	1-800-563-9089

4.0 Identification of Event

The response to an event will be determined by the magnitude, the expected quantity of mortalities, and the cause. The cause of the event will be the primary decision factor in determining the response to the event. The following definitions are provided as a guide to determining the magnitude of expected losses due to a mass mortality event. The approximate time to clean up will depend on the scale of the loss, time frames given are meant as a guide. Actual clean up time will depend on the resources mobilized to address the event.

Level	Item	Scope	Clean up time frame
1	Cage	Event affecting 1-3 cages at a single site.	1-2 weeks
2	Farm	Event affecting majority of cages within a farm site.	2-4 weeks
3	Multiple-Farm	Multiple-Farm sites affected in a BMA.	4-8 weeks
4	Multi -Regional	Multiple farms in more than one BMA affected.	8 weeks +

5.0 Preparation of mortality events

The most important part of preparing for mortality events is preventing them. Please see Environmental Event Mitigation Plan and Fish Health Management Plan for details on prevention of mortality events and maintaining fish health to avoid events.

In the event a loss occurs, priority will be on removing mortalities as quickly as possible. Resources will be mobilized to clean up the event in the least amount of time before decomposition has a chance to occur. MCE will catalogue a list of equipment and resources it will have available to assist in a mortality event. In addition to this, MCE will maintain a contact list of service providers who have the capacity to assist in the event of a mass mortality event. A seasonal listing of available service providers and their timelines to travel to the south coast region will be assembled to draw upon if needed.

Equipment:

MCE will store equipment necessary to enact rapid removal of mortalities should they occur in Pools Cove and Hermitage. This equipment includes:

- All pens on site are fitted with individual airlift mortality systems (Lift-Up). These are connected to central compressors stationed on the feed barge,.
-
- Large independent mortality airlift system available, can be installed on any large work boat or well-boat currently on long term contract1 m^3 fish totes (Harbour Breton and Pools Cove)
- Containment Boom: Oil Containment Boom. Three hundred feet of 36’ round with 12” skirt, will be stored in Pools Cove and three hundred feet will be stored in Harbour Breton.
- Sweeper boom: A sweeper boom will be rigged to existing vessels to enable collection and retention of any fat that may escape the primary containment boom.
- Skimmer Technology (see Fat/Debris Containment, below)
- Vessels: MCE have a several vessels that can participate in a mass mortality event. The list below does not include a variety of small outboard vessels and small barges, approximately 20 in total.

Vessel Name	Type	Length
FSV Multi-Ocean	Commercial Work Boat	15m M
Victoria Viking	Well Boat	1050 m^3
360 Contender	Well Boat	24m
Atlantic Harvester 360 Handler	Work Boat (Crane) Work Boat	19.5 M 24m
Northern harvester 1 – 65’ x 28’ vessel with 40’x 26’ of deck space	65’ x 28’ vessel with 40’x 26’ of deck space	19.5 M
Ben Lea	Long Liner Crane	12 M
Cage N Queen	Long Liner Crane	12 M

Adriana and Tanya	Utility Barge Crane	17.5 x 6.5 M
Northern Dawn	Utility Barge Crane	19 x 7.5 M

Figure 1. Containment boom for containing any drifting debris resulting from removal activities.

Figure 2. Examples of Sweeper Booms

Fat/debris Containment: Should mortality removal not be completed before decomposition occurs and fat and debris start to surface, MCE will notify the Spill Response Line, FFA and DFO (past event this was 7 to 10 days after fish death). Primary containment booms will be deployed to surround the seiner vessels and areas being pumped when there is evidence of floating material. Material contained within the booms will be removed by site staff and contained in 1 m3 fish totes. Should material float free of the booms, MCE will have a crew dedicated to collecting fat via small vessel with dip nets and 1 m3 fish totes, or with Sweeper Booms to collect and contain material for dipping out into fish totes. Clean up Crews will visit shorelines daily and will use absorbent pads to collect any fat/debris that may have gone to shore. Effectiveness of clean up will be monitored by the Environmental control Officer (see section 6.12 & 6.22) and/or environmental monitoring agencies (see section 8.0).

Note: Manual dipping of fat off the water is an accepted and effective practice, but it is time consuming and difficult. MCE is exploring the use of skimmer technology to suction fat and oil off the water. This is an efficient and effective way of removing oil from the waters surface and has

been used in the oil and gas sector. MCE will be purchasing skimmer technology and storing in Harbour Breton by the end of the second quarter of 2024.

Figure 3. Example of a skimmer technology.

Service Providers:

MCE will compile a list of service providers than can assist in rapid removal of mortalities should they occur. Prior to entering the winter season, the service providers on the list will be contacted to make a calendar of availability. Another availability calendar will be made prior to entering the warm water season. The list of service providers can be found in Appendix 1 and includes:

- Contracted seiners (40-90 mt capacity; 150-170 MT capacity)
- Diving contractors
- Boom/ oil absorbent suppliers
- Rendering facilities
- Anaerobic Digestor

Note: In addition to resources available in Newfoundland, MCE will engage Transport Canada in discussion on mechanisms to enable rapid approval for well boats to come to NL to assist in removal activities as necessary. Currently, approval process for allowing well boats from other countries, such as Norway and Scotland, take months to obtain.

Shore-based facilities that will support mortality removal depending upon location of the event are included in the table below. It encompasses operating areas and supporting facilities located in the regions, and others located outside of the region but are relevant to this plan. This plan will focus on existing outflow infrastructure that is available immediately.

Community	Facility
Harbour Breton	Fish Plant Wharf
Hermitage	Ferry Wharf
Belleoram	Fishing Wharf
Pool's Cove	Ferry Wharf
Wreck Cove/Coombs Cove	Fishing Wharf
Burgeo	Processing/Meal Plant Wharf

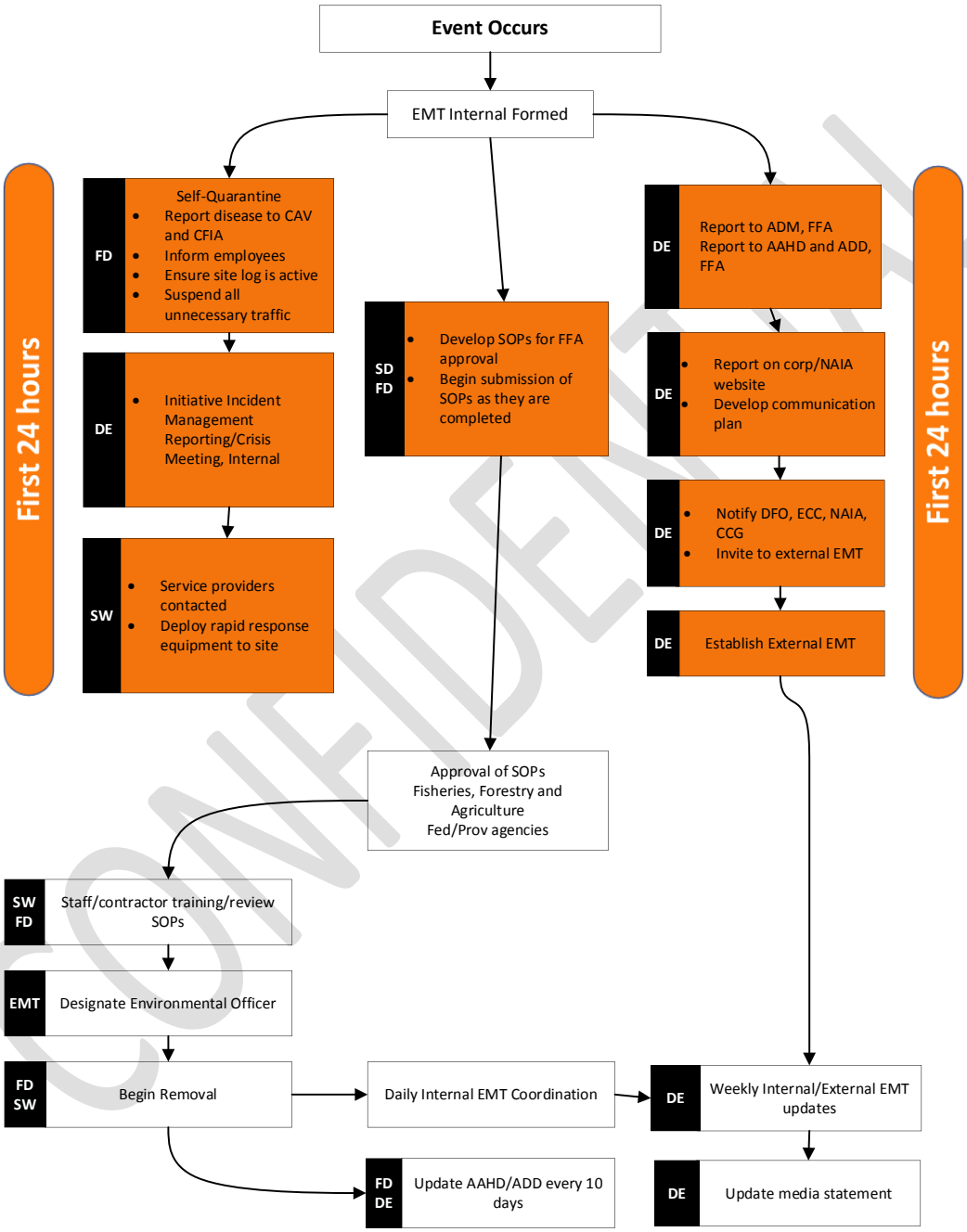
Should additional booms be required, they will be obtained from Hi-Point Industries in Botwood with a

delivery time of two weeks. Hi-Point is also able to provide oil absorbent material (Oclansorb Oil Absorbent) within a day of order.

6.0 Response Plan

6.1 General Process: Reportable Disease/Disease event.

In the event of a mass mortality or depopulation event the following general process shall be followed in accordance with Internal SOPS and regulatory requirements.



SW – Saltwater Director
FD – Fish Health Director
DE – Development and Environmental Compliance Director
EMT – Emergency Response Team

6.11 Mass Mortality Detection

Detection of a mass mortality event will occur through daily site activities, daily/weekly mortality removal, and fish health surveillance activities. If an event is detected where a reportable disease is the cause or suspected to be the cause, the following steps will be taken.

1. Assemble internal EMT
    a. Items i. to v occur concurrent with 2 to 4 below:
        i. Contact service providers (Appendix 1)
        ii. Deploy rapid response mortality removal equipment (see Sections 6.12 &6.22 and 7.0).
        iii. Initiate Incident and Crisis Management System (ICMS) with Incident Report.
        iv. Develop Communications Plan
        v. Self-Quarantine site(s)
            a. Inform employees of the situation.
            b. Initiate staging area for site access.
            c. Ensure visitor log is active.
            d. Suspend all unnecessary traffic.
2. Notify the following agencies Immediately (within 24 hours) as per AP 17, Public Reporting and AP 32, Fish Health Reporting:
    a. Assistant Deputy Minister, Fisheries and Aquaculture 729-1725
    b. Director of Aquatic Animal Health, Aquatic Animal Health, Fisheries, Forestry and Agriculture, 729-6872
    c. Director of Aquaculture Development, Aquaculture Development Division, Fisheries, Forestry and Agriculture, 538-3725
    d. District Veterinarian, Canadian Food Inspection Agency, 687-9012

3. Notify Fisheries and Oceans Canada, Environment and Climate Change Canada, and the Newfoundland Aquaculture Industry Association.
    a. If an Emergency Drug Release has been authorized for the site, also notify Health Canada
    b. Invite provincial and federal representatives and NAIA to participate in external EMT
    c. Notify Canadian Coast Guard, Spill Response Line, 1-800-563-9089 of mass fish mortalities.

4. If an official Quarantine Order or Order to Depopulate is given, then the following must occur as per AP33, Aquatic Animal Health Contingency Plan:
    a. A list of items on the site must be provided to the CAV. This list is to include:
        1. Fish numbers
        2. Fish cages/tanks with cage/tank identification numbers
        3. Fish nets with net identification numbers
        4. Vessels
        5. Barges
        6. Trucks
        7. Equipment
        8. Buoys
        9. Lines
        10. Trays/cages/tanks/socks or other applicable holding units
        11. Other items/equipment contained within the quarantine area
    b) Ensure a License to Move is obtained prior to removal of anything from site, including fish.
    c) If an Order to Depopulate is given, preparations to depopulate must begin within 24

hours.

d) Participate in enhanced surveillance program
e) Follow any other direction given from the CAV within the following authorities:
    a. Diagnostic testing
    b. Epidemiological investigation
    c. Treatment of the fish
    d. Vaccination of the fish
    e. Fish movement
    f. Enhanced biosecurity

5. Report Quarantine/Depopulation and abnormal mortality event on corporate/industry association website (within 24 hours), as per AP 17 Public reporting.

6. Submit SOPs for quarantine. Once SOPS area approved, and a License to Move has been granted, begin removal process (see section 6.13).

7. Conduct daily internal EMT calls to coordinate activities. Provide daily updates as per Section 8.0.

8. Conduct weekly external EMT calls to update agencies and coordinate activities. Provide weekly summary of operations as per Section 8.0.

9. Update AAHD and AD every ten days in accordance with conditions of license and AP17 Public Reporting. This will be accomplished more frequently, via daily and weekly updates.

10. Provide daily media updates that transition to weekly media statement on progress of mortality removal.

6.12 Mortality Retrieval Process

Initial Response:
The focus will be on fast response to enable quick removal of mortalities before they have a chance to spread disease to other sites, or decay and contribute to debris in the water. Mobilization of seiners or well boats to engage in mass mortality removal may take several days to a week depending on where they are located at the time of the event. Mortality will be retrieved via lift-up systems (on 140m cages), Servi-Pump diverless mort retrieval systems and airlift systems until seiners and well boats arrive. Once a seiner is in place, the net will be shallowed and the vessel pump utilized. Divers will be used to remove mortality as a last resort. Should mortality retrieval extend beyond a Class 1 or 2 event; the Migratory Birds Response Plan will be initiated in conjunction with the MMCP (see Appendix 5).

Environmental Control:
A staff member on each shift at each site will be designated as the "Environmental Control Officer" and will ensure that materials and debris are contained within the site lease area via monitoring of removal activities and the use of containment booms. Booms will be deployed when there is evidence of floating material. Material contained within the booms will be removed by site staff and disposed of in 1 m3 fish totes . Environmental monitoring services will be engaged in class 3-4 events.

Mortality Retrieval:
All teams and vessels involved in mortality removal will adhere to strict biosecurity and sanitation procedures including quarantine orders if required. Specific measures are described below.

Fish tote Removal:
Mortalities will be retained in fish totes which have been double lined with plastic bags that have been zip tied shut before being secured shut with the cover latched down once the dive is complete. Fish totes will be stored securely latched down in a biosecure area of the outflow wharf until there is enough to complete a full truck load. Fish totes will be transported to NWD or to the Barry Group meal plant in Burgeo under approved SOPs for transport (see section 6.13).

Seiner Removal:
Mortalities will be retained in a seiner vessel which has large holds below the deck. Seiners allow for removal of larger quantities of mortalities compared to fish totes. This results in fewer return trips to the final destination, and in turn results in a quicker removal process. Mortalities will be pumped directly into the seiner and once full, seiner boats will steam to the rendering facility in Burgeo. Dewatering outlets will flow through a screen or sock to retain as much debris as possible. Should removal be delayed, and decomposition of mortalities is present, a boom will be deployed around the seiner to contain and remove any floating debris. Mortalities will be pumped directly into the rendering plant, and if necessary, the seiner will steam back to site for another load.

Wellboat Removal:
If wellboats are available for removal, they will be used in conjunction with the Air Lift pumps. The same providers for seiners will b followed as, above.

Trucking
MCE will co-coordinating with the local transport companies to ensure that fish mortalities are removed to the service provider as rapidly as possible. Local trucking companies are listed in Appendix 1. Transport services with the essential SOPS for bio-securely transporting fish mortalities. These SOPS shall be approved as per FFA policy prior to engagement.

Containers
MCE will ensure that there is a sufficient number of containers or other means of storing the mortalities for the rapid disposal of fish to the service provider. Containers will be free from damage and leak proof.

Disposal Sites:
Mortalities will be disposed of at two locations. Location of disposal will depend on the scale of the event. Scale 1 events may be managed via disposal at New World Dairies anerobic digestor. Higher scale event may also use NWD, especially in early stage of removal when lift up pumps are used. NWD can accommodate **[redacted (3rd party); details registered with FFA]** mt of material per week. NWD has a Certificate of Approval from the Department of Municipal Affairs and Environment to accept waste from aquaculture facilities.

High volume removal will require removal by seiners. Seiners come in various sizes and can remove from 40mt to 170 mt. Seiners will transport material to the Burgeo meal plant. The meal plant is can take **[redacted (3rd party); details registered with FFA]** mt raw material per 24 hours seven days a week. The meal plant is permitted to accept fish from aquaculture operations.

6.13 Transport from Affected Farm Site(s)

Transport to Wharves

All mortalities that will be trucked shall be contained in an industry standard container-1 m^3 fish totes boxes and shall be transported in a bio secure manner to designated "Outflow" wharves. Bio secure handling and transportation is designed to circumvent spillage and entails:

- The covering of containers with lids, followed by strap securement
- Using containers that are leak proof and free from damage
- Double lining the container with plastic bags (which will be zip tied closed after full)
- The sealing of drain stoppers
- The availability of approved, industry-standard disinfectant and empty double-lined, leak-proof mortality totes with which to mitigate accidental spills. Decontamination protocols are outlined in section 6.14.

Outflow wharves are located at the following locations:

- Hermitage
- Belleoram
- Pool's Cove
- Hr. Breton
- St. Alban's
- Conne River

MCE will ensure that adequate numbers of vessels are provided to ensure a fast and efficient removal of all mortalities from the farm.

Transport Via Road to Disposal Site

Mortalities transport via road to disposal sites will be completed with no opportunity for spillage or leakage as per approved SOP's and in accordance with government policy regarding transportation of fish (see Appendix 2).

Transport Via Seiner to Disposal Site

Seiners will sail to the Burgeo meal plant utilizing a route that maximizes distance between the seiner and aquaculture sites while maintaining crew and vessel safety given prevailing weather conditions. Seiner holds will be sealed with no opportunity for leakage while on route to the meal plant. Seiners will be off loaded in accordance with approved SOP's that address biosecure transfer of material into the meal plant and cleaning and disinfection of vessel and wharf facilities at the disposal point.

6.14 Decontamination

The MCE shall be responsible for the decontamination and disinfection of all the wharves, company vessels, containers and all other equipment used in the collection, removal and transport of mortalities.

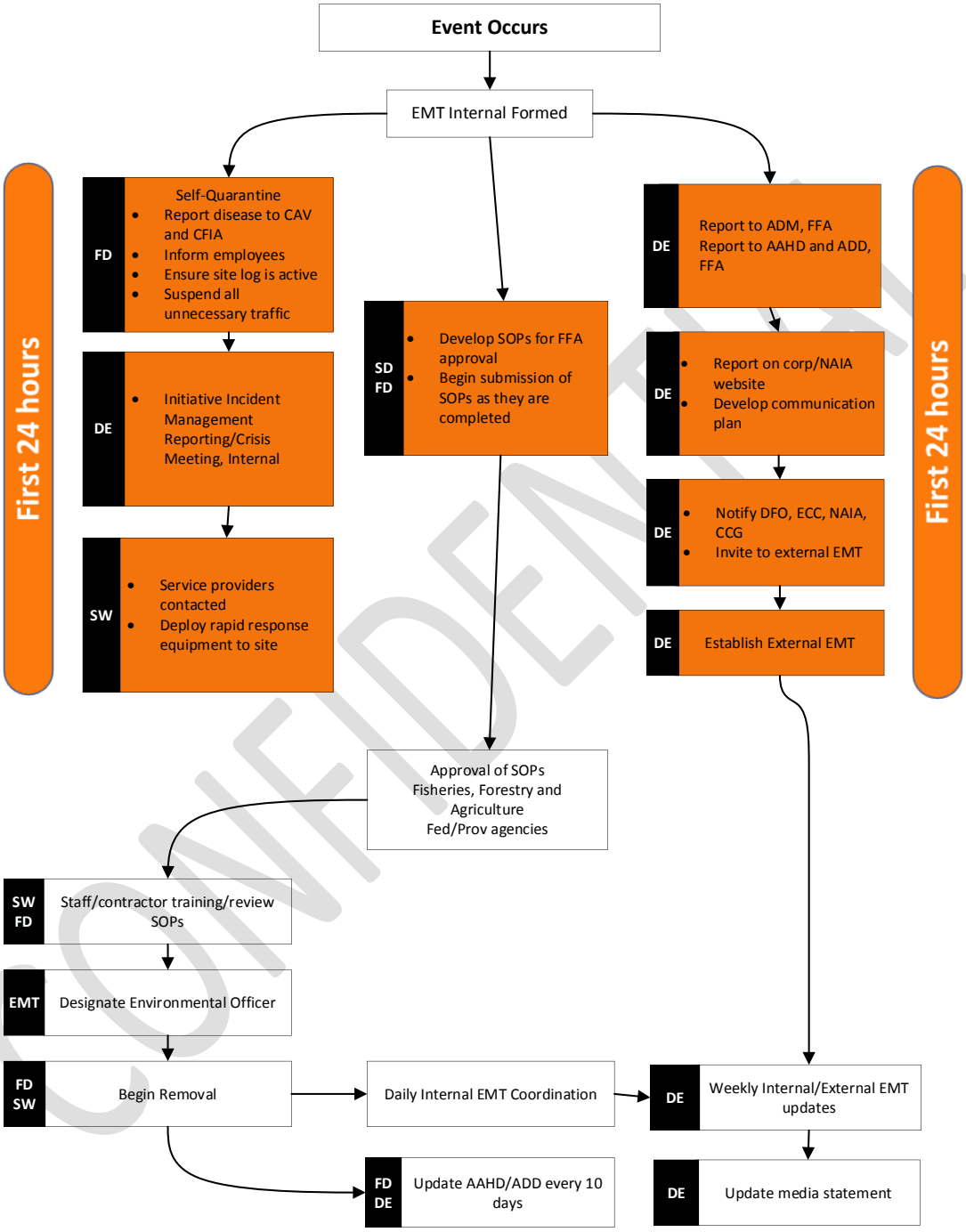
All disinfectants shall conform to industry and relevant environmental standards. The choice of disinfectant will depend on weather conditions and the disease which is present on the site.

Disinfectant	**Strength**	**Dilution**	**Contact time**
Iodor, Premise, etc.	250ppm	300mls/20liters	10 mins
Javex (cannot be used at marine site)	1,000 ppm	500mls/20liters	10 minutes
Virkon (can only be used with fresh water)	1%	250 grams/25liters (freshwater only)	10 minutes
Cleaning	**Strength**	**Dilution**	**Contact time**
Detergents	Ex. Green Works	Strong	Use prior to disinfecting
Hot water & High Pressure	>65°C	N/A	>10 minutes

All disinfection, sterilization and decontamination protocols shall be submitted and approved by the AAHD and/or CFIA prior to initialization.

6.2 General Process: Mass Mortality Non Disease.

In the event of a mass mortality or depopulation event the following general process shall be followed in accordance with Internal SOPS and regulatory requirements.



SW – Saltwater Director
FD – Fish Health Director
DE – Development and Environmental Compliance Director
EMT – Emergency Response Team

6.21 Mass Mortality Detection

Detection of a mass mortality event will occur through daily site activities, daily/weekly mortality removal, and fish health surveillance activities. If an event is detected, the following steps will be taken.

1. Assemble internal EMT
    a. Items i. to v occur concurrent with 2 to 4 below:
        i. Contact service providers (Appendix 1)
        ii. Deploy rapid response mortality removal equipment.
        iii. Initiate Incident Management System with Incident Report.
        iv. Develop Communications Plan
            a. Inform employees of the situation.
            b. Ensure visitor log is active.
            c. Suspend all unnecessary traffic.

2. Notify the following agencies Immediately (within 24 hours) as per AP 17, Public Reporting:
    a. Assistant Deputy Minister, Fisheries and Aquaculture 729-1725
    b. Director of Aquatic Animal Health, Fisheries, Forestry and Agriculture, 729-6872
    c. Director of Aquaculture Development, Aquaculture Development Division, Fisheries, Forestry and Agriculture, 292-4111

3. Notify Fisheries and Oceans Canada, Environment and Climate Change Canada, the Canadian food Inspection Agency and the Newfoundland Aquaculture Industry Association.
    a. If an Emergency Drug Release has been authorized for the site, also notify Health Canada
    b. Invite provincial and federal representatives and NAIA to participate in external EMT
    c. Notify Canadian Coast Guard, Environmental Response, 1-800-563-9089 of mass fish mortalities.

4. Report abnormal mortality event on corporate/industry association website (within 24 hours), as per AP 17 Public reporting.

5. Submit SOPs for people/equipment movement, mortality removal and disposal, cleaning and disinfection to AAHD and AD, Fisheries, Forestry and Agriculture for approval (SOPs will vary depending on location of event, size of event and time of year – see attached listing of SOPs anticipated for a Mass Mortality Event in Appendix 3).
    a. Submit SOPs to other agencies for review and approval.

6. Once SOPS area approved, begin removal process (see section 6.22).

7. Conduct daily internal EMT calls to coordinate activities. Provide daily updates as per Section 8.0.

8. Conduct weekly external EMT calls to update agencies and coordinate activities. Provide weekly summary of operations as per Section 8.0.

9. Update AAHD and AD every ten days in accordance with conditions of license and AP17 Public Reporting. This will be accomplished more frequently, via daily and weekly updates.

10. Provide daily updates that transition to weekly media statement on progress of mortality removal.

6.22 Mortality Retrieval Process

Initial Response:
The focus will be on fast response to enable quick removal of mortalities before they have a chance to spread disease to other sites, or decay and contribute to debris in the water. Mobilization of seiners or well boats to engage in mass mortality removal may take several days to a week depending on where they are located at the time of the event. Mortality will be retrieved via lift-up systems (on 140m/160m cages), Servi-Pump diverless mort retrieval systems and airlift systems until seiners and well boats arrive. Once a seiner is in place, the net will be shallowed and the vessel pump utilized. Divers will be used to remove mortality as a last resort. . Should mortality retrieval extend beyond a Class 1 or 2 event, the Migratory Birds Response Plan will be initiated in conjunction with the MMCP (see Appendix 4).
Should the event be class 3 or 4, additional booms will be ordered or rented from suppliers (see Appendix 1).

Environmental Control:
A staff member on each shift at each site will be designated as the "Environmental Control Officer" and will ensure that materials and debris are contained within the site lease area via monitoring of removal activities and the use of containment booms. Booms will be deployed when there is evidence of floating material. Material contained within the booms will be removed by site staff and disposed of in 1 m3 fish totes. Environmental monitoring services will be engaged in class 3-4 events.

Mortality Retrieval:
Details of mortality retrieval, and transport will be conducted in accordance with the Fish Disposal Plan (App 3 in the FHMP) as required by AP 23- Fish Disposal.

All teams and vessels involved in mortality removal will adhere to strict biosecurity and sanitation procedures including quarantine orders if required. Specific measures are described below.

Fish tote Removal:
Mortalities will be retained in fish totes which will be secured shut with cover latched down once the dive is complete. Fish totes will be stored securely latched down in a biosecure area of the outflow wharf until there is enough to complete a full truck load. Fish totes will be transported to NWD or to the Barry Group meal plant in Burgeo.

Seiner Removal:
Mortalities will be retained in a seiner vessel which has large holds below the deck. Seiners allow for removal of larger quantities of mortalities compared to fish totes. This results in fewer return trips to the final destination, and in turn results in a quicker removal process. Mortalities will be pumped directly into the seiner and once full, seiner boats will steam to the rendering facility in Burgeo. Dewatering outlets will flow through a screen or sock to retain as much debris as possible. Should removal be delayed, and decomposition of mortalities is present, a boom will be deployed around the seiner to contain and remove any floating debris. Mortalities will be pumped directly into the rendering plant, and if necessary, the seiner will steam back to site for another load.

Wellboat Removal:
If wellboats are available for removal, they will be used in conjunction with the Air Lift pumps. The same providers for seiners will b followed as, above.
Trucking

MCE will co-coordinating with the local transport companies to ensure that fish mortalities are removed to the service provider as rapidly as possible. Local trucking companies are listed in Appendix 1. Transport services will be conducted in according to SOPs for bio-securely transporting fish mortalities.

Containers
MCE will ensure that there is a sufficient number of containers or other means of storing the mortalities for the rapid disposal of fish to the service provider.

Disposal Sites:
Mortalities will be disposed of at two locations. Location of disposal will depend on the scale of the event. Scale 1 events may be managed via disposal at New World Dairies anerobic digestor. Higher scale event may also use NWD, especially in early stage of removal when lift up pumps are used. NWD can accommodate **[redacted (3rd party); detail registered with FFA]** of material per week. NWD has a Certificate of Approval from the Department of Municipal Affairs and Environment to accept waste from aquaculture facilities.

High volume removal will require removal by seiners. Seiners come in various sizes and can remove from 40mt to 170 mt. Seiners will transport material to the Burgeo meal plant. The meal plant can take **[redacted (3rd party); detail registered with FFA]** raw material per 24 hours seven days a week. The meal plant is a licensed processing facility through FFA and is permitted to accept fish from aquaculture operations.

Fish transport will be in accordance with FFA policy 'AP – 23 Fish Disposal'

6.23 Transport from Affected Farm Site(s)

Transport to Wharves

All mortalities that will be trucked shall be contained in an industry standard container-1 m3 fish totes boxes and shall be transported in a bio secure manner to designated "Outflow" wharves. Bio secure handling and transportation is designed to circumvent spillage and entails:

- The covering of containers with lids, followed by strap securement
- The sealing of drain stoppers
- The availability of approved, industry-standard disinfectant and empty double-lined, leak-proof mortality totes with which to mitigate accidental spills. Decontamination protocols are outlined in section 6.24.

Outflow wharves are located at the following locations:

- Hermitage
- Belleoram
- Pool's Cove
- Hr. Breton
- St. Alban's
- Conne River

MCE will ensure that adequate numbers of vessels are provided to ensure a fast and efficient removal of all mortalities from the farm.

Transport Via Road to Disposal Site
Mortalities transport via road to disposal sites will be completely continued with no opportunity for spillage or leakage as per approved SOP's and in accordance with government policy regarding transportation of fish – see Appendix: Disposal Guidance.

Transport Via Seiner to Disposal Site

Seiners will sail to the Burgeo meal plant utilizing a route that maximizes distance between the seiner and aquaculture sites while maintaining crew and vessel safety given prevailing weather conditions. Seiner holds will be sealed with no opportunity for leakage while on route to the meal plant. Seiners will be off load in accordance with approved SOP's that address biosecure transfer of material into the meal plant and cleaning and disinfection of vessel and wharf facilities at the disposal point.

6.24 Decontamination

The MCE shall be responsible for the decontamination and disinfection of all the wharves, company vessels, containers and all other equipment used in the collection, removal, and transport of mortalities.

All disinfectants shall conform to industry and relevant environmental standards.

Disinfectant	**Strength**	**Dilution**	**Contact time**
Iodor, Premise, etc.	250ppm	300mls/20liters	10 mins
Javex (cannot be used at marine site)	1,000 ppm	500mls/20liters	10 minutes
Virkon (can only be used with fresh water)	1%	250 grams/25liters (freshwater only)	10 minutes
Cleaning	**Strength**	**Dilution**	**Contact time**
Detergents	Ex. Green Works	Strong	Use prior to disinfecting
Hot water & High Pressure	>65°C	N/A	>10 minutes

In the situation that the mass mortality event was caused by a reportable disease, all disinfection, sterilization and decontamination protocols shall be submitted and approved by the AAHD and/or CFIA prior to initialization.

7.0 Mobilization Plan

7.1 Class 1-2 Event: One site only; 1-3 cages on a site or a whole site

Once notification is completed and SOPs are approved, MCE will mobilization people and equipment to site. Focus will be to remove mortalities prior to decomposition (within 7-10 days). In the event of a disease related event, all activities would occur in accordance with established and approved SOPs for quarantine actives and health related events. Timelines for mobilization will be dependent on location of site affected and prevailing weather conditions that may affect the time it takes to access the site.
Day 1: Concurrent with notification and SOP development as in Section 6.1 & 6.2.

- Coordination meeting with EMT, Salt water Manager, Fish Health Director, Development and Environmental Compliance Director, Regional manager, Site Managers, site staff.
    - Brief on event and plan to removal activities
    - Identify cages to start first and sequence of removal.
    - Identify roles and responsibilities (i.e who does what in terms of set up).
    - Notify disposal sites.

    - Identify ECO for site operations and monitoring.
    - Determine availability of wellboats
    - Identify potential challenges (i.e weather, distance to sites, etc., and mitigations to address challenges**.**
- Regional manager coordinate with site manager to deliver and set up Air Lifts at sites.
    - Identify vessels for transport of equipment and people. Identify vessels for holding and moving fish totes.
    - Arrange for 1m cube totes to be on site
    - Ensure transport is arrange for mortalities
    - Contact Dive companies to arrange divers (1-2 days for travel)
- SW Director will contact seiners to come to site. Determine time for arrival (if in Burgeo, one - two days for travel). If possible, well boats will be diverted to site.
- FH Director/SW Director – direct set up biosecure staging area if necessary
- Update regulatory authorities on activities.

Day 2: Begin Air Lift mort retrieval. Should seiners arrive on site, mortality removal will start with seiners. If wellboats are available, initiate removal with Air Lifts into wellboats.

- Begin mortality removal with Air Lifts, Lift-Up Systems or Servi-Pump units (see Fish Disposal Plan SOP's). Continue retrieval with these systems until seiners and/or well boats arrive.
- If wellboats are available, utilize Air Lifts, Lift-Up Systems or Servi-Pump units to pump into wellboats.
- Mortalities retrieved by Air Lifts, Lift-Up Systems or Servi-Pump units will be transported to NWD by truck.
- If seiners/wellboats arrive, begin mort retrieval with seiners.
- Seiners will transport mortalities to Burgeo meal plant.
- Record volumes of mortalities retrieved, and cages completed daily and report back to EMT.
- Provide daily updates to regulatory authorities on progress.

Day 3 until completion. Continue with mortality removal until complete.

- If removal continue beyond 7 days, deploy booms to site.
- ECO to report to Spill Response, FFA and DFO if fat and debris begins to surface.
- Clean up crews deployed to site to collect fat/debris
- Initiate Migratory Bird response Plan (see Appendix 5)
- Provide daily Update to regulatory authorities. Provide weekly review of activities to external EMT, including regulatory authorities.

7.2 Class 3-4 Event: Multiple sites in a BMA to multiple sites in multiple BMA's

Once notification is completed and SOPs are approved, MCE will mobilize people and equipment to site**s**. Focus will be to remove mortalities as quickly as possible. It is expected that some site will have floating fat/debris. In the event of a disease related event, all activities would occur in accordance with established and approved SOPs for quarantine actives and health related events. Timelines for mobilization will be dependent on location of site affected and prevailing weather conditions that may affect the time it takes to access the site.

Day 1: Concurrent with notification and SOP development as in Section 6.1 & 6.2.

- Coordination meeting with EMT, Salt water Manager, Fish Health Director, Development and Environmental Compliance Director, Regional manager, Site Managers, site staff.
    - Identify an Operations Coordinator responsible for overall vessel, equipment, and staff co-

ordination.
    - Brief on event and plan to removal activities
    - Identify sites affected and order of priority for removal.
        - Identify cages to start removal and sequence of removal within each site.
        - Identify roles and responsibilities (i.e who does what in terms of set up).
    - Notify disposal sites.
    - Identify ECO for each site operations and monitoring.
    - Identify clean up crews for each site
    - Identify environmental monitoring team for each site.
    - Contact Environmental Monitoring companies to initiate monitoring services.
    - Determine availability of wellboats
    - Identify vessels for transport of equipment, personnel and moving fish totes and which sites they will be assigned to.
    - Identify potential challenges (i.e weather, distance to sites, etc., and mitigations to address challenges.
    - Initiate Migratory Bird Response Plan.
    - Order/rent additional booms
    - Order absorbent pads
    - Develop biosecurity plan for movement of equipment and people from site to site and BMA to BMA.
- Operations Coordinator to coordinate with site manager to deliver and set up Air Lifts to priority sites.
    - Identify vessels for transport of equipment and people. Identify vessels for holding and moving fish totes.
    - Arrange for 1m cube totes to be on site
    - Ensure transport is arrange for mortalities
    - Contact Dive companies to arrange divers (1-2 days for travel) and determine numbers available.
- SW Director will contact seiners to determine how many are available to come to sites. Determine time for arrival (if in Burgeo, one - two days for travel). Determine if wellboats are capable of participating.
- FH Director/SW Director – direct set up biosecure staging areas if necessary
- Compile a Response Plan that addresses:
    - Sequence of sites to depopulate
    - Vessel's equipment and people available and where they will be assigned.
    - Verification of resource availability
    - Biosecurity plan
    - Reporting mechanisms (daily, weekly)
- Update regulatory authorities and external EMT on Response Plan.

Day 2: Begin Air Lifts, Lift-Up Systems or Servi-Pump units mort retrieval on priority site. Should seiners arrive on site, mortality removal will start with seiners. If wellboats are available, initiate removal with Air Lifts into wellboats.

- Begin mortality removal with Air Lifts, Lift-up Systems or Servi-Pump units. Continue until seiners/wellboats arrive.
- If wellboats are available, utilize Air Lifts, Lift-up Systems or Servi-Pump units to pump into wellboats.
- Mortalities retrieved by Air Lifts, Lift-up Systems or Servi-Pump units will be transported to NWD by truck.

- If seiners/well boats arrive, begin mort retrieval with seiners.
- Seiners/well boats will transport mortalities to Burgeo meal plant.
- Record volumes of mortalities retrieved, and cages completed daily and report back to EMT.
- Provide daily updates to regulatory authorities on progress.

Day 3 until completion. Continue with mortality removal until complete.

- Deploy booms to sites.
- ECO to report to Spill Response, FFA and DFO if fat and debris begins to surface.
- Clean up crews deployed to site to collect fat/debris.
- Initiate Migratory Bird response Plan (see Appendix 5)
- Provide daily Update to regulatory authorities. Provide weekly review of activities to external EMT, including regulatory authorities.

8.0 Monitoring and Reporting

MCE will utilize internal staff for environmental monitoring of Class 1 and 2 mortality events. MCE employs several qualified staff who will be responsible for working with the site staff to ensure fat/debris, should it occur, is immediately addressed before it leaves site. Staff will also implement the Migratory Bird Response Plan (Appendix 5) if necessary. See Mobilization section 7.0.

In the event of a Class 3 or above event, external environmental monitoring agencies will be hired to work with the ECO to monitor floating debris, effectiveness of clean up, address shoreline impacts if they occur and participate in the Bird Response Plan. The agencies listed below can provide monitoring services in the event of a mass mortality event:

- MAMKA
- TBD

Regulatory agencies will be advised if fat/debris is present and if it leaves the site. MCE will collaborate with authorities on appropriate removal techniques and monitoring of impacts and seek permission where required. Daily reports will be compiled on removal activities and reported to regulatory authorities and external EMT. These reports will include:

- Location of operations
- Removal methods utilized
- Number of cages completed
- Whether floating debris is present/absent
- Amount of fat/debris removed and removal method.
- Report on shoreline impacts if any and clean up if it occurs.
- Report on any bird effects as per Migratory Bird Response Plan.
- Any issues or challenges encountered

A weekly summary report will be compiled that will report on the following:

- How many sites/cages completed
- Total mortalities removed
- Total fat/debris removed
- Location of any affected beaches and current status
- Total affected birds, if any.
- How many cages/sites are left for removal
- Any issues or challenges encountered

The weekly report will be shared with the external EMT, including regulatory agencies. Both the daily and weekly report will be submitted to FFA in accordance with AP17, clause 8, requirement to report every 10 days.

9.0 Communications

In addition to reporting requirements required by the Department of Fisheries, Forestry and Agriculture policy and license conditions, MCE will conduct daily meetings of the internal EMT and weekly meetings of the external EMT. The internal EMT will provide a daily update to regulatory authorities and a written update every 10 days as per AP 17. MCE will also provide at minimum, weekly updates on the progress of any mass mortality clean up on the corporate or NAIA website.

For Class 1-2 events, MCE will verbally inform local communities (mayors) and fishers (through the FFAW) of the event and estimate time for clean up. For class 3-4 events MCE will initiate meetings with local stakeholders, including communities, local fishers, and FFAW representatives. These meetings will be held at regular intervals through out the response to keep stakeholders informed of progress.
All communications will be coordinated through MCE's Communications Director through collaboration with the internal and external EMT.

10.0 Training and Maintenance

MCE will ensure that each service provider shall ensure that staff involved in handling fish mortality are trained according to the SOPS and other protocols provided by MCE.
MCE staff will receive annual training on the Mass Mortality Plan. Training will include:

- Equipment set up, maintenance and deployment (i.e. Air lifts/booms)
- Review of Quarantine procedures
- Review of notification procedures
- Review of Migratory Bird Response Plan
- Review of all applicable SOP's.
- Tabletop mortality event exercise.

Should the plan be updated, amendments will be communicated immediately to all site staff. All new hires of site personnel will be briefed on this plan.

11.0 Post Event Analysis

Priority during events will be on containment and clean up, however, post event, each event will be evaluated through MCE Incident and Crisis Management System (ICMS) to determine the following:

- Cause of the event
- Effectiveness of response system
- Issues/bottleneck during clean up
- Description of future mitigations to prevent similar events
- Description of improvement to made in the response to and clean up of the event clean up of the event.

This evaluation will be shared with external EMT members and those with legislative and regulatory mandate regarding aquaculture and oceans environments.

Appendix Mass Mortality: Service Providers

Dive Contractors:

Private names, and contacts of 3rd party dive contractors are redacted. Details are registered with the FFA. MCE has 5 dive companies shortlisted.

Trucking Companies

Private names, and contacts of 3rd trucking companies are redacted. Details are registered with the FFA. MCE has 5 trucking companies shortlisted.

Seiners: Are all available August to November also February and March. All other times may only get one or two of them.

Private names, contacts and vessel capacity of 3rd party vessel owners are redacted. Details are registered with the FFA. MCE has multiple vessels shortlisted with a total hold capacity of approximately 885MT.

Mortality Disposal Facilities

Primary material recovery operators are public knowledge. Specific details of 3rd party capacity are redacted but are registered with FFA. Total capacity of companies exceeds 1,150 MT per week.

Name	Barry Group Inc.
Type	Rendering
Contact	
Phone	
Address	

Name	New World Dairy
Type	Anaerobic Digestor
Contact	
Phone	
Address	

Cleaning and Disinfections Materials Providers

Private names, and contacts of 3rd party suppliers are redacted. Details are registered with the FFA.

Booms, Absorbent Material

Private names, and contacts of 3rd party suppliers are redacted. Details are registered with the FFA.

Air Compressor Rental

Private names, and contacts of 3rd party suppliers are redacted. Details are registered with the FFA.

Appendix Mass Mortality: SOP's

Standard Operating Procedures will be developed for all mass mortality operations. These must be approved by FFA in accordance with policy and conditions of license prior to engaging in mortality removal and will be prepared to be specific to the site, region and time of year when the event occurs. Other provincial and federal agencies who have a jurisdictional mandate regarding aquaculture and mortality transfer will also be asked to review and approve SOP's. Below is a listing of anticipated SOPS that will be developed for approval. Should the event be disease specific SOP's will be developed with enhanced biosecurity. The Fish Disposal Plan (FHMP, Appendix 3) will be followed with adaptations to site, region and time of year.

- General Biosecurity Protocols
- Mortality Removal
    - Seiner set up and retrieval
    - Air lift set up and retrieval
    - Boom deployment and environmental monitoring
- Mortality Transport
    - Transport via truck
    - Transport via Seiner
- Equipment Cleaning and Disinfection
- Vessel Cleaning and Disinfection
- Mortality Disposal
- Vehicle Cleaning and Disinfection
- Any other SOPs relevant to the planned activities
- or as requested by FFA

Appendix Mass Mortality: Biosecurity
Biosecurity Protocols for a Quarantined Site

I. Purpose
The purpose of these protocols is to minimize the risk of spreading disease both within the site itself (i.e. from cage to cage) and minimize the risk of spreading infectious disease between sites within the same geographical area.

II. General
1. All personnel that are involved with the quarantined site are required to read and abide by these protocols. This includes staff working on site, visitors to site, transporting workers to site, etc.).
2. Traffic to and from the site is **restricted** and must be authorized by both the Department of Fisheries, Forestry and Agriculture (FFA) and through the Fish Health and Welfare Director (*currently vacant*) or designate. **No unauthorized entry to the site will be tolerated.**
3. Access to the site will be via FFA-approved SOPs ONLY.
4. Footbaths (Table 1) with scrub brushes will be present on the wharf and in boats and will be checked and refreshed daily or any time they appear dirty.
5. Equipment is **NOT** to be moved off site without a License to Move.
6. Farm staff and visitors are to wear proper PPE (see Table 3) to ensure all clothing can be disinfected to prevent disease transfer.

III. Site Set-Up
1. An aluminum barge will be used as a staging area.
2. The barge will be split into 3 areas:
    a. A "Clean" area will be the furthest away from the site
    b. A "Dirty area will be the closest to the site
    c. A "Buffer" area will be in between the "Clean" and "Dirty" areas
    d. A berm will be placed between the dirty and buffer zone to contain any fluid from cleaning and disinfection activities.
3. The areas on the barge will be clearly labelled and lines will be drawn to delineate the associated areas.
4. There will be a plastic storage shed on the dirty area so that site PPE can be stored in a dry area.

IV. Site Access

Entering Site
1. All visitors must follow the same protocols as staff. All staff and equipment must enter the site via the staging area. A transport vessel will be used to get from the designated wharf to the staging area.
2. Staff are required to disinfect their boots using a foot dip (see Tables 1 and 2) at the wharf before boarding the transport vessel and again on the transport vessel directly after boarding. This transport vessel is used to deliver staff and equipment to the staging area of the quarantined site.
3. **Transport vessels should ensure their route of travel is as far away from other sites as is feasible and safe.**

4. Upon arrival, the transport vessel will tie up to the designated clean side of the staging area.
5. Staff and equipment will exit the transport vessel and step onto the clean side of the staging area.
6. Staff and equipment will then proceed across the staging area through the designated buffer zone and onto the dirty side of the staging area.
7. Once staff or equipment leaves the clean side of the staging area, they cannot return to the clean side without proper cleaning and disinfection (see "Exiting Site" below).
8. Staff and equipment will board the site vessel from the dirty side of the staging area.
9. The staff can now access the site and attend to their designated duties.
10. **All equipment and staff must exit the site as per "Section IV: Site Access - Exiting the Site".**

Exiting Site

1. Once staff are ready to exit the site, they will steam from the site to the staging area in the site vessel.
2. The site vessel will be tied up to the "Dirty" side of the staging area.
3. All staff and equipment that is to leave site will exit the boat and land on the "Dirty" area of the staging area.
4. Staff will scrub themselves and any equipment with a detergent (see Table 1) and then rinse with clean water.
5. Once clean, equipment and staff be sprayed with disinfectant (See Table 1). Care must be taken to ensure disinfectant contacts every appropriate surface.
6. Once sprayed with disinfectant, staff and equipment will move to the "Buffer" area of the staging area. Staff (PPE) and equipment will and allowed to sit for the appropriate contact time.
7. Once the appropriate contact time has passed, equipment and staff can move to the "Clean" area of the staging area and board the transport vessel. If anything or anyone moves back into the dirty area, then the exiting protocols must be re-applied.
8. All transport vessels will be completely cleaned and disinfected above the waterline prior to departure from the staging area.

V. Personal Protective Equipment

1. PPE is to be worn at all times, according to Table 3.
2. When staff arrives at the transfer area, they remove their life vests before leaving the transfer vessel and entering the staging area. Once on the staging area on aluminum storage barge they proceed to the PPE storage area and put on their life vest and rain gear that are left on the farm.
3. At the end of the day, site rain gear is disinfected as per "Section IV: Site Access" and stored on the storage barge along with their life vest. Staff will then leave the transfer area and board the transfer vessel, where they put on their transfer vessel life vests.

VI. Feed Delivery

1. Feed will be brought to the staging area via a transport vessel on an as-needed basis.
2. Feed will be transferred from the transport vessel to the staging area.
3. Feed will then be transferred from the staging area to the feed barges on the dirty side.
4. All protocols outlined in "Section IV: Site Access" apply.

VII. Mortality Dives

1. SCUBA divers are used to retrieve mortalities as needed. Increased diving frequency will be employed if there are disease concerns on site or if mortality increases.
2. Divers will access the site as per Section IV: Site Access
3. Divers will dive the farm in order of cages with lowest mortality to highest mortality.
4. Divers will be disinfected between cages using an iodine bath of 250ppm
5. Mortalities will be collected into site specific mort bags that are rinsed in disinfectant after use and kept on the site vessel. (See Table 1).
6. All mortalities will be put into double lined xactic tubs and removed from site as per the "Mortality Removal from a Quarantined Site" SOP.
7. The vessel used for the mortality dives will be cleaned and disinfected before and after each dive. (See Table 1 and 2).
8. Diving equipment will be disinfected following the dive and all equipment will remain on site (except mask, fins, and tanks). This equipment will not be used at any other marine farms. Mask, fins, and tanks will exit the site as equipment following the protocols outlined in "Section IV Site Access".

VIII. Disease surveillance

1. A veterinarian or veterinary technician will visit the farm a minimum of every 2 weeks. A representative sample of dead and moribund fish will be examined for signs of disease. Appropriate samples will be collected for disease surveillance (including but not limited to ISA testing) and will only be permitted to be removed from the site under a FFA license to move.
2. The farm manager will report any unusual findings on the mortality dive to management as soon as possible.

Table 1: Disinfectant / Cleaning alternatives

Disinfectant	**Strength**	**Dilution**	**Contact time**
Iodor, Premise, etc.	250ppm	300mls/20liters	10 mins
Javex (cannot be used at marine site)	1,000 ppm	500mls/20liters	10 minutes
Virkon (can only be used with fresh water)	1%	250 grams/25liters (freshwater only)	10 minutes
Cleaning	**Strength**	**Dilution**	**Contact time**
Detergents	Green Works	Strong	Use prior to disinfecting
Hot water & High Pressure	>65°C	N/A	>10 minutes

Table 2: Disinfection Process

Procedure	
Disinfection of PPE	Clean with detergent. Rinse. Spray down with Iodor (250ppm) and let soak for 10 minutes
Disinfection of Deck and Gunwales of vessel	Clean with detergent. Rinse. Spray with Iodor(250ppm) then scrub in with brush and let soak for 10 minutes

Foot Dips	Step in with both feet (Iodor bath at 250ppm), stop for 10 seconds then step out of bath
Disinfection of mort bag (between cages)	Soak in an Iodor (250ppm). Alternate bags for each cage so each bag soaks for 10 minutes between uses.
Mask, fins and dive tank disinfection	Clean with detergent. Rinse. Submerse in Iodor (250ppm) bath for 10 minutes
Mort pans	Clean with detergent. Rinse. Spray with Iodor (250ppm) and brush around and let soak for 10 minutes

Table 3: Personal Protective Equipment

Rain Gear	To be worn on site
Rubber Boots	To be worn at all times
Rubber Gloves	To be worn when on the cages
Life vest	To be worn at all times

Appendix Mass Mortality: Disposal Guidance ECCM

GOVERNMENT OF
NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation
Pollution Prevention Division

Guidance Document

Title: Disposal of Fish, Shellfish and Fish Offal

Revision Date: November 07, 2004

Revised By:
Joe Ashley, Environmental Co-ordinator

Approved By:
Derrick Maddocks, Director

TABLE OF CONTENTS

1.0 INTRODUCTION

Fish, shellfish and fish offal wastes generated by fisher persons and fish plants have, on occasion, caused health and environmental concerns due to improper/poor storage, handling and/or disposal practices. Some of the problems created include water pollution, fouled beaches, insect/rodent infestations and noxious odors. In some cases, traffic hazards have been created due to spillage onto roadways from overloaded offal transport trucks. Also, contaminated liquids leaking from containers on transport vehicles or the tailgate of dump trucks create slippery road conditions and threaten public and domestic water supplies along the route.

These guidelines provide environmentally acceptable alternatives for the storage, transport and disposal of fish, shellfish and fish offal in the Province and are intended for internal use by Departmental agents at the Government Services Center. The guidelines may also be used as environmental guidelines for the general public.

These guidelines apply to fish , shellfish and fish offal as wastes generated within the Province. Importation of such waste is restricted except as may be authorized by an environmental Certificate of Approval.

2.0 LEGISLATION

Applicable legislation:

- *Environmental Protection Act, SNL 2002 and Regulations*
- *Water Resources Act, SNL 2002 and Regulations*

The following is a list of additional legislation, (and appropriate mandated agencies), which may be applicable when dealing with the storage, transport and disposal of fish, shellfish and fish offal.

- *Canadian Environmental Protection Act, Part VI* (Environment Canada)
  - *Ocean Dumping Regulations, 1998*
- *Fisheries Act* (Fisheries and Oceans Canada)
- *Fish Inspection Act and Fish Inspection Regulations* (Canadian Food Inspection Agency)
- *Load and Drugs Act and Sanitation Regulations* (Department of Health and Community Services)
- *Highways Traffic Act* and the *Load Security Regulations* section 3(5)(h), (Royal Newfoundland Constabulary, Royal Canadian Mounted Police, Department of Government Services and/or respective Municipal By-Laws).

3.0 DEFINITIONS

Approval	Approval means a Certificate of Approval issued under provisions of the Environmental Protection Act or Water Resources Act.
Department	Newfoundland Department of Environment and Conservation
GSC	Government Service Center, Department of Government Services

Offal	All parts of an animal which are removed from the carcass when it is dressed for food, e.g. entrails, heart, liver, head, tail.
Owner/Operator	A person that owns or is responsible for or has the charge, management or control of the operation of a waste management system. A person includes a council, firm, committee or franchise holder.
Waste	Waste includes rubbish, offal, slime, tailings, effluent, sludge, sewage, garbage, refuse, scrap, litter or other substances or waste products that would or could cause an adverse effect.
Waste Disposal Site	A site designated for handling, storage, processing, treatment, and/or disposal of waste and for which a certificate of approval has been issued under the provisions of the *Environmental Protection Act, May 22, 2002.*

4.0 EXEMPTION

4.1 Individual fisher persons splitting/filleting fish on a beach or on a stage head may only deviate from these guidelines to dispose of fish offal in traditional ways; disposal in the water or for use as fertilizer on fisher person's residential garden(s).

5.0 STORAGE REQUIREMENTS

5.1 All fish, shellfish and fish offal waste shall be loaded into leak-proof containers.(e.g. fish bins) Note: A dump truck with **a proper liner or proper gasket on the tailgate** can serve as a leak-proof container.

5.2 These containers shall be covered (tarpaulin or equivalent cover) at the completion of loading operations to minimize flies and odours.

6.0 TRANSPORTATION REQUIREMENTS

6.1 Waste shall be transported in leak-proof covered containers.

6.2 These wastes shall be transported to an authorized site within 24 hours after loading operations are completed. In cases where transportation of the waste may be delayed, refrigeration or ice cover shall be used as necessary to reduce the rate of decomposition and to minimize noxious odours and fly infestation of these wastes.

6.3 Fish, shellfish and fish offal transport trucks shall not be overloaded. Consideration shall be given for steep inclines along the route to an offloading or disposal site. Spillage from transport vehicles is prohibited.

7.0 DISPOSAL OPTIONS

7.1 Disposal of wastes shall be to predetermined/authorized sites. Environmentally acceptable alternatives for the disposal of fish, shellfish and fish offal are listed in order of priority and not limited to:

Option 1: Delivery to a Fish Waste/Meal Processing Plant

Offal shall be transported to a fish waste/meal processing plant daily between May and October and at least every other day between November and April. Plants utilized for chitin production, sauce production, crafts and ornaments (cod skin leather, earrings, scallop shell

items, etc.), are considered processing plants and are acceptable alternatives for fish, shellfish and fish offal disposal.

Option 2: Disposal as a Compost or Fertilizer

Fish, shellfish and fish offal used as fertilizer or compost is an acceptable alternative under certain circumstances.[1] The potential for noxious odors, flies and rodent infestation shall be considered. Watercourses, private and public water supplies and environmentally sensitive sites shall be avoided.

(a) Written approval of the GSC (for the Department) is required prior to commercial composting or land disposal of shellfish, fish and/or fish offal.

(b) Fish and offal stored for compost or fertilizer shall be covered to control flies and odour problems.

(c) Drainage from waste storage areas shall be directed to an approved discharge site/system. Discharge to a watercourse is prohibited.

(d) The use of offal as a fertilizer should be done after an assessment has been completed on the land where the offal is to be spread. Soil assay testing is recommended before any extensive quantity of offal is applied in a spreading program. The quantity of offal applied to land in a given period of time should meet only the soil requirement for beneficial use and therefore have least adverse impact on the environment.

(e) Fish offal may not be spread within **thirty** meters of a watercourse/body of water. Distance requirements may be greater as local conditions vary, i.e. slope of land, soil conditions, etc.

(f) Fish offal may not be spread within **ninety** meters of any well or public water supply and may not be spread on the watershed of any community water supply system.

(g) Consideration shall be given to neighbouring properties and land use. Noxious odours generated from decaying fish, shellfish and fish offal wastes may adversely affect land use on such neighbouring properties.

(h) Fish offal shall not be applied to snow covered and/or frozen ground.

Option 3: Ocean Disposal

A permit is required from Environment Canada for the disposal of any fish, shellfish and/or fish offal in marine waters (using a barge, vessel, netting, etc.)[2]

Option 4: Disposal at a Land Based Waste Disposal Site

Written approval must be obtained from the owner/operator of an approved waste disposal site and the appropriate regional GSC office prior to any offal disposal. All offal deposited at a waste disposal site must be into a prepared excavation. Liming prior to backfill is required (to control rodent/fly infestation and/or noxious odour problems associated with decaying wastes.)[3]

Note: Disposal in a waste disposal site is not permitted unless the generator of the offal demonstrates that meal, composting/fertilizer and ocean dumping options are either unavailable or economically prohibitive.

7.2 Unacceptable Disposal Methods

Methods of disposal of fish, fish offal, and shellfish waste which are **not acceptable** and are in violation of one or more of the previously mentioned Acts include;

- Over the wharf dumping.
- Dumping on a beach.
- Dumping at sea in an area other than a designated gurry ground for which the operator has an Ocean Dumping Permit from Environment Canada[2].
- Dumping on land that is not part of an approved composting/land fertilization program "or" at any location other than an approved Waste Disposal Site (with the permission of the owner/operator).

8.0 SPILLS

In the event of spillage from a waste container or transport truck, the proponent must immediately notify the GSC via the environmental emergency phone number (772-2083 or 1-800-563-9089) and take all necessary steps to clean the affected area and restore the environment to the satisfaction of the Department.

All waste, damaged materials and debris generated at the spill site must be disposed in an approved waste disposal site. Authorization of the site owner/operator and the appropriate regional office of the GSC is required prior to disposal. Special disposal requirements and/or user fees may be applied by the disposal site owner/operator.

.....

APPENDIX A

Endnotes:

1. Guidelines for Compost Quality have been developed by CCME(Canadian Council Ministers of Environment); ref. 1996-CCME-SWMTG-106, #ISBN 1-895925-6. (Available from CCME at a cost of $3./copy.) Composting activities may require a certificate of approval from the Department of Environment and Conservation. Contact should be made with the Department prior to conducting any composting activities.

2. Disposal at Sea: Offal loaded for the purpose of disposal at sea requires a permit issued by Environment Canada pursuant to the Canadian Environmental Protection Act (Ocean Dumping Regulations, 1998).

3. A minimum of 0.6 m of fill material is required for the backfilling of offal wastes. Backfill material shall be compacted at the end of the disposal operations. Lime refers to hydrate of lime (not to be confused with "dolomite" lime used as a soil conditioner/fertilizer). Liming will assist in disinfection/decomposition as well as suppress odour, flies and rodent infestation.

APPENDIX B

For further information on the disposal of fish, shellfish and fish offal, contact any Regional Office of the GSC, Department of Government Services or the Department of Environment and Conservation, Pollution Prevention Division.

Regional Government Service Centre Offices

St. John's
5 Mews Place
P.O. Box 8700
St. John's, NL
A1B 4J6
Tel: (709) 729-3699
Fax: (709) 729-2071

Corner Brook
Noton Building
1 Riverside Drive, P.O. Box 2006
Corner Brook, NL
A2H 6J8
Tel: (709) 637-2204
Fax: (709) 637-2681

Clarenville
2 Masonic Terrace
P.O. Box 1148
Clarenville, NL
A0E 1J0
Tel: (709) 466-4060
Fax: (709) 466-4070

Happy Valley-Goose Bay
Thomas Building
13 Churchill St.,
P.O. Box 3014, Stn B
Goose Bay, NL
A0P 1S0
Tel: (709) 896-2661
Fax: (709) 896-4340

Gander
McCurdy Complex
P.O. Box 2222
Gander, NL
A1V 2N9
Tel: (709) 256-1420
Fax: (709) 256-1438

Grand Falls-Windsor (field office)
9 Queensway
Grand Falls-Windsor, NL
A2A 1W9
Tel: (709) 292-4206
Fax: (709) 292-4528

Appendix 4: Migratory Bird Response Plan

Migratory Birds Response Plan

Prepared By:

Mowi Canada East

Doc. ID #	Revision	Date	Responsibility
MBRP V-3.0		February 2023	Environment and Development Division

Table of Contents

1.0 Objective

The objective of this document is to outline actions and procedures to prevent and monitor potential impacts on migratory birds, in the event of a mass mortality event that results in fish fat floating on the surface of sea cage sites.

Application: This plan applies to all active sea sites of Mowi Canada East (MCE) on the south coast of Newfoundland (See maps, Appendix 1, Mass Mortality Contingency Plan (MMCP)).

Authority: The Canadian Wildlife Service (CWS) is responsible for the management and conservation of migratory birds wherever they occur in Canada under the Migratory Bird Convention Act (MBCA) and Species at Risk under Environment and Climate Change's jurisdiction (SARA). CWS oversees all aspects of impacts to wildlife during an environmental emergency, including:

- Authorizing activities affecting Wildlife (i.e. permits)
- Acting as a Resource Agency to advise during emergencies.

This plan forms part of the Mass Mortality Plan as required by the Department of Fisheries, Forestry and Agriculture under Aquaculture Policy (AP) 2, 17 and 23 under the authority of the provincial *Aquaculture Act.*

2.0 Species and Risk Assessment

Avian species most at risk of encountering sea cage sites are sea birds. A listing of migratory birds covered under the MBCA can be found in Appendix 1.

In 2019 a mass mortality event at seas sites in Newfoundland resulted in floating fat on the surface of the water because of fish removal operations. Most of the fat was retained and collected, however, some fat drifted to nearby shorelines. Observers, including, site staff, fishers, environmental technicians (MAMKA technicians who conducted systematic inspections of beaches near the affected sites) and CWS officers did not report any impacted bird species during or after the event. The areas affected by the mass mortality event was limited to waters immediately around the cage structures and shorelines immediately adjacent to the sea sites (See MAMKA, Interim report, attached.). Should another event occur, it is expected that the area affected will be within the site boundaries directly around the cage structures (approximately area of 180m x 450m for Bays West and approximate area of 120m x 500m for Bays East).

Sea bird species may be at potential risk of encountering floating salmon fat on the water during mass mortality depopulation events. Fish fat/oil has the potential of harming birds by impacting the structure and waterproofing of bird feathers. MCE have undertaken environmental mitigation measures to prevent mass mortality from occurring again. However, should an event occur, a Mass Mortality Plan has been developed and includes measure to contain and minimize salmon fat on the water's surface. Should salmon fat be apparent on the water, MCE will take to steps to prevent birds from encountering the fat, collect the fat as quickly as possible while preventing it from leaving the sites, and monitor shorelines and the waters around the sites for impacted birds.

Note: Birds not covered under the MBCA that may be in the vicinity of sites include corvids (crows), raptors and kingfishers. These birds fall under provincial wildlife jurisdiction. Standard protocol on farms sites is to call the Wildlife Division if a bird is injured on site. Discussion with Wildlife Division officials indicate that the protocol for these birds if injured, is to notify Wildlife Division through local Conservation Officers at the Milltown Forestry office, 709-882-2200 or the Wildlife Division Head office in Corner Brook, 709-637-2025 for direction on actions to take.

3.0 Notification, Prevention, Monitoring and Permitting

The Avian response plan will be initiated upon identification of a mass mortality event.

3.1 Notification

The Mass Mortality Plan lists the notification process which included notification to ECCC/CWS (see Section 2.0, MMCP). Procedures for mortality removal and fat containment are outlined in the MMCP(Section 6.0)). The Spill Response Line will be notified of the mass Mortality event (1-800-563-9089). The Spill Response Line will be called if impacted birds are found.

3.2 Prevention

Preventing birds from coming into contact with salmon fat will be a priority during a mass mortality event. MCE will employ number of strategies to prevent birds from being impacted.

Bird nets:

Salmon farms employ bird nets to prevent birds from accessing the water surface inside the cage collars (Figure 1). Much of the salmon fat is retained within the cage collar during an event. The cage collar acts a boom, containing the fat. Sites affected will leave the bird nets on the cages during removal activities to prevent bird access to the fat. Should nets need to be removed, they will be replaced as soon as the activity requiring removal is completed.

Figure1: Sea cage with bird net in place.

Hazing:

Hazing is a technique used to deter birds away from impacted sites to prevent them from coming into contact with fat. Hazing techniques include auditory scare devices (pyrotechnic

devices, propane cannons), visual devices (i.e. artificial hawks kites) and hazing by personnel via vessel, aircraft or vehicle.
All the sites have personnel on site at all times during daylight hours. The activity of the mortality removal and clean up was sufficient to keep birds away from site activity during the 2019 event. The staff designated "Environmental Control Officer" (ECO, see MMCP, section 6.12 & 6.22) will monitor for the presence of birds and will direct site staff to "haze" birds via small boat activity should birds get too close to removal activity or if fat becomes free floating. Hazing will continue until fat can be contained or removed.
Habituation to scare devices can occur. Should hazing by scare devices or vessels vessel scare devices or vessels be ineffective, alternative means of hazing via acoustic deterrents will be sought through consultation with CWS and appropriate permits will be obtained prior to initiating hazing (See Section 3.4)

Containment:
The Mass Mortality Plan details efforts to contain fat and not allow it to drift from site or to shorelines. Should that occur the plan also lists actions to be taken to contain the fat and removed it from the shoreline.

3.3 Monitoring
MCE will monitor all activities during mortality removal to identify when birds are present. The designated site ECO will be responsible for coordinating monitoring activities and deciding when birds may be getting too close to removal activities.

3.31 Surveillance During Operations on site
Sites affected by a mortality event will be monitored for bird presence on an ongoing basis during fish removal operations. The ECO will direct site staff to conduct hazing operations in the event that birds get too close to removal activities as described in the MMCP.

3.32 Beach Sweeps
MCE site staff regularly do shoreline beach sweeps and clean ups as a regular part of farming activities. This would continue during a mortality event. MCE staff will begin to record when they see dead or distressed birds and will document the presence /absence of birds (a picture will be taken where possible), the beach location and the date of the sweep as part of their regular beach sweeps to form a baseline of knowledge on bird mortality in the areas near the site. This information will be made available to CWS. The shoreline survey form provided in the Adopt-A-Beach Program a Beached Bird Survey Guide, Environment Canada's Canadian Wildlife Service (EC-CWS) (Appendix 2) will be used to record any birds discovered.

During a removal procedures during a mortality event at a sea site, beach sweeps will be performed once a day on beaches in close proximity to the sites (within 1km of the center of the site). Once weekly, shoreline surveys within 2 km of the site will be conducted. This will continue until removal and cleanup activities are completed.

3.33 Bird Collection

Should oiled birds be discovered on site or on beaches, the Spill Line will be called. MCE will seek permits (see Section 3.4) to collect birds, both dead and alive, from CWS and will follow protocol outlined in ECCC's "Protocol for Collecting Birds During an Oil Spill Response" (Appendix 3).

Bird Collection kits will be assembled and distributed to affected sites. These kits will include:

- Dip net
- Tin foil
- Large plastic collection bags for dead birds
- Labels, sharpies
- Gloves
- Chain of custody form
- Cardboard boxes for holding live birds

MCE employs a licensed veterinarian on staff. The veterinarian wil, under permits from CWS and through consultation with CWS, decide if live affected birds need to be euthanized or if rehabilitation is possible. Should rehabilitation be possible, MCE will seek advice on options for rehabilitation, possibly the Suncor Rehabilitation Center (currently in discussions). Should birds need to be euthanized, it will be done by the veterinarian or under the supervision of our veterinarian. Dead birds will be delivered to CWS/ECCC for assessment.

3.4 Permitting

MCE will seek all required permit to enable responses to impacted birds. The MBCA requires permits for the possession, transportation, rehabilitation, and deterrence/dispersal of birds. CWS Atlantic Region permits officer will be contacted for permits should an event occur. It is understood that a Scientific Permit Application for Migratory Bird Emergency Response will be required for bird collection (application in Appendix 4). It is understood stood that we do not require a permit for hazing via the use of small vessels, however, if additional hazing methods are required, permits will be necessary.

3.5 Training

MCE are all trained in Occupational health and Safety protocols specific to operation onboard vessels and at sea sites. All site staff have MED A3 and First Aid. All small vessel operators have Small Vessel Operators Proficiency (SVOP) training. Site visitors are briefed on OH&S protocols. Safety equipment includes steel toes boots, hard hats, and rubber gear. This will be required equipment during hazing, beach sweeps and bird collection activities.

Site staff involved in hazing, beach sweep and bird collection will be briefed on prevention and monitoring techniques as discussed in section 3.0. Specific training will be given on bird collection techniques.

4.0 Mobilization

Experience indicates that fat as a result of salmon decomposition post mass mortality event begins to surface about 7 to 10 post mortality. This allows time for coordination of the Migratory Bird Response Plan. Upon identification of a mass mortality event, the following steps will be followed:

1. Identification of an event: Notification of regulatory authorities, including Spill Response Line, as per Section 2.0 of the MMCP.
2. Depending on the class of the event, the Migratory Bird Response Plan will be Initiated. Events classed as 1 or 2, with the ability to clean up within a week, will not trigger the MBRP. Response that are anticipated to take longer than one week will trigger the response plan.
3. Upon and Class 3 event or higher, the Migratory Bird Response Plan is initiated.
4. Obtain permits for bird collection in the event birds are encountered (this can be done in advance on a yearly basis).
5. Compile the bird collection kits and beach survey sheets and distribute to affected sites (Day 1).
6. Refresh staff training on techniques for preventing bird encounters and in shoreline surveys and collection techniques (Day 1).
7. Appoint an ECO at each site responsible for bird monitoring, prevention, survey, and collection activity (Day 1).
8. Ensure response kits, staff training, ECO and permits/notification are in place prior to mortality removal efforts (Day1-2).
9. Each morning before removal starts, staff meetings on site will be held to review activities related to birds and response success. Changes to methods will be made as necessary and through consultation with CWS.
    a. Review hazing effectiveness
    b. Review effectiveness of bird covers
    c. Review beach surveys and bird observations
10. Report all birds found to CWS through Spill Response Line.
11. Once removal activities are complete, review effectiveness of bird response plan and adjust for the future.

5.0 Reporting

Results of the Bird Monitoring Program will be reported daily/weekly along with the MMCP updates as per section 8.0 of the MMCP.

Appendix Bird Response: Migratory Birds

Migratory Game Birds:
(a)Anatidae or waterfowl, including brant, wild ducks, geese, and swans;
(b) Gruidae or cranes, including little brown, sandhill, and whooping cranes;
(c) Rallidae or rails, including coots, gallinules and sora and other rails;
(d) Limicolae or shorebirds, including avocets, curlew, dowitchers, godwits, knots, oyster catchers, phalaropes, plovers, sandpipers, snipe, stilts, surf birds, turnstones, willet, woodcock, and yellowlegs;
(e) Columbidae or pigeons, including doves and wild pigeons.

Migratory Insectivorous Birds: Bobolinks, catbirds, chickadees, cuckoos, flickers, flycatchers, grosbeaks, humming birds, kinglets, martins, meadowlarks, nighthawks or bull bats, nuthatches, orioles, robins, shrikes, swallows, swifts,
tanagers, titmice, thrushes, vireos, warblers, waxwings, whippoorwills, woodpeckers, and wrens, and all other perching birds which feed entirely or chiefly on insects.

Other Migratory Nongame Birds: Auks, auklets, bitterns, fulmars, gannets, grebes, guillemots, gulls, herons, jaegers, loons, murres, petrels, puffins, shearwaters, and terns.

Appendix Bird Response: Shoreline Survey

NEWFOUNDLAND AND LABRADOR
ADOPT-A-BEACH PROGRAM

Time start:
Time end:

Did you find birds (Yes/No)?

- No, please remember to still submit your results
- Yes, please fill out form and submit your results

Beach	Surveyor	Day	Month	Year

Species	No.	**Dead birds on beach**			
		Age (U, J, A)	Sex (U, M, F)	Is > 50% of carcass intact? (Y/N)	Oiling code (0, 1, 2, 3)

Live birds in area

Species	No.	Oil Code	

Beach condition code (0, 1, 2, 3) or % covered

Oil	Snow/ice	Seaweed

Notes:

LAB

ADOPT-A-BEACH PROGRAM

Degree of oiling:

0. No oil.
1. Slight oiling – smudges of oil that do not totally penetrate the breast feathers or coat the wings.
2. Moderate oiling – oil penetrates to base of feathers or saturates wings; < 25% body affected.
3. Heavy oiling – oil penetrates to base of feathers; > 25% of body affected.

Beach codes for oil:

0. Clean.
1. Slightly oiled – few small patches or tar-balls (<1 per 50 m).
2. Moderately oiled – several large patches of oil or many small ones; wrack line speckled with oil.
3. Heavily oiled – water line and wrack line extensively covered with oil.

Beach codes for snow/ice or seaweed:

0. Covers 5% of beach or less.
1. Covers up to 30% of beach.
2. Covers 30-60% of beach.
3. Covers >60% of beach.

Appendix Bird Response: Protocol for Bird Collection

PROTOCOL FOR COLLECTING BIRDS DURING AN OIL SPILL RESPONSE

Anyone collecting migratory birds must be a nominee on an existing federal salvage permit

Collection of dead birds

1) Every time a beach is swept, select *two oiled birds* to be retained as possible evidence, preferably from different parts of the beach. For each of these two birds:
   - Individually wrap the bird in aluminum foil,
   - Place the wrapped bird in its own evidence bag,
   - Completely fill out a chain of custody form,
   - Write on the bag (or on data form/label) the collector, date, time, coordinates/location, species (if known at time),
   - Place label, chain of custody form, and bagged bird carcass into a second bag,
   - Place evidence bag in a secure place until retrieved by appropriate Environment Canada personnel.

2) To avoid cross-contamination, it is vital that:
   - Clean gloves are used prior to handling each bird, and
   - Birds are wrapped in foil as soon as they are found.

3) Place each remaining bird found on the beach in its own generic plastic bag, and:
   - Write on the bag (or on data form/label) the collector, date, time, coordinates/location, and record that the bird was found dead,
   - Record on the bag weather the bird was OILED or NOT OILED, and
   - Treat bird parts the same as whole birds.

4) If it is not feasible to individually bag all birds found on the beach:
   - Put remaining oiled birds in one of more large bags,
   - Put remaining un-oiled birds in a separate large bag(s) from oiled birds,
   - Write on the bag (or on data form/label) the collector, date, time, coordinates/location, and record that birds were found dead,
   - Record on the bags contain OILED or NOT OILED birds, and
   - Keep birds from different beaches in separate bags.

5) Make arrangements to retrieve all oiled and un-oiled birds with:
   - CWS personnel if oiled wildlife rehabilitation response is NOT in place, or
   - Wildlife rehabilitator if oiled wildlife rehabilitation response is in place.

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August 2018

Collection of live birds

A. If oiled wildlife response is NOT in place:
   1. If you are permitted to humanely euthanize the oiled bird, do so following the standard protocol and:
      - Individually wrap two euthanized birds in aluminum foil,
      - Place the wrapped birds in individual evidence bags,
      - Completely fill out a chain of custody form,
      - Write on the bag (or on data form/label) the collector, date, time, coordinates/location, species (if known at time), and record that bird was found alive and
      - Place evidence bag, label, and chain of custody form in second bag.
      - Store in secure place until retrieved by appropriate Environment and Climate Change Canada personnel

   2. Record and bag remainder of the euthanized oiled birds as outlined in points 3, 4, and 5 on reverse side of this form.

   3. If you are not permitted to euthanize oiled birds, do not feel comfortable doing so, or have found a bird listed under COSEWIC or SARA (e.g. Harlequin Duck, Ivory Gull):
      - Place oiled bird in a cardboard box
      - Label box with the collector, date, time, and location where bird was recovered, and
      - Place in warm, quiet area until handed over to CWS personnel for euthanasia or rehabilitation

B. If oiled wildlife response is in place:
   1. Place the oiled bird in a cardboard box,
   2. Label box with the collector, date, time, and location where bird was recovered, and
   3. Place in warm, quiet area until handed over to wildlife rehabilitator for rehabilitation or euthanasia.

Important information when catching and placing birds in box:
- Handle birds with gloves, preferably disposable ones, and
- Lid and walls of box must have sufficient holes to allow proper ventilation.

Place only one murre, seaduck, or other large bird per box

Two dovekies may be placed together in box if both are only slightly oiled (i.e. <25% of body covered)

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August 2018

Appendix Bird Response: Permit Application

SCIENTIFIC PERMIT APPLICATION for Migratory Bird Emergency Response
Canadian Wildlife Service – Atlantic Region

SECTION 1: Applicant Information

1.1 Type of request

□ New project.

□ Continuing project for which a permit has expired. Permit number: _____

1.2 Previous permits

Do you currently have or have you previously held a permit issued under the *Migratory Birds Regulations*?

Yes □ No

If so, provide the most recent permit number: _____

Has a report been submitted for this (previous) permit? □ Yes □ No □N/A

1.3 Contact information

Applicant surname:	Applicant given name:	
Position/title (e.g. Environmental Planner):		
Name of the organization you are affiliated with:		
Mailing address of **applicant**		
Street:		
City:	Province/Territory:	Postal Code:
Work Telephone:	Fax (if available):	
Cellular:	Email:	
Mailing address of **organization** (if different from above)		
Street:		
City:	Province/Territory:	Postal Code:

SECTION 2: Project Information

2.1 Project title

2.2 Project duration (anticipated): Start_____ (yyyy/mm/dd)	End_____(yyyy/mm/dd)

2.3 Project summary

2.4 Applicant qualifications relevant to the project (or CV attached ☐)

2.5 Location of activities

Address/UTM/geo-location or proximity to nearest identifiable town or city. Provide the location(s) where the activities will be conducted. If the migratory birds are to be held in captivity, the address of the facility where they will be held must be included. If birds are to be released in a location other than at the point of capture, please provide the location of release.

SECTION 3: Activities/Methods

3.1 Target species (indicate the species expected to be affected)

3.2 Methods or protocol followed for disturbance, hazing, handling or release

3.3 Proposed disposition of dead birds

3.4 Shipment/transport

If samples or specimens will be shipped, transported, imported or exported, describe these and provide the name and address where they will be shipped (to/from):

Section 4: Nominees

4.1 Nominees (other participants)

Name all individuals disturbing or handling birds, if this is impossible at time of application, a detailed position title is required.

Name	Organization	Position/Title

SECTION 5: Individuals Recommending the Permit (letters must be included with the application unless this is a permit renewal application)

1) Name:	Work Telephone Number:
Title/Position & Organization:	
2) Name:	Work Telephone Number:
Title/Position & Organization:	

SECTION 6: Signature of Applicant

I, _____(print name) attest that I have the ability and knowledge to accurately identify the species and conduct the permitted activities and certify that:

- I am 18 years of age or older;
- all information submitted in this application is accurate and has been completed to the best of my knowledge;
- I may not commence work before a valid permit is in my possession;
- I understand that, in order to legally conduct the activities authorized by my permit, I may need to obtain in advance additional federal, provincial, territorial and/or municipal permits or authorizations.

SIGNATURE OF APPLICANT: _____	**DATE:**_____
(electronic signatures are accepted for email submissions)	*(yyyy/mm/dd)*

Return to your Regional Canadian Wildlife Service Office

Newfoundland and Labrador, Prince Edward Island, Nova Scotia, and New Brunswick
Permits Section
17 Waterfowl Lane, P.O. Box 6227
Sackville, NB
E4L 1G6

Telephone: 506-364-5068
Fax: 506-364-5062
Email: ec.scfatlpermis-cwsatlpermits.ec@canada.ca

Appendix 5 – Plankton Monitoring and Response Plan

MCE Plankton Monitoring and Response Plan contains specific operating procedures and methods that are highly confidential and commercially sensitive. The details are registered with the FFA. Disclosure of this information can harm significantly the competitive position of MCE. To meeting the EIS information needs, a more generalized description is provided in the Saltwater Environmental and Waste Management Plan V 6.2, Appendix A, Operational Environmental Mitigation Plan.

MOWI Canada East Plankton Monitoring and Response Plan

1. Overview of Plankton monitoring at sites
2. Phytoplankton Response Plan

Appendix I: Phytoplankton Identification Guide

Appendix II: Standard operating procedure for taking water samples

Appendix III: Standard operating procedure for counting and identifying phytoplankton with a microscope

Appendix IV: Plankton Recording Form

Appendix V: Sampling locations

1. Overview of Plankton Monitoring at Sites

Application and Purpose

The purpose of this document is to demonstrate the importance of phytoplankton monitoring at MOWI Canada East sites. This section provides a quick look into phytoplankton sampling, analysis and mitigation practices.

Responsibility and Authority

Site Managers will be responsible for collection and monitoring phytoplankton samples at their sites and remote sampling stations near their sites.
Fish Health will provide training for site managers. Fish Health will also provide remote assistance when it is appropriate to do so.

Description

[redacted]

Appendix H
Mowi Canada East Incident and Crisis Management System

Mowi Canada East

Incident and Crisis Management System

Doc ID#	Date	Responsibility
SCP-v4.1	Jan 2023	Environment and Development Division

Incident and Crisis Management System
MOWI Canada East

MOWI's Global System for incident reporting, crisis logging and crisis evaluations

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MOWI and its owned companies globally, including MOWI Canada East (MCE), have a confidential internal global web-based Incident and Crisis Management System (ICMS) in place for reporting incidents, logging incidents and crisis and performing crisis evaluations. This ICMS meets Fisheries, Forestry and Agriculture Aquaculture Policy, AP 2 and 17.

How it Works:

The following screenshots give a sense of the manner in which information is recorded / uploaded in the event of an incident or crisis. There is a web based portal (Figure 1) that leads to an Incident Reporting template (Figure 2). The system is fully searchable (Figure 3). Incidents and Crisis are evaluated for learning purposes and to improve operations locally and globally (Figure 4).

Figure 1: Web-based Incident and Crisis Management System Portal (Screen Shot):

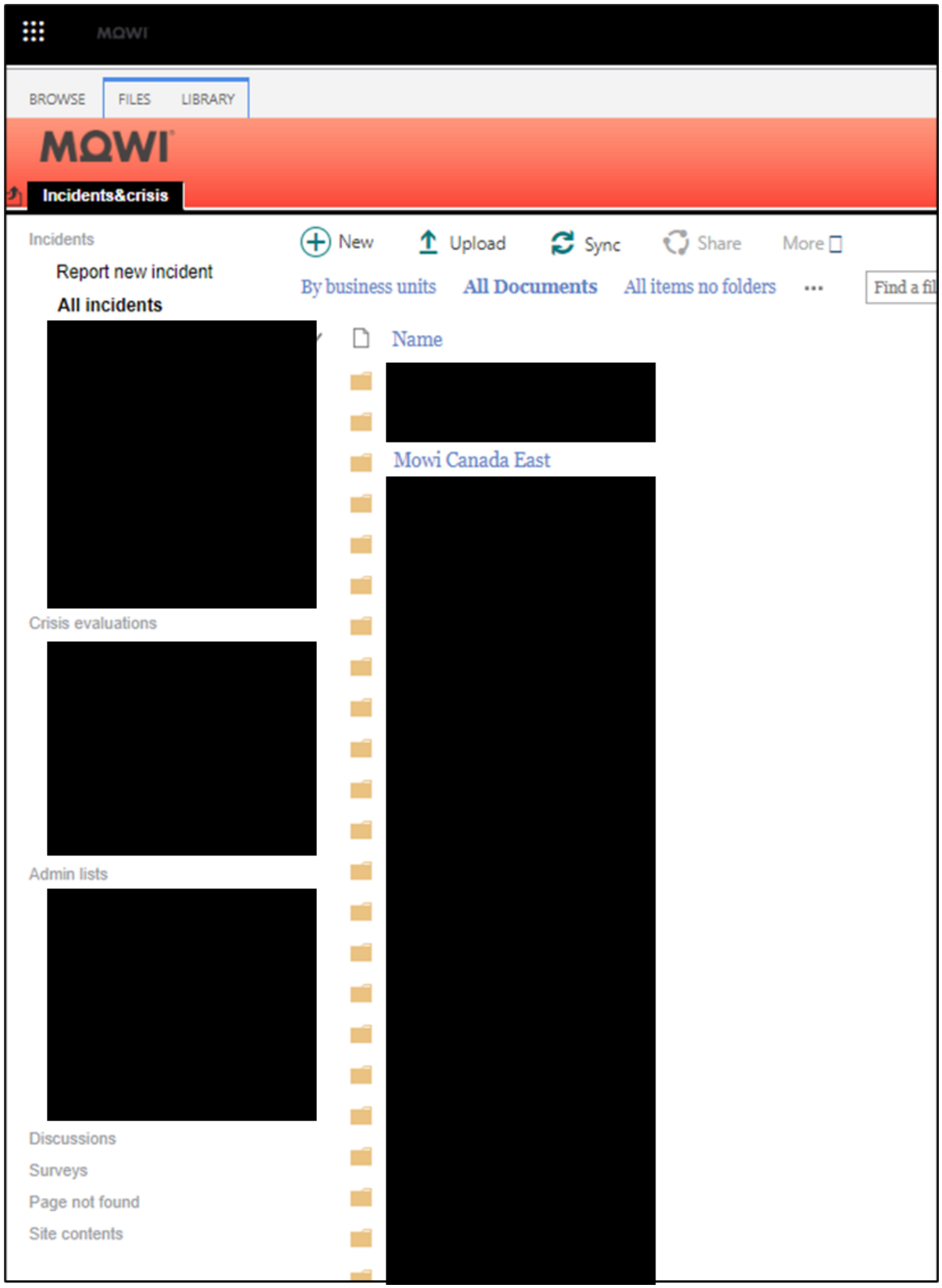


Figure 2: Incident Reporting Portal (Screen Shot):

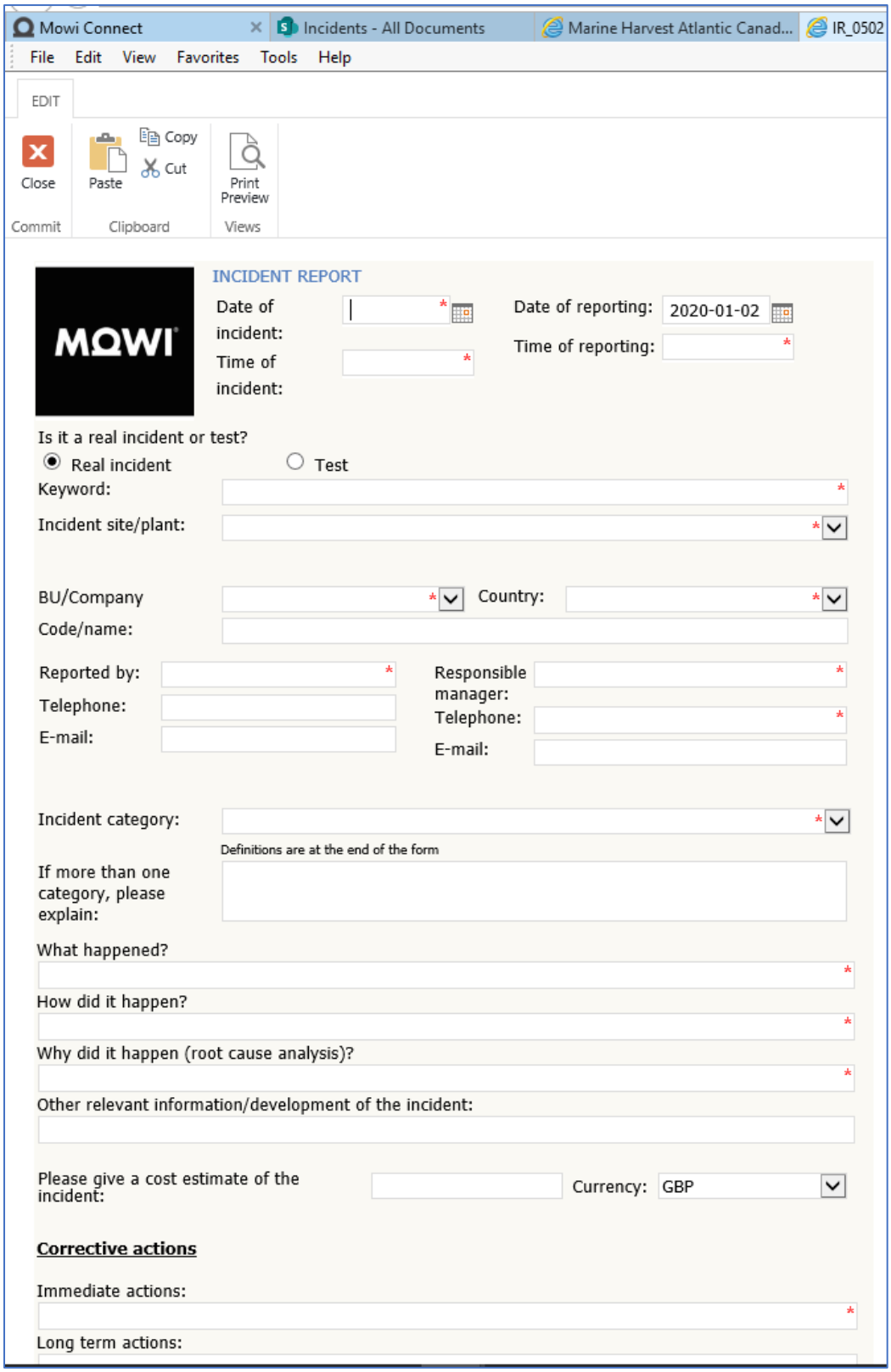


Figure 3: Incident/Crisis Management System Search (Screen shot):

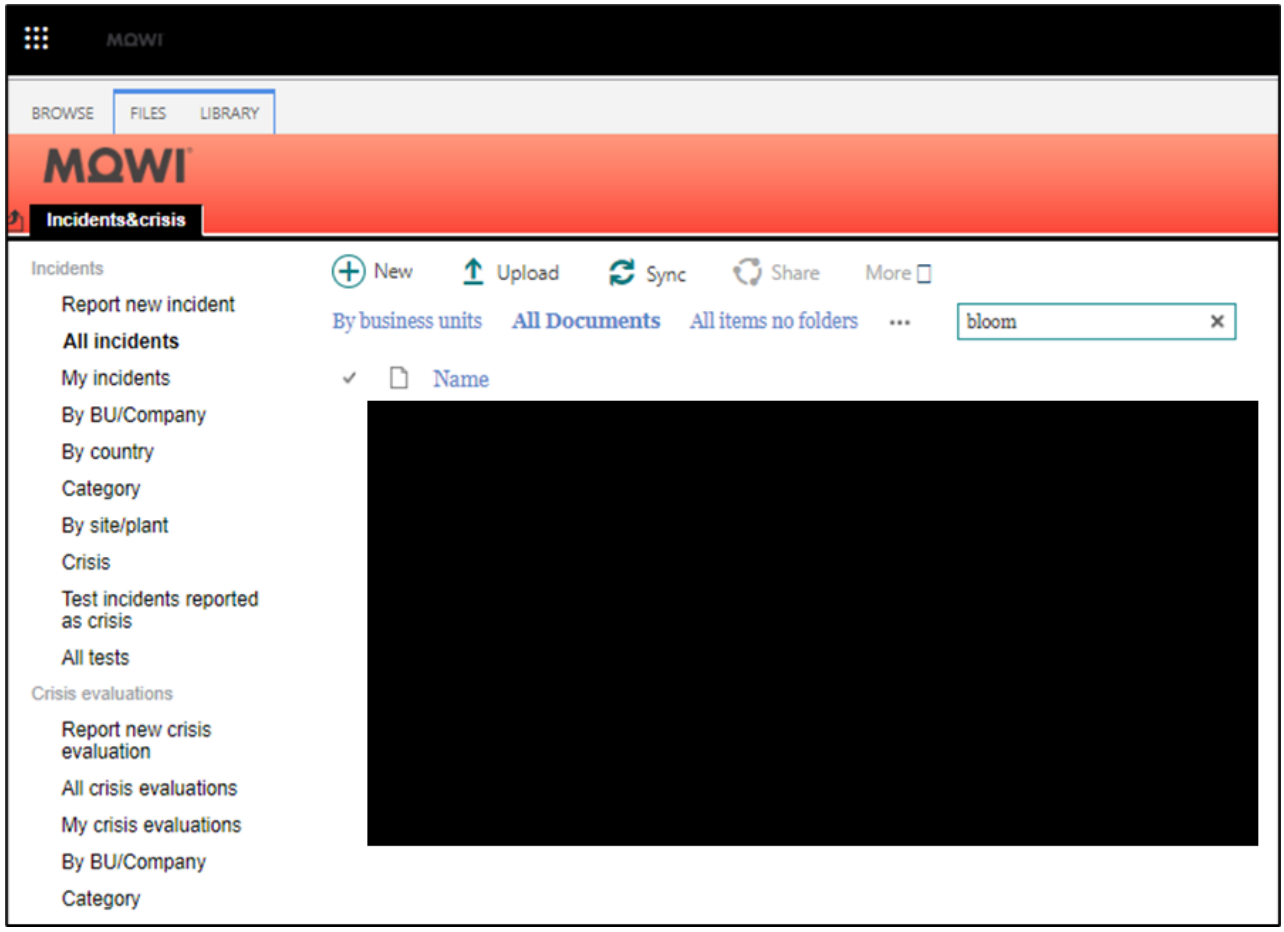
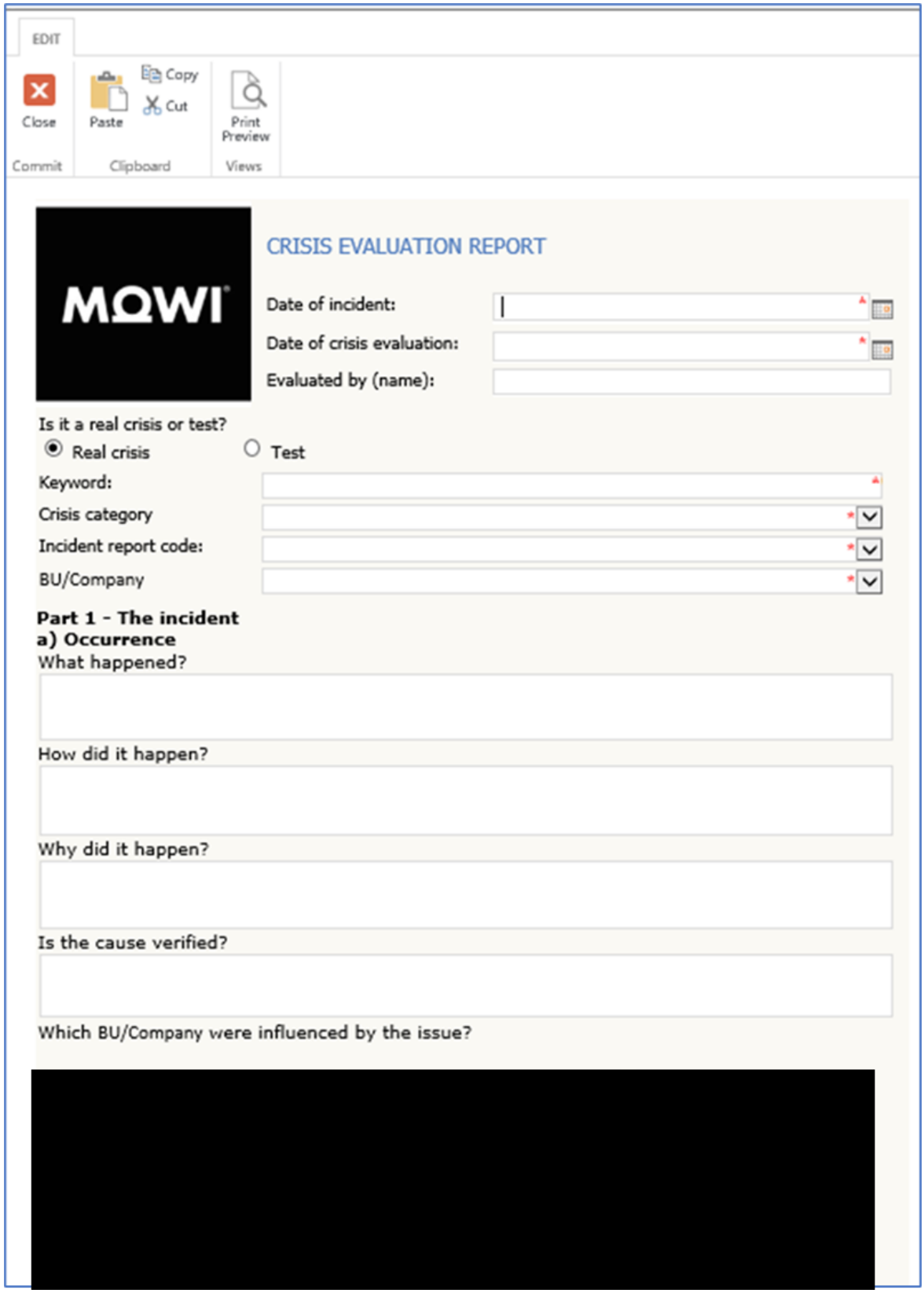


Figure 4: Crisis Evaluation Portal (Screen Shot):



Operational Procedures For Crisis Management

Crisis Teams

- The Crisis Team consists of the senior management team of MCE.

Crisis Notification

- Clear notification procedures/ lists are available for all employees listing:
  - The incidents that should be regarded as a crisis
  - Who to contact in case of crisis
  - The members of the MCE crisis team and their contact details (phone numbers).
  - Phone numbers to the ambulance, fire brigade and police department. ·
- All crises are reported as incidents. Refer to the operational procedure "Incident reporting".
- All incidents defined as a crisis are reported to the leader of a designated group of people comprising the standing crisis team at the level at which the incident has occurred.

Crisis Team Responsibility

As soon as a crisis is identified and a crisis team established, this team leads and coordinates all relevant activities and communication related to the crisis and decides when the crisis has ended.

Crisis team core tasks:

- Identify a reporter for the incident/crisis and register the situation in the ICMS.
- Gain overview of the situation
- Collect facts about the situation
- Categorize the crisis
- Inform regulatory authorities as per local requirements.
- Find out whether a similar crisis has occurred previously in MOWI
- Involve other relevant people in the team
- Appoint a leader and a secretary to prepare minutes and log
- Decide on actions to be taken and coordinate them to reduce damage (i.e. enact Mass Mortality Contingency Plan)
- Inform next of kin in crisis involving injuries to people
- Inform Global HR Director at MOWI Corporate whenever the crisis relates to employees
- Inform Communications Director at MOWI Corporate whenever there’s a BU crisis or Global crisis, before communicating with the media.
- Regularly evaluate crises level escalation. Refer to the operational procedure "Incident reporting".
- Manage communication, both internally and externally, and prepare statements for use in response to enquiries, including reporting requirement of regulators
- Notify insurance company and keep them informed as needed

- Keep a factual record of all incidents, findings and actions. The incident reports will also serve as a crisis log in these instances. Refer to the operational procedure "Incident reporting".
- Disband the crisis team when the crisis is resolved and decide whether further monitoring is needed
- Debrief and evaluate the crisis management and suggest procedure improvements (see "Crisis evaluation" below)

Crisis Evaluation

- A crisis evaluation will be completed once the crisis is fully closed and all aspects addressed (i.e. insurance claims, clean up, etc.).
- The appointed leader of the local crisis team is responsible for the evaluation
- All crisis evaluations are reported through the crisis evaluation report template available in the web- based Incident & crisis module (Figure 1 and 4).
- Once the crisis evaluation report is submitted and saved through this system, an e-mail notification goes automatically to predefined receivers both in the local BU, other BUs and to Corporate.

Linkages to Fisheries, Forestry and Agriculture Policy and Procedures Manual:

The ICMS allows MCE to manage incidents and crisis internally in accordance with established plans, such as the Mass Mortality Contingency Plan and the Escape Response Plan. Notification requirement as per FFA Policy AP17 are incorporated into the reporting mechanisms of the ICMS. The ICMS allows MHAC to search the global database for incidents that it may not have encountered before to find possible strategies and solutions to new events. It also allows for evaluation of both the crisis and the handling of the crisis so that improvement may be made to avoid future events and to improve handling of events.

Please see the following appendices for the full Incident Reporting and Crisis Evaluation forms completed by MOWI in the event of an incident or crisis.

Appendix 1: Incident Report

Mowi Global Internal Report Form contains specific operating procedures and methods that are highly confidential and commercially sensitive. The details are registered with the FFA. Disclosure of this information can harm significantly the competitive position of MCE.

Appendix 2: Evaluation Report

Mowi Global Internal Evaluation Report Form contains specific operating procedures and methods that are highly confidential and commercially sensitive. The details are registered with the FFA. Disclosure of this information can harm significantly the competitive position of MCE.

Appendix I
Spill Contingency and Response Plan – Newfoundland Freshwater Sites

Spill Contingency and Response Plan – Newfoundland Freshwater Sites

Prepared By:

Mowi Canada East Inc.

Doc. ID #	Date	Responsibility
	November 2024	Environment and Development Division

Change Log

SECTION	PAGE	DATE	CHANGE
Contents	All	Nov 5, 2024	Version 1.0

Contents

1. Purpose

Site: Stephenville, NL.

This procedure is a guideline for responding to any spills at MCE Newfoundland freshwater sites. However, circumstances may arise in which we will find it necessary to take other steps not specifically designated in this procedure.

2. Definitions

- Hazmat: Hazardous Material
- Controlled Product: Product that is not intended to be released into the environment
- CMT: Crisis Management Team **Contact Information: 1 XXX-XXX-XXXX (Freshwater Director); if unavailable, contact 1-XXX-XXX-XXXX (Development and Environmental Compliance Director)**
- EWMP: Environmental and Waste Management Plan

3. Storage Location of Controlled Products

Laboratory (see SDS binder)

- Chemical Room Smolt no. 1 (see SDS binder)
- Chemical Room Smolt no. 2 (see SDS binder)
- Chemical Room Smolt no. 3 (see SDS binder)
- Storage Room Grading and Vaccination Building (see SDS Binder)
- Fuel Tanks Fry Building
- Fuel Tanks Smolt no. 1

4. Environmental Aspects

- Port Harmon
- See Section 7.0 of the EWMP

5. Spill Response Equipment

There is one Spill response kit per building.

Required Equipment (minimum requirement):

Labelled portable container(s) suitable for containing kit contents. The container must be safely manageable by one person.

1. (12) 15x19” Pads
2. (3) 3x12’ Sorbent socks
3. (3) Disposal Bags
4. (2) 18x18” Sorbent Pillows
5. (1) pair Nitrile Gloves

6. Emergency Handbook
7. (1) Goggles
8. (1) Half Mask Respirator
9. (1) Boom

6. Additional items for Land Spill Kits

1. Shovel (plastic, aluminum or fiberglass)
2. Plastic Tarp
3. Rake (plastic, aluminum or fiberglass)

7. Spill Response

7.1 Discovery

Upon discovery of a spill, all trained, designated personnel should immediately:

- Identify the product that is spilling, or has spilled.
- Assess immediate hazard and ensure that all on-site people are aware of it.
- Secure the site.
- Notify appropriate personnel (refer to Section 8.).

Note: Employees discovering a spill must report it to a supervisor as soon as possible.

7.2 Identification and Assessment

This step is critical to ensure the safety of responders is not compromised, and to ensure that proper steps are taken to minimize the impact to the environment.

- Reassess the material spilled and the quantity spilled
- Reassess any immediate hazard
- Identify all the safety issues that need to be dealt with prior to taking action, such as ignition sources, protective clothing, and personnel safety
- Refer to SDS for product identification and handling

7.3 Actions and Responsibilities

The Supervisor must be trained in spill management response and will:

- Ensure spill will be managed as per this procedure
- Brief responders on safety issues and First Aid procedures for material involved
- Ensure that proper protective clothing is used
- Remove any potential ignition sources
- Stop the source of the spill or contamination, if safe to do so
- Coordinate the containment and clean-up process
- Contact the CMT – see Section 8

7.4. Spill Control and Containment

Proceed with the following only if safe to do so:

7.4.1 Diesel Spill

a. On Land

- Remove all sources of ignition
- Keep spill from reaching water
- Contain spill by damming with earth or other barrier
- Remove minor spills with sorbent pads
- Do not store soiled material in closed containers; leave lid open
- Report as per Section 8; dispose as per Section 9

b. On Water

- Use boom to contain and concentrate spill
- Remove spill using sorbent pads
- Protection booming can be considered for sensitive shoreline habitats
- A spill of any quantity into aquatic habitats must be reported to CMT immediately (Section 8)

7.4.2 Gasoline Spill

a. On Land

- Remove all sources of ignition
- Keep spill from reaching water
- Avoid sparks (use plastic shovels and rakes)
- Contain spill by damming with earth or other barrier
- Allow material to evaporate (monitor until safe/keep area clear of any source of ignition)
- Do not store soiled material in a closed container, leave lid open
- Report as per Section 8; dispose as per Section 9

b. On Water

- Use boom to contain and concentrate spill
- Allow material to evaporate (monitor until safe/keep area clear of any source of ignition)
- Protection booming can be considered for sensitive shoreline habitats
- A spill of any quantity into aquatic habitats must be reported CMT immediately (Section 8)

7.4.3 Feed

a. Outside the hatchery

- When off-loading the feed delivery truck there is potential for a feed bag ripping and spilling feed onto the ground or a skid tipping over.
- Mitigation: All 20kg feed bags are bound in a plastic wrap and the 1 tonne feed bags consist of a thick weaved bag.

- Response: Any spill is scooped up with a shovel and disposed of into a trash bin with all other hatchery waste.

b. Inside the hatchery

- Filling Feed Hoppers: Potential for small quantities of feed wastage onto concrete floor or into tank.
- Response to feed on the floor: Shoveled into a trash bin and disposed with all other hatchery waste.
- Response to feed in production tank: The feed is filtered through the hatchery solids removal systems, same as any fish waste.

7.4.4 Formalin

Proper PPE must be worn:

- Rubber boots
- Rubber gloves
- Full-face respirator with appropriate cartridge
- Rubber apron/raingear

a. On Land

- Mop up or wipe up small spills and dispose of in appropriate containers
- Dike large spills using plastic shovels or rakes
- Collect in appropriate waste containers
- Wash exposed material with water

7.4.5 Hydrochloric acid (20%)

Proper PPE must be worn:

- Rubber boots
- Heavy rubber gloves (acid gloves)
- Full raingear
- Full-face respirator with cartridge

a. Spill on Land

- Mark the area to keep unnecessary staff outside the spill area
- Contact the Development and Environmental Compliance Director (or other designated from CMT) to contact Canadian Transport Emergency Centre (CANUTEC). Emergency number: CANUTEC: 613-996-6666 (24 hour information number)
- Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).
- Keep in suitable, closed containers for disposal.

Caution!

- May be corrosive to metals.
- Causes severe skin burns and eye damage.

- May cause respiratory irritation.
- See SDS for the complete list of incompatible materials.

7.4.5 Sodium Hydroxide

Proper PPE must be worn:

- Rubber boots
- Heavy rubber gloves (acid gloves)
- Full raingear
- Full-face respirator with cartridge

a. Spill on Land

- Evacuate the area
- Eliminate all sources of ignition
- Contact professional help, PEP or supplier
- Contact the Development and Environmental Compliance Director (or other designated from CMT) to contact Canadian Transport Emergency Centre (CANUTEC). Emergency number: CANUTEC: 613-996-6666 (24 hour information number)

Caution!

Sodium hydroxide is reactive with the following:

- Water
- Peroxide
- Flammable/combustible material
- Organic material

See SDS for the complete list of incompatible materials

7.4.6 Anesthetic (tricaine methanesulfonate (TMS))

Proper PPE must be worn:

- Personal precautions, protective equipment and emergency procedures: Wear appropriate protective equipment, such as respirator, gloves, goggles and protective clothing, as conditions warrant.

Spill in the hatchery

- Only small quantities are used.
- Review the Safety Data Sheet (SDS)
- Exercise appropriate precautions to minimize direct contact with skin or eyes and prevent inhalation of dusts.

Response:

- Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways.
- Methods and material for containment and cleaning up: Sweep up, place in a bag, and hold for disposal.

- Avoid breathing dust.
- Ventilate area and wash spill site after picking up material.

7.5 Clean-Up Response

The CMT will contact an environmental agency to assist with the clean-up where appropriate.

8. Reporting

8.1 Internal Reporting Contacts

Once completely satisfied that the spill is under control:

1. Contact the CMT immediately
2. **CMT Contact Information: 1 XXX-XXX-XXXX (Freshwater Director); if unavailable contact 1-XXX-XXX-XXXX (Development and Environmental Compliance Director)**If necessary, the Development and Environmental Compliance Director will contact an environmental agency to assist with cleanup.

8.2 External Reporting

Reporting to external agencies may be required. This reporting will be undertaken by the CMT.

- Reporting of spills to external agencies may be based on the amount of material spilled
- CMT requires an estimate of the spill size

8.3 Investigating

- Promptly complete an investigation to determine the cause of the spill
- Make sure to include details of all actions initiated to avoid recurrence

9. Disposal of Soiled Material

9.1 Storage

- Spill equipment containers are to be used for storage and disposal of contaminated sorbents
- Containers are to be lined with the garbage bags

9.2 Disposal

- The nature and the volume of the spill will determine the method required for disposing of the clean-up material; disposal method will be addressed on an individual basis
- Contact the Development and Environmental Compliance Director for disposal instructions.

Appendix J
Environmental Management and Waste Management Plan

Environmental Management and Waste Management Plan

Prepared By:

MOWI Canada East Inc.

(Marine Harvest Atlantic Canada and Northern Harvest Sea Farms)

Doc. ID #	Date	Responsibility
EMWMP V-6.2	January 2025	Environment and Development Division

Change Log

SECTION	PAGE	DATE	CHANGE
Waste Mangement	23	April 14, 2025	Updated Table 8 to include well boat release of water with smolt during transfer
App E SW Escape Response Plan	106	Jan 24, 2025	Updated Recapture Licence
Appendix C: Spill Contingency Plan	55	Nov 17, 2024	Addition of 'other'
Materials Storage, Inventory and Handling – Medicated Feed Storage and Inventory	23	Mar 6, 2024	Removed reference to Appendix G: Salmonid Fish Health Management Plan
App B: Environmental Emergency Response Plan	46	Feb 13, 2024	Updated MCE Emergency Management Team Fish Health Contact
App B: Environmental Emergency Response Plan	45	Feb 13, 2024	Updated contact phone number for FFA ADM
Predatory and Nuisance Species: Management Measures	75	Feb 13, 2024	Corrected net mesh size to 38mm
Introduction	4	Feb 12, 2024	Removed site specific information
App E: App 2 - SOPs	129	Feb 12, 2024	Updated Escape Reporting – NL Marine Sites SOP
App E: App 1-C DFO Experimental Recapture Licence	116-121	Feb 12, 2024	Updated to 2024 licence
Equipment Maintenance and Repair Table 3	12	Jan 29, 2024	Change to net cleaning schedule
App E: Local Salmon Populations	87;89	May 25, 2023	Edited bullet in summary of the wild salmon stock information Edited para: Escape Monitoring Program
App D: Environmental Management: Wild Species	59	May 25, 2023	Removed summary of SAR and Sensitive Habitats
Introduction: Summary of Site Suitability	3-4	May 25, 2023	Modified bullet points

App A: Operational Environmental Mitigation Plan	40-42	May 2, 2023	Update on data collection frequency and method
Table 4 Regular Monitoring of the Environment	15	May 2, 2023	Update on data collection frequency and method
Table 2 Adverse Environmental Conditions and Mitigation Measures	8	May 2, 2023	Update on feeding technology
App E: Local Salmon Populations	86-87	Feb 10, 2023	Updated to 2020 DFO Assessment of NL Salmon
App E	88	Feb 8, 2023	Updated Partnerships, Ongoing Research
App E: App 1 SW Escape Response Plan	98-99	Feb 2, 2023	Updated Escape Reporting to include DFO requirements
Whole plan		January 20, 2023	Updated company contacts
App E	35, 94-95	January 20, 2023	Updated Code of Containment to 2022 issue
Regulations, Standards, Certifications	15	January 20, 2023	Removed specific information related to ASC certification
Introduction	2-3	Jan 19, 2023	Updated active sites/maps
		May 2, 2023	Updated active number of sites/maps
Introduction	5	May 5, 2022	Updated Bays East map
Appendix B	50	May 5, 2022	Updated contact names and numbers
Introduction	3	May 11, 2020	Ten active sites updated to eight active sites
Waste Management	23	May 11, 2020	Addition of DFFA Environmental and Waste Management Guide, 2022

CONTENTS

1.0 Introduction

Considerations for the physical environment include both the management of environmental influences on cultured salmon, the farm, as well as management of the potential effects to the environment from farming activities. This document has been developed in accordance with DFFA's Environmental Guidance document and outlines the company's policies and practices dedicated to reducing risks to the environment and to the project.

The environmental factors considered and information that pertain to and inform environmental management decisions, policies and practices are provided in this application in the following locations.

Environmental Factors	Information/Data Collected	Information Location
Abundance of wild Atlantic salmon	Scheduled salmon rivers and escape mitigation measures	Appendix E: Management of Wild and Farmed Salmon Interactions
Environmental accidents and emergencies	Accidents and malfunctions	This document
	Emergency response	Incident and Crisis Management System
Waste management	Hazardous and waste materials safe handling and disposal	This document
	Fish mortality and discards management	Salmonid Fish Health Management: Fish Disposal, and Mass Mortality Contingency Plan
Disease management	Protocols and policies to reduce spread of disease	Salmonid Fish Health Management Plan, Integrated Pest Management, Biosecurity Plan

MOWI Canada East (MCE) holds 53 Atlantic salmon sea farm licenses. This plan applies to all active sites of MCE. Prior to restocking, the aquaculture licensing review process is applied to all sites, including:

- Screening under CEAA (DFO)
- Review of benthic environment and potential impacts on same (DFO)
- Mitigation measures to protect the environmental and the farm site (DFO, FFA)
- Wild and farmed interaction, both traditional fishery species and wild salmon (DFO)
- Operations Plans (FFA)
- Water use and environmental review (ECCM)

Three-year Site Stocking and Production Plans are submitted annually to FFA as part of the license validation process. Active sites and planned wharf usage for the current cycle are provided in that plan.

2.0 Managing Adverse Environmental Conditions

Adverse environmental conditions can create stress for fish, damage to equipment and increase the potential for escapes, therefore significant data was collected and analyzed during the site assessment and the information used to develop site specific layout, engineer the farm design and develop procedures appropriate to the area environmental.

The following describes the measures taken to manage adverse environmental conditions for the MCE sites and to mitigate potential risks to the project.

1. **Thorough site assessment** prior to selecting the site for salmon culture, including collection of data from the site and general area and analysis of the data in the context of fish farming.
2. **Local knowledge** obtained through in person stakeholder meetings which engages with local fishers and recreational users which is used in the farm site planning for items such as weather positioning of pens, avoidance of ice and orientation for optimal water flow.
3. **Site specific design** to avoid conditions that are detrimental or unsafe, such as using anchors appropriate for the specific benthos, and to take advantage of conditions that enhance productivity and disperse of feces and uneaten food, such as orienting pens to the prevailing currents.
4. **Infrastructure built to Norwegian Technical Standard NS9415 or Scottish Technical Standard** which certifies moorings, anchors lines, pens, and nets can withstand the exposed environments and reduce the potential risk of escaped salmon from technical failure and human error.
5. **Implementation of operational mitigating procedures and technology applications** that have been proven to mitigate adverse environmental conditions in other areas.

2.1 Site Assessment

All MCE sites were assessed for suitability before and during the licensing process. The following information was accumulated and used to assess the suitability of the site for salmon aquaculture. The data collected was also used to identify sensitive areas and species as well as potential environmental situations that require management or mitigation. Information is provided in table 1.

Table 1 Environmental Considerations and Information provided in the License Application Package

Environmental Factors	Information/Data Collected	Information Location
Weather and storms	Weather, tropical storms and mitigation measures	This document
Wave, tidal fluctuations, fetch	Wind, waves and mitigation measures	This document
Substrate type and depositional effects, BOD	Waste management, feed management	This document
Water quality	Temperature, salinity, dissolved oxygen profiles and mitigation measures for extreme conditions	This document

Aquatic flora and fauna species and locations	Site survey, habitat map, species lists and information	This document Appendix D Environmental Management: Wild Species Appendix E Management of Wild and Farmed Salmon Interactions
Presence/absence of species at risk	Identification and response protocol	Appendix D Environmental Management: Wild Species
Invasive species	Identification and mitigation measures	Appendix D Environmental Management: Wild Species
Predators, nuisance animals and birds	Identification and mitigation measures	Appendix D Environmental Management: Wild Species

Summary of Site Suitability

The following summarizes the results of data analysis and site evaluation for MCE sites. For the following reasons, sites were identified as having the environment for salmon culture.

- Sites are sheltered from major storm winds.
- Summer and winter temperatures are conducive to salmon culture. Warm water temperature mitigations, outlined in Appendix A: Operational Environmental Mitigation Plan, will be in place on all active sites.
- Minimum water depth below the nets of 20m at the sites will facilitate dispersal of fish wastes and uneaten food and reduce BOD.
- The sites are all classified as hard bottom and deposition analysis resulting from AAR monitoring indicates localized potential effect of fish wastes and uneaten food.
- All sites are ice free.
- Commercial lobster fishing occurs in the vicinity of all of the sites.
- No sites owned by other companies operate in the BMA's where the sites are located and other sites owned by MCE are located more than 1km away.

2.2 Site Design

The MCE sites were designed taking into consideration the environmental factors and site characteristics such as bathymetry and benthos type. Factors considered for farm location include:

- Farm located in area of reduced wave and wind activity and moderate currents.
- Farm positioned to reduce wear and tear on the equipment from wave action.
- Pens oriented to take advantage of current flow and direction.
- Anchor type, configuration and positioning according to the specific bottom characteristics of the site

2.3 Engineered Infrastructure and Mooring

MCE sites were designed by experienced farm managers and reviewed by engineering consultants. MCE sites have not experienced any failure due to environmental events such as storms, tides or currents. MCE will be building farm sites to comply with FFA AP 2 which requires all sites to be designed and installed in accordance with a certification standard.

Engineering

In addition to meeting the standards in the NL Code of Containment, systems will be made of new material and designed to the Norwegian NS9415:2009 standard for marine fish farms or The Scottish Technical Standard, which were developed to reduce the risk of escapes due to technical failure and human error. These standards were developed specifically for adverse weather and sea conditions, incorporating site information, risk analysis, operation and production requirements to develop a site-specific technology design and installation and use protocols. They are two of the most rigorous standards in the world and cover all main components – pen, net, moorings, floater, barges and auxiliary equipment.

Third party engineering standards provide recommendations and regulations such as the following.

- Material specifications
- Design approach with respect to analyses methods and testing
- Material and load factors for Serviceability Limit State (SLS), Ultimate Limit State (ULS) and Accidental Limit State (ALS), and Fatigue Limit State (FLS)
- Net specifications
- Environmental specifications

MCE will build all new sites to meet or exceed the NS 9415 or the Scottish Standard. All active sites will be rebuilt to one of these standards by 2024, as per AP 2.

Design

Sea pens and moorings will be designed specifically for the unique conditions of each site with the dimensions of floating collars, nets and moorings based on environmental factors.

- The ability to withstand significant wave height, 1 in 50-year storms, and moving and fixed ice.
- Nets and pens are designed to accommodate the extra load which ice can produce.
- Pens made of flexible plastic and strong steel for maximum escape prevention.
- Specially designed fish nets where lowering ropes do not come into contact with the net, eliminating a source of net wear and damage.
- Net pens minimum 20m in depth, providing the salmon with access to colder high oxygen water during times of elevated surface water temperatures.
- Improved customized fish net design and net tensioning system where all components complement one another for optimal interaction creating greater longevity and reducing risk of equipment damage.
- All new nets will be at minimum high density polyethylene (HDPE), and as determined necessary (i.e., selected for it is high abrasion resistant and option to include stainless-steel core). The stainless steel core material is “bite-proof” to predators, eliminating predator damage and an avenue for escapes and resisting environmental damage. First

tested in British Columbia, the HDPE nets eliminated escapes due to equipment failure and are now used at sites in Newfoundland.

- Standard net mesh size of 38 mm has been tested in Norway with 60g fish, resulting in no escapes from technical failure even in the most adverse conditions. This mesh size will accommodate the smallest fish transferred to the marine sites and complies with the minimum size defined in the NL Code of Containment.
- The system is designed to facilitate maintenance and repair to ensure all equipment is in good working condition at all times.

2.4 Operational Mitigation Measures

Table 1 (above) includes a list of environmental information provided in this plan. Table 2 (below) includes potential adverse environmental conditions and mitigation measures in place.

Operational Management Plans

The following operational management plans are provided with this plan.

Environmental Management and Waste Management Plan (this document)

- Appendix A: Operational Environmental Mitigation Plan
- Appendix B: Environmental Emergency Response Plan
- Appendix C: Spill Contingency Plan
- Appendix D: Environmental Management: Wild Species
- Appendix E: Management of Wild and Farmed Salmon Interactions

Table 2 Adverse Environmental Conditions and Mitigation Measures

Event	Frequency/Duration	Impact(s)	Mitigation Measures
High water temperatures	Frequency: seasonal in the summer Duration: variable	High temperatures can reduce oxygen levels and negatively affect fish health and appetite	Farms have been located at a site with significant temperature stratification with colder water at depth that can be used to mitigate high water temperature nearer to the surface. Site design includes pens oriented for maximum water flow. Routine monitoring and recording of water quality parameters will ensure optimal fish health including dissolved oxygen, water clarity, and temperature. Infrastructure includes pens that are minimum 20m deep with low stocking levels of 2.0 smolt/m^3 and a maximum density of 15kg/m^3 at harvest, to allow the entire population to occupy more optimal depths to respond to different environmental conditions. At higher temperatures, feeding and other site activities may be reduced or suspended to decrease fish stress. An aeration system, installed in each pen, will move cooler water from depth and circulate the water within the pen. Due to thermal stratification within the water column, circulating cooler water from different depths with surface water will moderate high temperatures. Feeding technology may be available to feed fish at lower cooler water depths, reducing exposure to high temperatures. This technology has not yet been implemented at sites in Mowi Canada East. Cost and effectiveness in Atlantic Canada is being evaluated.

Event	Frequency/Duration	Impact(s)	Mitigation Measures
Low dissolved oxygen levels	Frequency: seasonal in summer and/or variable if specific events Duration: variable Dissolved oxygen levels can vary as a result of a number of environmental factors such as seasonally when water temperature rises, or with reduction of water flow due to fouling of nets, or specific environmental conditions such as algal blooms.	Low oxygen levels cause stress to fish, can negatively affect fish health and in extreme situations cause die offs.	Routine monitoring and recording of water quality parameters will ensure optimal fish health including dissolved oxygen, water clarity, and temperature. HDPE nets will be cleaned regularly to reduce fouling and allow water flow. Nylon nets will be removed and cleaned at a land based facility prior to heavy fouling occurring. Water samples will be taken on site and at designated stations to assess presence of plankton and to predict potential incoming events. The nets will be a minimum 20m deep, with low stocking levels of 2.0 smolt/m^3. This will allow the entire population to occupy optimal depths within the pen to respond to different environmental conditions. During seasonal periods of low dissolved oxygen, feeding and other site activities may be reduced or suspended to decrease fish stress. An aeration system will be installed in each pen to move cooler, more oxygenated water from depths and circulate the water within the pen, improving dissolved oxygen levels. Feeding technology may be available to feed fish at lower depths, reducing exposure to higher surface temperatures.
Heavy waves and high currents	Frequency: during storms and/or seasonal Duration: variable	Heavy waves, swell conditions and/or high currents can result in net deflection which reduces pen volume and impact fish health in the form of sores/lesions due to net abrasion.	Extensive data has been collected on weather, waves and storms. All nets and pens will be engineered to maintain pen volume on a continual basis through periods of waves and current. This will be done through the selection of net materials with reduced drag, maintaining clean nets and proper net weighting and tensioning. All pens will be inspected daily to monitor and address any net/pen concerns. The low stocking density of 2.0 smolt/m^3 will reduce the impact of any net deflection.
Event	**Frequency/Duration**	**Impact(s)**	**Mitigation Measures**

Ice flow and gear damage	Frequency: annual Duration: winter months	Ice can damage pens, nets and infrastructure. If ice is permitted to build up in large flows, the weight can cause strain on pens and moorings. Any situations that stress fish containment systems creates the potential for fish escapes, equipment loss and staff safety issues	To prevent ice encroaching on the site, onsite workboat(s) may also be utilized to break up the ice flows. Breaking the ice close to the source and ice tarps will minimalize the impact of ice flows.
Adverse weather	Frequency: seasonal in the winter, variable at other times of the year Duration: variable	Potential damage to the infrastructure of a marine site as a result of high wind and wave events are known to occur in NL waters.	The sea pen systems will be designed at minimum to the Norwegian NS9415:2009 standard or the Scottish Technical Standard that will ensure it will not break up or be damaged during storms or other weather events in Newfoundland. Continual evaluation of net and pen condition will occur at the surface. Underwater inspection of all nets and pens every month as well as after large storm events or any other on-site events. Any concerns will be immediately addressed.

Event	Frequency/Duration	Impact(s)	Mitigation Measures
Plankton (algal) blooms	Frequency: not often reported in NL water Duration: variable	The rapid increase in the number of plankton in the net pens requires dissolved oxygen thus rapidly reducing the dissolved oxygen available for the fish.	Routine monitoring and recording of water quality parameters will ensure optimal fish health including dissolved oxygen, water clarity, and temperature. To assess plankton levels and predict events, water samples will be evaluated and at designated stations at the site. Site water conditions are highly stratified. The nets will be a minimum of 20m deep, with low stocking levels of 2.0 smolt/m^3 to allow the entire population to occupy optimal depths within the pen to respond to different environmental conditions. During periods of algal blooms, feeding and other site activities may be reduced or suspended. An aeration system will be installed in each pen to move cooler water from deeper depths and circulate the water within the pen. Algal blooms are often near the surface and water at depth can be unaffected by an algal bloom providing fish with fully oxygenated water. Feeding technology may be available to feed fish at lower depths, reducing exposure to the algal bloom.
Superchill (< 1˚C)	Frequency: during the winter, February to April Duration: variable		The nets will be a minimum 20m deep, with low stocking levels of 2.0 smolt/m^3. This will allow the entire population to occupy optimal depths to respond to different environmental conditions. Onsite activity including feeding will be reduced or suspended. Lower stocking densities for the first winter; followed by thinning in the second winter. Maintaining lower densities will reduce stress and allow the fish to move to depths where water temperature may be slightly warmer.

2.5 Equipment Maintenance and Repair

A regular maintenance schedule for all equipment will identify weak or deteriorated equipment, so it can be replaced as soon as possible, see table 3 below.

Table 3 Routine Facility Maintenance Procedures and Inspection Frequency

Maintenance Activities	Purpose, Service Procedure	Inspection Frequency
Outboards	Protect gears and prevent damage to equipment, reduce potential leakage to the environment. Inspection every 100hrs. (oil and leg oil; inspection etc.).	Daily
Generators	Protect equipment and prevent damage, ensure staff safety and comfort when on site. Oil level inspection and filter inspection every 200 and 500hrs.	Daily
Compressors	Efficient operation and prevent damage. Oil level inspection and filter inspection every 200 and 500hrs	Daily
Feed Equipment Servicing	Efficient operation and prevent damage Monthly service call and refit after every generation (20-30 months)	Daily
Pen Inspection & Maintenance	Identify and replace worn or chaffing equipment, reduce potential for equipment breakage and loss, reduce potential for debris in the environment Pen inspection and rebuilds after every generation (20-30 months)	Daily
Net Cleaning	HDPE nets – *In situ* net cleaning Remove biofouling and maintain effective water exchange, promote fish health, reduce BOD and other potential environmental effects Nets will be kept clean at all times with ROV net cleaning equipment or changing. Net cleaning schedule: Cleaning will be scheduled to ensure pens are kept clean at all times. Frequency will vary based on water temperature and amount of biofouling present on the pens. As temperatures decrease, in-situ net cleaning will also decrease. During winter conditions, growth of biofouling is nil, therefore, no cleaning will be performed. Existing nylon nets Removed for cleaning at a land based facility. This is done as frequently as needed to prevent heavy fouling.	Seasonally adjusted

Net Inspection	Identify tears or weak areas from wear and replace before holes develop, reduce potential for escapes, reduce potential for debris in the environment. Visual inspection of net condition at the surface. Underwater inspection of all nets every month and after large storm events or other events that might damage equipment.	-Daily (surface) -Monthly (diver/ROV) -After every treatment (diver/ROV)

Maintenance Activities	Purpose, Service Procedure	Inspection Frequency
Net Servicing & Changes	Determine strength and discard/recycle nets at end of life to ensure only equipment that meets standards is used to reduce potential for escapes and for debris in the environment All nylon nets will be inspected, break tested and repaired as needed and required by the NL Code of Containment. HDPE nets will be inspected, break tested and repaired at least once per generation*. Completed by third party contractor, off-site. Any nets that do not meet requirements will be disposed of.	Nylon as frequently as needed based on net age and as required by provincial regulations. HDPE nets every generation (20-30 months) and as required by provincial regulations
Camera Servicing	Ensure accurate feeding volume to reduce uneaten feed and BOD and to monitor fish behavior especially during stressful events or emergencies. Inspect daily and clean weekly to maintain efficient functions and identify potential malfunctions before they happen.	Daily/Weekly
Other production and site equipment	Keep all production equipment in good working order to ensure fish welfare and the best possible growing environment and to provide safe working environment. Surface equipment inspected and cleaned daily to maintain efficient function and identify potential malfunctions and allow for maintenance and repair. Subsurface equipment, such as rearing systems, feeding systems, grow lights etc. inspected daily through underwater cameras and monthly by divers. Equipment prone to needing replacement or repair will have additional inspection and repair/maintenance replacement and/or supplies available at the site.	Daily/Monthly
Uplifts	Maintain all equipment in good order to remove mortalities efficiently from pens daily, to improve fish health and biosecurity and to reduce attractants for nuisance animals.	Daily

	All uplifts (mort removal systems) will be serviced on site as required. Uplifts will be removed after each generation for servicing.	
Aeration Equipment	Ensure efficient production of aeration within the pens for normal operations and provide mitigation options for high temperatures, low oxygen levels or other events and emergencies. Servicing will be completed on-site and removed after each generation for servicing.	Daily when in use
Vessel Engine	Protect engine parts and prevent damage to ensure efficient operations, reduce potential for leakage of fuels and other oils, for staff and operator safety. Each engine will be serviced after 500hrs (oil, filter). Annually, each engine will be serviced for major inspection and tune up.	Daily
Maintenance Activities	**Purpose, Service Procedure**	**Inspection Frequency**
Vessel Service and Refit	Protect vessel hull, ensure efficient movement through the water, ensure staff and operator safety. A vessel will be lifted two times per generation to replace zinc anodes, inspect and clean the bottom, and replace bottom paint (if required).	Semi-annually
Moorings	Identify lines, anchors and other mooring structures that may need to be replaced to reduce potential for escapes, equipment loss and debris in the environment All moorings will be inspected annually. Every generation, a spot testing of moorings will occur. All moorings are to be reviewed for replacement after three (3) generations, unless inspection allows for one further generation* (maximum four (4) generations).	1. Annual

*"generation" is synonymous with the term "production cycle".

3.0 Mitigating Potential Farm Impacts on the Environment

MCE has developed practices and protocols to safeguard the environment and minimize potential negative environmental consequences from the farming activities. Potential impacts on the environment include organic waste deposition and accumulation that has the potential for increased oxygen demand and increased algal growth with resultant changes in benthic community structure and potential for anoxic or anaerobic benthic conditions which further alters the ecosystem around the farm.

3.1 Continuous Monitoring

As with managing potential environmental effects on the farm, developing practices to mitigate impacts from the farm on the environment uses site specific data. See table 1 below for data collected and location of the information in this plan and the section above for details on the specific data collected.

Once the baseline of environmental conditions has been established, continuous monitoring of the environment is essential to determine any changes and if required initiate mitigation measures. The following table lists expected environmental conditions that will be monitored during operations.

Table 4 Regular Monitoring of the Environment

Environmental Factor	Data collected	Data collection
Water quality	Temperature, salinity, dissolved oxygen at surface, 1m, 5m, 10m, 15m, 20m, 30m (as net depth allows)	Daily (manual) at 1m, 5m, 10m, 15m, 20m and 30m. Real time water temperature, salinity, and oxygen data at 3 depths (5m, 10m, 40m) is available continuously remotely.
Plankton	Plankton density and identification	See Appendix A Operational Mitigation Plan in this document
Atmospheric conditions	Wind direction	Daily
Benthic deposition	ROV or grab benthos sampling and analysis	Annual as required by AAR
Sensitive habitat and species	ROV survey and analysis	Annual as required by AAR

3.2 Regulations, Standards and Certification

Global Standards

Mowi's goal is to have 100% of harvest yearly volume to be sustainably certified to a Global Sustainable Seafood Initiative (GSSI) recognised standard, which includes Aquaculture Stewardship Council (ASC), Best Aquaculture Practices (BAP), and Global Good Agricultural Practice (GAP). Since 2008, Mowi has worked with the World Wildlife Fund to strengthen sustainable aquaculture and to improve the industry's environmental standards.

MCE holds certifications from Best Aquaculture Practices (BAP), whose standards are built on the foundation of traceability with their four pillars of sustainability, which are as follows.

- Environmental Responsibility
- Animal Health & Welfare
- Food Safety
- Social Accountability

Code of Containment

MCE supports the management strategies in the Code of Containment for the Culture of Salmonids in Newfoundland and Labrador. These strategies highlight effective containment measures for farmed fish as a fundamental aspect of sound management practices to reduce the potential for negative impact on wild salmon, details can be found in Appendix E: Management of Wild and Farmed Salmon Interaction.

Bay Management System

The Province of Newfoundland has established the Bay Management System that delineates salmon farming areas and establishes criteria for fallowing and other farming activities to safeguard the environment and ensure sustainable salmon production. MCE is dedicated to the principles of social and environment sustainability which aligns with the advanced Bay Management System and has developed policies and management practices that meet these standards.

The forward-thinking system is a science-based method of reducing disease and parasite impacts that enables Best Management Practises to protect the environment and ensure the health and welfare of cultured salmon. This unique coordinated strategy to fish entry, fallow periods, biosecurity plans and health management plans within a given area fits the company's vision of sustainable production and environmental protection.

- MCE has sites in ten BMAs to facilitate continuous stocking and to meet the provincial BMA stocking year class requirements.
- Each BMA will be stocked with a single generation.

- Each site will have the minimum of 7 months fallow period, with the BMA having a minimum of 4 months prior to stocking with the next generation or will remain fallow until benthic analysis indicates re-stocking is possible.
- A minimum 1km separation between the fish production pens owned by MCE.
- Greater than 5km separation from farms owned by other companies.

3.3 Accidents and Malfunctions

MCE has taken into consideration potential accidents and malfunctions that may occur during the installation, operation, and decommissioning of a farm site and developed operational plans to prevent such situations.

The following information pertains to the reduction in the likelihood of situations, the management of and mitigation of harmful effects from accidents and malfunctions.

Table 5 Considerations Taken to Reduce the Likelihood of Accidents and Locations in this Application Package for the Information

Consideration	Information
List of potential accidents and malfunctions with potential impact and mitigation procedures	Environmental Management and Waste Management Plan (this document)
Specific risks	Environmental Management and Waste Management Plan (this document)
Equipment inspection frequency and maintenance activities for infrastructure at the site	Environmental Management and Waste Management Plan (this document)
Fuel Delivery and Spill Response provides protocols and practices.	Environmental Management and Waste Management Plan (this document)
Emergency response	Environmental Management and Waste Management Plan, Appendix B: Emergency Response Plan (this document)
Incident and Crisis Management System (ICMS)	Incident and Crisis Management System (ICMS)
Emergency contacts	Environmental Management and Waste Management Plan, Appendix B Emergency Response Plan (this document)

Specific Risks

Installation, Operation, Decommissioning: ***Staff and Contractor Safety***

- Newfoundland and Labrador Regulation Occupational Health and Safety Regulations, 2012 under the Occupational Health and Safety Act outlines safety requirements to reduce the likelihood of risks to workers.
- MCE has a comprehensive health and safety program that addresses all requirements in the Act. Staff and contractors will be required to attend safety meetings before commencing work on the site.
- While onsite, it is the responsibility of the construction manager and/or the site manager to ensure all activities are conducted according to the regulations in the Act and in safe manner according to the site and environmental conditions and all equipment is used according to manufacturer's instructions to ensure safe operations.
- Operational plans include keeping the work area hazard free and all refuse contained, lifesaving equipment readily available on all sites, training staff, personal floatation devices worn at all times and occupational diving activities conducted with safety first and according to all regulations.
- For employees, individuals are responsible for identifying and reporting unsafe work conditions to the site safety officer. Several staff, trained in first aid and transportation, will be available on each shift. Safety training is mandatory prior to starting employment and regular sessions are conducted during employment to ensure everyone understands their role in ensuring safe working conditions and staff safety at all times.

Operations: Salmon Escapes

MCE is committed to reducing the potential for escapes of farmed salmon during operations. The following mitigation measures will be used. Appendix E: Management of Wild and Farmed Salmon Interactions has detailed information on wild populations in the area and policies and practices to limit the potential for interaction between wild and farmed salmon.

- All infrastructure is designed and constructed to rigorous NS9415 standard or the Scottish Technical Standard to withstand adverse weather.
- Equipment will be routinely inspected and promptly replaced as needed. All equipment will meet or exceed the conditions as determined in the NL Code of Containment.
- Specific training has been designed to ensure crew and operational staff are aware of the safest best management and husbandry practices to safeguard salmon and reduce the potential for escapes.
- Operational plans to prevent accidents and reduce the potential for escapes are included in Appendix E: Management of Wild and Farmed Salmon Interactions.

The following table provides a full list of potential incidents that may occur during the installation, operation, and decommissioning phases of the project with the potential impact estimated, operational mitigation to reduce the risk of the accident happening and response to reduce the effect should the accident occur.

Table 6 Accidents or malfunctions, potential impact and mitigating measures that may occur during installation, operations, or decommissioning of the site.

Incident	Potential Impact	Mitigation and Response
Lost lines, pens, gear	Loss of gear, fish and potential for escapes, unsightly debris in the area, potential harm to the environment	**Mitigation:** Below surface pen inspections every 30 days and maintenance of complete records as well as subsurface pen and mooring structures inspection annually which will also identify lost gear, location and retrieval method. **Response:** All lost gear will be retrieved as quickly as possible. Once per month, employees will conduct a beach clean-up within one-kilometer radius of the farm locations to collect any aquaculture related debris. Further details can be found in Environmental Management and Waste Management Plan
Loss of refuse or waste materials	Unsightly debris in the area, potential harm to the environment	**Mitigation:** All refuse will be stored in secure containers with lids in designated areas on the farm. **Response:** All waste material or debris will be retrieved as quickly as possible. Once per month, employees will conduct a beach clean-up within one-kilometer radius of the farm locations to collect any aquaculture related debris. Details can be found in this Environmental Management and Waste Management Plan for details regarding debris/refuse management and disposal
Fish escapes	Loss of farmed fish, potential loss of habitat for wild stocks and/or interbreeding with wild stocks	**Mitigation and Response:** See Appendix E Management of Wild and Farmed Salmon Interactions.
Environmental Emergencies	Potential harm to the environment	**Mitigation:** See this Environmental Management and Waste Management Plan, Environmental Emergency Response Plan which include general and specific procedures and a contact list. The plan will be posted on each vessel, on the site and at the central site for BMA, at an easily accessible location. Emergency response orientation will be provided to all staff and operators. **Response:** In the event of an emergency spill, storm damage or destruction, both DFFA and the Canadian Coast Guard will be notified immediately. In the case of all marine emergency situations, the Canadian Coast Guard will also be contacted through the Environmental Emergencies, Oil, Pesticide and Chemical Spills, Fish Kills, Defective Navigational Aids to Navigation and Other Emergencies 24-hour service hotline. See Environmental Emergency Response Plan. Environmental Management and Waste Management Plan also have details on reducing the risks of unsafe conditions.

Incident	Potential Impact	Mitigation and Response
Fuel Spills – General and Refueling and including hydraulic fluids	Loss of fuel, potential harm to environment, potential staff safety issue	**Mitigation:** Spill response equipment will be installed on each site and on vessels. All staff and operators will be trained on early identification of spills, reporting and use of spill containment. Spill kits will be located at each fuel filling station. The kits will be complete, in good condition, well labelled and accessible. The spill response kit will contain sorbent booms, socks, sheets, and absorbent material, putty and spill bags as well as personal protectant equipment including gloves, coveralls, googles, and respirators. **Response:** A detailed Spill Contingency Plan and Spill Response Flowchart is provided in this Environmental Management and Waste Management Plan. In the event of a spill of fuel or contaminants, authorities will be contacted, and measures will be undertaken as directed by the Canadian Coast Guard. In the event of an emergency spill, both DFFA and the Canadian Coast Guard will be notified immediately. The Canadian Coast Guard will be contacted through the Environmental Emergencies, Oil, Pesticide and Chemical Spills, Fish Kills, Defective Navigational Aids to Navigation and Other Emergencies 24-hour service hotline.
Communications Failure	Potential staff safety issue	**Mitigation and Response:** MCE continuously seeks to improve telecommunications in the remote rural areas where it operates. To date, new cell towers and Starlink satellite internet have been installed to enhance telecommunications with existing sites.

3.4 Waste Management

Waste management protocols and procedures address the waste that could be generated from farm activities, as well as, waste identified by DFFA in the Applicant Guidance Document – Environmental Information Reviews, revised September 2019, as well as the DFFA Environmental and Waste Management Guide, 2022.

In general, no farm materials will be discharged to the environment and all efforts will be made to ensure no accidents occur that release materials to the environment. The company has a policy of reducing refuse through recycling and not using feed bags and pallets.

All farm staff have the responsibility of ensuring all materials are confined in secure containers in designated locations on the farm. Specifically, any gear lost to the environment will be retrieved immediately weather permitting. If immediate retrieval of large floating debris, such as a boat drifting free, is not possible, the details and coordinates will be provided to Transport Canada to release a Notice to Mariners.

Information pertaining to and/or informing waste management is provided in the following sections of this application.

Table 7 Information on Waste Materials Found in Other Appendices of this Application

Waste Materials	Information/Data Provided	Information Location
Infrastructure debris	Mitigation of infrastructure damage due environmental conditions	Environmental Management and Waste Management Plan: Table 8
Fish mortalities and discards	Fish Disposal Plan	Salmonid Fish Health Management: Fish Disposal Plan
	Mass Mortality Management	Salmonid Fish Health Management: Fish Disposal Plan, Mass Mortality Contingency Plan
Operational and accidental debris, spills	Accident management	Incident and Crisis Management System
	Fuel delivery & spill response	Environmental Management and Waste Management Plan: Section 3.7 Fuel Delivery and Spill Management
	Emergency Management Plan	Incident and Crisis Management System

The guiding principle of this plan is to ensure all materials are handled in a responsible manner in order to minimize potential risk to the environment. This will be achieved by applying the following priorities.

1. Reduction of the volume and non-recyclable wastes through efforts such as identifying and reducing single use plastics containers.
2. Recycling and re-purposing of waste materials over landfill dumping whenever possible.
3. Regular monitoring of the environment below the pens and around the site and mitigation and/or clean-up undertaken as required.

Materials storage and handling and waste management practices, as provided in this document, have been developed to reduce potential risks to the environment. More information on the company's commitment to environmental protection including BAP certification and details of

other management practices are provided in Appendix A: Operational Environmental Mitigation Plan, and Appendix D: Environmental Management: Wild Species.

Materials Storage, Inventory and Handling

Hazardous Materials

Control of hazardous materials is important to ensuring the health of staff and other persons as well as the environment. Concern for the environment is paramount. Also of concern is fish welfare and the creation of a healthy environment for cultured fish. These concerns are the incentive to ensure best practices guide hazardous materials use and management.

The first step in controlling materials is recognizing presence on site. The Hazardous Materials Inventory Form will be used track items are on site and will be a reference for ensuring that Safety Data Sheets (SDS) sheets are available for all identified hazardous substances. The form also provides options for identification and information on waste hazardous materials that may be stored on site prior to disposal.

It is the responsibility of each site to maintain a folder/binder for SDS specific to each hazardous substance found on site. In addition to this plan, this is required by MCE's Health and Safety Program and by Workplace Safety NL. 1-800-563-5471 http://www.workplacenl.ca/home.whscc.

Medicated Feed Storage and Inventory

Medicated feed, if used, will be stored in clearly marked container, easily distinguishable from non-medicated feed. The prescription number for the medicated feed will be marked on each container. The medicated feed is inventoried and recorded daily as the feed is offered to the fish according to a prescription. A Safety Data Sheet (SDS) for all medications used at the facility will be on-site and readily accessible.

Disinfectants and Chemicals

Disinfectants and chemicals will be stored in clearly marked containers with an SDS for each chemical on site and readily accessible. All chemical therapeutants are used as directed by the attending Veterinarian and will be handled safely by appropriately trained staff, taking suitable precautions (refer to Salmonid Fish Health Management Plan for detailed practices).

Waste Management

At all times the potential effect on the environment will be considered when collecting and disposing of waste. All waste will be securely contained in enclosed dedicated receptacles at designated locations on site. All waste materials generated at the sites will be transported to the central site for the BMA and stored prior to collection by a contracted service company.

Waste Reduction

Waste material handling and disposal, including waste reduction, is covered in MCE SOPs and Health and Safety Program that have been developed to meet all regulatory and certification requirements. The following waste reduction practices will be employed.

- Purchasing program controls on-site supplies by restricting staff purchases for most household and production supplies to a single approved list.

- Feed will be delivered in bulk with minimal feed bags or pallets on site.
- Corporate sustainability reporting includes performance measures on various sustainability aspects and provides goals for improved performance.

Management Practices

The table 8 below provides a list of waste materials expected to be generated per site and waste materials of interest to DFFA. Approximate volume and management practices are provided.

Table 8. Approximated wastes generated by sea farm sites per 1,000 tonnes of farm-gate production, and corresponding waste management methods.

Waste	Approximate Volume (MT annually)	Waste Management Methods
Organic Waste		
Biofouling from net cleaning and maintenance	n.d.[1]	Reduce Deposition: Cages are oriented in maximum current flow for optimal flushing. Reduce Net Changes: Use of HDPE nets and replacing nylon nets with HDPE Reduce Biofouling: Regular net *in situ* cleaning. Reduce Debris: All repair materials are collected and disposed of as appropriate on land and not discarded at sea. Residual: regular seafloor surveys.
BOD (fish faeces, uneaten fish feed)	6 (fines) 28 (uneaten) 111 (metabolic)[2]	Reduce Deposition: Cages are oriented in maximum current flow for optimal flushing, fish fed only to satiation, full benthic survey, and report as required by AAR conducted annually. Reduce Feed Waste: Feed is stored on the sea farm in silos and used immediately reducing deterioration Residual: Regular seafloor surveys for potential environmental impact.
Excess medicated feed	Negligible	Reduce: Only enough feed for a specific treatment is ordered and delivered to site. Residual Disposal: Excess medicated feed is disposed of under guidance from MCE's veterinarian or returned to manufacturer for disposal.
Fish Discards and Mortalities (See the Salmonid Fish Health Management Plan: Fish Disposal Plan)	136[3]	Reduce: Mortalities are kept to a minimum through rearing practices supporting healthy fish, site specific farm design and infrastructure, as well as Biosecurity and Fish Health Management measures. Recovery: Mortalities are retrieved daily from the pens and removed weekly from the sea farms. (See the Salmon Fish Health Management Plan: Fish Disposal Plan). Disposal: Mortalities and waste products (e.g., fish waste and fish silage) to be sent to New World Dairy (NL) with Barry Group Inc. (NL) and Cardwell Farms (NB) as alternatives.

Waste	Approximate Volume (MT annually)	Waste Management Methods
Blood water	n.d.	Reduce: All contained on the harvest boat and sent to processing plant for treatment and disposal.
Well boat smolt transport water	n.d.	Residual disposal: Release with smolt to sea farm during fish transfer.
Septic and Grey Water	n.d.	Reduce: All sites in Bays West have incinerating toilets to eliminate septic waste. All sites in Bays East will be converted to incinerating toilets. Recovery: Human waste (septic) and grey water is collected onsite in secure approved tanks. Residual Disposal: Disposed of according to regulations and licence conditions at municipal facilities by contractors.
Household organic waste	Negligible (7 kg/week, 0.36 MT annually)	Recycle: Recycling and compost (items such as cardboard, paper and compost) is secured onsite and collected regularly to land based facilities (if infrastructure exists). Residual Disposal: Garbage is disposed of at a landfill.
Construction and demolition		
Expired HDPE buoys, piping	6-7[4]	Reuse/recovery: HPDE is being stockpiled and recycled. Residual Disposal: Waste is collected on site and disposed of at the Central Newfoundland Waste Management Authority (NL) according to provincial regulations.
Expired netting		Reduce: Use of long-life HDPE nets (8 -10 years), replace nylon nets when possible. Reuse: Re-purpose or recycle those that do not meet strength and durability standards for salmon culture. Residual Disposal: Stockpiled for reuse or recycling opportunities as per Corporate policy not to dispose.
Wooden Pallets		Repurpose: to residence for heating or construction. Residual Disposal: Central Newfoundland Waste Management Authority (NL) according to provincial regulations.
Operational Waste (polypropylene ropes, lines)		Reduce: Only purchased when needed. Reuse: Where appropriate, materials are recycled, repurposed, donated, or sold. Residual Disposal: Central Newfoundland Waste Management Authority (NL) according to provincial regulations.

Waste	Approximate Volume (MT annually)	Waste Management Methods
Inorganic Waste		
Feed Bags,	3-4[4]	MCE participates in NAIA waste management research and development initiatives. Residual Disposal: Feed bags are collected and disposed by a 3rd party at the Central Newfoundland Waste Management Authority facility.
Household inorganic waste	Negligible (7 kg/week, 0.36 MT annually)	Reduce: Efforts to avoid single use plastics. Recycle: Glass and, metals are secured onsite and collected regularly and transported to land based facilities (if infrastructure exists). Residual Disposal: Garbage is disposed of at a landfill.
Operational Waste (production equipment or parts)	n.d.	Reuse: Where appropriate, materials are recycled, donated, or sold. Residual Disposal: Disposal at the Central Newfoundland Waste Management Authority at the discretion of the Regional Saltwater Manager.
Printer Cartridges	negligible	Recycle: Recycled at a depot.
Retired Technology	negligible	Reuse/Recycle: Return to MCE IT Department for recycling.
Chemicals		
Cleaners, disinfectants	negligible	Reduce: Only chemicals that are approved for the marine environment are used. Recovery: Expired chemicals are collected on site in a designated location and shipped to approved collector for disposal. Residual: Disposed of as per manufacturer's instructions with hazardous waste disposed of at approved facilities.
Hydrocarbons, paints	negligible	Reduce: No paint is used. Recovery: Used oils and fuel waste are collected on site in a dedicated location and recycled or transported to the central pick-up location. Oils and fuels are stored in secure containers that do not tip. Residual Disposal: Local Harbour Authority Waste Oil Collection points are utilized where applicable.

Waste	Approximate Volume (MT annually)	Waste Management Methods
Note: negligible ≤ 1 MT annually, n.d. = unable to determine.		
The following items are not used in MCE sea farms: Shipping containers, antifoulants, new paints.		
[1] There has been n**o provincial waste audit since the 100% adoption of in-situ cleaning (i.e., As part of The Way Forward FFA reported a 350% reduction in biofouling during the transition to in-situ net washing, and amounts are expect to be negligible now that 100% in-situ washing is in place on sea farms)**		
[2] **Value** based on the following benchmarks: 0.5% fines feed waste; 2.5% feed pellets waste (DFO DEPOMOD parameter 3% feed waste – 0.5% fines), and 90% digestibility (DFO DEPOMOD parameter)).		
[3] Estimate based on 1% mortality per month.		
[4] Benchmark extrapolated from FFA Environmental and Waste Management Guidelines.		

Monthly Beach Clean-ups for Marine Sites

Once per month, employees at each farm site will conduct a beach clean-up. The clean-up will include scanning all beaches within a 1km radius of the farm's location and collecting any rubbish that has accumulated. A record of the beach clean-up will be maintained in the site's activity log

Recycling and Disposal Depots and Services

Information on Recycling and Waste Disposal for Newfoundland: http://rethinkwastenl.ca/ and http://rethinkwastenl.ca/3rs/recycle/

Central Newfoundland Waste Management Authority

- Site for bulk materials, such as nets, piping, buoys etc. that are no longer usable and are not recyclable.
- Phone: 709-653-2900 http://www.cnwmc.com/

Regeneration Paint Recycling

- Product Care Association operates Regeneration, an industry-led and government-approved paint recycling program that provides residents and businesses with province-wide drop-off locations and collection events.
- Location: Visit Regeneration to view the list of province-wide paint collection sites.
  Phone: 1-888-772-9772: www.regeneration.ca

Envirosystems Inc.

- Envirosystems Inc. (formerly Crosbie Industrial Services Ltd.) provides a commercial collection service for hazardous waste as well as proper disposal of oil tanks and filters.
- Services throughout the province, Phone: 709-722-8212 (St. John's) / 709-686-5665 (Pasadena)
  Web: www.envirosystemsglobal.com

Pardy's Waste Management and Industrial Services Ltd.

- Commercial collection service for hazardous waste as well as proper disposal of oil tanks and filters.
- Phone: 709-368-4350 (St. John's) / 709-686-2043 (Pasadena) / 709-896-0489 (Goose Bay)
  Web: www.pardyswaste.com

3.5 Reducing Benthic Deposition

Farming activities have the potential to increase oxygen demand below the farm through organic waste deposition and accumulation of uneaten feed and faeces/pseudofaeces on the bottom. This can result in increased algal growth, changes in benthic community structure and altering of benthic habitat.

- The feeding schedule developed by experienced MCE production staff will be specific to the age and density of the fish and the rearing conditions.

- This schedule will be closely followed by trained site staff and monitored to ensure that all fish are fed to satiation and feed is not wasted.
- Each pen will be monitored by means of surface and subsurface camera systems.
- The Site Manager will be responsible for administering the feeding program which includes maintaining records and feed consumption on a daily basis. The evaluation parameters include a continuous assessment of feeding response and fish behaviour through the use of underwater cameras with an expected production cycle goal of an FCR of 1.2

Standard best practices in NL to reduce BOD are outlined in table 10 below. Additional management and mitigations that the company will undertake to reduce the accumulation of deposition waste and biochemical oxygen demand are provided in table 11.

Table 8 Best Practices Established in NL for Depositional Management

Activity	Standard Practice	Benefits
Local Site Selection	• Locating pens in water depths greater than 40 m • Baseline assessment (as is required at time of licensing) that may include current measurements, carbon footprint modelling at 10m contour intervals, and the collection of visual and chemical data within the 1g/m^2/C footprint	• Avoidance of productive fisheries habitat (eelgrass, etc) • Promote dispersion of particles • Establish baseline for comparison for future data and analyses and evaluation of operations
Regional Site Selection	• Mandatory 1 km site separation	• Promote dispersion of particles from sites • Avoid accumulate of particles from several sites
Fallowing	• Fallow period following a production cycle	• Reduction of particle deposition below the pens • Promotion of particle degeneration
Stock Density	• Maximum 15 kg/m^3 stocking density during growing season	• Caps production resulting in a cap on feeding per site and feed deposition • Caps number of fish and amount of fecal material deposited
Feeding	• Avoiding use of wet feed • Feed cameras monitor feed administration	• Control of feeding and avoidance of overfeeding with associated increase of uneaten feed and feed particles deposited
Net cleaning	• HDPE nets are cleaned continuously to reduce the amount of biofouling before they are visibly dirty. This limits the material that has opportunity to settle in the benthos • Heavily fouled nylon nets are removed from site to a centralized net washing facility	• Decrease volume of biofouling deposited at the site

Table 9 MCE Additional Mitigation Measures to Decrease Organic Deposition

Activity	Additional Mitigation	Benefits
Local Site Selection	• All pens located in greater than 40 m water depth • Benthic impact assessed through regular monitoring • Thorough baseline assessment (at time of licensing) including current measurements, carbon footprint modelling, indicating that the site is capable of sustaining a sizeable, well-managed aquaculture operation. • Pen array and moorings will be designed specifically for the site to NS9415-2009 or the Scottish Technical standard for adverse weather conditions. • Environmental monitoring in accordance with AAR.	• Promote dispersion of particles • Significant depth for particles to fall and be carried by currents before reaching the benthos • Early identification of potential issues through comparison of data collected during operations to Baseline Assessment data or historical benthic reports
Regional Site Selection	• Lease separated by more than 1 km from neighboring leases.	• Deposition from two farms will not overlap • Natural conditions carry away feed and faeces
Fallowing	• Contingency plan to avoid loss of production if a site cannot be stocked after fallowing	• Facilitates breakdown of organic deposition • Breaks cycle of pathogen and pest production
Stocking Density	• Goal 15 kg/m^3 maximum stocking densities.	• Reduction in feed used and faeces produced • Better visibility for feeding cameras to determine when to stop feeding • Reduction in mortalities with improved fish health
Feeding	• Salmon fed daily to satiation determined by the behavior viewed via 360-degree cameras at all depths • Feeding is stopped when the fish are full ensuring maximum growth and eliminating feed wastage and deposition of uneaten feed. • Daily checks of feeding volume in comparison to biomass and water temperature. • Assess feed consumption with a combination of direct staff monitoring and submerged cameras. • Accurate and up-to-date records on feed type and amount. • Investigate and implement new feed monitoring technology as it comes available for greater efficiency in feed monitoring.	• Reduction in wasted food deposited in the benthos • Greater efficiencies in feed use • Enhanced growth for potentially less time to harvest size and less time in the water

Activity	Mitigation Action	Benefits
Net Cleaning	• *In situ* net cleaning for HDPE nets on a regular schedule and adjust schedule to ensure biofouling doesn't build up. • Generational nets that don't require net changes reducing opportunity for escapes and for material being deposited into the ocean. • Nylon nets are removed and cleaned at a land based facility as frequently as needed and as required by the NL Code of Containment. • Research new technologies that are more efficient and reduce BOD	• Less biofouling deposited at one time • Enhances ability of the currents to disperse biofouling • Fewer nets to be removed from the site
Mortality Disposal	• Collected at least weekly to reduce disintegration while in the nets and immediately ensiled to eliminate further breakdown.	• Reduction of number of mortalities decomposing in the nets • Reduction of deposition • Improved biosecurity and fish health to reduce future mortalities

3.6 Additional Mitigation Measures to Reduce Environmental Impact

Commercial and Recreational Species

MCE sites are located in waters traditionally fished commercially for lobsters. These activities will not be restricted by the farm site or farm operations and access will be provided for lobster fishers. A minimum distance of 40m is provided on all sides of the farm surface infrastructure for boat travel. Placement of lobster fishing gear will not be restricted by the farm infrastructure. Lobster fishers are welcome to fish on the site.

Sensitive Habitat and Species at Risk

No sensitive habitat or species at risk were identified either through the original site assessment or through subsequent AAR monitoring reports. Appendix D: Environmental Management: Wild Species also includes procedures for identification, response and reporting should species at risk be identified on or near the site.

Escape Management and Response

Appendix E: Management of Wild and Farmed Salmon Interactions includes standards for infrastructure design and installation and management measures to reduce the potential for escape of farmed salmon, as well as Escape Response Management Plan determined in the Code of Containment and recently updated NL Aquaculture Policies.

Biosecurity and Fish Health

Biosecurity policies and fish health procedures have been developed to reduce pathogens in farmed fish and increase health. Biosecurity policies reduce the opportunity for pathogens to enter the farm site and infect farmed fish. Fish Health and Integrated Pest Management practices monitor fish daily and initiate mitigating actions when fish may be compromised. These activities reduce the opportunity for disease in the farm population and reduce the opportunity for pathogens to be transmitted from farmed fish to wild species. Detailed information is found in the 'Salmonid Fish Health Management Plan' that includes 'Integrated Pest Management' and 'Biosecurity Plans'.

3.7 Fuel Delivery and Spill Management

Protocols and practices for safe fuel delivery have been developed to reduce the potential for spills with detailed steps to be taken to control fuel spills to ensure minimal effect on the environment. Management of specific incidents and emergencies has also been developed. These protocols and practices will be readily available and posted on each site for staff and contractors to access.

3.71 Fuel Delivery

All employees assisting the fuel delivery crew (of any fuel delivery provider) in a delivery process will be trained in spill response and the Spill Contingency Plan and have knowledge of their site's Spill Response Kit location.

Safety Points

1. Turn off all sources of ignition (electric fuel pumps, running boats, matches, etc.).

2. Do not allow anyone to smoke within 50 feet of the delivery process.
3. Make sure that an operational (10 lbs. or greater) fire extinguisher is at hand.

Fueling Process

1. Connect ground cable to the tank (if available).
2. Carefully remove the filler cap from the storage tank, being careful not to cause a spark
3. Make sure that you fill the storage tank with the correct fuel product. Failure to do so may result in contaminated fuel.
4. Ensure the nozzle of the hose is safely in the storage tank before signaling the fuel delivery crew to release the flammable liquid.
5. Depress the nozzle trigger to release the flammable liquid.
6. Do not lock the trigger in the open position and walk away. Monitor the entire process.
7. Do not overfill the flammable liquid storage tanks.
8. In the summer months, flammable liquid storage tanks should not be filled beyond 90% of their capacity to allow for heat expansion.
9. Once the tank is filled, release the trigger, and signal the fuel delivery crew to turn the pump off before removing the nozzle from the tank.
10. Once the fuel transfer is complete, immediately secure the filler cap back on the storage tank.

3.72 Spill Response

In event of a spill, Canada Coast Guard will be immediately informed. Should a vessel be leaking fuel, MCE will deploy booms as indicated below. All vessels carry spill kits which will be deployed in the event of spill and used as indicated. Staff will follow direction given by Canada Coast Guard and Environment and Climate Change Canada regarding the response. A Spill Contingency Plan is provided in Appendix C of this document.

- All spills in the marine environment must be responded to and reported immediately, following the procedure in the Spill Contingency Plan.
- Standard fuel delivery services have personnel trained in spill response and who carry spill response equipment.
- When arrangements are made to top-off fuel supplies, site staff shall ensure that a spill response kit is readily available for their use.

5.0 References

Department of Fisheries and Oceans Canada, 2015. Aquaculture Activities Regulations

Guidance Document. http://www.dfo-mpo.gc.ca/aquaculture/management-gestion/aarraa-gd-eng.htm.

Department of Fisheries and Oceans Canada, 2018. Aquaculture Activities Regulations Monitoring Standard 2018. July 13, 2018. http://www.dfo-mpo.gc.ca/aquaculture/management-gestion/aar-raa-eng.htm.

Global Sustainable Seafood Initiative http://www.ourgssi.org

Government of Newfoundland and Labrador Department of Fisheries and Aquaculture 2013. Bay Management Areas Agreement for the South Coast of NL.

Government of Newfoundland and Labrador Department of Fisheries and Aquaculture. 2022. Code of Containment. DOC-2022-04405.

Government of Newfoundland and Labrador Fisheries and Land Resources. 2019. Aquaculture Licensing Process for Sea Cage Sites.

Government of Newfoundland and Labrador Fisheries and Land Resources Aquaculture Development Division. 2019. Applicant Guidance Document – Environmental Information Reviews

Appendix A: Operational Environmental Mitigation Plan

Operational Environmental Mitigation Plan

Prepared By:
Mowi Canada East Inc.

Doc. ID #	Date	Responsibility
OEMP V-4.2	May 2023	Sustainability Division

Contents

1.0 Objective

The objective of this document is to recognize the potential for environmental events to affect salmon farming operations and to outline established practices that Mowi Canada East (MCE) will employ to limit these potential effects. Environmental events may affect salmon farming operation in a number of ways. Events may cause damage to facilities and equipment, containment arrays, and vessels. Events may also contribute to increased stress on salmon stock and could result in increased mortality, either directly or indirectly. This document will focus on environmental events, potential adverse effects of these events, and mitigation/prevention/avoidance measures that will preserve system integrity and stock welfare. This plan will apply to all active operating sites of MCE.

This document was prepared in response to the Department of Fisheries, Forestry and Agriculture - Aquaculture Policy 2 and in response to condition 2 of the site aquaculture licenses which states:

> "Prior to October 2020, licensees must implement mitigation measures to prevent mortality events. Mitigation measures must be approved by Fisheries, Forestry and Agriculture, and include, but are not limited to, installation of nets that are a minimum of 20m, aeration devices and optimal farmed fish stocking density. Stocking of sites must not commence until departmental approval is granted."

2.0 Environmental Events

An environmental event for the purpose of this document is any event that is naturally occurring in the environment that may cause adverse effects to salmon farming operations, including potential damage to gear and potential impacts to the health and welfare of salmon stocks on the farm site. Environmental events considered in this document are those most likely to occur in Newfoundland and Labrador waters and include:

- Weather events
    - Storms, high winds, storm surge
    - Tides
    - Heavy rainfall and run off
- Temperature Extremes
    - Extreme warm water in coastal areas
    - Super Chill conditions in the winter months
- Algal/Plankton Blooms
    - Physically harmful and non-harmful

2.1 Weather

Weather events include storms that occur year-round, high winds, and extreme tides that can sometimes be coupled with storm surges or heavy run off from heavy rain. All of these can result in strong waves, currents and swell action on farm sites.

Frequency:

Any time of year, with stronger more severe storms occurring in fall, winter and spring.

Duration:

Variable.

Potential Effect:

Heavy waves, swell conditions and/or high currents and tides can result in net deflection which reduces pen volume and impact fish health in the form of sores/lesions due to net abrasion.

Mitigation Measures:

Infrastructure:

Sites are designed and deployed in consideration of the predominate weather conditions on the south coast and at the specific sites. All new sites are built, at minimum, to the Norwegian Engineering Standard for Aquaculture NS9415 or the Scottish Technical standard.

As pen site systems come up for replacement, they will be designed in accordance with NS 9415 or the Scottish Technical standard (if not already in place) which consider all weather and conditions to meet the worst case scenario for a one in 50 year storm event

All nets and pens will be engineered to maintain pen volume on a continual basis through periods of waves and current. This will be done through the adoption of net materials with reduced drag (i.e. HDPE netting), maintaining clean nets via ROV net cleaners, changing out nylon nets prior to heavy fouling, and proper net weighting and tensioning.

Monitoring:

Weather will be monitored via Environment Canada's weather and marine forecasts for the region and onsite observations. Tides can be determined by utilizing online tide tables and by staff observations on site.

Practices:

HDPE nets will be kept clean to ensure minimal drag during periods of high tide, current or wave action. Nylon nets will be removed and cleaned at a land-based facility as needed and as required by the NL Code of Containment. *In situ* net cleaning on the HDPE nets is performed as needed in the winter as there is minimal build up at this time. All pens will be visually inspected daily by site staff to monitor and address any net/pen concerns in addition to the weekly documented inspections required under the Code of Containment and as per FFA policy. When forecast predicts, site staff will visually inspect site structure pre storm and ensure all site components are secure. Sites will be inspected post storm to ensure system integrity. Site activities will be conducted in accordance with site conditions. Net changes, harvesting and other activities that require movement of nets or pen structure will be conducted during periods of low tide and current activity.

Training:

Staff follow the MCE SOP for Pre and Post Storm Checks, and the associated checklists.

2.2 Temperature Extremes

Temperature data from the south coast of Newfoundland indicates that temperatures are conducive to salmon aquaculture. However, there are times of the year where temperature extremes can occur. Very warm water temperatures can be experienced in the summer and very cold temperatures in the winter. This does not occur every year, however, farms must be ready in case it occurs.

2.21 Warm Water Temperatures

High temperatures can reduce oxygen levels and negatively affect fish health and welfare. High water temperatures can cause acute mortality when it is above the thermal limit for salmon and extreme prolonged temperature stress can affect fish welfare and make them more susceptible to disease or to additional stressors.

Frequency:

Warm water in coastal waters occurs each year, but extremes of temperature are unpredictable. Surface waters often reach 18 degrees Celsius, however, high temperatures at depths below the top 1-5 meters have not been recorded historically (according to historical data provided by FFA) but were experienced during the summer of 2019.

Duration:

Historical temperatures provided by FFA and data from ongoing monitoring at active MCE sites indicates that the warmest water temperatures occur from late August to mid-September.

Mitigation Measures:

Infrastructure

Nets will be a minimum of 20 m deep to the bottom of the net on all sites to allow adequate depth for fish to move out of warmer water. Stocking densities will not exceed 15 kg/m3 to allow for plenty of space for water circulation and to prevent crowding which can lower dissolved oxygen during times of high temperature.

An aeration system, installed in each pen and/or between pens, assists in moving cooler water from depth and circulate the water within the pen and provide circulation of available oxygen.

Monitoring

Temperature, dissolved oxygen and salinity will be monitored daily at 6 depths (0.1m, 1m, 5m, 10m, 15m, 20m, 30m) to 30m year-round, via handheld instruments. Real time monitoring of water temperature, salinity, and oxygen data at 3 depths (5m, 10m, 40m) is available continuously remotely.

Handheld sensors will be calibrated weekly to ensure accuracy. Staff will be trained in

recognition of the signs of low oxygen distress (hypoxia) and will note any unusual fish behavior. Signs could include crowding at the surface, aligning into the current, gasping, loss of equilibrium and darkening.

Practices

During times of increased water temperature feeding will be monitored closely and modified according to temperature. Feeding will be matched to the best tides and oxygen conditions. The following protocols will be followed regarding feeding and handling:

- Feeding will be stopped on sites at 16.5°C at a depth of five meters or when the fish are showing signs of distress.
- Feeding will be stopped when the dissolved oxygen level drops 6.5 mg/L at a depth of five meters or the fish are showing signs of stress, unless the DO can be increased via aeration.
- Fish will not be handled when the water temperature is >17°C at a depth of five meters, unless cooler water can be brought up via aeration.
- Aeration systems will be turned on when temperature recordings are 16.5°C at a depth of five meters or when DO levels reach 6.5 mg/L at a depth of five meters.
- All of these practices apply unless directed otherwise by the FHU.
- These practices may be adjusted as we collect more environmental, mortality, and fish behavior data.

Training

Staff will be trained to recognize signs of temperature distress. Staff will be trained in feeding methods, aeration and in processes to assess whether to feed or handle fish during high water temperatures. SOP's have been developed for YSI Probe Calibration, and Increased Water Temp Monitoring and Mitigation.

2.22 Cold Water Temperatures

Cold water temperatures can affect growth and negatively affect fish welfare. Historically, winter water temperatures vary along the south coast of NL. Historic temperatures provided by FFA show winter temperatures are at their coldest from February to the end of March and can range on average from 0 to 4 degrees, depending on the year and location, with periodic dips below zero degrees and occasional super chill conditions. Sites were selected based on being ice free, however, at or near some sites there may be occasional ice formation. Super chill occurs when the water temperature drops to -0.7°C or below. Impacts of cold-water temperatures can be minimized through monitoring and husbandry practices.

Frequency:

Cold water occurs every year in coastal water of NL. Super chill events are variable in frequency and intensity. Industry and FFA records demonstrate that there was significant super chill events in 2003, 2014 and to a lesser degree in 2019.

Duration:

Historical temperatures provided by FFA indicate cold water persist from February to the end of March. This is when super chill is most likely to occur. Super chill can occur over a span of an hour or two or over several days or weeks.

Mitigation measures:

Infrastructure:

- Nets will be a minimum of 20 m deep to the bottom of the net to allow for fish to move lower in the water column where water temperatures may be warmer.
- Remote feeding high definition cameras for observing fish behavior without approaching pens will be installed as cell/remote sensing technology allows.

Monitoring:

- Temperature, dissolved oxygen and salinity will be monitored daily at 6 depths (0.1m, 1m, 5m, 10m, 15m, 20m, 30m) to 30m year-round, via handheld instruments. Real time monitoring of water temperature, salinity, and oxygen data at 3 depths (5m, 10m, 40m) is available continuously remotely.
- Hand-held sensors will be calibrated weekly to ensure accuracy.
- During times of cold water, temperature reading will be taken before approaching the site.

Practices:

- Feeding will be stopped on sites when the water temperature at 5m is below 1.0 °C.
- All site activity will be stopped when surface water temperature is at 0°C or lower.
- Training for staff – mitigation plan and feeding practices for cold weather
- Pre-harvest fish will be passively graded, if at harvest weight before January to ensure lower stocking densities going into the winter months.
- Ice Mitigation
    - Ice tarps will be installed on pens exposed to sea spray to minimize ice build-up on pens, as needed.
    - Ice will be beaten off of the pens using hammers/axes/mauls as necessary as a daily part of winter site maintenance
    - Ice control practices will be adopted in areas where ice can form. Ice will be broken up into small manageable pieces by vessels as necessary and escorted away from site.

Training:

Staff will be trained in feeding methods, ice mitigation techniques and super chill mitigations. SOP's have been developed for YSI Probe Calibration, and Cold Water Monitoring and Mitigation.

2.3 Algal/Plankton Blooms

Algal and plankton blooms (APBs) have not been documented to cause mortality at sea pen sites in Newfoundland. It has been documented in other jurisdictions, such as Norway, which were previously thought to be free of algal or plankton blooms. Not all APB's are directly harmful to salmon. Harmful APB's can cause direct damage to fish gills via physical abrasion and some can cause mortality due to toxins released by the APB's. In cases where APB's are not harmful, they can still cause depletion in dissolved oxygen levels in sea pens when they occur in very large numbers. This low dissolved oxygen can then impact fish welfare. MCE has an algal/plankton monitoring program to identify potential blooms and develop and appropriate mitigation responses. For detailed information, see MCE Salmonid Fish Health Management Plan: Plankton Monitoring and Response Plan.

Frequency:

Unknown.

Duration:

Unknown.

Mitigation measures:

Infrastructure:

Aeration equipment is available on all active sites. Aeration is used to break up algae and plankton, lift clean water from depth to move harmful algae from the pen, and provide increased level of oxygen in the water in the event of a bloom that reduces oxygen in the water column.

Monitoring:

Staff take water samples to monitor algal species and plankton densities using the plankton tow kits available on each site.

- Staff will be trained to take samples and perform density counts and identification.
- Sample identification will be confirmed by MCE's Fish Health Technician.
- Suitable reference sites will be sampled both up and down stream of the sites for early warning of potential risks.
- Daily sampling will be increased if harmful plankton is present. A second 'plankton expert' will confirm harmful species.
- In the event harmful plankton are identified, samples will be labeled and stored in a cool place for a minimum of 2 weeks for verification.

Practices:

Should harmful or an abundance of algae/plankton be detected, increased surveillance of fish behaviour, temperatures and oxygen levels will occur. Depending on preliminary survey results, aeration system may be turned be on to mitigate any harmful effects to fish

while the algal species and density are identified. Once identified and if a harmful species or a non-harmful species in sufficient numbers, feeding will be reduced or stopped and aeration will continue until the threat has diminished.

Note: MCE engaged Microthalassia Consultants, an environmental consulting company based on the west coast of Canada to assist in developing its algal/plankton monitoring program. Microthalassia Consultants specialize in water quality management, especially harmful algae and jellyfish species that impact the marine environment.

Training:

Staff are trained in obtaining plankton samples using the tow kit, preparing slides for identification, determining plankton density and photographic recording on the microscope. Additional training is provided on the use and maintenance of the microscope and microscopy equipment as well as the sampling equipment. An SOP has been developed for Plankton Identification and Mitigation.

3.0 Evaluation and Reporting

Mitigations for environmental events will be reviewed and assessed on an ongoing basis, with changes made to monitoring and practices as required. A formal review will occur annually with updates to this plan made and submitted to FFA as required. In the event of adverse events resulting from environmental events, MCE will:

- Report to Fisheries, Forestry and Agriculture as per AP 17
- Initiate its Incident and Crisis Management System
- Implement Mass Mortality Response, Escape Response, or Spill Response as appropriate

Appendix B: Environmental Emergency Response Plan

Environmental Emergency Response Plan

Prepared By:
Mowi Canada East Inc.

Doc. ID #	Date	Responsibility
EERP-V 4.1	Jan 2023	Sustainability Division

Contents

1.0 Objective

The objective of this plan is to guide responses in the event of environmental emergencies. Environmental Emergencies include the following.

- Mass Mortality Events
- Oil Spills/Sunken Vessel
- Whale entanglement
- Escapes

Environmental emergencies trigger the MCE Incident and Crisis Management System (ICMS). Initiation of the ICMS leads to notification of the appropriate authorities and implementation of appropriate response plans and contingencies.

2.0 Environmental Emergency Contacts

All staff will have an emergency contact list on all sites and will be briefed on emergency response procedures for all emergencies.

Environmental Emergency Agencies Call List:

Via VHF radio (working channel 13 or emergency/call channel 16) or cell phone for shore based or other vessel emergency assistance Canadian Coast Guard- Maritime Rescue Sub Centre (MRSC) Distress	**709-772-5151** or **1-800-563-2444** **Marine Comm. & Traffic Services** **709-772-2083/2084**
Canadian Coast Guard – Environment and Climate Change Canada **- Environmental Emergencies Spill Response Line**	**1-800-563-9089**
Whale Release and Stranding group (Tangly Whales - 24/7 telephone hotline service)	**1-888-895-3003**
Regional Aquaculture Coordinator, DFO	**709-772-6674**
Conservation and Protection Supervisor, Fishery Officer, DFO	**709-279-7850 or** **709-277-7391 (cell)**
Senior Officer, Preparedness Environment and Climate Change Canada	**709-772-4285**
Emergency Response Coordinator, Canadian Wildlife Services	**902-426-6405**
Director Aquaculture Development, Fisheries, Forestry and Agriculture	**709-292-4111**
Director Aquatic Animal Health, Fisheries, Forestry and Agriculture	**709-729-6872**
Assistant Deputy Minister, Fisheries and Aquaculture, Fisheries, Forestry and Agriculture	**709-729-3765**

MCE Emergency Management Team

Position	Name	Cell Phone Number
Managing Director (Team Leader)		**Private contacts redacted**
Development and Environmental Compliance Director		**Private contacts redacted**
Fish Health Manager		**Private contacts redacted**
Salt Water Production Director		**Private contacts redacted**
Freshwater Production Director		**Private contacts redacted**
Processing Manager		**Private contacts redacted**

3.0 Environmental Emergency Response

3.1 Mass Mortality

Mass mortality events occur rarely. There is potential for environmental effects as a result of the clean-up operations for mass mortality events. MCE response to a mass mortality event is the implementation of the Mass Mortality Contingency Plan. This plan contains all of the actions to take to address a mass mortality events, including monitoring and protection of the environment. Please see MCE's Salmonid Fish Health Management Plan: Fish Disposal Plan and Mass Mortality Contingency Plan .

3.2 Oil Spill/Sunken Vessel

The use of oil, gas and diesel on site poses a potential risk for spillage. MCE maintains its vessels through regular maintenance and inspection would not expect to have any vessels leak fuel or sink, resulting in leaking fuel. In the event that a vessel did leak or sink there would be a risk of oil, gas or diesel leaking out. There is also risk of spillage of oil, gas or diesel during fueling operations. In the event of a fuel spill, Canada Coast Guard will be immediately informed. Should a vessel be leaking fuel, MCE will deploy booms as per the Spill Response protocols identified in Appendix C: Spill Contingency Plan. All vessels carry spill kits which will be deployed in the event of spill as per spill response protocols outlined in Appendix C. Staff will follow direction given by Canada Coast Guard, and Environment and Climate Change Canada regarding the response.

3.3 Whale Entanglement

Entanglement of whales in aquaculture gear on the East Coast is rare. There are no known incidents of whales becoming entangled in moored aquaculture nets or moorings. There was one incident of a whale being entangled in a monofilament gill net deployed for the recapture of escaped fish. The whale was successfully released. In the event of a whale entanglement, site staff will not attempt to free the animal and will maintain a safe distance from the entanglement area. The Whale Release and Stranding group will be called immediately. Staff will remain on site until the Whale Rescue team arrives. For more details see Appendix D: Environmental Management: Wild Species.

3.4 Escape Event

Escape events are rare and MCE takes steps to minimize the possibility of escape. These steps include advanced technology and processes as outlined in section Managing Adverse Environmental Conditions of this application. In the event of an escape, all appropriate notification to authorities will be made as

per the Incident and Crisis Management System, and the Escape Management Response Plan found in Appendix E: Management of Wild and Farmed Salmon Interactions in this application. MCE will immediately enact the Escape Management Response Plan upon discovery of an escape.

Appendix C: Spill Contingency Plan

Spill Contingency Plan

Prepared By:
Mowi Canada East Inc.

Doc ID#	Date	Responsibility
SCP-v4.1	Jan 2023	Sustainability Division

Contents

Spill Contingency Plan

The following are general practices for responding to spills at MCE marine sites. Site specific data is to be added, and the plan to be posted in a location for easy reference on site.

1.0 Storage Location of Controlled Products

Hazardous Materials Inventory Forms are completed and reviewed monthly for each site, indicating all controlled products, quantities, and storage locations. All staff, visitors, and contractors are to be made aware of hazardous materials and spill kit locations.

2.0 Response Procedure Location

"Spill Response Flow Chart" will be posted by all major hazardous materials storage locations.

3.0 Environmental Considerations

Site specific sensitive shoreline habitats will be identified around each site, that could be more critically/immediately impacted by a spill (example: clam bed 500 meters south east of system).

4.0 Spill Response Equipment

All sites must have a full spill kit located at each fueling station. Kits must be complete, in good condition, well labelled, and accessible. Kits will be inspected monthly, and inspections recorded in the Monthly Site Inspection Report. Sites should also have modified spill kits near all hazmat storage locations, specific to the location and type of risks ***(e.g. on land storage may not require water booms).***

4.1 Spill Response Kit Inventory

Labeled, portable container(s), to be safely manageable by one person, and must contain:

- 5 – 5" diameter booms totaling a minimum of 100 feet in length
- 5 – 3x4 oil sorbent socks
- 200 oil sorbent sheets
- 2 pairs of rubber gloves
- 2 sets of disposable coveralls
- 2 pairs of goggles
- 2 half mask respirators
- 2 pairs of organic vapour cartridges
- 1 Plug 'n Dike (Putty Form)
- 6 Yellow heavy duty plastic hazmat fuel spill bags
- Absorbent material such as floor dry or kitty litter (optional)

- 400 ft. of extra booms should be kept in a central, pre-determined location for each area (warehouse, operation house, etc.).

5.0 Responding to Spills

5.1 Discovery

Upon discovery of a spill, all trained, designated personnel shall immediately:

1. Identify the product that is spilling or has spilled.
2. Assess immediate hazard and notify all persons on site.
3. Secure the site.
4. Notify appropriate personnel (refer to section 5).
5. Retrieve spill kit from the nearest location.
6. Refer to SDS for product identification and handling.

5.2 Response

A supervisor trained in spill management response will:

1. Reassess the product and quantity spilled.
2. Reassess any immediate hazard.
3. Identify all the safety issues, such as ignition sources and PPE, prior to taking action.
4. Brief responders on safety issues and first aid procedures for material involved.
5. Ensure that proper PPE is used.
6. Coordinate the containment and clean-up process as per Appendix C.

5.3 Control and Containment

Proceed with the following only if safe to do so:

5.31 Diesel Spill

On Land

1. Remove all sources of ignition.
2. Keep spill from reaching water.
3. Contain spill by damming with earth or other barrier.
4. Remove minor spills with sorbent pads.
5. Do not store soiled material in a closed container. Leave lid open.
6. Report as per section 5.
7. Dispose as per section 7.

On Water

1. Use boom to contain and concentrate spill.
2. Remove spill using sorbent sheets.
3. Protection booming should be considered for sensitive shoreline habitats.

4. A spill of any quantity into aquatic habitats must be reported to the Emergency Response Team.

5.32 Gasoline Spill

On Land

1. Remove all sources of ignition.
2. Keep spill from reaching water.
3. Contain spill by damming with earth or other barrier.
4. Allow material to evaporate (monitor until safe/keep area clear of any source of ignition)
5. Do not store soiled material in a closed container. Leave lid open.
6. Report as per section 5.
7. Dispose as per section 7.

On Water

1. Use boom to contain and concentrate spill.
2. Allow material to evaporate (monitor until safe/keep area clear of any source of ignition).
3. Protection booming can be considered for sensitive shoreline habitats.
4. A spill of any quantity into aquatic habitats must be reported to Emergency Response Team.

5.33 Other

5.331 Chemotherapeutants (Pesticides)

A 'Pesticide Spill Contingency Plan' is a requirement of MCE Pesticide applicator licenses and the MCE Pesticide Spill Contingency Plan is to be referenced specifically for pesticide handling and spill response for Salmosan and Interox Paramove 50 Insecticide.

5.332 Fish Feed

Note: Fish feed is non-hazardous, but may be medicated, and all effort should be made to contain spills and retrieve wastage as quickly as possible to prevent further losses and avoid attracting scavengers.

1. Stop activity that led to spill.
2. Keep spill from reaching water.
3. Shovel into a disposal bin.
4. Report as per section 5.
5. Investigate as per section 6.
6. Dispose as per section 7.

5.4 Large Spill

Some spills may be too large to manage with the response equipment available on site. Should this occur an Emergency Response Team will be immediately contacted.

6.0 Clean Up

Site Management will contact the Development and Environmental Compliance Director to coordinate mitigation and clean up procedures.

7.0 Reporting

Internal Reporting

Once completely satisfied that the spill is under control, the person in charge will:

1. Contact the Emergency Response Team.
2. Contact Site Manager.

External Reporting

Development and Environmental Compliance Director reports externally to the appropriate federal and provincial agencies.

8.0 Investigating

1. Promptly complete an investigation using Spill & Near Miss Investigation Report Form.
2. Forward a copy of the completed report to the Development and Environmental Compliance Director. ***Make sure to include details of all actions initiated to avoid recurrence.***

9.0 Managing Soiled Material (Disposal)

1. Spill kit containers are to be used as disposal storage for contaminated sorbents.
2. Containers are to be lined with the garbage bags included in the kits.
3. Nature and volume of the spill will determine the method required for disposing of the clean-up material and will be addressed individually.
4. Contact the Development and Environmental Compliance Director for disposal instructions involved for the site.

Spill Response Flowchart

The following is intended as a quick reference guide only. Please refer to the Spill Contingency Plan and specific SDS for more detailed instructions.

Step 1: Safety First

- Only proceed if it is safe to do so.

Step 2: Secure Area

- Ensure co-workers are aware of the spill, minimize traffic, boats or otherwise.

Step 3: Stop the Flow

- If necessary, use the plug and dyke available in your kits.

Step 4: Contain the Spill

- Use appropriate equipment for the type of spill.
- Utilize additional equipment (booms and pads) to prevent the “spilled material” from reaching the beach.
- Gasoline may be contained (if fish health or other wildlife is in danger) but do not absorb the spilled gas; rather, allow it to evaporate (monitor until safe).

Step 5: Reporting

- Report all spills to the Emergency Response Team once the spill is under control.
- Notify the area Production Manager and appropriate personnel.
- Reporting to government agencies will be conducted by the Sustainability Manager.

Step 6: Clean Up & Disposal

- Ensure all used cleaning material (absorbent pads and booms) are stored in a safe manner.
- Spill equipment containers may be used to store and transport contaminated material.
- Refer to the Handling Hazardous Materials procedure

Appendix D: Environmental Management: Wild Species

Environmental Management: Wild Species

Prepared By:
Mowi Canada East Inc.

Doc ID#	Date	Responsibility
SCP-v4.1	Jan 2023	Environment and Development Division

Contents

1.0 Introduction

MCE is committed to using farming techniques and practices that reduce the risk of environmental interference by using a two-step process of 1) building a base of current knowledge of the species in the area and 2) developing and implementing environmentally sensitive culture protocols.

2.0 Sensitive Habitat and Species at Risk

Species identified as “at risk” require special consideration as they are deemed vulnerable to extinction. The company, employees and contractors need to be aware of species at risk in the area in order to manage activities to ensure no harm.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is an independent advisory panel to the Minister of Environment and Climate Change Canada that meets twice a year to assess the status of wildlife species at risk of extinction and maintains lists of species deemed to be at risk. Species at Risk (SAR) are protected under the Species at Risk Act (SARA) which prohibits the following.

- Killing, harming or harassing of a threatened, endangered or extirpated species
- Damage or destruction of an individual species’ residence
- Destruction of any part of a species’ critical habitat

The work of the SAR Committee includes research into species of concern identified by COSEWIC which may or may not be listed under SARA, candidate species research to determine status, and strategic issues in risk management.

Sensitive habitat are areas are important for the survival of specific species and the company is committed to protecting them.

3.0 Aquatic Species at Risk

The following information on aquatic species list and maps of the area were sourced from the Fisheries and Oceans Canada Aquatic Species at Risk website (Aquatic species at risk map (dfo-mpo.gc.ca)) in January 2021 provide critical habitat and distribution data for aquatic species listed under SARA. The official source of information for this site is the Species at Risk Public Registry https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html. This information provided the foundation for company management policies.

3.1 SARA Action Plans

Action Plans have been developed for the Blue Whale and Leatherback Sea Turtle, noted above, which identify both threats to the species and specific management measures.

Northwest Atlantic Blue Whale - The main threats to the recovery of the population are determined to be anthropogenic noise and the lack of food availability which could result from ecosystem changes.

- Whale identification charts will be available on all sites.
- Information on the presence of whales will be communicated to farms in the area.
- Environmental Management and Waste Management Plan: Additional Mitigation Measures to Reduce Environmental Impact, outlines measures to mitigate effect of the farm on the environment and reduce the potential for changing the food availability.

Leatherback Sea Turtle – Plastics have been found in the gastrointestinal tracts of dead Leatherback Turtles and entanglement has occurred in some commercial fisheries.

- To eliminate plastics from the farm getting in the aquatic environment, MCE has a policy of all garbage and debris collected in secure dedicated locations on the farm and disposed of on land or recycled and completes a monthly clean-up around the lease area.
- For scientists to learn more about this potential issue, all sightings of turtles will be reported, and MCE staff will provide turtle mortalities for necropsy whenever feasible.
- The risk of entanglement with farm infrastructure will be reduced by eliminating all unnecessary lines subsurface and ensuring lines are held as taunt where feasible. Response to entanglement is in section provided below: ***Reporting a marine animal or sea turtle in trouble***.

Resources

Fisheries and Oceans Canada. 2018. Action Plan for the Blue Whale (Balaenoptera musculus), Northwest Atlantic Population, in Canada [Proposed]. Species at Risk Act Action Plan Series. Fisheries and Oceans Canada, Ottawa. iv + 21 pp.

Fisheries and Oceans Canada. 2018. Action Plan for the Leatherback Sea Turtle (Dermochelys coriacea) in Atlantic Canada [Proposed]. Species at Risk Act Action Plan Series. Fisheries and Oceans Canada, Ottawa. v + 29 p.

3.2 Management Measures

Management of SAR interactions involves preventative measures, such as staff awareness and training and reducing the attractiveness of the site to wildlife, observation and recording to inform site SOPs and company policies, reporting to increase our knowledge and assist the management authorities and specific situation procedures.

1. MCE employees will not kill, harm, harass, capture or take any wildlife species.
2. Species at risk information will be readily available on all sites to enable accurate identification of species, facilitate reporting, and clarify the responsibilities of site staff and regulatory authorities. Both the sensitive species list and the guide will be laminated and made available in the Point site office, as well as, on each MCE vessel.
3. Unless otherwise indicated by direct instruction from regulatory authorities, a minimum approach distance of 100 metres will be observed for whales, dolphins and porpoises.

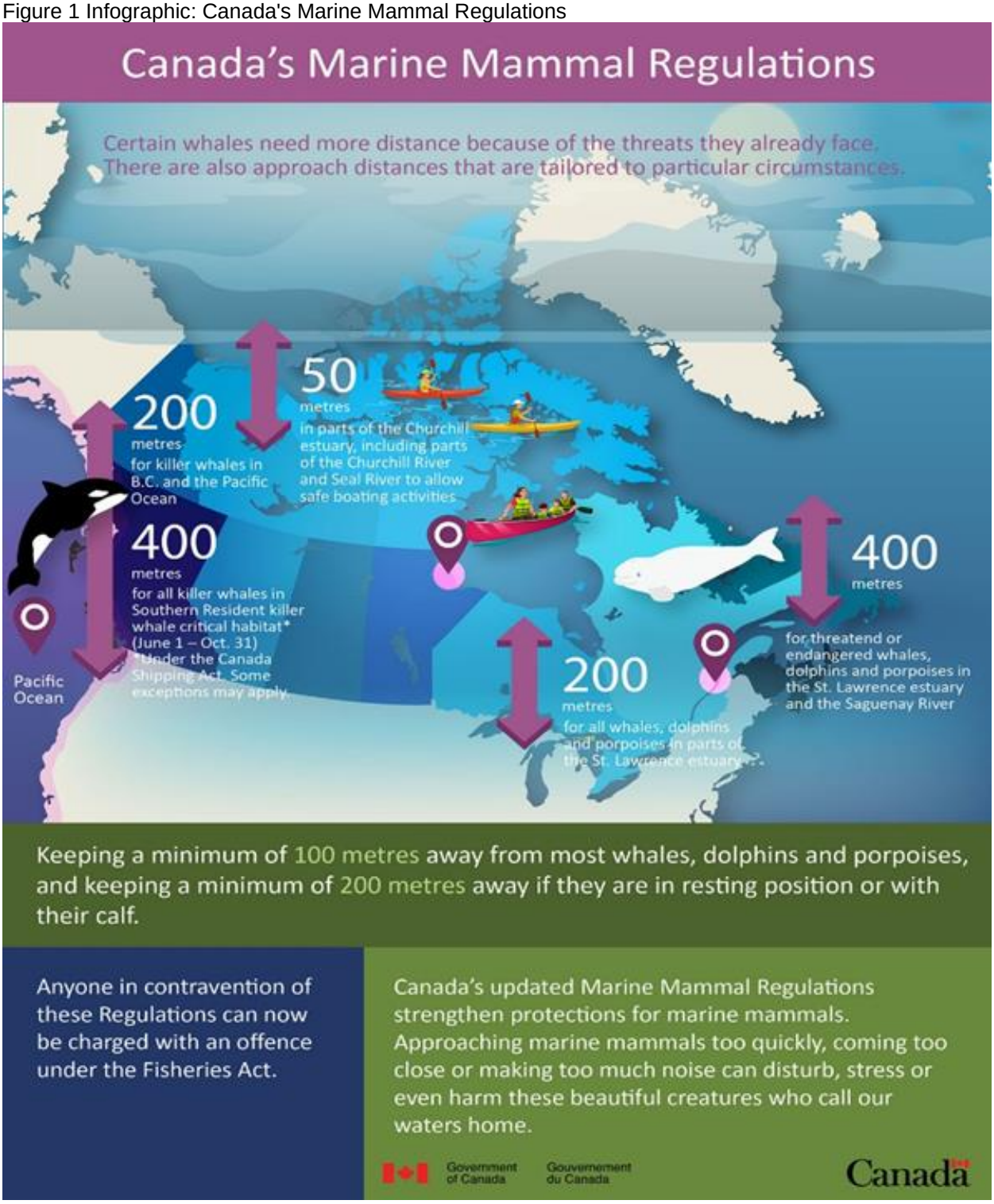
4. Reporting instructions and contact information, as listed in this document, will be posted on all sites and in all boats with reporting forms if appropriate.
5. Standard Operating Procedures for marine mammal interactions that adhere to the Marine Mammal Regulations of the Fisheries Act will be followed. SOPs will include reporting requirements, internal company incident recording, scheduled updating of information from the SARA and DFO websites, and regular review of the SOPs by all staff and operators to ensure they fully understand their role and responsibilities.
6. Standard Operating Procedures for material and waste management will include protocols that reduce site attractiveness to wildlife. Refer to the Materials Storage and Handling and Waste Management Plan for more information.
7. Operational protocols as well as net and gear types, such as HDPE nets, will be adopted that reduce the opportunity for marine mammals to breach nets and access the salmon in the pens. Refer to Appendix E: Wild and Farmed Salmon Interactions for a more information on net types. Experience in other jurisdictions has shown that marine mammals will go elsewhere if food is not available.
8. In the unlikely event access to the shore adjacent to the site is required, all necessary precautions will be made to ensure minimal disturbance of breeding, nesting and fledging birds.

3.21 Marine Mammal Regulations of the Fisheries Act

Whales and other marine mammals have been sighted in the area of the south coast of Newfoundland. All marine mammals are subject to the provisions of the Marine Mammal Regulations under the Fisheries Act. The Government recently amended the Marine Mammal Regulations to provide greater protection for marine mammals including Canada's at-risk whales. http://www.dfo-mpo.gc.ca/species-especes/mammals-mammiferes/watching-observation/index-eng.html#laws

The following infographic will be laminated and available on all farms and in boats to ensure clarity on the approach distances for marine mammals of concern. Prohibited activities and reporting requirements listed below will be part of the training program and will be followed by site staff and operators. SOPs have been developed and staff have been trained in the process for Reporting Marine Mammals and Sea Turtles.

Figure 1 Infographic: Canada's Marine Mammal Regulations



3.22 Prohibited Activities

- feeding
- swimming, diving or interacting with them
- move, encircle them or entice them to move
- change directions quickly or park your boat in their path
- approach them when they're resting - the whale will look like it's not moving and will be floating at the surface or near the surface
- separate a mammal from its group or go between it and a calf
- trap a marine mammal or a group either between a vessel and the shore, or between a vessel and other vessels
- approach them if there are already several boats present
- approach head on or from behind, as this will cut off their movements
- tag or mark them
- touch, feed or disturb an animal, even if it comes up to a wharf or the shoreline
- approach using aircraft

Porpoises and dolphins - if dolphins or porpoises ride the bow wave of your boat, avoid sudden course changes. Hold course and speed or reduce speed gradually. Do not drive through groups of porpoises or dolphins.

Seals and sea lions

- reduce boat speed, minimize wake, wash and noise, and then slowly pass without stopping
- 'wake' is the disturbed water caused by the motion of a boat's hull passing through the water
- 'wash' is the disturbed water caused by the propeller or jet drive
- avoid sudden changes of speed or direction
- move away slowly at the first sign of disturbance or agitation. If the animal starts to stare, fidget or dive into the water, you are too close

For more information: http://www.dfo-mpo.gc.ca/species-especes/mammals-mammiferes/report-rapport/page01-eng.html

3.23 Reporting a Marine Mammal or Sea Turtle Incident or Sighting

Marine mammal or sea turtle in trouble

To report abuse or harassment (fisheries violation), contact the following 24-hours/day toll-free numbers:

- Crime Stoppers: 1-800-222-TIPS (8477)
- Marine VHF radio channel 16
- Report a fisheries violation, see section below

To report an injured, stranded, entangled or dead marine mammal or sea turtle, contact the following 24-hours/day toll-free numbers.

Newfoundland & Labrador	Whale Release and Strandings Newfoundland and Labrador (Tangly Whales Inc.): 1-888-895-3003 or 1-709-895-3003

Sighting of a live marine mammal or sea turtle

Record the following important details and characteristics that might help to identify or locate it including:

- Date, time, and location (lat./long.) of animal
- Type of animal (species if possible)
- Sighting distance
- Description of key body parts, including color, any tags or unique markings
- Estimated length of the animal
- Behaviors of the animal observed (and your degree of confidence in the identification)
- Number of individuals

If possible, from a safe location and abiding by the *Marine Mammal Regulations*, take photographs and/or video of the animal, especially close-ups of the tail, flukes, flippers, entangling gear and visible injuries.

Newfoundland & Labrador Marine mammal: whalesighting@dfo-mpo.gc.ca

Accidental contact

Reporting accidental contact of a marine mammal with the site infrastructure, staff or contractors, or equipment used on or near the site to federal authorities is required within the conditions of licence as is detailed reporting in site daily logbooks.

- Use attached Marine Mammal Interaction Reporting Form, also available at http://www.dfo-mpo.gc.ca/species-especes/documents/mammals-mammiferes/report-rapport/Fish-Harvester-Form-Eng.pdf
- Do not touch or move an animal - you may accidentally harm it or yourself and it may carry diseases that could transfer to you.

Fisheries violation

Fisheries violations include polluting, poaching, damage to fish habitat and illegal fishing including fishing with the wrong gear, harvesting fish out of season, using fishing techniques that are banned.

Report a fisheries violation using the following 24 hours/day toll-free numbers. Where there's both a national and provincial/territorial number available, report to both contacts.

Canada wide: Crime Stoppers: 1-800-222-8477
Newfoundland and Labrador: (not toll-free nor 24-hour numbers)

- Stephenville (national): 709-643-8000
- St. John's (national): 709-772-5044

Resources

Atlantic Canada Conservation Data Centre. http://accdc.com//

http://www.dfompo.gc.ca/species-especes/index-eng.htm

https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

https://wildlife-species.canada.ca/species-risk-registry/sar/index/default_e.cfm?stype=species&lng=e&index=1&common=&scientific=&population=&taxid=2&locid=7&desid=0&schid=0&desid2=0&

Marine Mammal Regulations of the Fisheries Act http://www.dfo-mpo.gc.ca/species-especes/mammals-mammiferes/watching-observation/index-eng.html#laws

http://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

Recovery strategies and action plans www.sararegistry.gc.ca/default_e.cfm

3.3 Identification Charts

The following identification charts are provided by the province and are laminated and posted on each site and in boats for ease of identification.

Newfoundland Labrador

Newfoundland and Labrador Protected Wildlife

Newfoundland Labrador

The following species are protected in Newfoundland and Labrador and have been or could be found near aquaculture sites on the south coast of Newfoundland. Contact information for sightings and entanglements can be found below.
Care should be exercised to avoid causing the animal any harm.

Acadian Redfish (*Sebastes fasciatus*)

Description: Spiny-rayed with distinctive flame-red colouring and fan of bony spines. Adults reach 60 cm in length

Contact: Local DFO Office – 1-709-885-2520

Atlantic Bluefin Tuna (*Thunnus thynnus*)
Description: Large, stout but fusiform body. Dorsal surface is dark blue to black, shading to lighter blue on the sides and silvery grey below. Adults reach 270 cm fork length and 400 kg or more.
Contact: Local DFO Office – 1-709-885-2520

Atlantic Salmon (*Salmo salar*)

Description: Fusiform body shape. Adults reach 100+ cm in length.

Contact: Local DFO Office – 1-709-885-2520

Blue Shark (*Prionace glauca*)
Description: Vibrant dark blue dorsal region, bright blue sides, white underneath. Long and slender body, long pointed snout, and long sickle-shaped pectoral fins. Adults reach 3.8 m in length.
Contact: Carolyn.Miri@dfo-mpo.gc.ca

Fin Whale (*Balaenoptera physalus*)
Description: Long, slender body, V-shaped head, paired blowholes, asymmetrical coloring. Adults reach 20 to 27 m in length and 70 MT
Contact: Sightings to whalesighting@dfo-mpo.gc.ca or telljack@dfo-mpo.gc.ca; release and strandings – 1-888-895-3003; Coast Guard – 1-709-772-2083

Harbour Porpoise (*Phocoena phocoena*)

Description: Robust body, dark grey fins and flipper, light grey sides, and whiter underside. Adults reach 1.9 m in length and 76 kg.

Contact: Local DFO Office – 1-709-885-2520

American Eel *(Anguilla rostrate)*
Description: Elongated, grey with cream colour belly. Adult males reach 40 cm and adult females reach 100 cm in length
Contact: Department of Environment & Conservation Wildlife Division – 1-709-637-2026; endangeredspecies@gov.nl.ca or shelleypardy@gov.nl.ca

Atlantic Cod *(Gadus morhua)*
Description: Brown to green or grey with spots on dorsal surface, pale underside. Distinctive chin barbell, 3 dorsal and 2 anal fins. Adults reach 2 m and 96 kg.

Contact: Local DFO Office – 1-709-885-2520

Atlantic Wolffish *(Anarhichas lupus)*
Description: Rounded profile, blunt snout. Colour ranges: slate blue, dull green, purplish brown with vertical, dark brown bars along the sides. Extensive teeth structure. Adults reach 150 cm and 20 kg.
Contact: Local DFO Office – 1-709-885-2520

Blue Whale *(Balaenoptera musculus)*
Description: Largest animal on earth, coloured dark and light grey, smallish dorsal fin and pointed pectoral flippers. Adults reach 30 m in length and 181 MT.
Contact: Sightings to whalesighting@dfo-mpo.gc.ca or telljack@dfo-mpo.gc.ca; release and strandings – 1-888-895-3003; Coast Guard – 1-709-772-2083

Great White Shark *(Carcharodon carcharias)*

Description: Large, slender bodies. Robust, large, conical snout. White underside and grey dorsal area. Adults can reach 6.1 m in length and 1950 kg.

Contact: Carolyn.Miri@dfo-mpo.gc.ca

Leatherback Sea Turtle *(Dermochelys coriacea)*
Description: Large, teardrop shaped body and differentiated from other species by its lack of a bony shell. Adults can reach 2.2 m in length and 700 kg
Contact: Sightings to whalesighting@dfo-mpo.gc.ca or telljack@dfo-mpo.gc.ca; release and strandings – 1-888-895-3003; Coast Guard – 1-709-772-2083

Newfoundland and Labrador Protected Wildlife

The following species are protected in Newfoundland and Labrador and have been or could be found near aquaculture sites on the south coast of Newfoundland. Contact information for sightings and entanglements can be found below.
Care should be exercised to avoid causing the animal any harm.

North Atlantic Right Whale (*Eubalaena glacialis*)
Description: Broad back with no dorsal fin. Dark grey or black with callosities on it head. Adults reach 13 to 16 m in length and 70 MT
Contact: Sightings to whalesighting@dfo-mpo.gc.ca or telljack@dfo-mpo.gc.ca; release and stranding's – 1-888-895-3003; Coast Guard – 1-709-772-2083

Harlequin Duck (*Histrionicus histrionicus*)
Description: Males have slate-blue plumage, chestnut sides, streaks of white, chestnut and black on head. Females are plain, brownish-grey with patches of white. Adults reach 45 cm in length.
Contact: Department of Environment & Conservation Wildlife Division – 1-709-637-2026; endangeredspecies@gov.nl.ca or shelleypardy@gov.nl.ca

Piping Plover (*Charadrius melodus melodus)*
Description: Small, thrush-sized shorebird primarily the colour of dry sand with distinctive black markings, a white rump, and bright orange legs. Adults reach 18 cm in length.
Contact: Department of Environment & Conservation Wildlife Division – 1-709-637-2026; endangeredspecies@gov.nl.ca or Julie.Paquet@ec.gc.ca

Red Knot (*Calidris canutus rufa*)
Description: Medium-sized shorebird. Long bill, long legs, long tapered wings with elongated body. Adults reach 25 cm in length.
Contact: Department of Environment & Conservation Wildlife Division – 1-709-637-2026; endangeredspecies@gov.nl.ca or shelleypardy@gov.nl.ca

Short Eared Owl (*Asio flammeus*)
Description: Medium-sized, puffy white and brown owl with short ear tufts and yellow eyes. Adults reach 34 to 43 cm in length and 206 to 475 g.
Contact: Department of Environment & Conservation Wildlife Division – 1-709-637-2026; endangeredspecies@gov.nl.ca or shelleypardy@gov.nl.ca

Boreal Felt Lichen (*Erioderma pedicellatum*)
Description: Medium-sized foliose lichen, fuzzy upper surface, greyish-brown when dry and slate-blue when moist. Underside is white with edges usually curled.
Contact: Department of Environment & Conservation Wildlife Division – 1-709-637-2026; endangeredspecies@gov.nl.ca or shelleypardy@gov.nl.ca

Olive-sided Flycatcher (*Contopus cooperi*)
Description: Dark olive on the face, upperparts and flanks. Light under parts, large dark bill and a short tail. Adults reach 18 to 20 cm in length.
Contact: Department of Environment & Conservation Wildlife Division – 1-709-637-2026; endangeredspecies@gov.nl.ca or shelleypardy@gov.nl.ca

Red Crossbill (*Loxia curvirostra percna*)
Description: Medium-sized finch with a crossed beak. Males are dull red color with brown shading. Females are grayish-olive with yellow rumps. Adults reach 14 to 16 cm in length.
Contact: Department of Environment & Conservation Wildlife Division – 1-709-637-2026; endangeredspecies@gov.nl.ca or shelleypardy@gov.nl.ca

Rusty Blackbird (*Euphagus carolinus*)
Description: Medium-sized, pale yellow eyes and black slightly curved bill. Males are black with a faint green to violet gloss, females are brownish grey. Adults reach 21 to 25 cm in length and 47 to 80 g.
Contact: Department of Environment & Conservation Wildlife Division – 1-709-637-2026; endangeredspecies@gov.nl.ca or shelleypardy@gov.nl.ca

4.0 Invasive Species

Aquatic Invasive Species (AIS) are plants, animals, aquatic life and micro-organisms that can out-compete native species when introduced from outside of the Newfoundland aquatic environment. AIS are often difficult to control and can have higher rates of reproduction, fewer natural predators and the ability to thrive in different environments.

AIS can negatively impact native species, habitats, ecological structures. For aquaculture, AIS can cause damage to site infrastructure, alter the water quality requiring changes in operating procedures and/or create an unhealthy culture environment for salmon.

The impacts of invasive species usually worsen over time as they reproduce and disperse, posing a major, long term threat to the health of aquatic ecosystems causing reduced native biodiversity, increased number of species at risk and reducing the sustainability of the aquaculture industry.

The ***Aquatic Invasive Species Regulations*** provides regulatory tools under the federal Fisheries Act to prevent the introduction of aquatic invasive species (AIS) into Canadian waters, to control and manage their establishment and spread, once introduced. The Regulations complement existing federal and provincial authorities and bridge gaps within these frameworks to enable a broad range of AIS management activities.

The ***National Code on the Introductions and Transfers of Aquatic Organisms*** provides science-based principles for management of intentional introduction and transfer of aquatic organisms for aquaculture. ***The Aquatic Organisms Risk Assessment Protocol*** may be used to analyze the effects of introducing or transferring aquatic species and to examine measures to minimize harmful consequences before movement occurs.

Activities to manage AIS in Newfoundland have included mapping of confirmed presence, attempts to remove species, and measures to mitigate spread into new areas.

The following AIS have been identified in NL waters. A full list of invasive species, distribution in NL, photos and descriptions as well as regulations and other information can be found at: http://www.dfo-mpo.gc.ca/species-especes/ais-eae/regulations-reglements/index-eng.html

4.1 Species in the Area

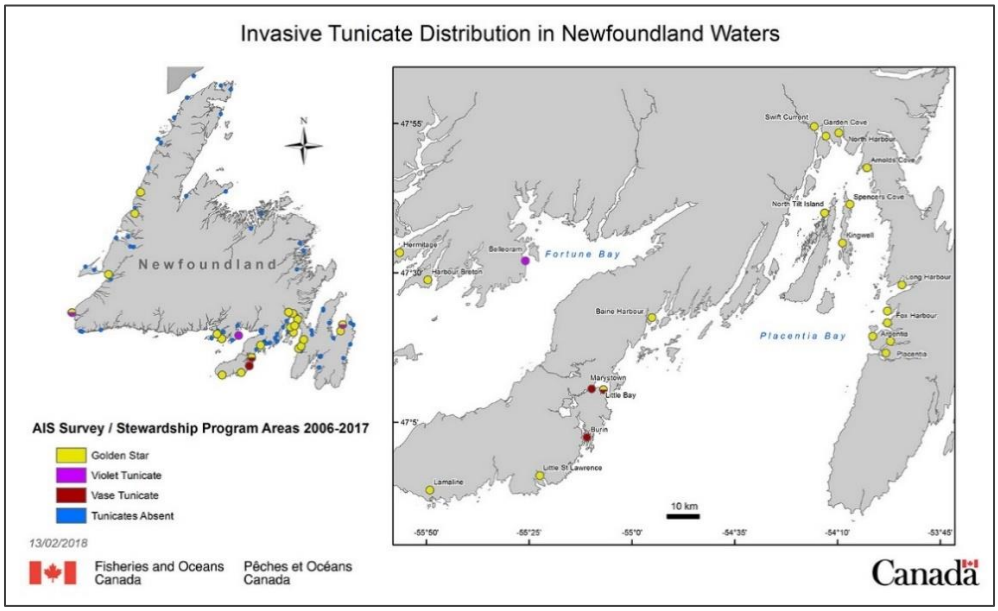
Vase Tunicate (*Ciona intestinalis)* is an invasive solitary tunicate first identified on September 19, 2012 in Placentia Bay. Follow-up surveys in October and November 2012 discovered vase tunicate was also present in Little Bay and Marystown. Only one identification of the vase tunicate has occurred Newfoundland aquaculture farm to date.

Golden Star Tunicate (*Botryllus schlosseri*) grows in colonies up to 10 cm in diameter and distinguished from other types of tunicates by the star-shaped arrangement of individuals within a clear, firm, coat or tunic in typically densely packed mat that covers the underlying surface. Colonies are arranged into a star or flower-shaped pattern. First reported in Bonne Bay around 1975 and has confirmed at a number of sites along the south coast of insular Newfoundland.

Violet Tunicate (*Botrylloides violaceus*) First identified in Belleoram in 2007 and as of 2010 had not spread beyond this area. A colonial tunicate, usually a single colour colony (purple, pink, yellow, white, or orange) of approximately 10 cm in diameter. Distinguished from other tunicate colonies by random arrangement of individuals and distinct ridge or track-like patterns on the surface of their fleshy coat. Violet tunicate has fewer colour patterns than the golden star

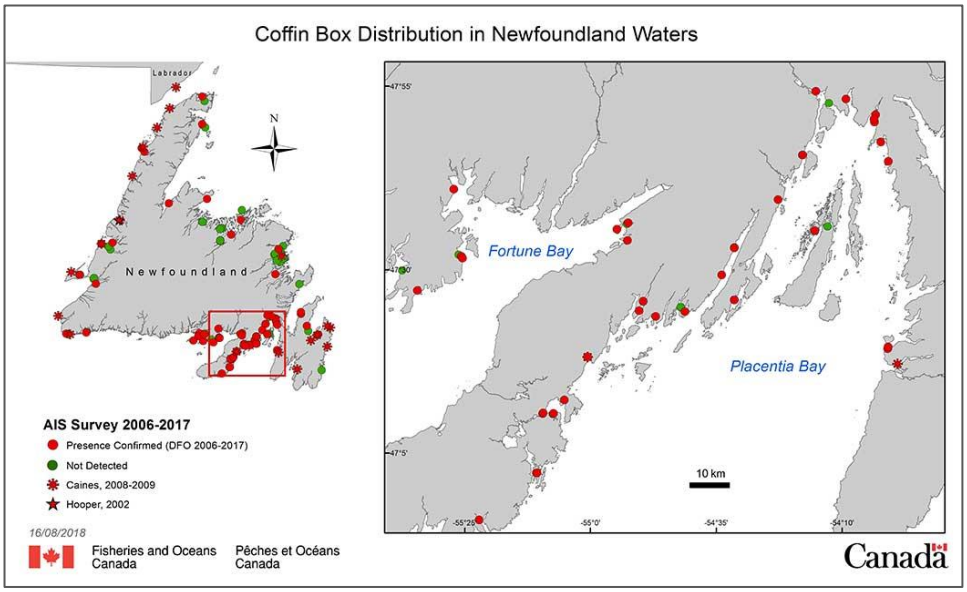
tunicate and is typically evenly coloured in shades of orange, burgundy, dull pink, lavender or purple.

Figure 2 Confirmed Invasive Tunicate Sightings in Newfoundland



Coffin Box Bryozoan (*Membranipora membranacea*) is a tiny invertebrate animal living together with others in large colonies. The coffin box feeds by filtering sea water through its body. First observed in Newfoundland and Labrador in 2002 and has become a prominent part of kelp beds throughout coastal areas of the island.

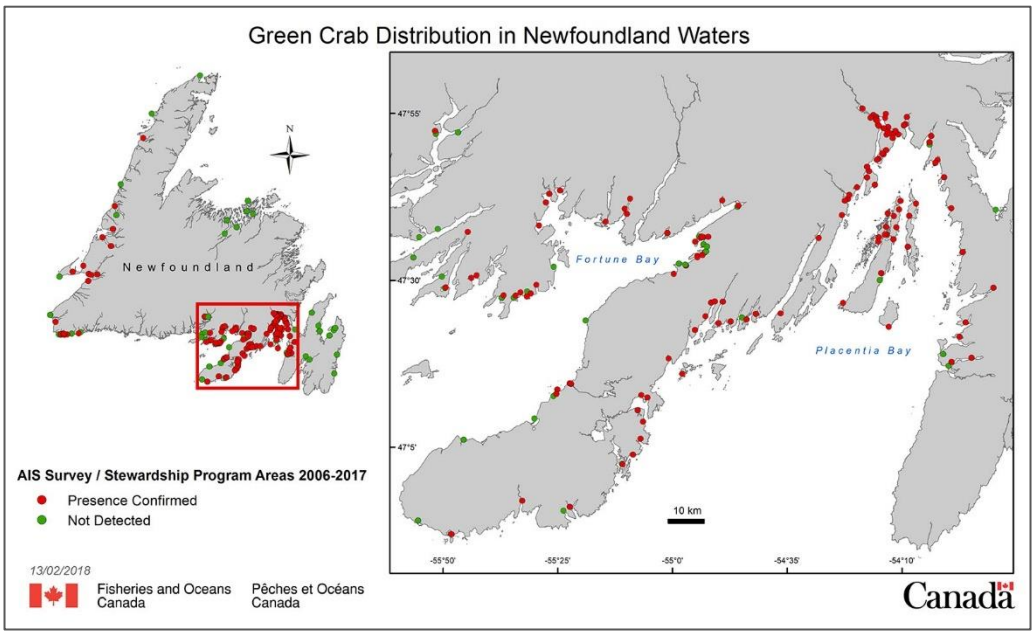
Figure 3 Confirmed Coffin Box Sightings in Newfoundland



Compound Sea Squirt (*Diplosoma listerianum*) forms dense colonies that are soft, gelatinous and translucent with fragile crusts which are hard to remove without tearing. Most often darkish grey with white dots. In 2008, it was found in Atlantic Canadian waters for the first time, off the Magdalen Islands and impacts of the introduction and establishment are widespread. Coastal ecosystems are particularly vulnerable as it may outcompete other organisms for food and space, thereby altering the natural community dynamics, in a short period of time. This species will increase the weight of the aquaculture cultivation gear, causing work to be more demanding as well as increasing the operating costs.

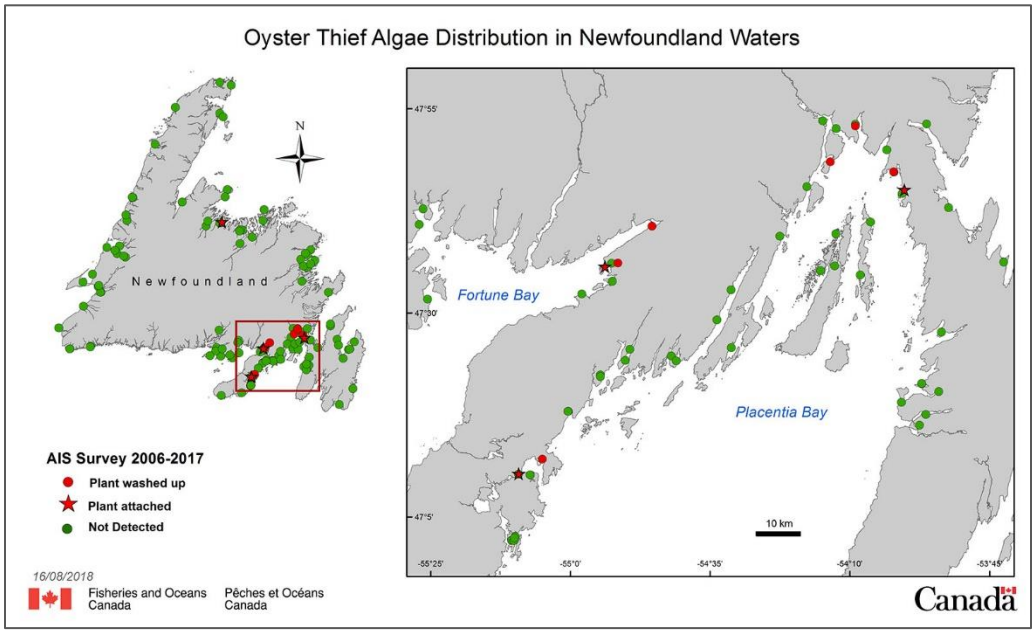
European Green Crab *(Carcinus maenas)* has been identified in southern Newfoundland in sheltered areas, generally on muddy, sandy or pebble bottoms or in vegetation. Two different types of green crabs have been found in eastern Canada with one type being more hardy and able to thrive in colder water. Adults have up to 10 cm shell with three spines between the eyes and five on each side and two claws of different sizes. They are aggressive, territorial and pose a serious threat to estuarine and marine ecosystems as voracious predators feeding on a variety of intertidal animals, including oysters, mussels, clams and juvenile crabs.

Figure 4 Confirmed Green Crab Sightings in Newfoundland



Oyster Thief (*Codium fragile*) is a large, green, spongy macroalga with thick, irregularly cylindrical branches usually 3 to 10 mm in diameter and 15 to 20 cm long and up to 90 cm in length. Discovered in Newfoundland waters on November 27, 2012, it grows on any hard surface including rocks, boulders, cobbles, wharves, boat hulls and shellfish in both intertidal and subtidal zones. It has been found on native mussels, scallops and oysters. It excludes kelps from base substrates and fouls aquaculture nets.

Figure 5 Confirmed Oyster Thief Sightings in Newfoundland



4.2 Management Measures

Management of the potential negative effects of an invasive species includes prevention of spread of the species, identification and reporting as instructed in the Fisheries and Oceans Canada Invasive Species website: http://www.dfo-mpo.gc.ca/species-especes/ais-eae/identify-eng.html

The Aquatic Species Identification Guide will be made available to all site staff. It can be found at the following link: https://waves-vagues.dfo-mpo.gc.ca/Library/365586.pdf

4.2.1 Prevention

The most effective management of invasive species is to prevent the spread to new areas.

- Invasive species identification charts will be available on all sites.
- MCE biosecurity protocols include cleaning of boat hulls prior to moving from one BMA to another. Tunicates can be readily transferred via boat hulls from one area to another. Refer to the Salmonid Fish health Management Plan, Biosecurity Plan for more details.

Attempts to eradicate invasive species once they have become established can be difficult. Therefore, prevention of the introduction of these species and controlling the spread of existing populations are priorities.

The following provides operating procedures to reduce the likelihood of introducing AIS into the areas farmed by MCE.

General

- All MCE farm sites will have access to the AIS Identification Booklet for staff to recognize suspected organisms and up to date maps of locations where invasive species have been identified. NL AIS posters will also be available on all sites.
- Staff will be trained to identify AIS and be vigilant in looking for invasive species.

- Procedures to remove AIS from farm gear or boats and disposal of the organism(s) will be followed to reduce the likelihood of spreading the species further during the removal process.
- No organisms or water will be moved from an area known to have invasive species into an area that does not.
- Non-native aquatic plants or animals will not be released into the natural environment or sewers.

Nets and Farm Equipment

- During production, fouling organisms will be removed regularly with nets thoroughly cleaned with remotely operated onsite net cleaning equipment.
- Fouling organisms removed from nets and equipment will be examined for presence of AIS. If present, the organisms will be disposed of and report as indicated in the below sections.
- On farm equipment will be cleaned, rinsed and whenever possible be allowed to dry between uses.
- Cleaning activities and examination for AIS will be documented.
- Any suspected or identified AIS will be reported as indicated below.

Boats and Gear

- Ensure that boats and equipment are not vectors of spread for aquatic invasive species, especially when moving from one area to another.
- Avoid transferring previously submerged gear from an area known or suspected to have invasives to an area that does not.
- When leaving an area with known invasive species, boat hulls and gear will be inspected and, if necessary, thoroughly cleaned and disinfected with bleach or vinegar and if possible dried before moving to other areas.
- Gear will be thoroughly dried before transfer whenever possible.
- Any organisms removed from boat hulls or gear will be disposed of on land. If pressure washing is necessary it will only be done on land (not on the water) ensuring the out-flow does not go into the sea, as colonies can re-grow from small fragments.
- Removed material will be disposed in an appropriate compost or garbage bin.
- All water will be drained from the vessel when returning from areas with known invasive species present. Bilge water will be released on land or disinfected.
- When required, environment-friendly anti-fouling paint or products will be used on boat hull.

4.3 Identification and Reporting

If you think you have discovered an aquatic invasive species, the following steps are to be taken.

1. Do not return the species to the water
2. Note the exact location (GPS coordinates) and the observation date
3. Take photos
4. Note identifying features
5. Contact Environment and Development with all above details.
6. Environment and Development will report it as an invasive species in Newfoundland and Labrador: 1-855-862-1815 or Email: AISEAE.XNFL@dfo-mpo.gc.ca

Resources

Fisheries and Oceans Canada Invasive Species http://www.dfo-mpo.gc.ca/oceans/publications/soto-rceo/2012/page06-eng.html

Fisheries and Oceans Canada Invasive Species http://www.dfo-mpo.gc.ca/species-especes/ais-eae/identify-eng.html

Fisheries and Oceans Canada Invasive Species Regulations http://www.dfo-mpo.gc.ca/species-especes/ais-eae/regulations-reglements/index-eng.html

Fisheries and Oceans Canada State of the Oceans Report, 2012 https://waves-vagues.dfo-mpo.gc.ca/Library/346701.pdf

Information and Identification Charts

The following charts are provided by the province and are laminated and posted in the office of the farm site and in the boats for information and easy identification.

EXOTIC SPECIES:
Plants, animals and micro-organisms existing in habitats beyond their natural distribution. Their introduction is usually caused by humans or human activities but most do not become invasive. Exotic species are also referred to as introduced, non-native, alien and non-indigenous species.

INVASIVE ALIEN SPECIES:
Harmful exotic species whose introduction or spread threatens the environment, economy, or society, including human health.

PATHWAYS OF INTRODUCTION:
The activity, most commonly human, that provides the opportunity for species to establish in new habitats.

THREATS:
The potential negative outcomes to a habitat or species after the introduction of an exotic species. Threats include biodiversity loss, introduction of predators, and loss of food source.

BIODIVERSITY:
The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Red Squirrel
J. Brazil

Meadow (Canada) Thistle
MUN Botanical Gardens

For More Information:

Department of Environment and Conservation
Wildlife Division
Endangered Species and Biodiversity
Phone: (709) 637-2026
www.gov.nl.ca/

Botanical Gardens of Memorial University
Memorial University of Newfoundland and Labrador
Phone: (709) 737-8590
www.mun.ca/botgarden

Canadian Biodiversity Network
www.cbin.ec.gc.ca

Wild Species 2005
www.wildspecies.ca

IAS Concepts, Terms & Context, CAB
http://www.cabi.org/ias_ctc.asp?Heading=Terms

IUCN *100 of the World's Worst Invasive Alien Species*
www.issg.org/database

Environment Canada, Invasive Alien Partnership Program: http://www.cbin.ec.gc.ca/issues/ias_iaspp.cfm

Funding Provided By:

Canada

Cabbage White, S. Pandy Moores

Exotic and Invasive Alien Species in Newfoundland and Labrador

Starling, M. Rodrigues-Wright

Exotic and Invasive Alien Species in Newfoundland and Labrador

Newfoundland and Labrador is home to tens of thousands of animals, plants, and other organisms. Together, these species create the unique environment and diverse habitats of the province.

However, intentionally or accidentally, exotic species have been introduced to the province. While most exotics may have little or no impact on local ecosystems, some species may become invasive.

Snowshoe Hare
J. Brazil

Coltsfoot
J. Brazil

The most significant threat to an ecosystem following the introduction of an invasive alien species is the loss of native biodiversity. There is a direct relationship between an ecosystems biodiversity and its ability to respond and adapt to change. Therefore, any change in ecosystem dynamics, including the loss of species, may ultimately cause a decrease in the systems stability.

Continued sustainable use of our natural resources requires us to maintain biodiversity. Changes made to ecosystems by invasive alien species could potentially lead to negative social, cultural, and economic impacts.

Some Exotic Species Found in Newfoundland and Labrador

Where in the province they have been introduced

=Newfoundland & Labrador =Newfoundland =Labrador

Vertebrates

- Deer Mouse
- Eastern Chipmunk
- Green Frog
- House Mouse
- House Sparrow
- Lake Whitefish
- Masked Shrew
- Mink
- Mink Frog
- Moose
- Red Squirrel
- Muskox
- Norway Rat
- Northern Bank Vole
- Rock Dove
- Ruffed Grouse
- Southern Red-Backed Vole
- Spruce Grouse
- Wood Frog
- American Toad
- Snowshoe Hare

Invertebrates

- Birch Leaf-Mining Sawfly
- Cabbage White Butterfly
- Centipedes
- European Earwig
- European Skipper
- Fir Coneworm
- Long Horned Beetles
- Multicolored Asian Lady Beetle
- Water Scavenger Beetle

Plants

- Black Knapweed
- Canada Thistle
- Goutweed
- Purple Loosestrife
- Japanese Knotweed
- St. John's Wort
- Wild Chervil
- Colts Foot
- Yellow Iris
- Sea Buckthorn

*Please note this is not an inclusive list of all species in Newfoundland and Labrador

How To Prevent the Introduction Of Exotic Species

Always check with the appropriate Newfoundland and Labrador government agencies to ensure that a permit is not required to import the species that you are transporting.

Three most common pathways of introduction:

Trade

- Purchases or the packing materials could be harmful to the native environment. For example, the brown spruce longhorn beetle arrived in Nova Scotia from Europe or Asia on wooden packing materials used in exporting goods.
- Purchases of living things or their by-products, from out of the province may lead to unintentional introductions of invasive alien species. Several of the exotic lady bug species present in the province were introduced intentionally as biological controls. These exotic species may out compete native species
- Whenever possible buy local plants and pets and always ask for the source of your purchase.

Travel

- Species can travel along with you when you travel into or around the province.
- Think about what might be hitching a ride on your vehicle, boat or even your shoes. Take the time to rinse off recreation vehicles, automobiles, and outdoor equipment. The movement of recreational vehicles through the Great Lakes has contributed to the spread of the Zebra Mussel around that region.

Tourism

- Do not bring home living souvenirs—even seemingly harmless gifts such as fruits and plants may be or carry potentially harmful invasive insects and disease.

Purple loosestrife
J. Brazil

Green Frog
J. Brazil

Learn

- Know the law. Current provincial legislation prohibits the introduction of any wild animal without prior permission.
- Become familiar with local species so you know what is native and what may be an exotic.

Inform

- Educate others about the potential threats associated with introducing non-native species.
- Notify Wildlife Officials of potentially new introductions to an area.

Monitor

- Be on the lookout for non-native species.
- Participate in local and community monitoring projects, such as the Butterfly Monitoring Program (www.env.gov.nl.ca/env/wildlife/biodiversity/biodiversitymon.htm) and the Eyes Across the Province Program (www.mun.ca/botgarden)

Examples of Invasive Alien Species in Newfoundland and Labrador

Balsam Woolly Adelgid, Wikipedia

Species Balsam Woolly Adelgid, *Adelges piceae Ratz*

Introduced 1910

Where First introduced to Nova Scotia but spread accidentally through the import of infected plants.

Threats Can kill balsam fir trees, which may lead to habitat destruction.

American Mink, E. Sargent

Species Mink, *Mustela vison*

Introduced 1935-1937

Where St. John's and Springdale, for the development of fur farming, escapees established themselves in the wild.
Followed by an intentional release of 31 animals by the government in 1948

Threats Very strong competitor, can have large impact on prey populations, including bird, rabbits and aquatic life.

Brown Trout, Government of Newfoundland and Labrador

Species Brown Trout, *Salmo trutta*

Introduced 1884, stocking continued until the late 1930's

Where Avalon Peninsula, NL

Threats Out competes native Brook Trout for habitat, and has the potential to negatively impact native salmon populations through competition and intermixing.

Starling, M. Rodriguez-Wright

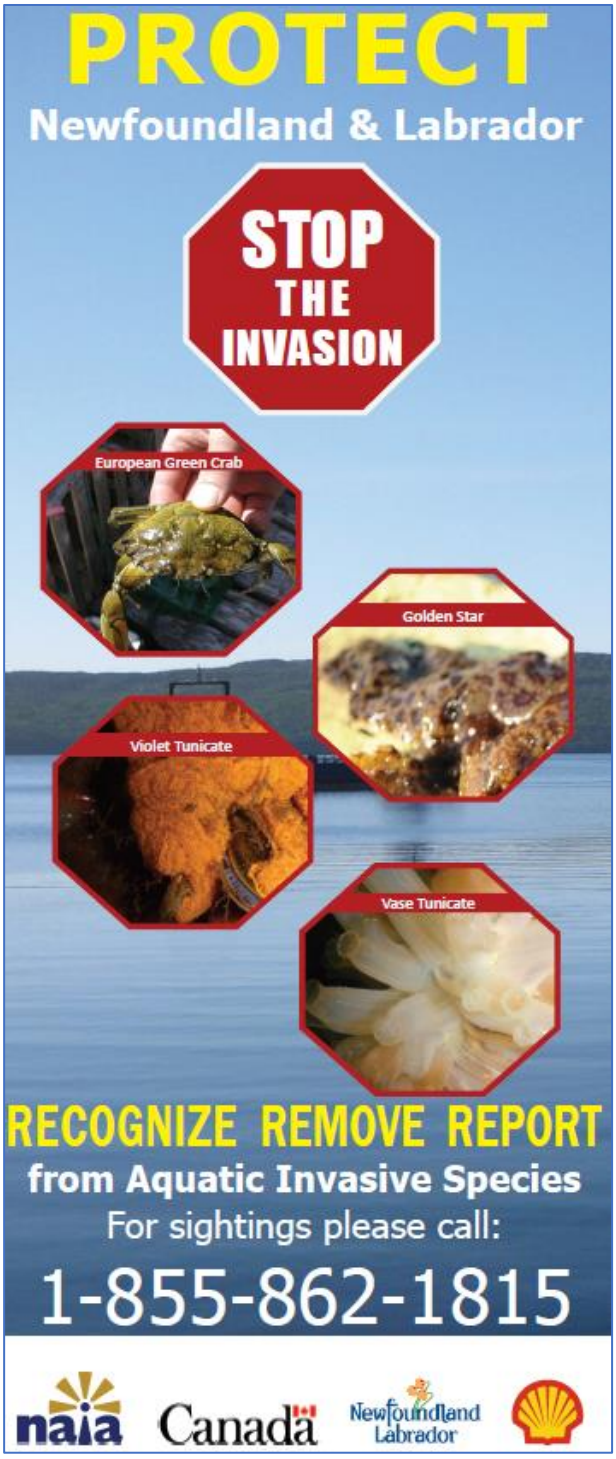
Species Starling, *Sturnus vulgaris*

Introduced 1890

Where New York City and spread all over North America

Threats Displaces native birds by taking over nesting sites.


PROTECT
Newfoundland & Labrador
STOP
THE
INVASION
Oyster Thief
Clubbed Tunicate
Carpet Tunicate
Coffin Box
RECOGNIZE REMOVE REPORT
from Aquatic Invasive Species
For sightings please call:
1-855-862-1815
The Coast of Bays Coastal Planning Committee in Partnership with:
naia
Canada
Newfoundland Labrador


PROTECT
Newfoundland & Labrador
STOP
THE
INVASION
European Green Crab
Golden Star
Violet Tunicate
Vase Tunicate
RECOGNIZE REMOVE REPORT
from Aquatic Invasive Species
For sightings please call:
1-855-862-1815
naia
Canada
Newfoundland Labrador

5.0 Predatory and Nuisance Species

The predators known to frequent the general area of the south coast of Newfoundland are ospreys, eagles, gulls, seals, minks, otters, sharks, tuna, killer whales and dogfish. Predatory species such as tuna, whales and sharks are a concern because they could potentially damage farm structure and creating a risk of salmon escapes.

Birds, mink and otters that are attracted to farmed fish or mortalities and reduce the biosecurity of the farm by potentially spreading disease. Management measures have been developed to reduce the potential for these species to access farmed fish and/or mortalities, Salmonid Fish Health Management: Biosecurity Plan.

5.1 Management Measures

Management of the risks involved with predatory or nuisance species includes installation of robust infrastructure built to the NS9415 or the Scottish Technical standard that has been proven to withstand marine mammals in other parts of the world, waste management procedures that reduce the appeal of the farm as a food source and installation of equipment to reduce access to farm fish.

Table 10 Predatory and Nuisance Species and Mitigation Measures

Predator	Control Method	Description
Osprey	Equipment: Top net poles or birdstands and top net. No mortalities or refuse will be left in open containers. Mortalities will be ensiled on site or contained in a closed xactac box for removal off site to eliminate odour and visual attractant.	Poles or bird stand plus top net of HDPE 38 mm @ 1.6 mm or nylon and will be sewn to top of grower net and secured to the handrail, marked with 10cm x 60cm yellow reflective tape in 4 locations of the top rail, equidistant apart.
Eagle	Equipment: Top net poles or birdstands and top net. No mortalities or refuse will be left in open containers. Mortalities will be ensiled on site or contained in a closed xactac box for removal off site to eliminate odour and visual attractant.	Poles or bird stand plus top net of HDPE 38 mm @ 1.6 mm or nylon and will be sewn to top of grower net and secured to the handrail, marked with 10cm x 60cm yellow reflective tape in 4 locations of the top rail, equidistant apart.
Seagull	Equipment: Top net poles or birdstands and top net. No mortalities or refuse will be left in open containers. Mortalities will be ensiled on site or contained in a closed xactac box for removal off site to eliminate odour and visual attractant.	Poles or bird stand plus top net of HDPE 38 mm @ 1.6 mm or nylon and will be sewn to top of grower net and secured to the handrail, marked with 10cm x 60cm yellow reflective tape in 4 locations of the top rail, equidistant apart.
Seal	Equipment: Single net system. HDPE main nets with Ultracore stainless steel woven into mesh on the walls and bottom.	38 mm HDPE Ultracore @ 3.1 mm on the walls and bottom. There is also a predation prevention net on the bottom made from 4.2 mm HDPE Ultracore. The HDPE Ultracore contains stainless steel wiring woven into the bottom mesh which

	No mortalities or refuse will be left in open containers. Mortalities will be ensiled on site or contained in a closed xactac box for removal off site to eliminate odour and visual attractant.	improves strength, abrasion and predation resistance. When nylon nets are in use, an additional predator net may be employed if needed.
Predator	**Control Method**	**Description**
Mink	Equipment: Single net system. HDPE main nets with Ultracore stainless steel woven into mesh on the bottom. No mortalities or refuse will be left in open containers. Mortalities will be ensiled on site or contained in a closed xactac box for removal off site to eliminate odour and visual attractant.	38 mm HDPE Ultracore @ 3.1 mm on the bottom. There is also a predation prevention net on the bottom made from 4.2 mm HDPE Ultracore. The HDPE Ultracore contains stainless steel wiring woven into the bottom mesh which improves strength, abrasion and predation resistance. The use of live traps may be considered, as permitted by Wildlife Division, DFFA. When nylon nets are in use, an additional predator net may be employed if needed.
Otter	Equipment: Single net system. HDPE main nets with Ultracore stainless steel woven into mesh on the bottom. No mortalities or refuse will be left in open containers. Mortalities will be ensiled on site or contained in a closed xactac box for removal off site to eliminate odour and visual attractant.	38 mm HDPE Ultracore @ 3.1 mm on the bottom. There is also a predation prevention net on the bottom made from 4.2 mm HDPE Ultracore. The HDPE Ultracore contains stainless steel wiring woven into the bottom mesh which improves strength, abrasion and predation resistance. The use of live traps may be considered, as permitted by Wildlife Division, DFFA. The use of live traps may be considered, as permitted by Wildlife Division, DFFA. When nylon nets are in use, an additional predator net may be employed if needed.
Shark	Equipment: Single net system. HDPE main nets with Ultracore stainless steel woven into mesh on the bottom. No mortalities or refuse will be left in open containers. Mortalities are ensiled on site or contained in a closed xactac box for removal off site to eliminate odour and visual attractant.	38 mm HDPE Ultracore @ 3.1 mm on the walls and bottom. There is also a predation prevention net on the bottom made from 4.2 mm HDPE Ultracore. The HDPE Ultracore contains stainless steel wiring woven into the sides and bottom mesh which improves strength, abrasion and predation resistance. This has proven effective against large sea lions and other marine predators in British Columbia. When nylon nets are in use, an additional predator net may be employed if needed.
Tuna	Equipment: Single net system. HDPE main nets with Ultracore stainless steel woven into mesh on the bottom. No mortalities or refuse will be left in open containers. Mortalities are ensiled on site or contained in a closed xactac	38 mm HDPE Ultracore @ 3.1 mm on the walls and bottom. There is also a predation prevention net on the bottom made from 4.2 mm HDPE Ultracore. The HDPE Ultracore contains stainless steel wiring woven into the sides and bottom mesh which improves strength, abrasion and predation resistance.

	box for removal off site to eliminate odour and visual attractant.	When nylon nets are in use, an additional predator net may be employed if needed.

Predator	Control Method	Description
Killer Whales	Equipment: Single net system. HDPE main nets with Ultracore stainless steel woven into mesh on the bottom. No mortalities or refuse will be left in open containers. Mortalities will be ensiled on site or contained in a closed xactac box for removal off site to eliminate odour and visual attractant.	38 mm HDPE Ultracore @ 3.1 mm on the walls and bottom. There is also a predation prevention net on the bottom made from 4.2 mm HDPE Ultracore. The HDPE Ultracore contains stainless steel wiring woven into the bottom mesh which improves strength, abrasion and predation resistance. When nylon nets are in use, an additional predator net may be employed if needed.
Dogfish	Equipment: Single net system. HDPE main nets with Ultracore stainless steel woven into mesh on the bottom. No mortalities or refuse will be left in open containers. Mortalities will be ensiled on site or contained in a closed xactac box for removal off site to eliminate odour and visual attractant.	38 mm HDPE Ultracore @ 3.1 mm on the walls and bottom. There is also a predation prevention net on the bottom made from 4.2 mm HDPE Ultracore. The HDPE Ultracore contains stainless steel wiring woven into the bottom mesh which improves strength, abrasion and predation resistance. When nylon nets are in use, an additional predator net may be employed if needed.

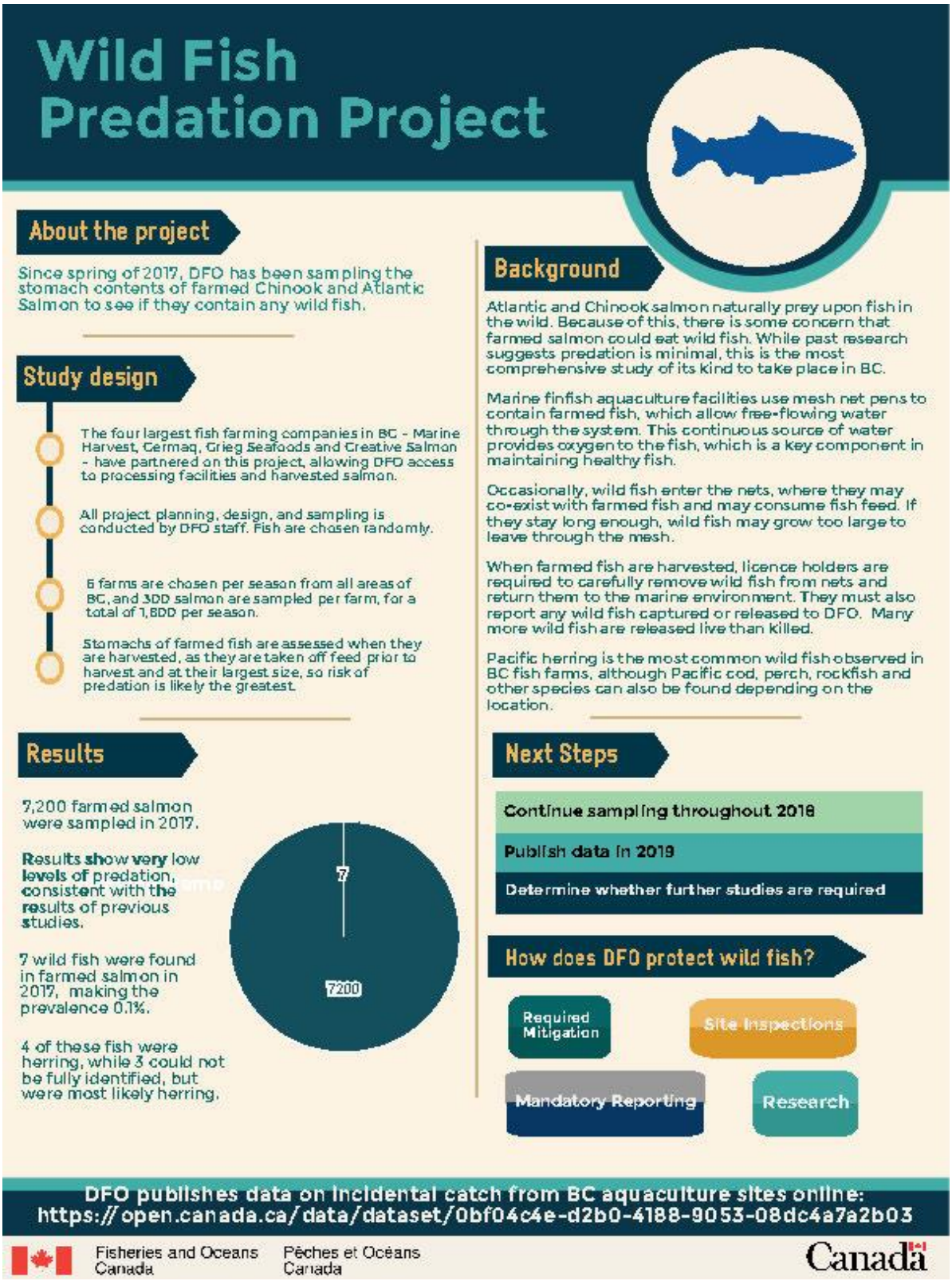
6.0 Wild Fish in the Culture Pens

Fish farms can attract wild fish because they provide structure, refuge from predators and food resources (Arechavala-Lopez et al 2010). Any wild fish present during operational activities, such as harvesting, will be clearly identifiable as they would likely be a different species. Harvesting protocols include returning wild fish alive to the marine environment during harvest of the salmon. Once the pen has been harvested the nets are lowered so any wild fish left in the pen can swim away.

6.1 Predation

Studies have been completed in BC that that show farmed salmon do not eat wild fish that swim in and out of farm pens. DFO researchers recently examined the stomach contents of harvested farmed salmon in British Columbia and found they were almost all empty (DFO, Jones 2019). Farmed salmon are trained to eat pelleted feed and this study shows that even when farmed salmon are at their hungriest, right before harvest, they do not eat wild fish, see figure 8.

Figure 6 Wild Fish Predation Project



References

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DFO. Wild Fish Predation Project. https://www.pac.dfo-mpo.gc.ca/science/aquaculture/wfpp-ppps/index-eng.html

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Appendix E: Management of Wild and Farmed Salmon Interactions

Management of Wild and Farmed Salmon Interactions

Prepared By:
Mowi Canada East Inc.

Doc ID#	Date	Responsibility
SCP-v4.2	Jan 2025	Environment and Development Division

Contents

1.0 Introduction

Management of the potential effects of the farm operations on the environment, specifically on wild salmon is a priority for Mowi Canada East (MCE). MCE has undertaking significant management strategies designed to reduce the likelihood of cultured salmon escaping from the pens and thereby interacting with wild salmon. All of MCE sites have been assessed by DFO for potential interactions with wild salmonids. DFO's recommendation for licenses and the subsequent licensing of the sites was dependent on implementation and compliance with the Code of Containment for the Culture of Salmonids in Newfoundland and Labrador. MCE will build upon this code by implementing pen structure and nets that are compliant with NS-9415 or the Scottish Standard.

Managing the potential risk of farm operations requires a wholistic approach including knowledge of the environment, local salmon populations and their life cycle as well as infrastructure reliability and bio-secure culture practices that reduce the interaction potential between wild and cultured salmon. This plan provides information on how MCE will mitigate and manage the potential risk to wild salmon populations using site-specific farm design and technology, established operating procedures for keeping farmed salmon in net pens and ongoing research to understand the ecosystem and develop more efficient methods and technologies with a focus on the specific area of the proposed lease.

The following additional information informs and/or pertains to the management of wild and farmed interactions and is found in locations as indicated in the application.

Table 1 Wild-farmed management information found in other locations in this application

Wild-Farmed Management Considerations	Information/Data Provided	Information Location
Infrastructure damage and escapes	Weather, tropical storms, wave and tidal fluctuations and mitigation measures	Environmental Management and Waste Management Plan
Current direction and speed	Data Report – Current Measurements	Environmental Management and Waste Management Plan
Wild salmon life cycle and habitat	Status of populations	Appendix D Environmental Management: Wild Species
Environmental accidents and emergencies	Environmental impacts on the farm Impacts on the environment	Environmental Management and Waste Management Plan
	Emergency response Fuel delivery& spill response	Incident and Crisis Management System Environmental Management and Waste Management Plan, Environmental Emergency Management and Fuel Delivery and Spill Response
Mortality management	Fish mortality and discards policies and procedures	Salmonid Fish Health Management: Fish Disposal Plan and Mass Mortality Contingency Plan
Disease management	Protocols and policies to reduce spread of disease	Salmonid Health Management Plan: Integrated Pest Management Plan, and Biosecurity Plan

Recent genetic studies have documented hybridization between wild salmon and aquaculture escapees in southern Newfoundland (Sylvester et al 2018 and 2019, Wringe et al). MCE recognizes the risk to wild salmon and has taken steps to mitigate the potential negative effects from farming operations by understanding the wild populations in the area of the proposed lease, developing escape prevention protocols and technology, and continuing to research viable options for the future.

In the study by Baskett et al, authors that assessed strategies to minimize the effect of farmed salmon on wild populations, a reduction in the number of escapes was indicated as a first line defence to directly reduce effects on wild salmon. The Code of Containment for the Culture of Salmonids in Newfoundland and Labrador outlines requirements for reducing the risk of escapes and specific measures for recapture and reporting. This document provides MCE management policies and procedures to manage wild and farmed salmon interactions as required by the Code. Detailed procedures to manage an escape event are also included the Appendix 1 Escape Response Plan of this document. This plan will be posted and readily available on all sites and staff will be trained in these procedures.

2.0 Local Wild Salmon Populations

DFO is responsible for the management of and research on Atlantic salmon stocks in Newfoundland by conducting a stock assessment for Atlantic Salmon in Newfoundland every five years, with the most recent assessment completed in 2020 (DFO 2022). An annual record of counts at fishways provides an update on returns (DFO n.d.). Other publications provide information on the presence of Atlantic salmon in the areas where we operate. A summary of some aspects of the stock assessment provided by DFO is below:

- Salmon populations in assessed rivers may not be representative of all rivers in the SFA. There are three rivers with counting fences in SFA 11 and 16 scheduled rivers and a number of unscheduled waterways.
- Historical or estimated biological characteristic data (e.g. fecundity, sex ratio, female size) are generally used in the assessment process. Given that these values can vary annually and are not collected on an annual basis, there is uncertainty in the estimation of egg depositions.
- Estimates of recreational catch and effort data are dependent on the number and accuracy of angler licence stubs completed and returned each year. For all salmon fisheries, uncertainty exists where either inaccurate or incomplete information is provided.
- Seventeen populations of Atlantic Salmon were assessed in 2020. Adult salmon were counted on three rivers in Labrador and fifteen rivers in Newfoundland. One river in SFA 4 was not included as an assessed river because of recent enhancement activities carried out there.
- The COVID-19 pandemic had a significant impact on the program for the 2020 year. Because of the impact on DFO operations, there were no smolt data collected in 2020, therefore, marine survival could not be estimated for the 2021 adult return year.
- In 2020, eight monitored rivers showed declines in total returns, and six of these eight rivers had declines of greater than 30% compared to their previous five-year mean. Marine survival continues to be the major factor limiting the abundance of Atlantic salmon within the region (Veniott et al 2018). Returns in any given year are determined primarily by marine survival rather than variations in smolt production. Inter-annual variation in marine survival continues to fluctuate, with lower survival than the previous generation and three generation averages for rivers where marine survival estimates were available.
- Estimates of recreational catches for NL have been highly variable since 2005 (total catch range of 38,900 to 76,100 salmon (Veniott et al 2018). Preliminary estimates of retained and released salmon in 2020 were unavailable at the time of the report. 2020 total returns and spawning escapements were estimated using means catch values over the previous generation. This estimate resulted in values of 20,574 retained and 25,704 released salmon.
- Status of Atlantic salmon on the south coast of Newfoundland (SFAs 9-11) remains poor. Returns to Conne River in 2020 were only 157 fish, which was a -86% change from the previous generation average and equivalent to only 7% of the LRP in 2020. Estimated marine survival rate remains low at less than 1% in 2020. There is evidence of hybridization between wild and farmed salmon juveniles throughout Fortune Bay and Bay d'Espoir and the long- term consequences of this on wild salmon populations are

uncertain.

In Hamoutene et al, a series of experimental releases of aquaculture fish were conducted to simulate escapes in a Canadian fjord and results indicate that aquaculture fish dispersed from the site quickly but had infrequent migrations to the open ocean. The study further summarizes the findings by saying negative interactions of escaped farmed salmon are likely to be largely contained within the fjord for short temporal durations.

The following is a summary of the wild salmon stock information. References indicated are listed at the end of this document.

- In Redden et al, thirty-four rivers on the southwest coast from Point Crewe to Cape Ray were identified as having at some point in the past recorded the presence of salmon.
- The latest publication of scheduled rivers by DFO (DFO n.d.) indicates there are four scheduled salmon rivers in the areas of the MCE sites in Outer Bay d'Espoir, Facheux Bay, Hare Bay, Rencontre Bay West, and Chaleur Bay. SFA 10 - Northeast River (Placentia); SFA 10 - Come By Chance River; SFA 11 - Garnish River; and SFA 11 - Conne River

2.1 First Nations Knowledge of Atlantic Salmon

Miawpukek First Nation has documented historical knowledge and use of Atlantic salmon on the south coast of Newfoundland. The document entitled "Atlantic Salmon (plamu) in the lifeways of the Miawpukek Mi'kmaw" MAMKA, March 2018, details traditional uses and perspective on the development of salmon regulations and the declines of salmon on the Conne River. The document notes the following.

- The first escaped salmon were documented on the river in 1994.
- Many Miawpukek Mi'kmaw attribute declines in salmon to improper installation of counting fences in the 1980's.
- Young salmon from Conne River survive to reach the outer fjord, but there is poor survival at sea.

3.0 Partnerships

Mowi was invited as guest to the "Miawpukek Plamu Ceremony, International Year of the Salmon – 2019" event held in June of 2019. Mowi was invited to speak and reiterated the commitment to the Miawpukek First Nations (MFN) to work with them to support efforts in salmon recovery on the Conne River. This follows a previous commitment made in February of 2019 to Chief Misel Joe by Mowi Canada East, in response to the request by the Chief request for salmon farmers to support the development of a comprehensive Salmon Enhancement Plan through technical, financial and ethical support. Mowi wholeheartedly supports this initiative and has committed to work with Miawpukek First Nations to achieve their goals for salmon enhancement. Miawpukek is in the process of determining how they wish to proceed on this initiative.

MCE collaborated with MFN and Mi'kmaq Alsumk Mowimsikik Koqoey Association (MAMKA) on a project entitled 'The Use of Cunners, Tautogolabrus adspersus, to Remove Sea Lice from Salmon on a Commercial Scale Salmon Farm'.

4.0 Ongoing Research

MCE supports a variety of research including research related to wild and farmed salmon interaction. In Newfoundland, MCE is currently partnering with Fisheries and Oceans Canada (DFO) research in a project entitled 'Validation of spatial benthic footprint predictions with monitoring of organic deposition'. This research is occurring the Bays West region.
Another project that Mowi partnered with DFO on was entitled "Distribution and recapture success of farmed Atlantic salmon after experimental release from sea pens, and migration, residency time and survival of wild Atlantic salmon smolt from an adjacent river". MCE's role was to provide access to sites and farmed fish for the study and enable acoustic devices placed on mooring lines at various sites in Fortune Bay.

In our New Brunswick operations, MCE has participated in Fisheries and Oceans Canada (DFO) research related to tracking of wild smolt migrations into sea water "Migration of juvenile salmon and their interactions with aquaculture in Passamaquoddy Bay". The company role was to provide access to and assistance with the placement and retrieval of acoustic sensors to track smolt movement.

While not directly related to wild and farmed interactions, a project with Memorial University is developing important environmental management tools. MCE has signed an agreement with Memorial University to develop effective eDNA tools for environmental monitoring at salmon aquaculture sites in Atlantic Canada. The project has completed the initial "proof of concept" and is exploring opportunities to continue to validate procedures through future projects. MCE is also collaborating with DFO on the Aquaculture Monitoring and Modelling Program (AMMP) to assess aquaculture impacts in the far-field environment. The work was carried out in Fortune Bay, and MCE has helped via access to sites and assistance with deployment and retrieval of current meters.

5.0 Traceability of Farmed Salmon

MCE is in a transitionary period retiring existing nylon nets and will utilize HDPE netting that has a stainless-steel core in the NL farming operations along with internal company SOPs to reduce escapes. MCE is aware of a variety of technologies that could be used to identify escaped farmed fish. These include the use of single nucleotide polymorphisms, frequently called SNPs, microsatellite DNA (older, less reliable technology) and the use of fish scale signatures combined with genetic markers.

Some current constraints to managing escapes include the lack of an escape monitoring program in the province and the lack of effective recapture mechanisms.

5.1 Escape Monitoring Program

MCE utilizes SNP markers in the pedigreed broodstock program. From an escapes monitoring perspective, the ability to identify our fish has little utility in the absence of a comprehensive and well formulated escape monitoring program. Such a program would need to include methodologies that cover chain of custody of suspect escapes and SOPs for sample analysis. MCE is collaborating with government and industry partners to develop an escapes monitoring program for Newfoundland, participating in the DFO Traceability and Monitoring Committee.

6.0 Escape Prevention

Mowi ASA, parent company of Mowi Canada East Inc. (MCE), has a global goal of zero escape incidents. MCE has incorporated this goal into the site and system design, gear used and operational practices.

MCE draws upon Mowi experience to prevent escapes as MCE has years of research into equipment as well as training and operational procedures developed from the experience of salmon farming in difficult areas.

As stated in Baskett et al, the greatest effect on reducing the influence of farmed salmon on wild stocks is to reduce the interaction between wild and farmed fish. The Code of Containment for Culture of Salmonids in Newfoundland and Labrador addresses this by indicating the first level of management is to minimize escapes of farmed salmon through the application of equipment standards, handling practises, documentation and reporting, inspections and mitigating measures.

MCE fully supports the management strategies in the Code of Containment for the Culture of Salmonids in Newfoundland and Labrador. These strategies highlight effective containment of farmed fish as a fundamental aspect of good management practices to reduce the potential for negative effects on wild salmon. MCE has included all equipment standards, handling practices, reporting and audit requirements, inspections and mitigations in the Code in company policies and management practices including the following.

- Infrastructure – equipment, nets, moorings - designed and built to the NS9415 or the Scottish Technical standard for longevity and to withstand adverse conditions. (see previous section)
- Extra strength HDPE generational nets used reduce net changes and for predator control. (see next section)
- All nets will be labelled, inspected monthly and meet Net Testing Breaking Strength requirements as outlined in the Code.
- All fish handling practices will meet or exceed those as outlined in the Code (see Appendix 2 Catch Net Use and Deployment).
- Ice barriers installed as needed (see next section)
- Escape prevention management and recapture and reporting strategies in place, see Appendix 1 Escape Response Plan and Appendix 2 Diver/ROV Net Check SOP in this document.
- Reporting scheduled for net inventory, inspection and testing, equipment inspections, biomass, mortalities etc. part of the farm activities.
- Scheduled inspections and maintenance of all net, pen and surface mooring equipment (see Appendix 2 Diver/ROV Net Check SOP).

MCE will prevent escapes through a multi-step approach that addresses all aspects of escape potential including the application of the following.

1. Appropriate Siting
2. Rearing System Engineered to Standard and Specialized Equipment for the Site

3. Specific Operational Procedures and Application of the NL Code of Containment
4. Required and Ongoing Staff Training

6.1 Appropriate Siting

MCE performed a detailed analysis of sites prior to licensing to determine if they are suitable for salmon aquaculture.

6.2 Engineering Standards and Specialized Equipment

Norwegian Standard 9415 or Scottish Standard

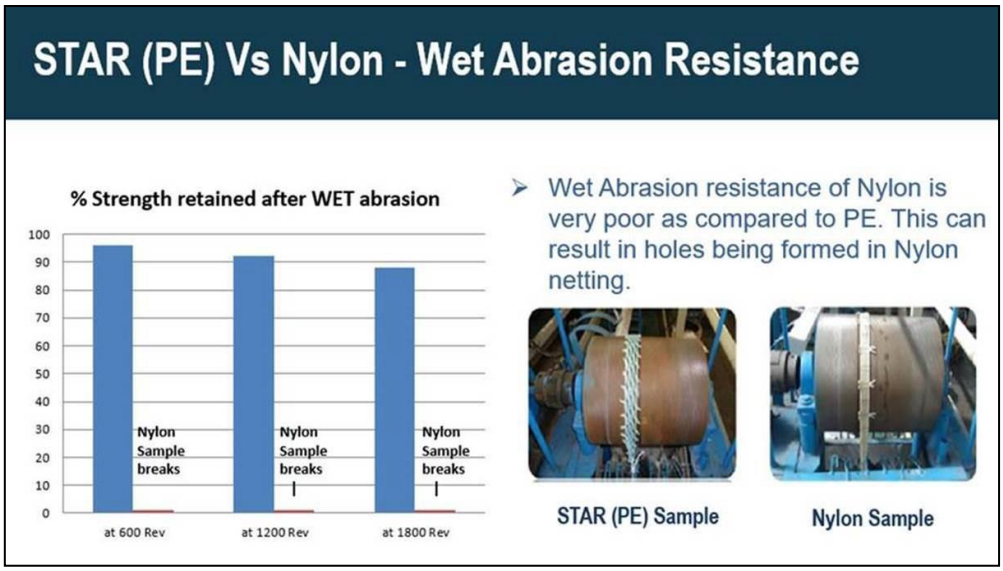
MCE designs systems to the rigorous Norwegian Standard (NS) 9415 or the Scottish Standard that were developed to address areas of technology failure in the past that had resulted in escapes.

HDPE Nets

All nets on MCE sea farms will be changed over to HDPE material as nylon nets are retired due to its high abrasion resistance and increased strength. At some operations steel-core material provides additional protection.. This material is “bite-proof” to predators, eliminating predator damage and an avenue for escapes and resisting environmental damage. Standard net mesh size of 38 mm has been tested in Norway with 60g fish, resulting in no escapes from technical failure even in the most adverse conditions.

HDPE is an advancement over the use of nylon netting. It has tremendous abrasion resistance (Figure 2) and more than double the resistance to damage and wear (Figure 3) as comparted to nylon. Abrasion resistance is critically important. As nets wear and are abraded on the pen structures and/or predator interactions, they became more susceptible to rips and tears under adverse conditions. HDPE has very high abrasion resistance.

Figure 3 Abrasion resistance, HDPE vs. Nylon



Source: Barware, GARWARE-WALL ROPES LTD, Pune, Maharashtra, www.garwareropes.com

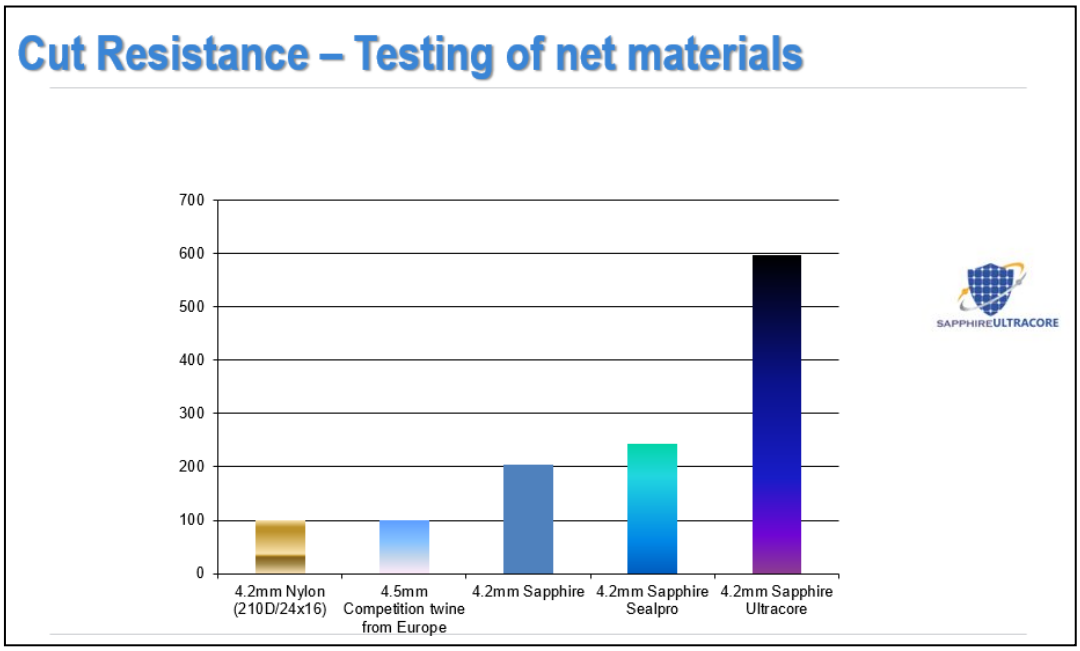


Figure 4 Cut Resistance, HDPE vs. NylonSource: Garware, GARWARE-WALL ROPES LTD, Pune, Maharashtra, www.garwareropes.com

HDPE nets retain both strength and abrasion resistance for years after deployment. Field tests by Garware indicate that after 6 years of deployment, including regular *in situ* net cleaning, only a 10% reduction in strength. This is supported by direct experience in Mowi Canada West operations where HDPE nets have been tested and tracked since installation. In contrast, nylon nets are retired after 4-6 years of use due to reduced strength and abrasion resistance.

6.3 Net Handling

MCE seeks to minimize net handling to reduce abrasion and weakening the nets which may increase opportunities for escapes to occur. In addition, MCE through global research and development teams at Mowi continue to look to innovations for better anti-fouling strategies that minimize the need for net cleaning and for better sea lice treatment strategies that minimise net handling.

7.0 Operational Procedures

In a global survey, MCE identified three key areas to address equipment failure and specifically to reduce escapes: nets and equipment inspected regularly, correct use of equipment and review operational procedures and perform risk assessment before operations that have a potential for escape incidents. The following practices have been developed to address these concerns.

- Checklists will be prepared for operational procedures that include escape-related risks.
- Checklists will be signed off prior to execution of operational procedures that involve risk of escapes and will be revised and updated, if needed, at least once per year.
- All mooring buoys and other markers will be installed as per Transport Canada requirements and maintained in good condition.
- Installation of moorings, pens and net combinations will be guaranteed and used according to minimum standards recommended by the supplier.
- User manuals for the pen system and moorings will be followed.

7.1 Net Use and Management

- All sites will have “Generation nets” that will remain in place during the entire grow out eliminating the need to change nets and create a potential situation for fish escapes. This will be phased in as nylon nets are retired and the HDPE net inventory grows.
- Nets will be uniquely identified to ensure traceability.
- Net treatment log will detail production date, repairs, strength tests etc.
- Security/catch/secondary nets will be used when sampling or handling fish to eliminate potential for escapes during grading or harvesting.
- When pumping fish, a drop net and double walled pipes will be used to mitigate loss of fish. HDPE nets will be cleaned regularly with ROV *in situ* cleaning system that eliminates the need to remove the nets for cleaning, therefore eliminating an activity that has the potential for escapes. Existing nylon nets are removed for cleaning at a land based facility prior to heavy fouling.
- Towing pens containing fish is not part of the production plan, however, should this activity become necessary, an SOP will be submitted to FFA for approval prior to any activity taking place.

MCE has adopted the Mowi advanced containment procedures. These internal company procedures include the following.

- Escape Prevention and Response Plan

- Fish Containment Plan
- Escape Response Procedure
- Net Inspection Procedure
- Net Inspection (Diver and non-Diver)
- Predator Avoidance Plan
- Pen and System Daily Inspection (Daily and Post Storm)
- Risk Assessments - performed when running large operations or using new equipment

7.2 NL Code of Containment

MCE recognizes and supports the provincial Code of Containment and will include all requirements in operating procedures and training programs included in the Code.

All Mowi farm staff realize their responsibility is to reduce the potential for escapes. Mowi provides detailed escape prevention SOPs and training for all farm workers.

MCE practises align with the Code of Containment and describe specific actions to be undertaken on a daily, weekly monthly and annual basis to prevent escapes, focussing on gear and equipment design and engineering standard, inspections of gear and equipment, checklists and sign off prior to operations that could have potential for escape, actions to take to assess near escapes as well as follow up and response to potential escape incidents.

Recapture of escaped fish and reporting will be conducted as directed in the Code of Containment – Measures for the Recapture of Escaped Fish of the Code.

For more information refer to the Newfoundland and Labrador Department of Fisheries and Aquaculture DOC-2022-04405. Code of Containment for Culture of Salmonids in Newfoundland and Labrador.

8.0 Required and Ongoing Training

All staff are required to read, understand, implement and report upon all operational procedures described above. Training is provided prior to starting on a farm site and is renewed at least annually, with risk assessment performed before procedures with risk of escapes (i.e. net change, fish movement). In addition to these procedures, all employees must participate in annual Escape Prevention training and testing pertaining to escape prevention. The training program is aimed at everyone involved in farming operations where there is a risk for fish escaping and it highlights the importance of preventing human errors by having well-established routines, simple checklists to be followed and signed-off prior to operations, and effective communication.

The training program is also an important platform for sharing new knowledge, internal experiences and lessons learned after escape incidents. This training aims to reaffirm our internal standard for seawater management, including the sharing of experiences and lessons to be learned after escapes, and the highlighting of behavioural changes that can make a difference. We focused on simplifying procedures and developing checklists that our site managers can use to help prevent human error leading to escapes. Conducting the training is an essential part of the strategy to achieve our goal of zero escapes.

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Appendix Wild and Farmed Interactions: Saltwater Escape Response Plan

Saltwater Escape Response Plan

Contents

1.0 Introduction

This document describes the escape response plan for all Mowi Canada East Inc. (MCE) net pen operations on the south coast of Newfoundland. These plans conform to the requirements of the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (FFA).

MCE staff shall monitor, evaluate and maintain nets and equipment to eliminate the potential for escapes. Staff will monitor and respond to changes in fish behavior that may indicate an escape. Staff shall be trained to respond with appropriate actions if an escape is suspected or if one occurs. Refer to MCE applicable SOPs for additional information.

2.0 Escape Response – Site Procedures

This section outlines the steps and procedures in brief that the site staff will go through when a suspected or actual escape occurs. Refer to the Fish Escape Response Flowchart at the end of this Appendix for more information.

2.1 Suspected Escape

A suspected escape is defined as one in which fish have not been confirmed (either visually or through actual counts) to have left the containment net. This occurs when a hole or other potential source of escape is identified by the site staff. Suspected escape must be treated as an actual escape until the supervisor is able to determine that no fish did or were able to leave the confine of a pen.

2.2 Actual Escape

A confirmed escape is defined as one in which fish have been confirmed to have left the containment net. This occurs when staff have visually observed farmed fish in the wider marine environment following a breech of containment. This can also be defined as farmed fish that are confirmed to have been released into the wider marine environment during a fish transfer from vessel to sea pen or sea pen to vessel.

Once site staff have identified either a suspected escape, the primary task is to secure the site to prevent further escapes. The following steps will be followed during all incidents:

1. Investigate the source:
    a. Inspect net pens until locating the damaged pen;
    b. Use camera to look for holes; and
    c. Contact dive team to assist with further investigation.

2. Once the cause has been determined site staff will proceed to repair/contain the incident. Below are appropriate responses to identified causes:
    a. Holes:
        i. Deploy escape response kits. Cover with net panel. Raise net so hole is at surface (if feasible); and
        ii. Repair if possible--get divers to assist with repair if needed (keep net panel over hole until divers arrive).
    b. Equipment failure: Stop flow of fish; contain fish; and rectify the cause of the failure.

3. Once the site is secured and fish containment has been re-established MCE will complete necessary internal reporting and proceed with Section 3.0 – Notifications.

3.0 Procedure for Notifications

3.1 Mowi Canada East Initial Incident Response

In the event of an escape, MCE will initiate its Incident and Crisis Management System (ICMS) as per FFA Aquaculture Policy (AP) 2 and 17, immediately completing all necessary required reporting to regulators and internal stakeholders and initiating escape response activities.

3.2 Fisheries, Forestry and Agriculture

FFA defines an escape as: Escapement of fish from sea-cage aquaculture into the wider marine environment.

PER FFA Aquaculture Policy (AP) 17, MCE will make the following notifications upon confirmation of an escape.

Verbal Notification: MCE shall immediately (following actions taken to ensure the safety of farmed fish, marine installation or structure or vessel) notify the following:

Director of Aquaculture Development (DAD) of the Department of Fisheries, Forestry and Agriculture:

Phone: Office: (709) 292-4011

Cell: Redacted

Written Notification: MCE shall provide written notification to the DAD, the Department of Fisheries, Forestry and Agriculture within 24 hours of becoming aware of the escape. The written notification will include:

a. the site(s) of the escape;
b. the species escaped;
c. the cause of the escape;
d. the estimated number of fish escaped;
e. the recapture plan for escaped animals; and
f. any other information deemed by the department to be reportable.

Written notification will be sent to the DAD via:

Email: gail.hoskins@gov.nl.ca

3.3 Fisheries and Oceans Canada

Verbal and Written Notification: MCE will immediately upon discovery of an escape or when it is reasonable to suspect that any escape incident has occurred, report verbally to Department of Fisheries and Oceans (DFO) Aquaculture Management:

Regional Manager of Aquaculture Management of Fisheries and Oceans Canada:
Phone: Cell: Redacted

Following verbal notification, MCE will provide written notification to DFO within 24 hours of the escape incident via:

Email: DFO.NLITC-CITTNL.MPO@dfo-mpo.gc.ca

The same information provided to the province (above) will be provided to DFO. Notification to DFO will also include a request to recapture under DFO experimental recapture licenses NL-7321-23 (MHAC) and NL-7323-23.

Written Report: MCE file a written report (Annex 1 of the Salmonid Code of Containment) within 72 hours of the escape incident to DFO via:

Email: DFO.NLITC-CITTNL.MPO@dfo-mpo.gc.ca

3.4 Public Reporting

After completing necessary verbal and written notifications and subsequent approval of a response plan by FFA and other applicable agencies, MCE will publicly report the escape and planned response. Public reporting will be via public communication acceptable to FFA, in addition to the MCE or the industry association websites. Public reporting will occur within 24 hours of confirming the escape incident.

For suspect escapes, the information that will be made publicly available is as follows:

a) the site(s) of the escape;
b) species escapes; and
c) any other information deemed by the department to be reportable.

For confirmed escapes, the information that will be made publicly available is as follows:

a) the site(s) of the escape;
b) the species escaped;
c) the strain escaped;
d) the cause of the escape;
e) the estimated number of fish escaped;
f) the recapture plan for escaped animals; and
g) any other information deemed by the department to be reportable.

4.0 Recapture Procedures

4.1 Escape Protocol

MCE will only initiate recapture upon approval of DFO and in accordance with the DFO license and recapture protocols. MCE will follow the collection and sampling protocol outlined by Fisheries and Oceans Canada for Escaped Aquaculture Salmon (Appendix B of this plan) and all conditions of the Experimental (Recapture) License (Appendix C of this plan). In accordance with the aquaculture site license condition 19, MCE will provide FFA with a copy of the recapture license prior to initiating recapture.

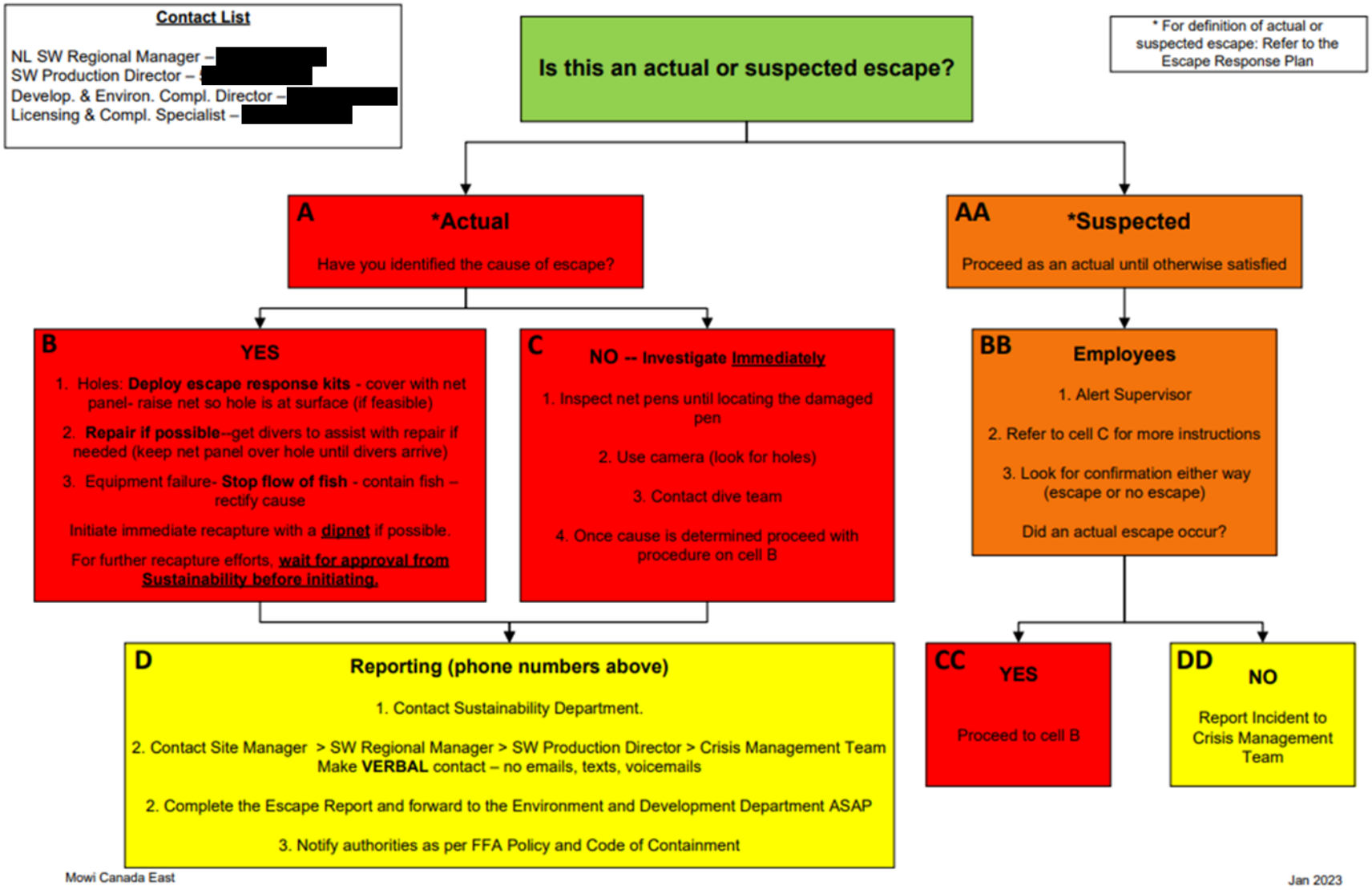
4.2 Recapture Reporting

MCE will complete and submit the Escapement/Incident Report Appendix 4 of the NL Salmonid Code of Containment once the farm is secured and recapture efforts have been completed.

MCE will follow the direction of both DFO and FFA in regard to any follow-up measures that may result from the review of the Escapement/Incident Report which may include the resubmission of preventative measures for revaluation.

Appendix Escape Response: Fish Escape Response Flowchart

FISH ESCAPE RESPONSE FLOWCHART – NEWFOUNDLAND MARINE SITES



Appendix Escape Response: DFO Experimental Recapture License 2025

Fisheries and Oceans Pêches et Océans

2025

EXPERIMENTAL (RECAPTURE) LICENCE

LICENCE # NL-8657-24

Marine Harvest Atlantic Canada
2 Salar Court
St. George, NB
E5C 3N1

Contact: [redacted]

Pursuant to Section 52 and Section 56 of the *Fishery (General) Regulations,* permission is hereby granted to **Marine Harvest Atlantic Canada**, or designates, to fish, collect biological samples, and transport farm-origin Atlantic salmon and wild Atlantic salmon mortalities subject to the following conditions:

1. This licence is valid from **January 1, 2025 to December 31, 2025.**

2. **Purpose:** To remove and/or biologically sample suspected and known farm-origin Atlantic salmon in fish-bearing waters and from aquaculture sites to identify the origin of escaped farm-origin Atlantic salmon and to determine the biological characteristics of escaped or wild Atlantic salmon in order to evaluate and mitigate potential impacts on wild Atlantic salmon populations.

3. **Locations:** Coastal waters on the South Coast of Newfoundland in Salmon Fishing Area 11.

4. **Fishing Gear:** Gill nets. All gear must be marked with licence number **NL-8657-25.**

5. **Species:** Farm-origin Atlantic salmon and wild Atlantic salmon

6. Fishing under authority of this licence will not commence prior to discussion with DFO Aquaculture Management. However, for incidents that occur where there is no breach in containment and farmed salmon are observed outside of the cage, employee(s) are authorized to use a handheld tool such as, a dip net, for immediate recapture efforts without first engaging DFO. If this event does happen, it is still subject to the notification protocols as defined in the Code of Containment for Salmonids in NL.

7. Each day will consist of six one-hour tended sets at locations determined in consultation with DFO.

8. Gillnetting efforts will be conducted daily unless otherwise directed by DFO.

9. All gillnet sets are to cease if recovery efforts result in <u>two</u> wild Atlantic salmon mortalities.

10. All living wild fish are to be immediately released back into the water in a manner that causes the least amount of harm.

Canada

11. Fish caught under the authority of this licence cannot be sold and must be destroyed following completion of experimental (recapture) efforts unless determined to be wild Atlantic salmon. All wild Atlantic salmon mortalities must be held for collection by DFO.

12. Data and biological samples (scale sample and fin clips) to be collected as per attached sampling instructions and held for collection by DFO.

13. All fishing activities must be overseen by DFO personnel. Records of all fishing activity must be recorded and submitted daily to Chris Hendry (Christopher.Hendry@dfo-mpo.gc.ca). A "nil report" with explanation of why there was no fishing activity must be submitted for days when no fishing activities occur. **Recapture efforts will continue until DFO advises that recapture efforts will cease.**

14. Prior to activities taking place, the Conservation and Protection (C&P) Supervisor, C&P must be notified verbally of your activities (**Marystown, 279-7850**).

15. This licence must be carried at all times and must be produced for inspection upon request of a Fishery Officer or Fishery Guardian.

16. **Marine Mammal Interactions**:

    You must provide information regarding all lethal and non-lethal marine mammal interactions during fishing trips. For the purposes of these conditions lethal and non-lethal marine mammal interactions is defined as interactions that include bycatch or collision of all marine mammals and all sightings of marine mammals entangled in fishing gear.

    You must complete the DFO Marine Mammal Interaction Form and it must be submitted as per the instructions provided on the form. The form is located online at https://www.dfo-mpo.gc.ca/species-especes/mammals-mammiferes/report-rapport/page01-eng.html

    This form can be completed and submitted online or if you prefer, you can fax or email the printed form. This form must be completed and submitted for all lethal and non-lethal marine mammal interactions.

    If there is a whale (alive or dead) caught in fishing gear during recovery efforts, call 1-888-895-3003 immediately.

    You must report all sightings of North Atlantic Right Whales by calling 1-888-895-3003 as soon as possible or at least 24 hours after sighting.

    It is prohibited to disturb a marine mammal. You are not permitted to move or entice or cause a marine mammal to move from the immediate vicinity in which it is found. You are not permitted to trap it or its group between a vessel and the shore or between a vessel and one or more other vessels. For additional prohibitions, please refer to the Marine Mammal Regulations.

17. **Species at Risk**

    In accordance with the recovery strategy for the Northern Wolffish (*Anarhichas denticulatus*) and Spotted Wolffish (*Anarhichas minor*), the licence holder is permitted to carry out experimental fishing activities authorized under the *Fisheries Act* that may incidentally kill,

harm, harass, capture or take the Northern Wolffish and/or Spotted Wolffish as per subsection 83(4) of the *Species at Risk Act* (SARA) subject to the following conditions:

Licence holders are required to return Northern Wolffish and Spotted Wolffish to the place from which it was taken, and where it is alive, in a manner that causes it the least harm.

Licence holders are required to report in the attached SARA Questionnaire any interaction with Northern Wolffish or Spotted Wolffish.

18. Aquatic Invasive Species

Best practices must be undertaken to prevent the introduction and spread of Aquatic Invasive Species (AIS), including:

- routine vessel maintenance (i.e. cleaning the hull and using anti-fouling paint to prevent bio-fouling)
- cleaning, draining and drying gear and ropes to prevent movement between Bay Management Areas
- avoiding transportation of large amounts of water from one location to another
- and recognizing and reporting any AIS to DFO for early detection at DFO.NLAIS-EAETNL.MPO@dfo-mpo.gc.ca

More information and maps of aquatic invasive species in Newfoundland and Labrador can be found at Identify an Aquatic Invasive Species.

Failure to comply the conditions of this licence will result in the cancellation of the licence.

Canada

11. Fish caught under the authority of this licence cannot be sold and must be destroyed following completion of experimental (recapture) efforts unless determined to be wild Atlantic salmon. All wild Atlantic salmon mortalities must be held for collection by DFO.

12. Data and biological samples (scale sample and fin clips) to be collected as per attached sampling instructions and held for collection by DFO.

13. All fishing activities must be overseen by DFO personnel. Records of all fishing activity must be recorded and submitted daily to Chris Hendry (Christopher.Hendry@dfo-mpo.gc.ca). A "nil report" with explanation of why there was no fishing activity must be submitted for days when no fishing activities occur. **Recapture efforts will continue until DFO advises that recapture efforts will cease.**

14. Prior to activities taking place, the Conservation and Protection (C&P) Supervisor, C&P must be notified verbally of your activities (**Marystown, 279-7850**).

15. This licence must be carried at all times and must be produced for inspection upon request of a Fishery Officer or Fishery Guardian.

16. **Marine Mammal Interactions**:

    You must provide information regarding all lethal and non-lethal marine mammal interactions during fishing trips. For the purposes of these conditions lethal and non-lethal marine mammal interactions is defined as interactions that include bycatch or collision of all marine mammals and all sightings of marine mammals entangled in fishing gear.

    You must complete the DFO Marine Mammal Interaction Form and it must be submitted as per the instructions provided on the form. The form is located online at https://www.dfo-mpo.gc.ca/species-especes/mammals-mammiferes/report-rapport/page01-eng.html

    This form can be completed and submitted online or if you prefer, you can fax or email the printed form. This form must be completed and submitted for all lethal and non-lethal marine mammal interactions.

    If there is a whale (alive or dead) caught in fishing gear during recovery efforts, call 1-888-895-3003 immediately.

    You must report all sightings of North Atlantic Right Whales by calling 1-888-895-3003 as soon as possible or at least 24 hours after sighting.

    It is prohibited to disturb a marine mammal. You are not permitted to move or entice or cause a marine mammal to move from the immediate vicinity in which it is found. You are not permitted to trap it or its group between a vessel and the shore or between a vessel and one or more other vessels. For additional prohibitions, please refer to the Marine Mammal Regulations.

17. **Species at Risk**

    In accordance with the recovery strategy for the Northern Wolffish (*Anarhichas denticulatus*) and Spotted Wolffish (*Anarhichas minor*), the licence holder is permitted to carry out experimental fishing activities authorized under the *Fisheries Act* that may incidentally kill,

Fisheries and Oceans Pêches et Océans

2025

EXPERIMENTAL (RECAPTURE) LICENCE

LICENCE # NL-8656-25

Northern Harvest Sea Farms NL Ltd.
2 Salar Court
St. George, NB
E5C 3N1

Contact: [redacted]

Pursuant to Section 52 and Section 56 of the *Fishery (General) Regulations,* permission is hereby granted to **Northern Harvest Sea Farms NL Ltd.**, or designates, to fish, collect biological samples, and transport farm-origin Atlantic salmon and wild Atlantic salmon mortalities subject to the following conditions:

1. This licence is valid from **January 1, 2025 to December 31, 2025.**
2. **Purpose:** To remove and/or biologically sample suspected and known farm-origin Atlantic salmon in fish-bearing waters and from aquaculture sites to identify the origin of escaped farm-origin Atlantic salmon and to determine the biological characteristics of escaped or wild Atlantic salmon in order to evaluate and mitigate potential impacts on wild Atlantic salmon populations.
3. **Locations:** Coastal waters on the South Coast of Newfoundland in Salmon Fishing Area 11.
4. **Fishing Gear:** Gill nets. All gear must be marked with licence number **NL-8656-25.**
5. **Species:** Farm-origin Atlantic salmon and wild Atlantic salmon
6. Fishing under authority of this licence will not commence prior to discussion with DFO Aquaculture Management. However, for incidents that occur where there is no breach in containment and farmed salmon are observed outside of the cage, employee(s) are authorized to use a handheld tool such as, a dip net, for immediate recapture efforts without first engaging DFO. If this event does happen, it is still subject to the notification protocols as defined in the Code of Containment for Salmonids in NL.
7. Each day will consist of six one-hour tended sets at locations determined in consultation with DFO.
8. Gillnetting efforts will be conducted daily unless otherwise directed by DFO.
9. All gillnet sets are to cease if recovery efforts result in <u>two</u> wild Atlantic salmon mortalities.
10. All living wild fish are to be immediately released back into the water in a manner that causes the least amount of harm.

Canada

harm, harass, capture or take the Northern Wolffish and/or Spotted Wolffish as per subsection 83(4) of the *Species at Risk Act* (SARA) subject to the following conditions:

Licence holders are required to return Northern Wolffish and Spotted Wolffish to the place from which it was taken, and where it is alive, in a manner that causes it the least harm.

Licence holders are required to report in the attached SARA Questionnaire any interaction with Northern Wolffish or Spotted Wolffish.

18. Aquatic Invasive Species

Best practices must be undertaken to prevent the introduction and spread of Aquatic Invasive Species (AIS), including:

- routine vessel maintenance (i.e. cleaning the hull and using anti-fouling paint to prevent bio-fouling)
- cleaning, draining and drying gear and ropes to prevent movement between Bay Management Areas
- avoiding transportation of large amounts of water from one location to another
- and recognizing and reporting any AIS to DFO for early detection at DFO.NLAIS-EAETNL.MPO@dfo-mpo.gc.ca

More information and maps of aquatic invasive species in Newfoundland and Labrador can be found at Identify an Aquatic Invasive Species.

Failure to comply the conditions of this licence will result in the cancellation of the licence.

Canada

Escaped Aquaculture Salmon Sampling Protocol

Collection Protocol

Gillnetting

Set nets proximal to the cage where the escape event has occurred. Allow nets (probably 4 inch gill nets) to soak a maximum of 1 hour per set. Actively tend nets throughout the duration. Sampling should consist of of six one-hour tended sets. If during the set it is obvious a fish has become entangled, the net is to be pulled and the fish processed as per below.

Farmed Salmon Sampling Protocol

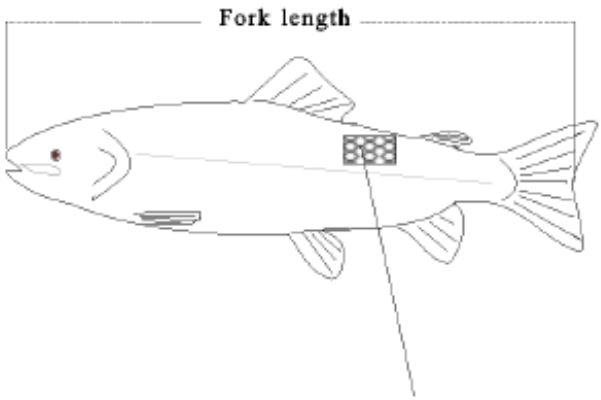
1. All putative farmed salmon caught will be sampled for biological characteristics (Whole Weight, Gutted Weight, Fork Length, Sex, and Maturity), scales (see below), and a genetic sample (fin clip – see details below).
2. All farmed fish should be photographed. Prior to taking a photo of the fish, take a photo of the sample envelope with the specimen number on it (or at a minimum a photo of something other than a fish to be able to easily separate photos later). Photos should include:
    a. Photo of left side of whole specimen on measuring board
    b. Close up of tail on measuring board showing fork length
    c. Photos of fin wear
    d. Photos of eye bulges or other abnormalities
    e. Photo of gut still in body cavity
    f. Photo of gonad
    g. Photo of dissected stomach and contents
3. Record site ID and description, waypoint (coordinate information), start and end time, and environmental data (cloud cover, weather conditions, wind direction, water temperature, and air temperature).
4. All wild fish should be released as soon as possible.
5. All aquaculture fish should be lethally sampled and disposal of according to DFO regulations.
6. Any wild salmon mortalities should be properly tagged and returned to NAFC for proper disposal according to DFO regulations.

Scale Samples

Scales are collected mainly for ageing purposes, but can also be used to confirm the genetic identification of salmon which are suspected to be of farmed origin.

Place the salmon on the measuring board with its left side up. Collect scale samples from an area 3-6 scale rows above the lateral line, just back of the dorsal fin preferably on the left hand side of the fish. Using a clean knife remove the mucus from the sample area by rubbing the knife in a head-to-tail direction. Clean the mucus from the knife and remove scales from the fish by scraping the knife in a tail-to-head direction. Try to remove approximately 20-25 scales and place them on paper (cut into small

squares) before storing the sample in the envelope provided. Fold the paper so that it covers the scales on both sides, but be careful to ensure the scales are not in the fold of the paper. Ensure scale envelope is labelled with all pertinent information, including FL, WW, Sex, fin clips, date, location, how collected, name of collector, etc.). Note: It is important to clean knife thoroughly after taking scale sample, so the next sample is not mixed with scales from several fish (i.e., 'cross-contamination').



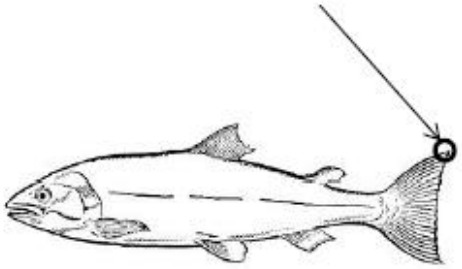
Scale sample area

Fin Clips

Fin clips are used mainly for DNA identification and can be used to confirm the genetic identification of salmon which are suspected to be of farmed origin. Fin clips should be sampled from salmon which are either alive or as shortly after death as possible. ***Extensive time delays or freezing of samples results in DNA breakdown.***

Collect fin clips (1 cm x 1 cm) from the caudal/tail fin (Fig. 3), and quickly place in a vial containing 95% ethanol. NOTE: vials contain 95% ethanol which is flammable and poisonous, read attached MSDS sheets before proceeding (see Appendix A). Tissue in vial should not exceed 25% of volume of preservative (Fig. 4) and each vial should be labeled with an identification number (ID). Since the salmon may also be sampled for scales, use the same specimen/ID on the vial as on the scale envelope for that salmon. It is important to properly label the vial with the date, location, and ID on the log sheet provided. If samples are being stored, ethanol will generally need to be replaced after 2 weeks of storage. Vials should be stored in a cool, dark place, if possible.

Figure: Example of tissue size requested in 2 ml vial of ethanol



Caudal/Tail Fin

Contact

For further information or questions, please contact **Ian Bradbury 709 772-3869 (office) or 902 233-5612 (cell).**

Commercial Alcohols
A Trade Name of GreenField Specialty Alcohols Inc.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME:	ETHYL ALCOHOL (ANHYDROUS)	Page 1 of 6
MSDS NO:	1009	EFFECTIVE DATE: February 1, 2014

MANUFACTURED BY: Commercial Alcohols

Bruce Energy Centre
4th Concession
Tiverton, Ontario
N0G 2T0

275 Bloomfield Road
Chatham,
Ontario
N7M 5J5

2 Chelsea Lane
Brampton, Ontario
L6T 3Y4

EMERGENCY PHONE NUMBER: CANUTEC (613) 996-6666

TRANSPORTATION

PRIMARY CLASS:	3	CLASS NAME:	FLAMMABLE LIQUID	UN#:	1170
SUBSIDIARY CLASS:	NONE				
SHIPPING NAME:	ETHANOL				

I. EMERGENCY AND FIRST AID PROCEDURE

INGESTION	• Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing. • DO NOT INDUCE VOMITING. • Have victim drink about 250ml (8fl. oz.) of water to dilute material in stomach. • If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. • Seek medical assistance.
SKIN	• Flush contaminated area with water for at least 20 minutes. • Remove contaminated clothing under running water. • Completely decontaminate clothing before re-use, or discard. • If irritation occurs seek medical attention.
INHALATION	• Remove victim to fresh air. • Artificial respiration should be given if breathing has stopped and cardiopulmonary resuscitation if heart has stopped. • Oxygen may be given if necessary. • Seek medical attention immediately.
EYES	• Immediately flush eyes with water for at least 20 minutes, holding the eyelids open. • Seek medical attention immediately.
NOTES TO PHYSICIAN	• Symptoms of ethanol intoxication vary with the alcohol level of the blood. Mild alcohol intoxication occurs at blood levels between 0.05-0.15% and approximately 25% of individuals will show signs of intoxication at these levels. Above 0.15% the person is definitely under the influence of ethanol and 50-95% of individuals at this level are clinically intoxicated. Severe poisoning occurs when the blood ethanol level is 0.3-0.5%. Above 0.5% the individual will be comatose and death can occur. • The unabsorbed ethanol should be removed by gastric lavage after intubating the patient to prevent aspiration. • Avoid the use of depressant drugs or the excessive administration of fluids.

II. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °C

- 13 (Tag closed cup, ASTM D-56)

OTHER IMPORTANT DATA

COMPONENT	% V/V			VAPOUR PRESSURE	VAPOUR DENSITY	AUTOIGNITION
		LOWER	UPPER	KPA AT 20°C	(AIR = 1)	POINT, °C
(1) Ethyl Alcohol	100	3.3	19.0	5.87	1.6	422

EXTINGUISHING MEDIA

- Apply alcohol-type or all-purpose-type foams by manufacturers' recommended techniques for large fires.
- Use carbon dioxide or dry chemical media for small fires.
- Water is generally unsuitable and may help to spread the fire.

SPECIAL FIREFIGHTING PROCEDURES

- Use water spray to cool fire-exposed containers and structures.
- Use water spray to disperse vapours; reignition is possible.
- Use self-contained breathing apparatus and protective clothing.

UNUSUAL FIRE AND EXPLOSION HAZARDS

- Vapours form from this product and may travel or be moved by air currents and ignited by pilot lights, other flames, sparks, heaters, electrical equipment, static discharges or other ignition sources at locations distant from handling point.

III. IDENTIFICATION

CHEMICAL NAME	ETHYL ALCOHOL (ANHYDROUS)	**CHEMICAL FAMILY**	ALCOHOLS
FORMULA	(1) $CH_3 - CH_2 - OH$	**MOLECULAR WEIGHT**	(1) 46.07
SYNONYMS	• Ethanol, Absolute Ethanol, Alcohol, Ethyl Alcohol 200 proof, Ethyl Alcohol DPS Anhydrous, Ethyl Alcohol DS Anhydrous.		
USE	• General purpose organic solvent, aerosols, cosmetics, pharmaceuticals, etc.		

IV. PHYSICAL DATA

BOILING POINT, °C at 760mm Hg	78.3
FREEZING POINT, °C	-114.1
DENSITY, kg/L @ 20°C	0.7883
COEFFICIENT OF WATER/OIL DISTRIBUTION	Separates from oil
pH	Not applicable
DISTILLATION RANGE, °C	78.0 - 79.0
MISCIBILITY IN WATER	Complete
% VOLATILES BY VOLUME	100
EVAPORATION RATE (butyl acetate = 1)	1.7

APPEARANCE AND ODOUR

- Colourless liquid with typical lower alcohol odour.
- Odour threshold is in the range of 0.1 to 5100 ppm, according to the Canadian Standards Association publication Z94.4-M1982 (Appendix 1).

V. INGREDIENTS AND TOXICOLOGICAL DATA

INGREDIENT	% V/V	CAS NO.	TLV, ppm	LC50, ppm/4h, RAT, INHAL.	LD50, mg/kg, RAT, ORAL	LD50, mg/kg, RABBIT, SKIN
(1) Ethyl Alcohol	100.0	64-17-5	1000	31,623	7,060	20,000

REFERENCES: ACGIH (1988-1989), RTECS (1983).

VI. WHMIS CLASSIFICATION AND SYNERGISTIC MATERIALS

WHMIS CLASSIFICATION

- Flammable liquid, eye irritant.

SYNERGISTIC MATERIALS

- Carbon tetrachloride, chloroform, bromotrichloromethane, dimethylnitrosamine,

VII. HEALTH HAZARD DATA

INGESTION	• May cause dizziness, faintness, drowsiness, decreased awareness and responsiveness, euphoria, abdominal discomfort, nausea, vomiting, staggering gait, lack of coordination and coma.
SKIN ABSORPTION	• No adverse effects with normal skin. However, potentially harmful amounts of material may be absorbed across markedly abraded skin when contact is sustained, particularly in children.
INHALATION	• High vapour concentrations may cause a burning sensation in the throat and nose, stinging and watering in the eyes. At concentrations which cause irritation, dizziness, faintness, drowsiness, nausea and vomiting may occur.
SKIN CONTACT	• No evidence of adverse effects from available information.
EYE CONTACT	• Severe eye irritant. • Vapours can irritate eyes. • Eye damage from contact with liquid is reversible and proper treatment will result in healing within a few days. • Damage is usually mild to moderate conjunctivitis, seen mainly as redness of the conjunctiva.
EFFECT OF REPEATED OVEREXPOSURE	• Long term repeated oral exposure to ethanol may result in the development of progressive liver injury with fibrosis.
MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE	• Repeated exposure to ethanol may exacerbate liver injury produced from other causes.
OTHER EFFECTS OF OVEREXPOSURE	• Repeated ingestion of ethanol by pregnant mothers has been shown to adversely affect the central nervous system of the fetus, producing a collection of effects which together constitute the fetal alcohol syndrome. These include mental and physical retardation, disturbances of learning, motor and language deficiencies, behavioral disorders, and small size head.

VIII. REACTIVITY DATA

STABILITY	• Stable
CONDITIONS TO AVOID	• Sources of ignition
INCOMPATIBILITY	• Oxidizing materials
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS	• Burning can produce carbon monoxide and/or carbon dioxide and/or formaldehyde.
HAZARDOUS POLYMERIZATION	• Will not occur
CONDITIONS TO AVOID	• None currently known

IX. SPILL OR LEAK PROCEDURES

SPILL	• Contain spilled material. • Provide adequate ventilation and protective equipment. • Remove sources of heat, sparks or flames. • Spill should be collected in suitable containers or absorbed on a suitable absorbent material for subsequent disposal.
WASTE DISPOSAL	• Waste material should be disposed of in an approved incinerator or in a designated landfill site, in compliance with all federal, provincial and local government regulations.

X. SPECIAL PROTECTION INFORMATION

RESPIRATORY EQUIPMENT	• Up to 1000 ppm, an approved organic vapour cartridge respirator can be used. • For concentrations above 1000 ppm, an air-supplying respirator is recommended. • The user should consult a respirator guide, such as the Canadian Standards Association's guide Z94.4-M1982.
VENTILATION	• The ventilation system should be non-sparking, grounded and separate from other exhaust ventilation systems. • Local ventilation is recommended when handling.
PROTECTIVE GLOVES	• Neoprene, butyl or natural rubber.
EYE PROTECTION	• Chemical resistant monogoggles when handling
OTHER PROTECTIVE EQUIPMENT	• Eye bath, safety shower and other protective equipment as required.

XI. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING	• Keep away from heat, sparks and flames. • Keep container closed when not in use. • Use with adequate ventilation. • Avoid breathing vapours. • Avoid contact with eyes and skin. • Wash exposed skin thoroughly after handling. • Take precautions to prevent static electricity build-up when transferring contents.
OTHER PRECAUTIONS	• Good personal hygiene practices are suggested, such as abstaining from eating, drinking and smoking in the workplace.

XII. MSDS PREPARATION

PREPARED BY:	Alcohol QA, Technical Services, and Regulatory Affairs Department	
PHONE NUMBER:	(905) 790-7500	DATE: February 1, 2014

COMMERCIAL ALCOHOLS URGES EACH CUSTOMER OR RECIPIENT OF THIS MSDS TO STUDY IT CAREFULLY TO BECOME AWARE OF AND UNDERSTAND THE HAZARDS ASSOCIATED WITH THE PRODUCT. THE READER SHOULD CONSIDER CONSULTING REFERENCE WORKS OR INDIVIDUALS WHO ARE EXPERTS IN VENTILATION, TOXICOLOGY OR FIRE PREVENTION, AS NECESSARY OR APPROPRIATE TO USE AND UNDERSTAND THE DATA CONTAINED IN THIS MSDS.

TO PROMOTE SAFE USE AND HANDLING OF THIS PRODUCT, EACH CUSTOMER OR RECIPIENT SHOULD
(1) NOTIFY EMPLOYEES, AGENTS, CONTRACTORS AND OTHERS WHO MAY USE THIS MATERIAL, OF THE INFORMATION IN THIS MSDS AND ANY OTHER INFORMATION REGARDING HAZARDS OR SAFETY,
(2) FURNISH THIS SAME INFORMATION TO EACH CUSTOMER FOR THE PRODUCT, AND
(3) REQUEST CUSTOMERS TO NOTIFY THEIR EMPLOYEES, CUSTOMERS,
AND OTHER USERS OF THE PRODUCT OF THIS INFORMATION.

Appendix Escape Response: SOP's

Catch Net Use and Deployment – Newfoundland Marine Sites

Purpose & Authority

Internal

- To implement standard processes on site when fish handling is to be done
- To ensure that all potential fish escapes are prevented while performing all fish handling

Regulatory Authorities

- N/A

One Mowi

- Escape Prevention and Mitigation

Responsibility

- The manager is responsible for ensuring that this standard is adhered to.
- It is the responsibility of site supervisors/staff to utilize appropriate containment equipment while performing fish handling tasks.
- Any deviations or changes to the standards must be approved by the Production Director.

Description

- All fish handling events, including but not limited to, transfers, sampling, treatments, mortality removal must have a catch net in place.
- All catch nets must be the minimum size to cover the working "area or risk".
- All catch nets will be constructed of a mesh size that will contain the smallest fish within the population.
    - Minimum required size is 20' x 30' purchased from NL Aqua Services
        - Certain activities may require larger catch nets which must be identified during the planning and risk assessment phases of the fish handling activity.
- The vessel must be secured with a minimum of three tie up lines when attaching a catch net to any vessel.
- All catch nets must be secured in a manner that minimizes tripping hazards and other potential hazards.
- Each farm must have at least two catch nets, in good repair, on site.
- After each use, catch nets must be cleaned and disinfected as per the SOP and stored safely in a cleaned containment.

Securing the Net

- All catch nets must be secured with ropes in such a fashion that prevents slipping out of place.
- All catch nets will be secured to ensure there are no low points that allow fish any access outside the area of containment. A minimum of ¼" rope will be used to secure all catch nets.
- "Draping" of catch nets without being secured by rope is not an acceptable practice.
    - NOTE: All vessel scuppers must be closed or equipped with netting or mesh prior to sampling/lice counting to prevent an escape.

Hand Sampling/Lice Counting

- The catch net must be secured in a "box shape" around the working area.
- The entire perimeter must be secured to ensure all fish movement occurs within the elevated catch net area.
- Although sampling from a flat-deck vessel is not recommended, if unavoidable, the catch net/s must be secured to ensure the perimeter of the catch net is elevated to cover the entire work area and prevent an escape.

Harvesting

- Harvest vessel: the netting must be secured around the intake of the vessel's intake hose and must be inspected for safe use prior to each day.
- A properly secured catch net must be used if a fish is to be sampled or dipped out of the pens.
- A catch net must be used during the removal of a seine net from the pen. This net must be properly secured and cover the area of risk as identified within this procedure.

Wellboat Activities (transfers, smolt deliveries, treatments, fish movements etc.)

- Vessel: the netting must be secured around the intake and outflow of the vessels hoses and must be inspected for safe use prior to use each day.
- A properly secured catch net must be used if fish are to be sampled or dipped out of the pens.
    - Note: inspect the Wellboat hoses for signs of wear and degradation.

Treatments (Flushing and Thermolicing)

- Vessel: all hoses and connections must be inspected each day prior to use.
- Catch nets will be placed directly under the inflow and outflow hoses secured to the cage top rail and the sides of the vessel. Ensure a risk assessment is performed to ensure all tripping hazards are identified and clearly marked.
- Sampling/Dip Netting Moribund fish: catch nets will be used as per this procedure.

Mortality Removal

- A properly secured catch net must be placed directly in the "area of risk" for mortality removal.
- When using a vessel to assist with mortality removal, the nets and vessels must be secured as identified within this procedure.
- Ensure a risk assessment is completed and reviewed when contractors are handling mortalities.
- Any time mortality is being handled and/or transferred into tubs/ensilage systems etc. a Mowi employee must be present and consider the following:
    - Be aware of environmental factors such as wind and waves.
    - Do not overfill buckets/pans.
    - Do a risk assessment to mitigate fish loss – a lost mort is still considered an escape.
    - Make sure vessel scuppers are covered to catch any potential loss.
    - When euthanizing, ensure catch nets are in place in the "area of risk" as identified in this procedure.

Inspections

- Catch nets must be inspected prior to each use. Inspection will include but is not limited to:
    - Appropriate size of net in proportion to the "area of risk"; mesh strength and condition; mesh size matches fish size; secured tie-up points; overall condition; there are no holes.

Records

- **Marine Site Daily Log Books**
- **Activity Based Risk Assessment Form**
- **Coffee Pot Meeting Notes**

Diver / ROV Net Checks – Newfoundland Marine Sites

Application & Purpose

- To attempt early detection of holes or damage to the net and to conduct repairs in order to avoid escapes
- To maintain compliance with regulatory authorities, specifically AP 4 – Aquaculture Licensing Process, as well as with conditions of our aquaculture licenses

Responsibility and Authority

- Site management must ensure a visual underwater inspection of all active nets are conducted every 30 days and any damage is documented and repaired as required.
- Site staff must brief the dive team on any known hazards or special instructions prior to commencing the dive.
- Site management must communicate any delays in net check completion in advance of the due date so that the CACC can inform government.

Description

Frequency of Inspections

- Underwater inspections of all active nets are to be conducted at a minimum **every 30 days** by a qualified dive team or trained ROV operator.
- Additional net checks may be required following any operational activity or event that increases the risk of net failure, including: *extreme environmental conditions, net changes, fish delivery, treatments, seining activities, predator attacks, vandalism. If a full check has been completed within the 30 day period, then the due date will then fall 30 days from that most recent check.*
- For new site stockings: As soon as a site is fully stocked of smolt, a net check must be performed and forwarded to the CACC. This will serve as the first monthly net check.

Diver Inspection

- A diver visual inspection must be conducted systematically to ensure that all areas of the net are covered.
- Divers will immediately repair, in a manner that will maintain the integrity of the net, and report any holes and make the site crew aware of any signs of chafing.
- To minimize the risk of escape, the diver door must only be dropped in the water long enough to allow diver(s) to enter or exit a pen.

ROV Inspection

- May be done either by properly trained site staff, or in conjunction with regular ROV net cleaning activities, provided that all areas of the net are inspected.
- Upon discovery of any holes / chafing, ROV operator must immediately notify site manager so that containment kits can be deployed and risk of escape can be assessed.
- Upon completion:
    - In the case of an **internal ROV inspection**, ROV operator must complete and sign the internal Net Check Report, and submit to site manager.

      or

    - In the case of an **inspection done during net cleaning**, a signed copy of the In Situ Net Cleaning Report must be reviewed by site manager prior to leaving site. Site manager to take a picture or photo copy to be forwarded to CACC.

Note: Site management must investigate all reports of chafing and rectify as soon as possible.

Documentation of Net Checks

Site management must complete the internal net check report for all net inspections (Diver/ROV/Net Cleaner). The information provided on the form must be consistent with the information provided on the Dive Company Log / In Situ Net Cleaning Report.

The following is required on the Dive Company Log / In Situ Net Cleaning Report:

- Cage number
- Size of hole(s) – described in number of mesh breaks
- Shape of hole(s) – eg. Round, slit, vertical/horizontal
- Depth / location of hole(s)

  For example:
  "8x1 mesh hole at 35 ft. Vertical slit closed taut by weight of the net."

Note the above must be communicated from the dive company / ROV operator to the site manager to determine the possibility of an escape through the hole(s).

Internal Net Check Reports must include the above, as well as:

- Net tag number
- Identifying empty nets (checked or not)
- If holes are identified that are 3 mesh or larger, where someone could suspect an escape, but no escape is actually suspected, additional detail may be requested from the CACC. This may include:
    - Description of site activity that contributed to the hole
    - Size of the fish
    - Where the fish are schooling

  For example:
  "Horizontal 1x4 mesh hole at 30 ft. Closed hole. Fish on site avg of 6 kg. Fish schooling and feeding deep at 50 ft. Stocking density low as site is currently being harvested."

Reporting

- Site management submit both our internal net check form, and a copy of the Dive Company Log / In Situ Net Cleaning Report to the CACC via email or fax as soon as possible after the dive. Where possible, the dive / ROV inspection supervisor should sign the internal Net Check Report.
    - Site management must provide additional information to the CACC as requested.

- If site managers anticipate that a required 30 day net check cannot be completed for any reason within the specified time frame, the CACC must be notified immediately via email of:
    - Reason for delay in completing net check
    - Anticipated date of completion

If this notification to FFA isn't provided ahead of the due date, then we will be out of compliance and risk having our licence suspended or be issued a fine.

Records

NHSF / MHAC Net Check Report
NHSF / MHAC Diver Sign off Form
In Situ Net Cleaning Report
ROV Training Record

The completion of net checks every 30 days is a condition of our licence. If we do not comply, we could have our licence suspended or be issued a fine.

Escape Reporting – NL Marine Sites

Application & Purpose

- To ensure a quick and effective reporting response to an escape incident or event
- To maintain compliance with regulatory authorities, specifically the Code of Containment and AP 17 – Public Reporting, which requires reporting of escapes to the Department of Fisheries, Forestry and Agriculture within 24 hours of observation.

Responsibility and Authority

- It is the responsibility of the site staff to identify any fish escapes or suspected escapes on site and report it **immediately** to the Site Manager.
- Site Manager will report to Regional Saltwater Manager.
    - If unable to reach Regional Saltwater Manager, Site Manager must contact Saltwater Production Director and Sustainability division.
- Regional Saltwater Manager then reports to Saltwater Production Director and the Sustainability division.

Description

Escape Incident Definitions

1. **Suspected Escape** - A situation where there is a reason to believe that one or several fish could have left the containment. For example:
    a. Holes large enough for a fish to escape
    b. Observing Atlantic salmon, or possible Atlantic salmon outside containment that are consistent with the size of current stock
    c. Sudden decrease in feed rate in a specific pen

2. **Actual Escape** - An actual escape is a confirmed instance of fish leaving the containment structure, or being observed outside of containment.

3. **Near Miss** – A close call incident in which fish almost escaped

Reporting

- **Immediately** following observation of any suspected, actual or near miss escape, report to the:
    - Seawater Production Director, [redacted]
    - Regional Saltwater Manager, [redacted]
    - Develop. and Environmental Compliance Director, [redacted]
    - Licencing and Compliance Specialist, [redacted]
- **KEEP CALLING UNTIL SOMEONE IS REACHED.**

Reporting of elevated mortality within 24 hours is a condition of our licence. If we do not comply, we could have our licence suspended or be issued a fine.

Appendix K
Mowi Site Restoration Plan [Example: Friar Cove]

SITE RESTORATION PLAN

Atlantic Salmon Fish Farm Site

AQ 1148

FRIAR COVE

Newfoundland and Labrador, Canada

47°36'00.0"N 56°44'48.1"W

Prepared For:

Government of Newfoundland and Labrador
Department of Fisheries, Forestry and Agriculture
St. John's, NL

Prepared By:

MOWI Canada East
2 Salar Court, St. George, NB
Canada, E5C 3N1

SAMPLE

Table of Contents

List of Figures

List of Tables

Executive Summary

The Friar Cove aquaculture facility AQ 1148 is located in Friar Cove, Chaleur Bay, on the south coast of Newfoundland and Labrador. The marine finfish site lease is approximately 150 hectares in size. The site infrastructure consists of 10 net pens at 140m in circumference, a sunken grid secured in place with 12 plow anchors and 22 rock pins. There is 1 feed barge on site with a separate anchor.

Site Restoration, if required, is the responsibility of the current license holder of marine aquaculture facilities in the province of Newfoundland and Labrador. The objective of the site restoration process is to return the Site to its original condition, as best can be accomplished, while minimizing environmental impacts and future fishing or navigation issues.

The Site restoration process consists of assessment, restoration, and verification. The site assessment will take place on Site at the aquaculture lease before the restoration begins and is used to finalize the restoration Work Plan.

The restoration of the FRIAR COVE Aquaculture Facility AQ 1148 is estimated to take approximately 3 months and cost $.

Once the Site has been restored, MOWI Canada East will provide verification to validate the removal of aquaculture gear and aquatic animals at the waters surface and the lease bottom below providing an attestation *“swearing the site is now free from aquaculture infrastructure and restored.”*

1.0 Background Information

1.1 Description of Current Operations at FRIAR COVE

The marine finfish aquaculture facility AQ 1148 known as “FRIAR COVE” is located at 47°36'00.0"N, 56°44'48.1"W near Friar Cove in Chaleur Bay on the south shore of Newfoundland and Labrador. It is shown below in Figure 1.

Figure 1: Location of FRIAR COVE Finfish Aquaculture Facility AQ 1148

The marine finfish site lease is approximately 150 hectares in size. The site infrastructure consists of 10 net pens at 140m in circumference, a sunken grid secured in place with 12 plow anchors and 22 rock pins. There is 1 feed barge on site with a separate anchor.

The net pen farm site is shown below in Figure 2.

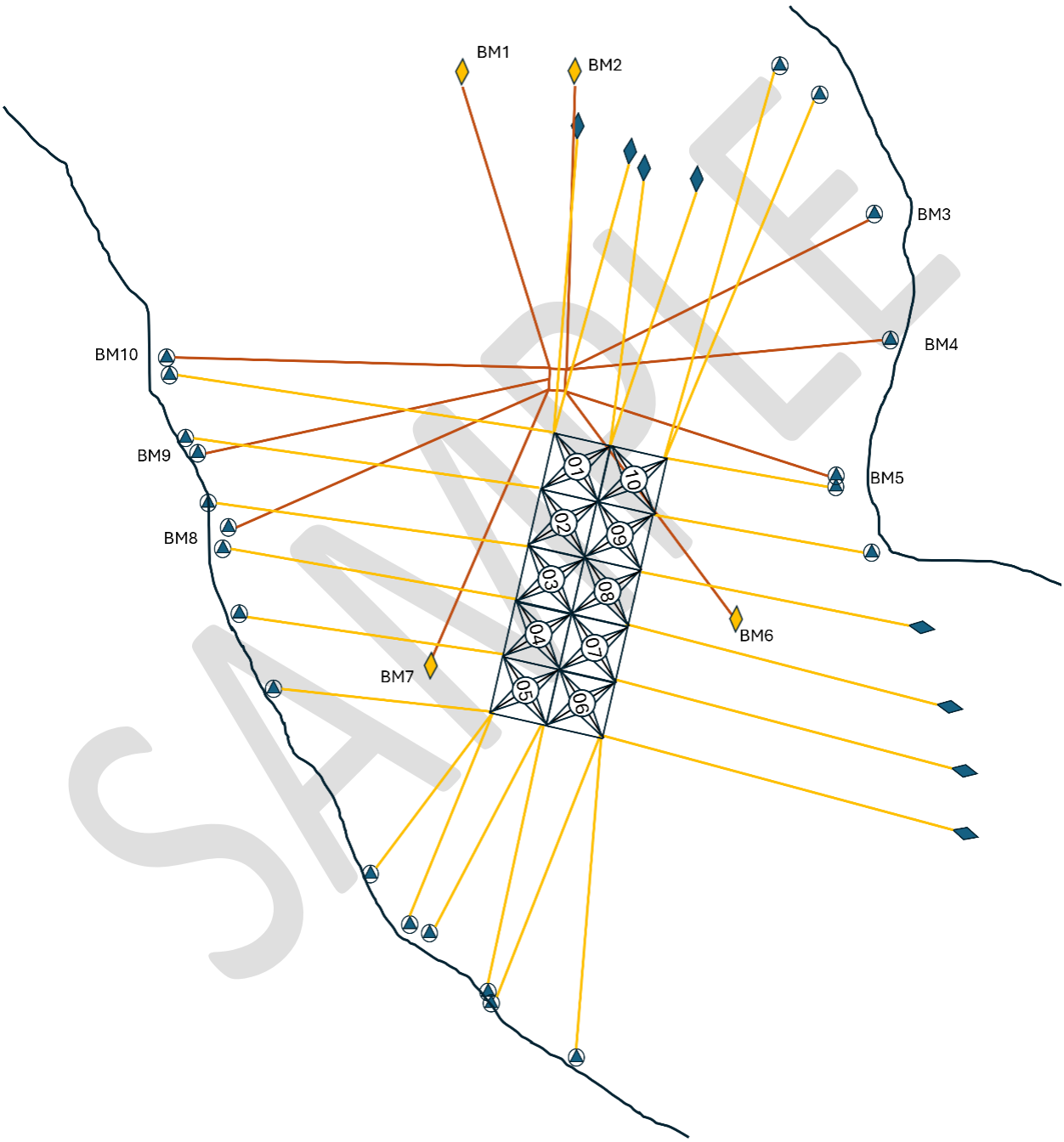


Figure 2: Site Layout of Friar Cove Finfish Aquaculture Facility AQ 1148

The Site specifics for Friar Cove AQ 1148 are summarized below Table 1.

Table 1: Site specifications and infrastructure for Friar Cove.

FRIAR COVE		Friar Cove
License No.		AQ 1148
Northing		47 36 000 N
Westing		56 44 481 W
Stocking Status		Active
Infrastructure Present	Net Pens	Yes
	Net Pen Size	140 m circum.
	No. of Pens	10
	Moorings	Yes
	Grid Type	sunken grid
	Block_anchor_pin	0_22_12
	No. Cells	10
	Feed Barge	Feeder 1

The bathymetric data for Friar Cove is shown in Figure 3 below. One of the primary environmental considerations in decommissioning this site is disturbance to the sea floor environment when mooring systems are lifted. However, considering the depth of water at the site it would be impossible to remove the chain from the mooring without raising it to sea level to disconnect. Since the sea floor would be disturbed at that point it is better to remove the anchors completely. Leaving the anchors in place may also present some interference with future fishing activities.

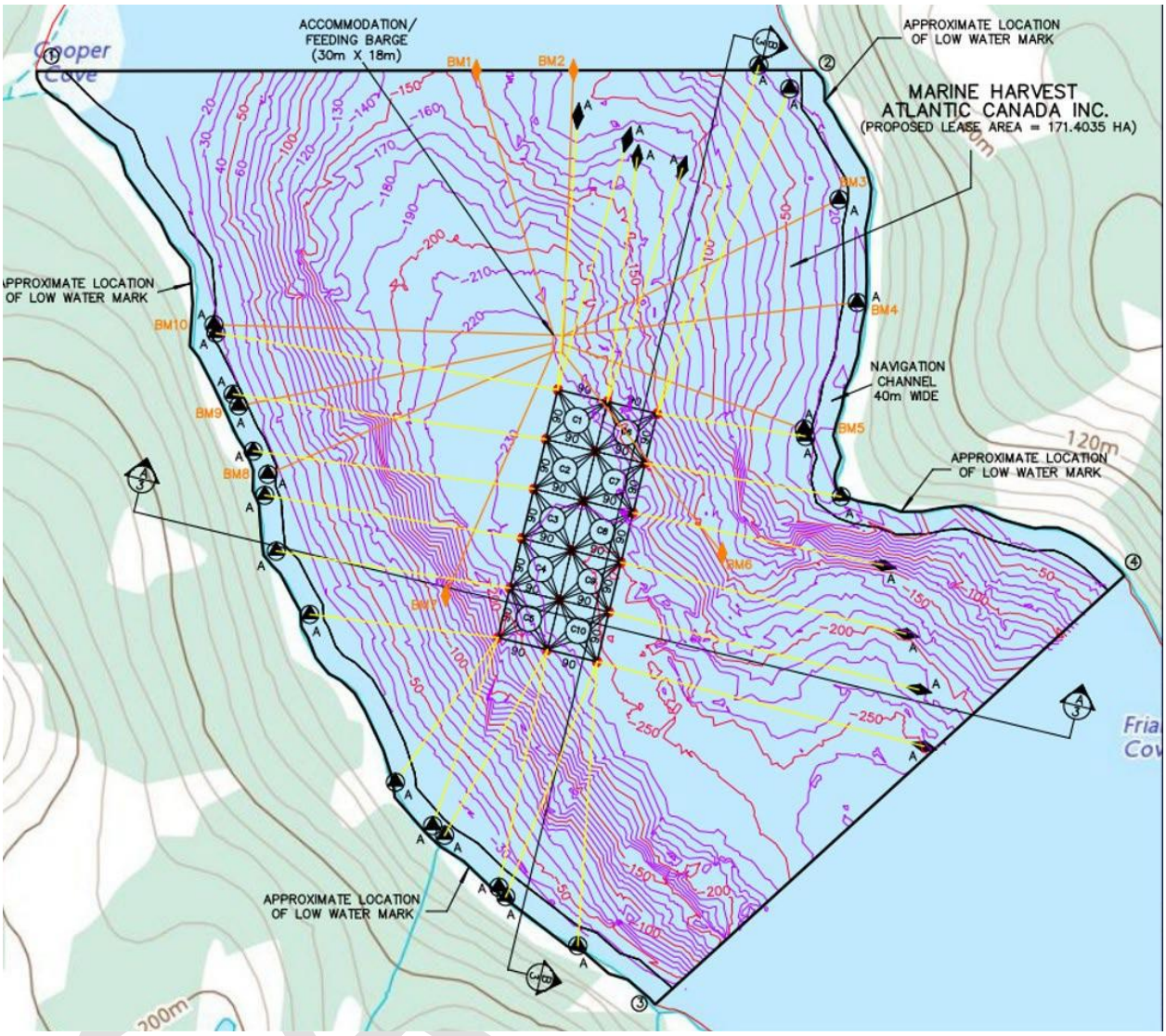


Figure 3: Bathymetric Data for Friar Cove Aquaculture Facility AQ 1148

1.2 Objectives and Scope of Site Restoration

Site Restoration is the responsibility of the current license holder. Figure 4 below illustrates the typical infrastructure used at a marine finfish aquaculture site. The objective of the site restoration process is to return the Site to its original condition, as best can be accomplished, while minimizing environmental impacts and future fishing or navigation issues.

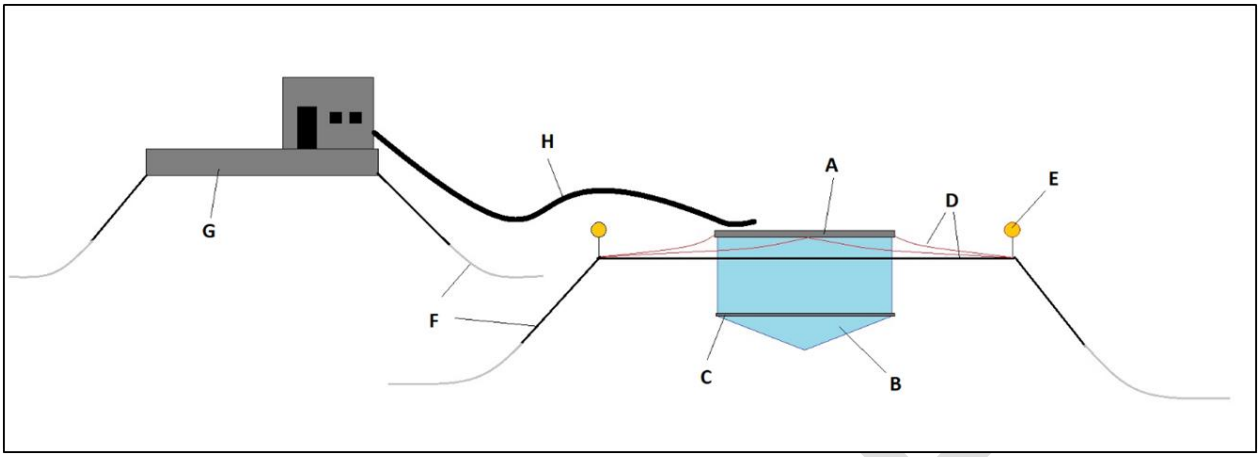


Figure 4: A typical marine finfish aquaculture facility showing: A – floating HDPE plastic pen collar that forms the basis of marine pens; B – containment net; C – weighted bottom ring (HDPE pipe filled with concrete); D – roped mooring grid; E – mooring grid marker buoys; F – mooring system (consists of mooring rope, chains, and anchors/pins); G – feed barge, and H – feed pipe.

2.0 Site Restoration Work Plan

Site restoration will begin at the request of the Ministry of Fisheries, Forestry and Agriculture or an Order undertake site restoration measures under our approved Site Restoration Plan under the terms of our Aquaculture Licence. We will work closely and cooperatively with Department to fulfil our obligations.

Generally, our Work Plan will consist of the following:

- Site Assessment
- Restoration Work
- Verification

2.1 Site Assessment

The site assessment will take place on Site at the aquaculture lease before the restoration begins. This will compare what is on paper as being present (i.e., number of fish, barges, net-pens, and other infrastructure) to what is on site at the time of decommissioning. Once a site Assessment is complete the Work Plan can be finalized.

2.2 Restoration Work

The site restoration work is expected to take approximately three months and will be carried out by local and experienced and qualified contractors and service providers such as 360 Marine, FSV Group, The Barry Group, Silk Stevens Limited, and others who are familiar with the aquaculture sites construction and operation.

2.3 Verification

Once decommissioning and site restoration work is completed, MOWI Canada East Inc. will provide verification that the work has been completed. Verification will include methods to validate the removal of aquaculture gear and aquatic animals at the waters surface and below, including pictures and/or video or remote sensing of the lease bottom where possible showing the benthos within the lease. We will coordinate this verification with Department staff so an inspector and other departmental staff, as deemed necessary may be present to monitor and inspect. At completion, we will submit to FFA a report that encompasses attestation *"swearing the site is now free from aquaculture infrastructure and restored."*

3.0 Site Restoration Cost Estimate

Our best estimate of probable cost to complete the restoration of the Site at marine finfish aquaculture facility AQ 1148 Friar Cove, is $. It captures all the activities associated with the required site restoration and is based on peak production at the Site. A detailed Cost Estimate was received from Silk Stevens Limited and is attached in Appendix 'B'. Silk Stevens Limited is an experienced Consulting Engineering firm licensed to practice in the province of Newfoundland and Labrador and has almost 2 decades of experience consulting to the marine finfish net-pen farming industry in Atlantic Canada. The cost estimate is summarized below in Table 2. The cost estimate displayed below in Table 2 below is in 2024 dollars and excludes HST.

Table 2 Cost estimate for AQ 1148 Friar Cove

Site Restoration Cost Estimate FRIAR COVE AQ-1148		
Task #	**Task Description**	**Cost**
1	Removal of all bird nets, feed pipe, spinners, aeration equipment, cameras, electrical equipment, and mort removal systems. Clean and ship to Harbour Breton.	
2	Pressure wash all fish nets prior to removal	
3	A) Raise weight ring (Sinker Tube) Release Tie-ins, remove 10 nets and ship to Harbour Breton.	
	B) Remove all bridles. Clean and ship to Harbour Breton for storage.	

4	Truck nets from Harbour Breton to storage facility	
5	Tow all pens and bird stands to Harbour Breton and secure on beach	
6	Remove all feeder barge anchor lines, chains, blocks and anchors and tow barge to Harbour Breton.	
7	A) Remove all marker buoys, anchor lines, chains, anchors, and blocks.	
	B) 4 Man dive team Includes boat rental. Disconnect rock Pins	

Note: Costs are in 2024 Cdn. dollars and does not include HST. See detailed cost estimate in Appendix 'B' for basis of cost estimate and exclusions.

APPENDIX 'A'

Site Restoration Plan and Financial Assurance Requirements

Guidance Document

Department of Fisheries, Forestry and Agriculture

Aquaculture Development Division

2022

Site Restoration Plan and Financial Assurance Requirements Guidance Document

Department of Fisheries, Forestry and Agriculture
Aquaculture Development Division

2022

Information in this document is subject to change.

Table of Contents

1. Site Restoration Plan Guide

The purpose of this document is to provide guidance to licensees in preparing a Site Restoration Plan to meet the Department of Fisheries, Forestry and Agriculture (FFA) surety requirement. It is important to note that any activity identified in the Site Restoration Plan must conform to all applicable municipal, provincial and federal regulatory requirements as well as departmental approved management plans on file for operations.

A Site Restoration Plan shall be divided into four main parts, as follows:

1.1 Background Information
1.2 Work Plan
1.3 Cost Estimate
1.4 Financial Assurance Proposal

1.1 Background Information

a) Description of Operations

Provide a brief description of the site including the species; production plan details; infrastructure; facilities; equipment; and inventories at peak production.

b) Objectives and Scope

Define the objectives and scope of the Site Restoration Plan. Identify legislative requirements and any applicable company or subsidiaries criteria.

The following are examples of Site Restoration Plan objectives that may be included in the plan:

1) Reduce or eliminate potential adverse environmental effects associated with the site;
2) Decommission and restore the site; and/or
3) Remove potential navigational and other safety hazards.

1.2 Work Plan

Provide a detailed Work Plan that identifies the following components.

a) Schedule
   (i) Site assessment
   (ii) Restoration work
   (iii) Completion date

b) Reporting to FFA on progress at the following stages, may include

(i) Site assessment;
(ii) Completion of corrective actions;
(iii) Completion of key stages of the restoration (i.e., removal of stock inventory, facilities, equipment and infrastructure, hazards and disposal in accordance with departmental approved management plans);
(iv) Attestation to completion of site restoration (Appendix A).

Reports are to be submitted to the Director of Aquaculture Development of FFA.

1.3 Cost Estimation

Site restoration estimated costs are to capture all activities associated with site restoration. Appendix B provides a list of restoration criteria that may be taken into consideration in determining estimated costs. To ensure that restoration costs are indicative of operations, estimates are to be based on peak production for site(s).

Cost estimates should include:

(i) A comprehensive **third party cost estimate** by a certified entity; and
(ii) Costs associated with the restoration, which will be combined into a sub-total.

A list of certified third party entities that may be able to provide third party cost estimates for restoration activities are identified in the following link: https://www.gov.nl.ca/ecc/env-protection/impactedsites/#envconsult. Other service providers with the ability to provide an independent cost estimate may be considered by FFA.

Conditions that apply to the completion of estimates are as follows:

(i) All cost estimates must be third party costs (not in-house costs);
(ii) All costs should be in Canadian funds (excluding HST);
(iii) All costs should be in current year dollars, with no allowance made for escalation; and
(iv) The cost estimate is to be based upon peak production, schedule, and site restoration work.

1.4 Financial Assurance Proposal

The financial assurance proposal shall be based upon a supportable cost estimate of restoration costs certified by a qualified entity and provide a description of the means to fund an acceptable Site Restoration Plan. Appendix C includes further details regarding financial assurance proposals, as well as standard financial assurance templates that may be used as part of a submission is provided.

Appendix A: Attestation to Completion of Site Restoration

Persons holding the last aquaculture licence for a site are required to attest that the site has been restored. A Declaration is required to be provided to FFA, signed in the presence of a Commissioner for Oaths for Newfoundland and Labrador or a Notary Public in and for the Province of Newfoundland and Labrador swearing the site is now free from aquaculture infrastructure and restored.

The person shall also provide verification that the work has been completed. Verification will include methods to validate the removal of aquaculture gear and aquatic animals at the waters surface and below, the benthos, within the lease. Depending on the location, verification will be supported by pictures, remote sensing, and/or video. An inspector and other departmental staff, as deemed necessary may be present to monitor and inspect. The person will be required to submit to FFA a report that encompasses the attestation, supporting methods and results to verify restoration.

Appendix B: Cost Estimations

The following may be considered when estimating the costs:

- Type and size of the site;
- Type and amount of gear deployed;
- Methods to remove infrastructure and aquatic animals cultivated;
- Disposal methods of gear, aquatic animals cultivated (if not processed);
- Presence of hazardous material and potential contaminants;
- Transportation costs;
- Labour costs;
- Final restoration costs: attestation to site restoration; and
- Other components, not captured above, that may be specific to the operation (ex. overall project management, engineering, administrative, etc.).

Appendix C: Financial Assurance

The types of financial assurances accepted by FFA are Security Bonds and Irrevocable Letters of Credit (ILoC). Documentation is to be submitted to FFA in an electronic format. Financial assurance requirements may be changed at any time by the Minister, as deemed necessary.

1. Security Bond

A Security Bond is an indemnity agreement in a specific and fixed amount executed by a surety insurer licensed to do business in the Province of Newfoundland and Labrador: https://www.gov.nl.ca/snl/insurance/licenses-valid/

Security Bonds are issued for a specific period and cannot be cancelled until the Minister of FFA approves new financial security. In addition, bonds must include a clause requiring the written notice of cancellation to the Minister a minimum of three calendar months prior to any such cancellation. If the Licensee does not provide the required notice, the Minister may cancel the licence.

The Security Bond template in Appendix C may be used. If availing of a bond program administered by an approved association (i.e. Newfoundland Aquaculture Industry Association), an agreement in accordance with the program may be provided to FFA for consideration.

2. ILoC

An ILoC is a non-negotiable form of security. It is issued by any bank listed in Schedule I of the **Bank Act (Canada)** and authorized to conduct business in Newfoundland and Labrador. It shall be for a specific period of time and must not be revocable by the Licensee until;

1) restoration is completed pursuant to the accepted Site Restoration Plan;
2) the Minister has issued a Notice of Release to the Licensee; or
3) the ILoC is replaced with another acceptable form of financial assurance.

The ILoC template in Appendix C may be used.

3. Activities to be Covered

Activities that may be covered are those associated with the development and operation of an aquaculture site: removal of inventory, removal and care for stock if present, disposal methods, project management and administrative costs, on-site monitoring and underwater footage of restoration, etc. If necessary, activities required for environmental effects monitoring as well as measures to ensure compliance with Transport Canada navigation requirements throughout the course of restoration may be included in financial assurance

coverage.

4. **Financial Assurance Amount**

Financial assurance amount must be sufficient to cover all costs associated with restoration activities and must be verified by a third party estimator.

The amount of financial assurance may have to be adjusted if the site is approved for an amendment: site boundary, species add-on, etc., which may result in an increase in the estimated cost of the site restoration.

The amount of financial assurance required shall not be reduced by the inclusion of salvage costs.

5. **Financial Assurance Details**

The financial assurance proposal must include information specific to the type and value of the assurance. The submission should include, as a minimum, the following information:

(i) Security Description; and
(ii) Security Value (at cost).

6. **Period of Liability for the Licensee**

The Licensee shall maintain adequate financial assurance continuously throughout the life of the aquaculture operation and until:

1) restoration has been completed pursuant to the accepted Site Restoration Plan;
2) restoration has been attested to and verified by the Licensee; and
3) the Minister has approved the release of financial assurance, if necessary.

7. **Site Transitions: Site Restoration Plan and Financial Assurance Requirements**

When there is a change in ownership or a sub-lease of an aquaculture operation, the original Licensee's Security Bond or ILoC must remain until the Minister has approved the site transition. The successor Licensee will be required, through the licence application process, to submit a Site Restoration Plan that will include financial assurance in accordance with departmental requirements.

8. **Annual Requirements**

Annually, proof of financial assurance will be required for licence validation. Proof is to be

provided in the form of a letter from either the association administering a bond program, the surety insurer, or financial institution.

9. **Excess Funds on Completion of Restoration Work**

Where the Minister deems it necessary to invoke a financial assurance (Appendix D), residual balances will be refunded once the Minister is satisfied that the restoration work has been completed, as required.

Appendix C: Financial Assurance

Fisheries, Forestry and Agriculture Security Bond Template

AQUACULTURE SITE RESTORATION SECURITY BOND

Bond #_____ Amount:_____$

KNOW ALL PERSONS by these presents that [*name of compan*y] ("the Principal") whose place of business is at [*full company address*] and the [*name of insurance company]* ("the Surety") whose place of business is at [*full company address*] are held and firmly bound unto Her Majesty the Queen in Right of Newfoundland and Labrador as represented by the Minister of Fisheries, Forestry and Agriculture, its heirs, and successors ("the Obligee") whose place of business is at 30 Strawberry Marsh Rd., P.O. Box 8700, St. John's, Newfoundland and Labrador, A1B 4J6 in the penal sum of [*amount of bond]* of lawful money of Canada for the payment of which we bind ourselves, our heirs, administrators and successors, and assigns firmly by these presents.

WHEREAS, the Principal will operate/operates a [*type of aquaculture operation*] located at [*site location stated on the licence*] in accordance with a Site Restoration Plan accepted by the Minister's letter dated_____, which is attached hereto.

NOW, THEREFORE, the condition of this obligation is such that, if the Principal shall comply with the terms of the Site Restoration Plan then this obligation shall be void; otherwise it shall remain in full force and effect, subject to the following conditions:

1. Whenever the Principal shall be in default and declared by the Obligee to be in default of the terms of the Site Restoration Plan, the Obligee shall send a registered letter to both the Principal and Surety, stating in substantial detail the facts leading to the default.

2. That the Surety's obligation to the Obligee shall only be to pay such amounts demanded by the Obligee and this bond will be totally exonerated by remitting to the Obligee such amounts in default, provided however, the total liability of the Surety shall in no event exceed the penal sum of the Surety.

3. This bond shall remain in full force and effect until released by the Obligee, or replaced by a form of financial assurance acceptable to the Obligee.

4. Provided that, if the Surety at any time gives at least three calendar months' notice in writing to the Obligee and to the Principal of its intention to terminate this obligation, then this obligation shall be deemed to be terminated on the date stated in the notice, which date shall not be less than three calendar months after the date of the receipt of the notice by the said Obligee or by the said Principal, whichever is the later date of receipt, provided that, should the Principal fail, within two calendar months of the above referred to later date of receipt, to provide a financial assurance in at least the

same amount as this bond in a form acceptable to the Obligee, the Surety shall automatically and immediately pay the full amount of the bond to the Obligee.

5. Any suit or action on this bond against the Surety must be commenced by the Obligee within 120 days from the date of notice of default mentioned in clause #1 above.

6. In the event the Surety becomes unable to fulfill its obligations under the bond for any reason, notice shall be given immediately, by registered mail, to the Principal and the Obligee. Upon Obligee's receipt of Surety's notification or upon the incapacity of the Surety by reason of bankruptcy, insolvency, or suspension or revocation of its license, the Principal shall be deemed to be without bond coverage and will be required to submit alternate financial assurance, subject to the approval of the Obligee and as required by Section 4.2 of the *Aquaculture Act,* within 30 days.

7. The Surety is duly registered to carry on the business of surety in the Province of Newfoundland and Labrador.

8. Upon partial completion of the site restoration, and the submission by the Principal of a written application including technical supports and relevant information, the Obligee at its discretion may reduce the amount of the bond to an amount consistent with the financial requirements of the restoration work left to be completed.

9. This bond will be valid for the term of [*date bond sealed*] to *[date 1 year hence*] and shall be automatically renewed, without further documentation from year to year thereafter unless terminated as aforesaid, provided that the Surety may, if it wishes, issue certificates evidencing such renewal.

Sealed with the respective seals of the Principal and of the Surety the____day of_____, 20 .

SEALED, SIGNED AND DELIVERED
by the Principal in the presence of

_____ _____
Witness Principal

SIGNED, SEALED AND DELIVERED
by the Surety in the presence of:

_____ _____
Witness Surety

_____
Surety Approved Signatory
[NAME, ADDRESS, & TELEPHONE NO. OF SURETY]

Appendix C: Financial Assurance

Fisheries, Forestry and Agriculture Irrevocable Letter of Credit Template

Irrevocable Letter of Credit

Financial Institution Letterhead

Date of Issue: *[date]*

Beneficiary: Government of Newfoundland and Labrador
Department of Fisheries, Forestry and Agriculture
P.O. Box 8700
St. John's, NL A1B 4J6

IRREVOCABLE LETTER OF CREDIT NO. *[number]*

At the request of *[company name, address]* ("the Customer") we, *[name of financial institution]*, hereby establish our Irrevocable Letter of Credit No. *[number]* ("the Letter of Credit") in your favour for an amount not exceeding CAD[$$$$.$$] (*[written out xx]*/100 Canadian Dollars) available to you against presentation of the original documents mentioned hereinafter:

1. Your dated and written declaration referring to *[name of financial institution]* Letter of Credit No. *[number]* purportedly signed by an authorized officer, stating the amount claimed and certifying that the amount claimed is due to you by the Customer for either one of the following reasons:

   A. The Minister of Fisheries, Forestry and Agriculture has reasonable grounds to believe that the Customer is not complying with or has not complied with an order to undertake site restoration measures under its Site Restoration Plan for the restoration of operations under the terms of Aquaculture Licence *[AQ number]*; or

   B. You have received a notice from *[name of financial institution]* of its election not to extend its Irrevocable Standby Letter of Credit No. *[number]* and as of the date of the present demand for payment, you have not received a substitute Irrevocable Standby Letter of Credit acceptable to you.

2. The present original Letter of Credit.

Any claims made by you under this Letter of Credit must be presented to us on or before *[date]* (the expiry date). It is a condition of this Letter of Credit that it shall be deemed to be automatically extended without amendment on our part for one year from its present expiry date or from any future expiry date unless thirty (30) days prior to any such expiry date we shall notify you by courier that we elect not to consider this Letter of Credit extended for any such additional period. In case of non-extension, you shall have the right to draw upon this Letter of Credit up to the full amount then outstanding upon presentation of the original of the present Letter of Credit and your written declaration in the fashion described in 1.B above.

This Letter of Credit is neither transferable nor assignable. Partial drawings are permitted.

In the event of any partial drawing we will note the amount of the drawing on the original of

this Letter of Credit and immediately return directly to you the original of this Letter of Credit.

We hereby undertake that any drawing made by you on us under this Letter of Credit will be duly honoured on presentation provided that all above-mentioned terms and conditions have been complied with.

All correspondence and/or demand shall be addressed to *[full legal address of financial institution]* and shall refer to our Letter of Credit No. *[number]*.

This Letter of Credit is subject to the Uniform Customs and Practice For Documentary Credits 2007 Revision, I.C.C., Publication Number 600.

[financial institution]

Authorized Signature *[name]*

Authorized Signature *[name]*

The present document consists of 2 pages.

In the event an operation ceases, the Licensee shall initiate the Site Restoration Plan to ensure the site is restored and provide FFA with the required reports. If the department determines that no site restoration activities have been undertaken or they are not in compliance with the Site Restoration Plan, FFA may make a demand under the financial assurance document.

No court order or procedures are required to act. All that is required for action is the existence of reasonable grounds for the belief on the part of the Minister that the last licensee has not commenced or completed site restoration activities.

Appendix L
List of Approved Mowi Canada East Management Plans and SOPs

Listing of Management Plans

1. Freshwater Environmental and Waste Management Plan (Ver 6.1)

    Appendix B - Escape Prevention and Response Plan: Freshwater Hatchery Operations

    Appendix C - Escape During Truck/Wellboat Loading, Transport and Unloading

    Appendix E - Environmental Emergency Response Plan

2. Spill Contingency and Response Plan - Newfoundland Freshwater Sites
3. Technical Memorandum - Managing and Mitigation Risk from the Surface Contaminates to the MOWI-East Well Fields
4. Salmonid Fish Health Management Plan (Ver 8.0)

    Salmonid Fish Health Management Plan (Ver 8.0)- Integrated Pest Management Plan

    Salmonid Fish Health Management Plan (Ver 8.0)-Biosecurity Plan

    Salmonid Fish Health Management Plan (Ver 8.0)-Fish Disposal Plan

    Salmonid Fish Health Management Plan (Ver 8.0)-Migratory Bird Response Plan

    Salmonid Fish Health Management Plan (Ver 8.0)-Plankton Monitoring and Response Pan

5. Environmental and Waste Management Plan Saltwater (Ver 6.2)

    Appendix A - Operational Environmental Mitigation Plan

    Appendix B - Environmental Emergency Response Plan

    Appendix C - Spill Contingency Plan

    Appendix D - Environmental Management: Wild Species

    Appendix E - Management of Wild and Farmed Salmon Interactions

6. Pesticide Spill Contingency Plan (Ver 2.0)
7. Mowi Canada East Incident and Crisis Management System (Ver 4.1)

Listing of SOP:

1. Ensilage on a Marine Site
2. Mortality Removal Using Lift Up Devices Marine Sites
3. Mortality Removal by Divers Marine Sites
4. Transporting Mortalities by Truck Marine Sites
5. Mass Mortality Removal with Seiners Marine Sites
6. Mass Mortality Removal with Portable Air Lift System Marine Sites
7. Mass Mortality Removal with Wellboats - NL Marine Sites
8. Freshwater Mortality Removal
9. Feedbag Management - Stephenville Hatchery
10. Escape Prevention and Response Plan - Freshwater Hatchery Operations
11. Escape During Truck/Wellboat Loading, Transport and Unloading
12. SOP for Transport Tankers Disinfection
13. ATP Swab Test
14. Catch Net use and Deployment - NL Marine Sites
15. Diver/ROV Net Checks - NL Marine Sites
16. Escape Reporting - NL Marine Sites
17. SOP for Taking Phytoplankton Water Samples
18. SOP for Counting and Identifying Phytoplankton with a Microscope

Appendix M
Pesticide Spill Contingency Plan

Pesticide Spill Contingency Plan

Prepared By:

Mowi Canada East Inc.

Doc. ID #	Revision	Date	Responsibility
PSCP V-1.0		February 2020	Fish Health and Welfare Division
PSCP V-2.0	Update of senior mgmt. personnel	May 2022	Sustainability

Table of Contents

Section 1 EMERGENCY PHONE NUMBERS (area code 709 unless otherwise indicated)

Spills and Clean up:

Canadian Coast Guard (Environmental Emergencies	772-2083
Environment Canada	1-800-563-9089
CANUTEC	1-613-996-6666

Poison Control Centre/Hospitals

Poison Information Centre (St. John's)	722-1110
Other Areas	1-800-722-1110
Hospital – Harbour Breton	885-2401 / 885-2359

Pesticide Information

Pest Management Information Service	1-800-267-6315
CANUTEC (Non-emergency information)	1-613-992-4624

Other Emergency Response Numbers

Emergency Measures Organization	729-3703

Fire Departments

Conne River	882-2222
Hermitage	883-2343
St. Alban's	538-3000
Harbour Breton	885-9999
Pool's Cove	665-3108
English Harbour West	888-3473

Police Departments

RCMP Province wide	1-800-709-7267
Milltown	882-2230
Harbour Breton	885-2320

Ambulance

Conne River	882-2705
St. Alban's	538-3117
Harbour Breton (hospital)	885-2359 / 885-2401
Mose Ambrose	888-0000

Other

Maritime Rescue-Sub Centre (MRSC)	772-5151 / 1-800-563-2444
Marine Communication & Traffic Services	772-2083
Canadian Coast Guard – General Enquiries	772-4423

MCE Emergency Response Team

Position	Name	Cell Phone Number
Managing Director (Team Leader)	[redacted]	
Compliance and Certification Manager		
Communications Director		
Saltwater Production Director		
Processing Manager		
Fish Health and Welfare Director		
Freshwater Production Director		

Section 2 SPILL REPORTING INSTRUCTIONS

Internal Reporting

- Once completely satisfied that the spill is under control, the person in charge will: Contact the ERT immediately.
- Contact the Crisis Management Team immediately (CMT) Refer to the Crisis Management Tab in Site Operation Handbook for CMT Contact List.
- Contact Site Manager.

External Reporting

- Compliance and Certification Manager reports externally to the appropriate federal and provincial agencies. If a spill occurs on land, Canadian Coast Guard or Environment Canada will be informed as below.

  Report spill to Canadian Coast Guard (Environmental Emergencies 772-2083) or Environment Canada (1-800-563-9089) with the following information:

  1. Reporters
     - Name, phone number (24 hour), address, title, company
  2. Location
     - Nearest populated area – exact location of spill
  3. Type of Emergency
     - E.g. insecticide spill
  4. Quantity
     - Litres, size of area affected
  5. Time
     - Of spill
     - Of detection
     - Of report received
  6. Source of spill
     - Boat, truck, container, etc.
  7. Type of accident
     - Collision, rupture, overflow, etc.

8. Owner of pollutant and/or vehicle
9. Clean-up efforts
    - By whom, address, phone number, percentage cleaned up
10. Clean-up methods
    - What methods used – trenching, booming, damming, absorbents, diking, removal, etc.
11. Spill Site Conditions
    - Win velocity and direction
    - Ambient temperatures
    - Water – open water, wave height, currents, depths, and tides
    - % ice cover if any
    - Spill on or under ice
    - Land - % snow cover and depth, if any
    - Type of terrain – bog, sand, soil, etc.
12. Contingency Plan
    - Is there a plan?
    - Is it in action?
    - Assistance needed?
13. Danger Potential
    - Course of spill – water intakes, water fowl, fish shorelines, vegetation, mammals

Section 3 EMERGENCY FIRST AID EXPOSURE TO PESTICIDES

Salmosan 50 WP First Aid:

IF SWALLOWED
Call a poison control centre or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control centre or doctor. Do not give anything by mouth to an unconscious person.

IF ON SKIN/CLOTHING
Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control centre or doctor for treatment advice.

IF IN EYES
Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, and then continue rinsing eye. Call a poison control centre or doctor for treatment advice.

IF INHALED
Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.

Take container, label or product name and P.C.P. Registration number with you when seeking medical attention.

Interox Paramove 50 Insecticide First Aid:

IF SWALLOWED
Call a poison control centre or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control centre or doctor. Do not give anything by mouth to an unconscious person.

IF ON SKIN/CLOTHING
Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control centre or doctor for treatment advice.

IF INHALED
Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control centre or doctor for further treatment advice.

IF IN EYES
Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, and then continue rinsing eye. Call a poison control centre or doctor for treatment advice.

Take container, label or product name and P.C.P. Registration number with you when seeking medical attention.

Section 4 PESTICIDE SPILL HANDLING ON LAND

Company manager or designate take appropriate action:

- Wear protective clothing when cleaning up any spills, ventilate the area (if enclosed), keep bystanders and animals away, and follow safe practices (no smoking, eating or drinking during clean-up etc.).
- Check the label and SDS for instructions and the registrant's emergency phone number.
- Contain and control the spilled material. Cover liquid spills with absorbent material. Prevent the spill from entering storm drains, wells, water systems and waterways.
- Call the provincial government emergency number if the spill is likely to:
    - Harm the environment;
    - Injure or damage property, livestock, or people;
    - Affect safety of the area;
    - Interfere with normal activities.
- Clean up the spill. Follow emergency guidelines if provided, otherwise: sweep or shovel absorbent material into a designated solid waste container lined with a heavy duty plastic bag. Dry formulations can be swept up and reused or placed directly into the designated waste container if they are wet or contaminated.
- Decontaminate the spill area:

  Decontaminate hard surfaces by:

- Using as small amount of wash water as possible (only enough to extract the pesticide, not dilute it);
- Containing the wash water to the contaminated area;
- Using bleach only when specified on the label;
- Working the cleaning material into the spill area with a coarse broom;
- Absorbing the excess liquid with more absorbent material, then sweeping it into the special waste container; sealing the water container, placing a warning label on it and storing it until it can be properly disposed of. If unsure of how to dispose of the material contact the Department of Environment and Climate Change, Pesticide Control Section at 729-3395 or 1-800-563-6181

For soil contamination:

- Contact the manufacturer or Department of Environment and Climate Change, Pesticides Control Section at 729-3395 or 1-800-563-6181 for information on decontaminating soil saturated with pesticide

For information on minor application errors or minor spills, refer to the Safety Data Sheets (SDS).

- Decontaminate clean-up equipment and protective gear.
- Shower.

Section 5 SPILL RESPONSE KIT (EMERGENCY RESPONSE MATERIALS)

Applicators should have a decontamination kit on hand, fully equipped, and easy to get in an emergency. Inspect the kit regularly. Label the kit properly.

An example of a well equipped spill response kit is:

- Heavy duty detergent
- Absorbent material
- Laundry bleach
- Hydrated lime (do not mix bleach and lime)
- Square mouthed shovels or spades
- Yard brooms
- Hand pump with hose
- Open-head drums with lids or sealable drums
- Heavy duty plastic bags
- Cartridge type respirators
- Safety goggles
- Industrial chemical resistant gloves
- Chemical resistant boots
- Overalls

Section 6 FIRES

Pesticide fires are hazardous. Pesticides may be flammable, explosive, produce highly toxic fumes when they burn. The toxicity and hazards of many pesticides burning together in the same fire are unknown; fumes may poison people (including fire fighters), animals, or plants; and the run-off water from fire fighting may contain pesticide residue that could contaminate soil, sewers, streams, lakes, wells, and other water sources.

Be prepared to respond to a fire involving pesticides by:

- Keeping an inventory of stored pesticides in easily accessible locations away from the storage area;
- Letting the fire department know where the pesticides are stored;
- Posting a warning sign on all entrances to the storage facility;
- Keeping emergency phone numbers handy;
- Keeping a fire extinguisher approved for chemical fires near the storage area.

If a fire occurs:

- Call the fire department immediately;
- Account for all personnel;
- Keep people and animals away/upwind from the area so they are not exposed to toxic fumes, run-off, or explosions;
- Remind fire fighters that pesticides are in the building;
- Provide the fire fighters with an inventory list;
- Report fire involving pesticides to the Department of Environment and Climate Change, Pesticide Control Section at 729-3395 or 1-800-563-6181.

Prevent fires by:

- Not using open flames for welding, burning, cutting, etc. in the pesticide storage;
- Making sure the pesticide storage follows the required codes;
- Securing doors and windows to prevent unauthorized people from entering your property.

Section 7 THEFT

Help prevent theft of pesticides by always keeping pesticides securely stored. The owner may be liable in the event of an accident. If pesticides are stolen, inform the provincial regulatory authority, the supplier, and the police.

Section 8 FIRST AID

First aid provides immediate assistance (will help stabilize a person and sustain life) until medical help can be reached.

If a person feels ill during or after handling pesticides, seek medical attention immediately. People working with pesticides or closely associated with pesticide applicators should be familiar with:

- The relevant emergency phone numbers
- Signs and symptoms of pesticide poisonings
- First aid for pesticide poisoning for the products being used
- Where the application takes place
- Where the applicator will return

Post emergency phone numbers by the phone and in all vehicles. The following items should be available for emergency response near the application site and pesticide storage area:

ITEM	PURPOSE
Clean water	Drinking, washing skin or eyes
Soap	Washing pesticide off skin
Gloves	Protecting person administering first aid
Cup	For drinking
Protective airway device	Protection during mouth-to-mouth resuscitation
Bandages	Prevents pesticides entering wound
Blanket	Cover victim
Phone numbers	To get help
Paper towel	Cleaning
Plastic bag	Collecting vomit
toothbrush	If pesticide got in mouth

PLUS:

- Activated charcoal which absorbs pesticide in stomach. This remedy is **ONLY TO BE ADMINISTERED UPON INSTRUCTION BY A POISON CONTROL CENTRE OR DOCTOR, AND IF THE PATIENT IS ALERT.**

GENERAL PROCEDURES FOR ANY PESTICIDE POISONING:

- **Always protect yourself from injury first.** Put on protective clothing and personal protective equipment before you enter a contaminated area or handle a contaminated victim.
- **Check if the victim is conscious.** If the person is not conscious, call an ambulance right away
- **Check to see if victim is breath.**
  If victim is not breathing:
    - Straighten the victim's airway and check for breaths.
    - If the victim does not begin to breathe, administer mouth-to-mouth rescue breathing until the victim begins to breathe on his/her own.
    - Do not contaminate yourself, especially if the victim has pesticide or vomit around his face or mouth. Use protective airway device with a one way valve. Do not breathe the exhaled air from the victim.
    - Perform CPR if the victim's pulse disappears. You should only person CPR if you are trained to do so.

  If victim is breathing, but not conscious:
    - Place the victim in the recovery position (on the side with the head turned slightly to one side). If the victim vomits, try to keep airway clear.

- **Stop the exposure to the pesticide.** Move the victim away from the contaminated area. (Note: only move the person if you don't suspect spinal cord injury). Remove all contaminated clothing. Use soap and water to wash any skin exposure to the pesticide.
- **Call the Poison Control Centre – don't waste time.** If you don't have all the facts of the accident, call anyway and tell Poison Control whatever you can.
- **Start the First Aid treatment.** Start the first aid treatment appropriate for the route of entry as advised by the Poison Control Centre or the label.
- **Make sure the patient gets medical attention.** First aid is **not** a substitute for professional medical help. The Poison Control Centre will tell you what medical follow up is needed.
- **Position the person.** Place the person on their side with the head lower than the rest of the body and turned to one side. If the person is not conscious, keep chin pulled forward and head back to allow breathing to take place. An unconscious person should never be transported flat on their back. Specific emergency procedures for dermal exposure, oral exposure, ocular exposure, or respiratory exposure are below.

IF PESTICIDE CONTACTS SKIN (DERMAL EXPOSURE):

Remove contaminated clothing and rinse skin with plenty of water.

- Wash skin, hair, nails, and underneath nails thoroughly with lots of soap and water. Repeat.
- Dry victim and wrap him/her in a blanket or other clean material.
- Contact the Poison Control Centre. The Poison Control Centre staff will tell you about symptoms you should watch for and will tell you if you need to go for medical attention.
- Watch victim carefully for signs of severe allergic reaction that may lead to anaphylactic shock.

Signs and symptoms of severe allergic reactions include:

- Swelling of the lips, ears, hands, and/or feet
- Redness of the skin over the body such as raised, itchy, blotchy rash (hives)
- Weakness, dizziness
- Breathing difficulty, coughing, and wheezing that can progress to an obstructed airway as the tongue and throat swell.

Call an ambulance immediately if the victim has any breathing difficulty or complains that his/her throat is closing.

For chemical burns on skin:

- Remove the chemical immediately to stop the burning. Do not wait for the clothing to be removed.
- Brush dry chemical off skin and clothes away from the victim, then rinse the affected area with lots of water.
- For liquid chemicals, rinse off affected area with large amounts of water.
- Keep flooding the area with water while removing the victims clothing. Do not remove clothing that is stuck to the skin.
- Immerse the burned area in cold water or cover with an ice pack.
- Cover with loosely applied clean cloth.
- Get medical attention
- **Do not:**
  Touch the burned area

Remove clothing stuck to the skin
Break blister
Use ointments or lotions

IF PESTICIDE ENTERED THE MOUTH BUT WAS NOT SWALLOWED (ORAL EXPOSURE):

Call the Poison Control Centre immediately. If the victim is conscious and not convulsing, rinse the mouth with large quantities of water. Wipe the mouth with a damp cloth and brush teeth thoroughly.

IF PESTICIDE WAS SWALLOWED (ORAL EXPOSURE)

Call the Poison Control Centre immediately.

Some Pesticide labels may give directions to cause vomiting if the pesticide has been swallowed. However, do NOT do this unless a medical person or someone from the Poison Control Centre tell you to do so. In some situations, it may be dangerous to cause the victim to vomit.

Never induce vomiting if:

- The victim is unconscious or in a coma
- The victim is in convulsions
- The victim has a known heart condition
- The victim is pregnant
- The victim swallowed a pesticide containing petroleum products such as an Emulsifiable Concentrate. If these pesticides are aspirated (inhaled into the lungs during vomiting) it will cause respiratory distress and possibly death
- The victim has swallowed a corrosive poison (strong acid or base/alkaline products). Strong acids and bases/alkaline products will burn the throat and mouth. They will also damage the lungs if the victim aspirates during vomiting.
- The victim has swallowed any pesticide belonging to one of the following pesticide classifications:
    - Chlorinated hydrocarbons (also called organochlorine insecticides) for example, endosulfan (Thiodan)
    - Organophosphorous insecticides, for examples, diazinon, azamethiphos (Salmosan)
    - Carbamates, for example, carbaryl (Sevin), bendiocarb (Trumpet)
    - Concentrated dinitrophenols, for examples, dinoseb

Induce (cause) vomiting ONLY under the direction of a medical person or the Poison Control Centre

If the victim does vomit and you don't know what the poison is, be sure to collect some of the vomit for the doctor.

IF PESTICIDES CONTACT EYES (OCULAR EXPOSURE)

- Hold the victim's eyelids open and wash the eyes with large amounts of clean, lukewarm, running water
- Wash for 15 minutes or more
- Contact the Poison Control Centre. The Poison Control Centre staff will tell you about symptoms you should watch for and will tell you if you need to go for medical attention

INHALATION (RESPIRATORY EXPOSURE)

- Move the victim to fresh air
- Loosen tight clothing and remove any clothing contaminated with pesticide. Pesticide on the clothing may harm the rescuer as well as the victim
- Give mouth to mouth rescue breathing if the victim is not breathing. Caution: If the victim's face or mouth has pesticide or vomit on it, protect yourself when you perform artificial respiration, if possible use a protective airway device with a one-way valve. Do not breathe the exhaled air from the victim
- Contact the Poison Control Centre. The Poison Control Centre will tell you about symptoms you should watch for and will tell you if you need to go for medical attention

Information that the medical personnel need to know about a pesticide poisoning is:

- Name of pesticide (active ingredient), label and container if possible
- Type of exposure
- Symptoms
- Registration number (the P.C.P. number on the front panel of the product label)
- Length of exposure or amount ingested
- Age and weight of person exposed
- First aid performed
- Pre-existing medical conditions (check for medical alert bracelet or necklace)

Section 9 Labels/Safety Data Sheets (SDS)

See attached.

Appendix N
Summary of Rankings Analysis for Conceptual Alternatives

Summary of rankings analysis for conceptual alternatives which are scored against the Project's intended purpose with consideration of the environmental, social, economic, and regulatory setting of Mow's Guiding Principles. Note that if a conceptual alternative rates very poorly against a critical environmental, social or economic principle the concept is determined to be unviable.

EIS Guidelines Section 6.2. Environmental Effects	Concepts Directly Impacting the Indian Head Hatchery		Concepts Directly Impacting the Indian Head Hatchery and NL Sea Farms		Concepts Directly Impacting Smolt Supply to NL Sea Farms		
	Conceptual Alternative 1 - Site Selection for the Hatchery Expansion (i.e., Indian Head Site as Proposed)	Conceptual Alternative 2 - Hatchery Expansion (I.E., Flow-through Versus Recirculation)	Conceptual Alternative 7 - No Expansion (i.e., Smolt are Supplied from Outside the Province)	Conceptual Alternative 3 - Site Selection for Grow-out Operations (i.e., Smolt are Exported)	Conceptual Alternative 4 - Source and Selection of Eggs and Broodstock (i.e., Triploid as an Alternative to MCE Programs)	Conceptual Alternative 5 - Land-based Versus Marine-based Options for Salmon Grow-out (i.e., Egg-To-Plate RAS)	Conceptual Alternative 6 - Marine-based Containment Options (i.e., Closed Containment)
MOWI Guiding Principle (Annual Report) – Planet: Freshwater stewardship (Environment)							
a) changes in nearby surface and groundwater quality and quantity resulting from water withdrawals from the Project, including potential effects on industrial and other users of nearby surface water and groundwater aquifers	0	**-3**	+1	0	0	-1	0
b) effects of wastewater/effluent discharge from the hatchery to the receiving environment	0	-2	+1	0	0	-1	0
MOWI Guiding Principle (Annual Report) – Planet: Preserve Biodiversity, Prevent Fish Escapes, Responsible Sea Lice Management, and Responsible Use of Medicines and Chemicals (Environment)							
c) direct and indirect genetic and ecological interactions between escaped farmed salmon and wild Atlantic salmon, including potential health and fitness effects	0	0	-1	-1	+2	-1	-1
d) effects of transfer of disease and parasites between farmed salmon and wild Atlantic salmon, and between farmed salmon and other fish	0	-1	-1	-1	0	-1	-1
e) effect of feed, feces, sea cage deposits (i.e. pesticides, chemotherapeutants, and disinfectants), disease and parasites on the adjacent aquatic environment (i.e. lease area), including possible effects on wild Atlantic salmon and	0	0	-1	-1	0	-1	-1

EIS Guidelines Section 6.2. Environmental Effects	Concepts Directly Impacting the Indian Head Hatchery		Concepts Directly Impacting the Indian Head Hatchery and NL Sea Farms		Concepts Directly Impacting Smolt Supply to NL Sea Farms		
	Conceptual Alternative 1 - Site Selection for the Hatchery Expansion (i.e., Indian Head Site as Proposed)	Conceptual Alternative 2 - Hatchery Expansion (I.E., Flow-through Versus Recirculation)	Conceptual Alternative 7 - No Expansion (i.e., Smolt are Supplied from Outside the Province)	Conceptual Alternative 3 - Site Selection for Grow-out Operations (i.e., Smolt are Exported)	Conceptual Alternative 4 - Source and Selection of Eggs and Broodstock (i.e., Triploid as an Alternative to MCE Programs)	Conceptual Alternative 5 - Land-based Versus Marine-based Options for Salmon Grow-out (i.e., Egg-To-Plate RAS)	Conceptual Alternative 6 - Marine-based Containment Options (i.e., Closed Containment)
other non-target organisms such as wild crustaceans							
f) effects of the Project on marine water quality and benthic characteristics	0	0	-1	-1	0	-1	-1
g) effects of the Project on fish and fish habitat, including significant habitat, which may include invertebrates, crustaceans, corals and sponges, and eelgrass	0	0	-1	-1	0	-1	-1
h) effects on Species at Risk within the study area	0	0	-1	-1	0	-1	-1
i) the potential for proliferation of aquatic invasive species	0	0	0	0	0	0	0
MOWI Guiding Principle (Annual Report) – Planet: Circular Economy and Responsible Waste Management (Environment)							
l) effects associated with the handling of mortalities from operations	0	0	-1	-1	0	-1	-1
MOWI Guiding Principle (Annual Report) – Planet: Efficient and Sustainable Fish Feed (Environment)							
MOWI GRI - Efficient and sustainable fish feed	0	0	0	0	0	0	0
MOWI Guiding Principle (Annual Report) –Planet: Climate Friendly Food Production (Environment)							
MOWI GRI - Climate friendly food production	0	0	-1	-2	0	-1	-1
MOWI Guiding Principle (Annual Report) – Planet: Innovation to Reduce Environmental Impact (Technical)							
MOWI GRI -Innovation to reduce environmental impact	0	**-3**	-2	-1	+2	+3/-2	+2
MOWI Guiding Principle (Annual Report) – Planet: Ensure Fish Health and Welfare (Technical)							
MOWI GRI - Ensure Fish Health and Welfare	0	-2	-1	-1	-2	-1	-1
MOWI Guiding Principle (Annual Report) – Planet: Resilient Breeding Program (Technical)							
MOWI GRI - Resilient breeding program	0	0	0	0	-2	0	0

EIS Guidelines Section 6.2. Environmental Effects	Concepts Directly Impacting the Indian Head Hatchery		Concepts Directly Impacting the Indian Head Hatchery and NL Sea Farms		Concepts Directly Impacting Smolt Supply to NL Sea Farms		
	Conceptual Alternative 1 - Site Selection for the Hatchery Expansion (i.e., Indian Head Site as Proposed)	Conceptual Alternative 2 - Hatchery Expansion (I.E., Flow-through Versus Recirculation)	Conceptual Alternative 7 - No Expansion (i.e., Smolt are Supplied from Outside the Province)	Conceptual Alternative 3 - Site Selection for Grow-out Operations (i.e., Smolt are Exported)	Conceptual Alternative 4 - Source and Selection of Eggs and Broodstock (i.e., Triploid as an Alternative to MCE Programs)	Conceptual Alternative 5 - Land-based Versus Marine-based Options for Salmon Grow-out (i.e., Egg-To-Plate RAS)	Conceptual Alternative 6 - Marine-based Containment Options (i.e., Closed Containment)
MOWI Guiding Principle (Annual Report) – People: Local Jobs and Value Creation (Economic)							
MOWI GRI - Local jobs and value creation	0	-1	**-3**	-2	-2	0	0
j) effects of the Project on commercial, recreational and Indigenous fisheries	0	0	0	0	0	0	0
k) effects of the Project on tourism and recreational activities	0	0	0	0	0	0	0
MOWI Guiding Principle (Annual Report) – People: Promote Smart and Predictable Regulations (Regulatory)							
MWI GRI - Promote smart and predictable regulations	0	-2	-1	**-3**	**-3**	**-3**	**-3**
MOWI Guiding Principle (Annual Report) – Product: Ensure Healthy and Safe Seafood (Market)							
Ensure healthy and safe seafood	0	0	0	0	0	-1	0
MOWI Guiding Principle (Annual Report) – Product: Third-Party Certification (Market)							
MOWI GRI - Third-Party Certification	0	-2	0	-1	0	0	0
MOWI Guiding Principle (Annual Report) – Profit: Reliable Shareholder Return, Optimal Capital Structure, and Long-term Investment and Planning (Economic)							
MOW GRI - Reliable shareholder return, Optimal capital structure, and long-term investment and planning	0	**-3**	-2	**-3**	**-3**	**-3**	**-3**
m) effects of increasing salmon hatchery capacity in the province	0	0	-2	**-3**	0	**-3**	**-3**

Appendix O
MCE Hatchery Effluent Modelling in St. George's Bay, NL

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www.bmt.org

Technical Note

Project:	003402.001_Mowi_Nearfield_Modelling		
BMT Ref:	31333		
From:	Gayan Gunaratne, Louise Bruce and Jaret Fattori		
Date:	19/11/2024	To:	Jonathan Kawaja, Malcolm Gibson and Aaron Bennett
Doc Ref:	Near Field Mixing Model		
Subject:	Near-Field Mixing Model for Stephenville Hatchery Effluent Discharge		

Contents

Tables

Figures

1 Introduction

In support of the Mowi Canada East (MCE) and Northern Harvest Smolt Inc. (NHSI) development and expansion of the Indian Head Hatchery in Stephenville, Newfoundland and Labrador, Canada, BMT has developed a model for the jet dispersion of the pipeline discharge into St George's Bay. The aim of this model is to visually represent the expected near-field effects of the effluent discharge and the expected maximal radius at which end dilution is expected to be reached. This model uses Visual Plumes (VPlumes, Frick, et al., 2003), a numerical Updated Merge three-dimensional (UM3) model for the plume dispersion of material from diffusers and discharge pipes.

1.1 Study Area

The pipeline described is used by MCE to facilitate the safe disposal of waste material from the Indian Head Hatchery into the Port of Stephenville. The pipeline outfall is located at (48° 31' 53.8" N, 58° 33' 37.5" W) as shown in Figure 1.1. The local ocean topography in St George's Bay appears to be highly variable in the Stephenville region, with the shelf (Figure 1.1) having a number of features including a trough reaching depths above 100 m to the south of the outfall location (NCEI, 2024).

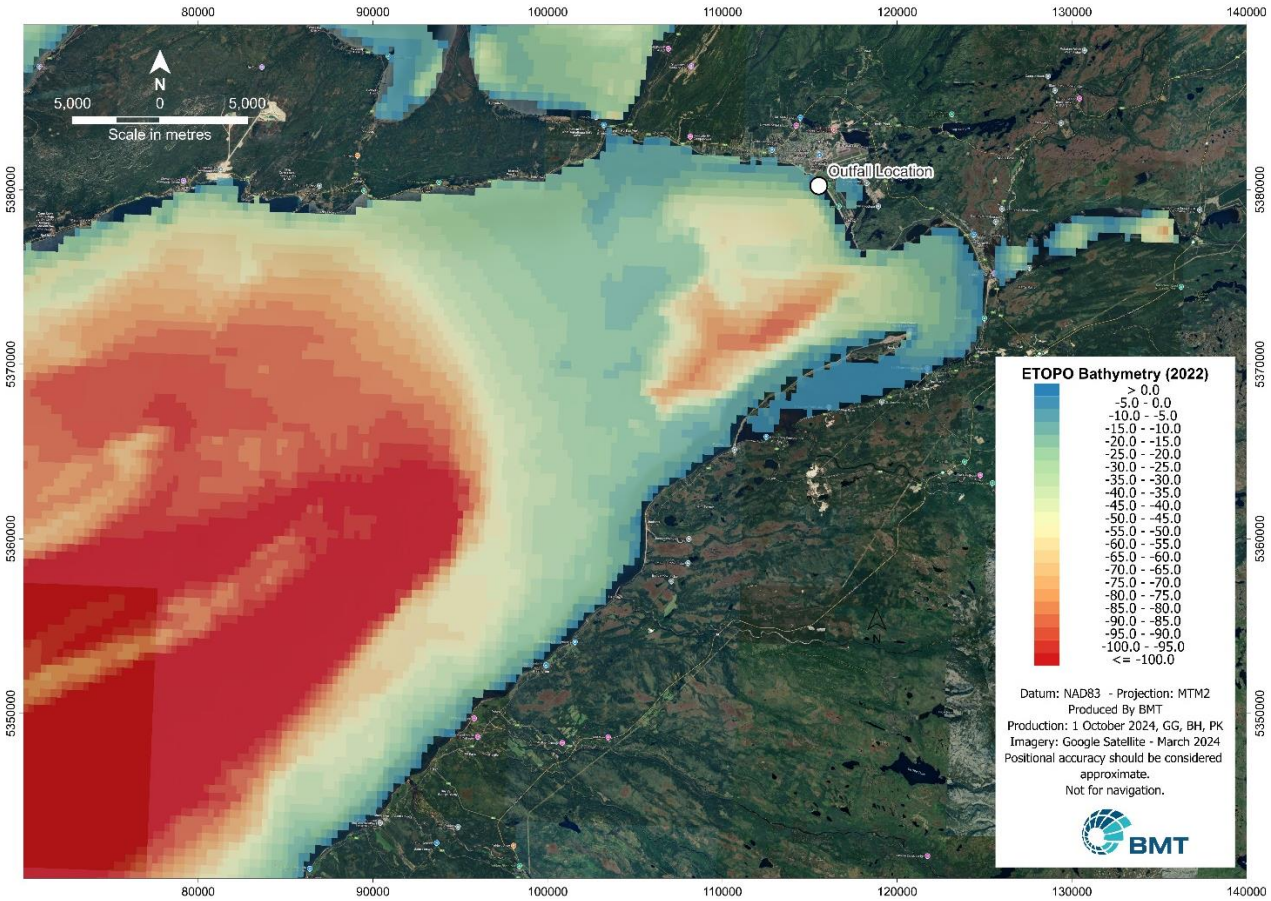

Figure 1.1 Discharge Location and Bathymetry at St George's Bay, Newfoundland, Canada

Discharge Properties

Properties of the outfall discharge are listed in Table 1.1 as provided by MCE.

Table 1.1 Stephenville Discharge Plume Parameters

Discharge Pipe Diameter (m)	Depth at Outfall (m)	Effluent Temperature (°C)	Flow Rate (LPM)	Flow Rate (m^3 / s)
0.5	6	10	7,000	0.117

In addition to the above parameters the following assumptions were made based on provided information:

- The axis of the outfall was taken to be 0.3 m above the bed (assuming half of the pipe radius and a further 0.05 m clearance); and
- The dilution was treated as a freshwater plume with entrained material of a similar density.

1.2 Selected Model Parameters

1.2.1 Ambient Current Speeds

Due to the unavailability of ambient current speed data for the discharge area, alternative data sources were considered. These included Hybrid Coordinate Ocean Mode (HYCOM) regional oceanographic model and Acoustic Doppler Current Profiler (ADCP) measurements from the Broad Cove farm site. Broad Cove is an embayment located south coast of Newfoundland and Labrador.

Limitations of using HYCOM currents for near-field modelling include:

- HYCOM data is provided at low resolution and interpolated between grid points, making it less effective at capturing local variations in coastal regions, such as tidal and swell currents in embayments like Broad Cove and St. George's Bay; and
- Local features, such as localised troughs, are not well represented in the HYCOM dataset.

To understand variations in current speed between HYCOM and measured data, a factor of time exceedance for current speeds, based on ADCP and HYCOM data at the Broad Cove site, was plotted for the ADCP observation period (2023/04/21 to 2023/08/03) (Figure 1.2). Although HYCOM underestimated some of the local measured flows, the range was similar. In St. George Bay, the range of HYCOM ambient current speeds from 0 m / s to 0.3 m / s, was deemed suitable for use as input for the VPlumes simulation under both co-flow and counter-flow conditions.

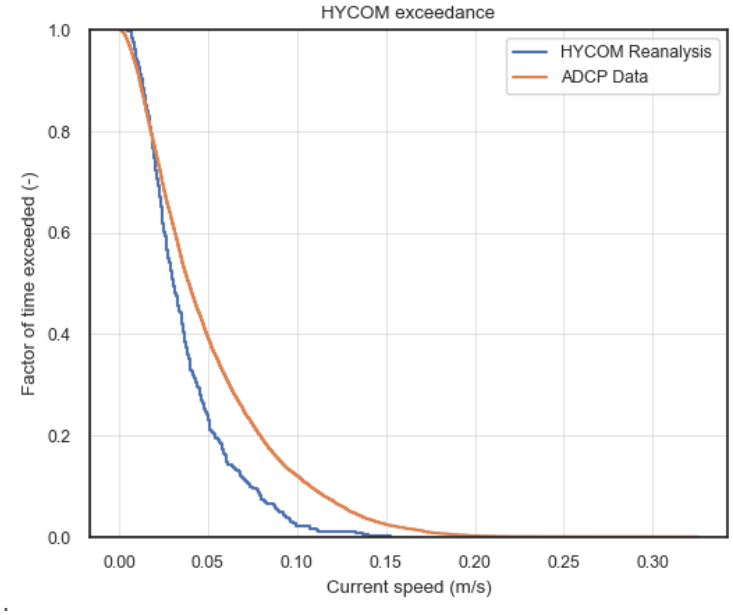

Figure 1.2 Factor of Time Exceedance for Current Speeds at Broad Cove

1.2.2 Salinity

HYCOM estimated salinity of between 31.5 PSU and 32.5 PSU were extracted from the selected outlet location. A study into the expected conditions from 2021 by the Canadian Science Advisory Secretariat (CSAS) indicate a similar range of salinity in the Gulf falling between 31.5 PSU and 33.5 PSU (Cyr, et al., 2022). On the basis of these parameters, a salinity of 32 PSU was selected for the VPlumes simulation.

The freshwater discharge at the outfall location was represented by a salinity of 1 PSU.

1.2.3 Water Temperature

Temperatures were provided by MCE as a maximum temperature during Summer (17.8°C) and Winter (-1.6°C). From Roberts et al. (1997), the near-field dilutions inversely scale as function of the discharge Froude number (*Fr*). From this relationship, analysis of the historical temperature and salinity data presented that winter density conditions constituted marginally reduced dilutions, and were subsequently used for the basis of the near-field modelling (Roberts, Ferrier, & Daviero, 1997).

1.3 Model Setup

A total of 14 VPlumes runs were performed to inform dilutions in the nearfield. The simulations adopted fixed discharge and densiometric properties, with cases distinguished by various flow velocities (co-flow – positive sign, and counter-flow – negative sign), ranging from a quiescent case (0 m / s) to a dynamic condition (0.3 m / s) at 0.05 m / s velocity increments. Simulations adopted a uniform receiving water column, representing a well-mixed environment. Discrete steady-state simulations were conducted for each discharge scenario using the UM3 module in VPlumes.

A Brooks far field model was applied to further estimate the advection of the plume at the given velocity. The VPlumes Manual (Frick, et al., 2003) postulates that the VPlumes default far-field dispersion coefficient of 0.0003 $m^{2/3}s^{-1}$ is overly conservative in coastal contexts. For this reason, the coastal coefficient of 0.0005 $m^{2/3}s^{-1}$ was adopted with the goal of more accurately portraying the dispersion expected in the far-field up to a range of 100 metres.

2 Results

2.1 VPlumes - UM3 Module Results

When ambient current directions oppose the discharge flow (counter-flow), the plume can reach a dilution factor of up to 40 at a current speed of 0.3 m / s (Figure 2.1). In contrast, under co-flow conditions with the same ambient current speed of 0.3 m / s, the dilution exceeds 40 (Figure 2.2). During quiescent conditions, the dilution is minimal compared to both co-flow and counter-flow scenarios (Figure 2.3).

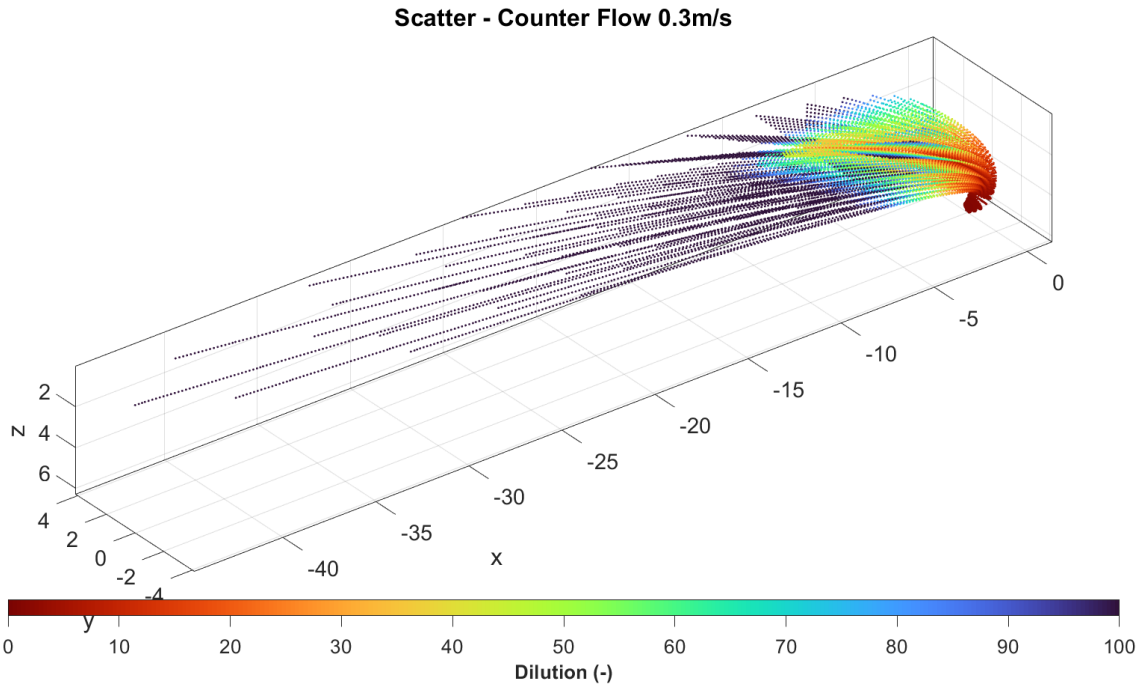

Figure 2.1 Dilution Factor Distribution at 0.3 m / s Counter-Flow Ambient Current Speed

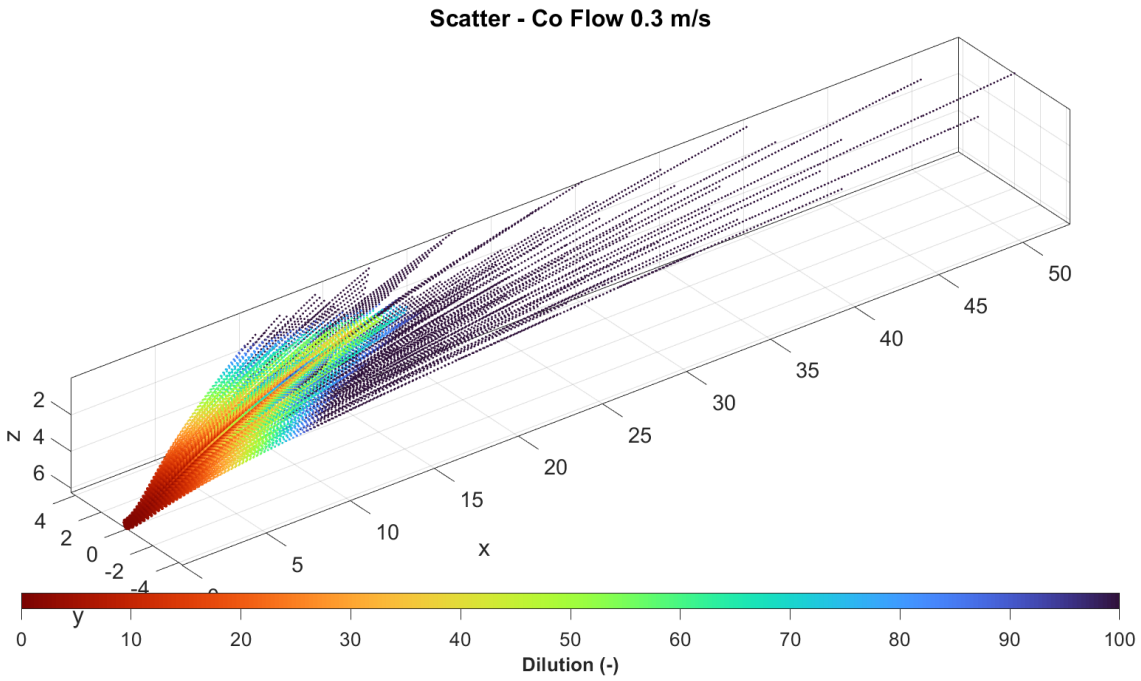

Figure 2.2 Dilution Factor Distribution at 0.3 m / s Co-Flow Ambient Current Speed

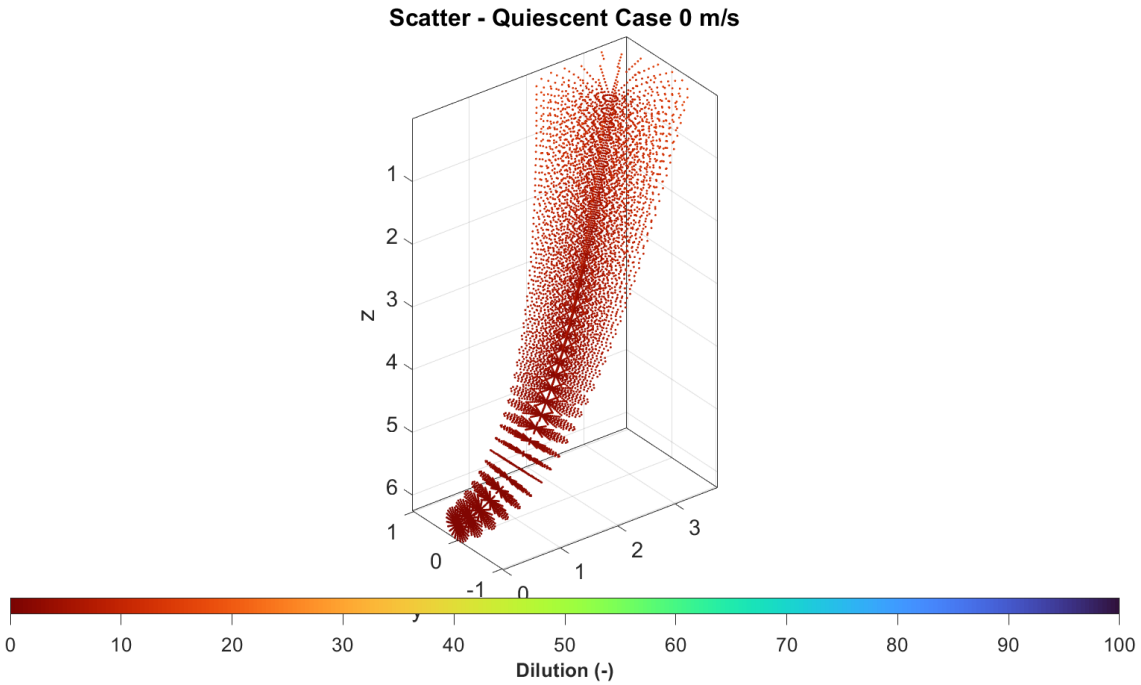

Figure 2.3 Dilution Factor Distribution at Quiescent Ambient Conditions

Table 2.1 presents the near-field model results for dilution factors under two seasonal conditions, focusing on cases where the plume reaches the water surface (positively buoyant). Higher ambient current speeds lead to greater dilution due to increased dispersion. For instance, with an ambient current speed of 0.3 m / s, the dilution plume achieved a factor of 41.9 at a distance of 7.5 m from the discharge point. Dilution is slightly lower in winter compared to summer, attributed to the temperature difference between the discharge effluent and the ambient water.

Table 2.1 Mean Dilution Factor Where the Plume Reaches the Water Surface

Speed	Winter		Summer	
	Dilutions	X-Position (m)	Dilutions	X-Position (m)
0 m / s	10.3	2.6	10.1	2.8
0.05 m / s	10.3	3.1	10.2	3.3
0.1 m / s	13.5	3.7	13.5	4.0
0.15 m / s	18.4	4.4	18.8	4.7
0.2 m / s	25.5	5.3	26.2	5.6
0.25 m / s	33.1	6.2	34.3	6.7
0.3 m / s	41.9	7.5	42.8	8.1

2.2 VPlumes – Brooke's Far-Field Results

Using Brooke's far-field approach, dilution in the intermediate and far-field was calculated up to 100 m from the discharge location. Table 2.2 presents the results from Brooke's far-field model, showing dilution factors under two seasonal conditions. Higher ambient current speeds result in increased dilution due to greater dispersion and advection. Dilution is slightly lower in winter compared to summer, primarily due to the temperature difference between the discharge effluent and the surrounding ambient water.

Table 2.2 Dilution Plume Radii for Different Ambient Current Speeds

Speed	Winter		Summer	
	50 m	100 m	50 m	100 m
0.05 m / s	21.1	29.3	20.7	28.8
0.1 m / s	19.8	26.5	19.7	26.2
0.15 m / s	22.6	28.8	22.9	29.1
0.2 m / s	28.4	34.5	29	35.2
0.25 m / s	35.1	41	36.2	42.2
0.3 m / s	43.2	48.8	44.1	49.7

3 Conclusion

3.1 Results Summary

Based on the VPlumes simulations, BMT determined the following:

- The effluent plume is positively buoyant, rising to the surface of the water column before reaching the point of full dilution in all modelled cases;
- After the plume reaches the surface, advection was modelled up to a distance of 100 m;
- In the far-field, after the plume reaches the surface, estimating advection patterns using tools like VPlumes becomes challenging;
- Results suggest that achieving full dilution would require monitoring over a greater distance beyond 100 m;
- The monitoring range depends on:
  - The specific composition of the effluent discharge at any given time; and
  - A more precise assessment of local metocean conditions in St. George's Bay.

3.2 Limitations and Recommendations

- While VPlumes and the Brooks model offer preliminary, time-efficient estimates of effluent dilution, they are mainly useful for establishing a limited dilution range in the near-field;
- These models are limited in their applicability when the bed or surface is immediately impacted by the plume, such as in cases of significant positive or negative buoyancy in the discharge;
- The UM3 VPlumes solver is particularly limited in representing the mixing dynamics in intermediate and far-field mixing zones;
- For more detailed information on specific dilution values, further analysis is recommended, particularly for far-field dispersion; and
- Additional modelling using global hydrodynamic models (e.g., TUFLOW FV) or dedicated computational fluid dynamics (CFD) analysis may be necessary if MCE requires greater precision to capture the nature of dispersion further from the outfall location.

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Appendix P
Additional Non-bird SAR Information for the Terrestrial Environment

Appendix P
Additional Non-bird SAR Information for the Terrestrial Environment

1.0 Introduction

The Project's terrestrial components include the Hatchery site (and its associated wells and infrastructure). The site is in the Port of Stephenville Industrial Park, which was cleared of vegetation prior to the initiation of the Project. There will be no additional clearing, grubbing, or levelling of the Hatchery site or new road construction to access sea farms. Existing conditions at the Hatchery's already cleared site are not considered suitable habitat for terrestrial flora or fauna, including SAR insects, terrestrial mammals, or amphibians. Although it is not expected, it is possible that some at-risk terrestrial fauna may periodically occur there.

Terrestrial non-bird species/populations that may potentially, periodically occur in and near the Hatchery site and are listed/designated under Schedule 1 of the *Species at Risk Act* (SARA), by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and/or under the Newfoundland and Labrador (NL) *Endangered Species Act* (ESA; i.e., assessed by the Species Status Advisory Committee) are provided in Table 1.1. Candidate species under consideration by COSEWIC are also listed, and S-ranks designated by the Atlantic Canada Conservation Data Centre are provided for the island of Newfoundland.

Table 1.1. SARA- and ESA-listed and COSEWIC-designated non-bird terrestrial species/populations that may periodically occur in or near the Hatchery site.

Common Name	Scientific Name	Status			
		SARA [1]	COSEWIC [1]	ESA [2]	S-Ranks [3]
Plants					
Lindley's aster	*Symphyotrichum ciliolatum*			E	S2
Black ash	*Fraxinus nigra*	UC	T	T	S2S3
Insects					
Gypsy Cuckoo Bumble Bee	*Bombus bohemicus*	E	E	E	S1?
Yellow-banded bumble bee	*Bombus terricola*	SC	SC	V	S3S4
Transverse Lady Beetle	*Coccinella transversoguttata*	SC	SC	V	SU
Mammals					
Little brown myotis	*Myotis lucifugus*	E	E		S1S3
Northern myotis	*Myotis septentrionalis*	E	E		S1S3
Eastern red bat	*Lasiurus borealis*	UC	E		SNA
Hoary bat	*Lasiurus cinereus*	UC	E		SUM
Silver-haired bat	*Lasionycteris noctivagans*	UC	E		SNR
Caribou (Newfoundland population)	*Rangifer tarandus*	SC	SC		S3S4
Candidate Species [4]					
n/a	*Trematodon longicollis*		LPC		–
Suckley's Cuckoo Bumble Bee	*Bombus suckleyi*		HPC		S2?
American toad	*Anaxyrus americanus*		LPC		SNA

Source: [1] GC (2025); [2] FFA (2025); [3] A. Durocher, Data Manager, Atlantic Canada Conservation Data Centre, pers. comm. 28 March 2025; [4] COSEWIC (2025).

Notes:

E = Endangered; T = Threatened; SC = Special Concern; V = Vulnerable; UC = under consideration for addition to Schedule 1 of SARA; HPC = High Priority Candidate; MPC = Mid Priority Candidate; LPC = Low Priority Candidate.

S-Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S5 = Secure; SNR = Unranked (i.e., not yet assessed); SU = Unrankable (i.e., due to lack of information or conflicting status/trend information); SNA = Not Applicable (i.e., species not a suitable target for conservation activities); S#S# =: Range Rank (i.e., numerical rank indicating range of status uncertainty); SH = Possibly Extirpated; B = Breeding; N = Nonbreeding; M = Migrant; ? = Inexact or Uncertain numeric rank; "-" = no S-Rank (ACCDC (2025). S-Ranks based on latest Atlantic Canada Conservation Data Centre NL revision (18 February 2025); S-Ranks are for the island of Newfoundland – Labrador S-Ranks differ.

2.0 Recovery Strategies, Action Plans, and Management Plans for non-Bird Species at Risk

Final recovery strategies have been prepared for three non-bird terrestrial species/populations currently with *Endangered* or *Threatened* status under Schedule 1 of SARA that have potential to occur in or near the Hatchery site: (1) little brown myotis; (2) northern myotis; and (3) gypsy cuckoo bumble bee (DFO 2024). No action plans have been created for non-bird terrestrial at-risk species/population that apply to the Hatchery site (DFO 2024). One management plan has been prepared for terrestrial species/populations designated as *Special Concern*: (1) yellow-banded bumble bee (DFO 2024).

3.0 Profiles of Non-bird Terrestrial Species/Populations listed as Endangered, Threatened, Special Concern, or Vulnerable under Schedule 1 of SARA, the ESA, and/or COSEWIC

Only those species and/or populations listed as *Endangered* or *Threatened* under Schedule 1 of SARA and/or under the ESA receive immediate legal protection (GC 2014). The legal prohibitions protecting species/populations listed as *Endangered* or *Threatened* under Schedule 1 of SARA or the ESA do not apply to those listed as *Special Concern* under Schedule 1 of SARA or as *Vulnerable* under the ESA (ECCC 2007; GC 2014). However, provisions related to environmental assessments, including the identification of species at risk, critical habitat and mitigation, monitoring, and notification of appropriate ministers if a project is likely to affect a listed species or its critical habitat, apply to all species listed under Schedule 1 of SARA, including species of *Special Concern* (GC 2014). Profiles for terrestrial plant, insect, and mammal species at risk that may periodically occur in or near the Hatchery site are included in this section. Candidate species do not receive legal protection and are not described further here.

3.1 Plants

Two at-risk terrestrial plant species under Schedule 1 of SARA, the ESA, and/or designated by COSEWIC that may occur in or near the Hatchery site are briefly profiled below (see Table 4.38 in LGL 2025, Volume 1).

3.1.1 Lindley's Aster

Lindley's aster is listed as *Endangered* under the ESA. It is a clumping perennial. In Newfoundland, it is found in the Stephenville-St. George's Bay area and the central Port au Port Peninsula (DFFA 2024). Its generalized habitat is rich, open, often calcareous deciduous forest, i.e., aspen or aspen-birch-fir-spruce. It is also found in clearings, woodland edges, aspen thickets, open pine forests, trails, streambanks, and roadsides. It can be found at elevations ranging from 0–2000+ m.

3.1.2 Black Ash

Black ash is designated as *Threatened* by COSEWIC, is under consideration for addition to Schedule 1 of SARA, and is listed as *Threatened* under the ESA. It is found from western Newfoundland to southeastern Manitoba and North Dakota, south to Iowa, Illinois, Virginia, and Delaware (COSEWIC 2018). In Newfoundland, it is distributed from the head of St. George's Bay north to Bonne Bay and northeast to Springdale, where it tends to be associated with Ordovician, Devonian, and Carboniferous bedrock with high pH. Black ash is primarily found in swamps, floodplains, and fens and is most abundant in more alkaline sites. It is also found at lower densities in moist upland forests. The Canadian population is estimated at about 162 million mature individuals. A decline in the size of this population has been inferred from substantial ash mortality from the introduced emerald ash borer in southern Ontario and Quebec. Declines due to unknown disease are also suggested in the Maritime Provinces. The primary threats to this species are emerald ash borer, the undetermined pathogen(s) in the Maritime Provinces, and climate change.

3.2 Insects

Three at-risk insect species may periodically occur in or near the Hatchery site and are described below (see Table 4.38 in LGL 2025, Volume 1).

3.2.1 Gypsy Cuckoo Bumble Bee

Gypsy cuckoo bumble bee is listed/designated as *Endangered* under Schedule 1 of SARA and COSEWIC. It is an obligate social parasite of other North American *Bombus* sp. bumble bees and, while it has historically been recorded from all Canadian provinces and territories except Nunavut, this species was only reported from Ontario, Quebec, and Nova Scotia between 1991–2013 (COSEWIC 2014a) and only from British Columbia, Alberta, Northwest Territories, and Yukon between 2014-2018 (ECCC 2022). Its current status in NL is either unknown or presumed extirpated (see Figure 2 in ECCC 2022). It utilizes a variety of habitats ranging from meadows and farmlands to urban areas and boreal forest (COSEWIC 2014a). This bee parasitizes host nests in rotten logs or abandoned, underground rodent burrows during the spring, with emergence occurring a bit later than the timing of the host queen (COSEWIC 2014a). Unlike other bumble bee species, this species does not produce workers; rather, a mated female kills/subdues a host queen and lays eggs that are then tended by host colony workers (COSEWIC 2014a). Bees emerge from the host nest during late summer or fall to mate, and then mated females choose their overwintering site; both males and egg-laying females of that generation die once the cold, winter weather begins (COSEWIC 2014a). Threats to the gypsy cuckoo bumble bee include population declines of their host bumble bee species, pesticides, pathogens, and habitat loss due to anthropogenic activities (COSEWIC 2014a).

3.2.2 Yellow-banded Bumble Bee

Yellow-banded bumble bee is listed/designated as *Special Concern* under Schedule 1 of SARA and by COSEWIC. In Canada, it is found from Newfoundland to eastern British Columbia, southeastern Yukon, and southern Northwest Territories (COSEWIC 2015). Its habitats include mixed forest, urban areas, montane meadows, prairie grasslands, and boreal vegetation communities. It nests primarily underground in natural cavities, such as rodent burrows and in rotten logs. Queens overwinter in similar locations. In the past, this species typically made up >20% of bumble bee species collected. However, this proportion decreased to <4% in more recent studies. An average reduction of 66.5% in proportional abundance was found for nine of ten sites analyzed across southern and central Canada. Threats to yellow-banded bumble bee are not known, but potential threats include introduced pathogens from managed bumble bees, pesticides, climate change, and habitat loss (COSEWIC 2015).

3.2.3 Transverse Lady Beetle

Transverse lady beetle is listed/designated as *Special Concern* under Schedule 1 of SARA and by COSEWIC. It occurs throughout Canada and the U.S. in habitats such as agricultural areas, gardens, parks, and various other natural areas, where their prey varies with seasonal availability, although mainly consists of aphids (COSEWIC 2016). Each year, this species can produce two generations: if necessary, the spring generation can avoid high summer temperatures by entering aestivation (i.e., torpor/dormancy during a hot or dry period) and lay eggs in early fall; adults of the fall generation overwinter/diapause in a congregation and mate in early spring (COSEWIC 2016). Although highly mobile with low site fidelity, this species is non-migratory (COSEWIC 2016). Threats to this species include predation by other fauna, parasites, pathogens, and possibly invasive species or habitat loss through anthropogenic activities (COSEWIC 2016).

3.3 Mammals

Six terrestrial at-risk mammal species may periodically occur in or near the Hatchery site and are described below (see Table 4.38 in LGL 2025, Volume 1).

3.3.1 Little Brown Myotis

Little brown myotis is listed/designated as *Endangered* under Schedule 1 of SARA and by COSEWIC. It is distributed across Canada from Newfoundland to British Columbia, south of the tree line (COSEWIC 2013). In Newfoundland, its range covers the entire island. This species forages over water, along watercourses, forest edges, and forest gaps within commuting distance of maternity colonies. The latter are found in buildings or large-diameter trees. Little brown myotis usually avoids clearcuts or large, open fields. It hibernates in cold, humid caves and mines. This species' population size in Canada is not known but may have been over one million

individuals prior to the appearance of White-nose Syndrome (WNS) in 2010. The proportion of the Canadian population affected by WNS is also unknown. At hibernacula with pre- and post-WNS data, the recorded declines for combined *Myotis* spp. have been 94% when totalled for Ontario, New Brunswick, Nova Scotia, and Quebec. Summer data show similar trends. Threats to this species include WNS, colony eradication, chemical contamination, change in forest structure, and wind turbines (COSEWIC 2013). WNS has been detected in Stephenville Crossing (DFFA 2021). Critical habitat (hibernacula) for little brown or northern myotis has been designated in the White Bay area of Newfoundland, but none has been designated near the Hatchery site (ECCC 2018).

3.3.2 Northern Myotis

Northern myotis is listed/designated as *Endangered* under Schedule 1 of SARA and by COSEWIC. It is found across the forested parts of Canada, south of the tree line (COSWEC 2013d). This species is found over much of the island of Newfoundland and throughout south-central Labrador. Like little brown myotis, northern myotis forages along waterways, forest edges, and in forest gaps, generally avoiding large, open fields and clearcuts, and commutes to maternity colonies in large-diameter trees. It overwinters in cold, humid caves and mines. Its population size in Canada is unknown but likely numbered over one million individuals preceding the arrival of WNS. As discussed above for little brown myotis, catastrophic declines for *Myotis* spp. combined have been recorded since the appearance of WNS at hibernacula for which data are available. Northern myotis is susceptible to those threats discussed above for little brown myotis. No critical habitat for either species of myotis has been designated near the Hatchery site (ECCC 2018).

3.3.3 Eastern Red Bat

Eastern red bat (*Lasiurus borealis*) is designated as *Endangered* by COSEWIC and is currently under consideration for addition to Schedule 1 of SARA. It is known from all provinces except Prince Edward Island, but its status in the territories is poorly understood (COSEWIC 2023). It is uncommon in the Atlantic provinces and has been recently recorded in Newfoundland. It is a long-distance migrant, with most individuals overwintering in the southeastern U.S. It is found in both deciduous and coniferous forests, although it prefers deciduous trees in some parts of its range. Roost trees are tall and have large diameters. This species forages in both forest and open habitat, above and within the forest canopy, and in early and later stage forest successional states. The population size of eastern red bat in North America is thought to be similar to that of hoary bat (see Section 3.3.4), which has been estimated at 2.25 million individuals. A decline in the size of this population is suggested by declining capture rates, annual rabies submissions, fatality rates at wind turbines, and acoustic detection rates. The most important threats to this species are wind energy development and the decline of insect prey populations.

3.3.4 Hoary Bat

Hoary bat is designated as *Endangered* by COSEWIC and is currently under consideration for addition to Schedule 1 of SARA. It is found in all provinces and territories, although it is uncommon in the Atlantic provinces (COSEWIC 2023). Most individuals from Canada undertake long-distance migration out of the country. This species is found in deciduous and coniferous forest, preferring to forage in open areas. As a result, its habitat includes wetlands, grasslands, and open fields with patchy trees. It roosts in tall, large-diameter trees. The population size of hoary bat is estimated to be 2.25 million individuals. Declining population size has been inferred from changes in capture rates, annual rabies submissions, fatality rates at wind turbines, and acoustic detection rates. Threats to hoary bat are thought to consist primarily of wind energy development and declining insect populations. At wind farms in the Atlantic Provinces, it is the most common species of migratory bat found dead.

3.3.5 Silver-haired Bat

Silver-haired bat is designated as *Endangered* by COSEWIC and is currently under consideration for addition to Schedule 1 of SARA. In Canada, it is distributed primarily from Nova Scotia to British Columbia and northward into the Northwest Territories and Yukon (COSEWIC 2023). It has recently been detected in Newfoundland. Individuals in Canada largely migrate out of the country for the winter. This species is found in forests, where it roosts in large-diameter trees under bark or in cavities. Foraging takes place in young and old forest, canopy gaps, forest edges, and intact forest. Riparian areas are used during migration. Silver-haired bat's population in North America is estimated to be similar to that of hoary bat (see Section 3.3.4), i.e., 2.25 million individuals. Like hoary and eastern red bat, this species' population size is thought to be declining because declines have been seen in rates of capture, annual rabies submissions, wind turbines fatalities, and acoustic detections. Like eastern red (see Section 3.3.3) and hoary bats, silver-haired bat is thought to be threatened by wind energy development and declining insect prey populations.

3.3.6 Caribou (Newfoundland population)

Caribou is listed/designated as *Special Concern* under Schedule 1 of SARA and by COSEWIC and has ecological, economical, and cultural significance for much of Canada (COSEWIC 2014b). Across its geographic range, this species demonstrates ecological, behavioural, and morphological variations which led to the determination of several subspecies and ecotypes (COSEWIC 2014b). The Newfoundland population is one of 12 Canadian caribou Designatable Units (DUs) and is divided into 14 sub-populations, including the Port-au-Port sub-population, with a total extent of occurrence of 112,000 km^2 (COSEWIC 2014b). Caribou of this DU inhabit coniferous forests year-round (COSEWIC 2014b). Such forests have shallower snow and less crust than open areas during winter, features that provide greater access to the caribou's primary food, ground lichen (*Cladina* and *Cladonia* spp.; COSEWIC 2014b). However, during snow-free seasons, wetlands, barren lands, and shrub lands are generally preferred (COSEWIC 2014b). After the

1990s, caribou of this DU began avoiding cutovers and forests and shifted to greater use of barrens, shrubs, and wetlands (COSEWIC 2014b). As of 2021, the Newfoundland population is estimated at 27,115 individuals (GNL 2024). Threats to this DU include predation, energy production, hunting, logging, recreation, forage limitation, and invasive species (COSEWIC 2014b).

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Appendix Q
Select Hatchery Schematics

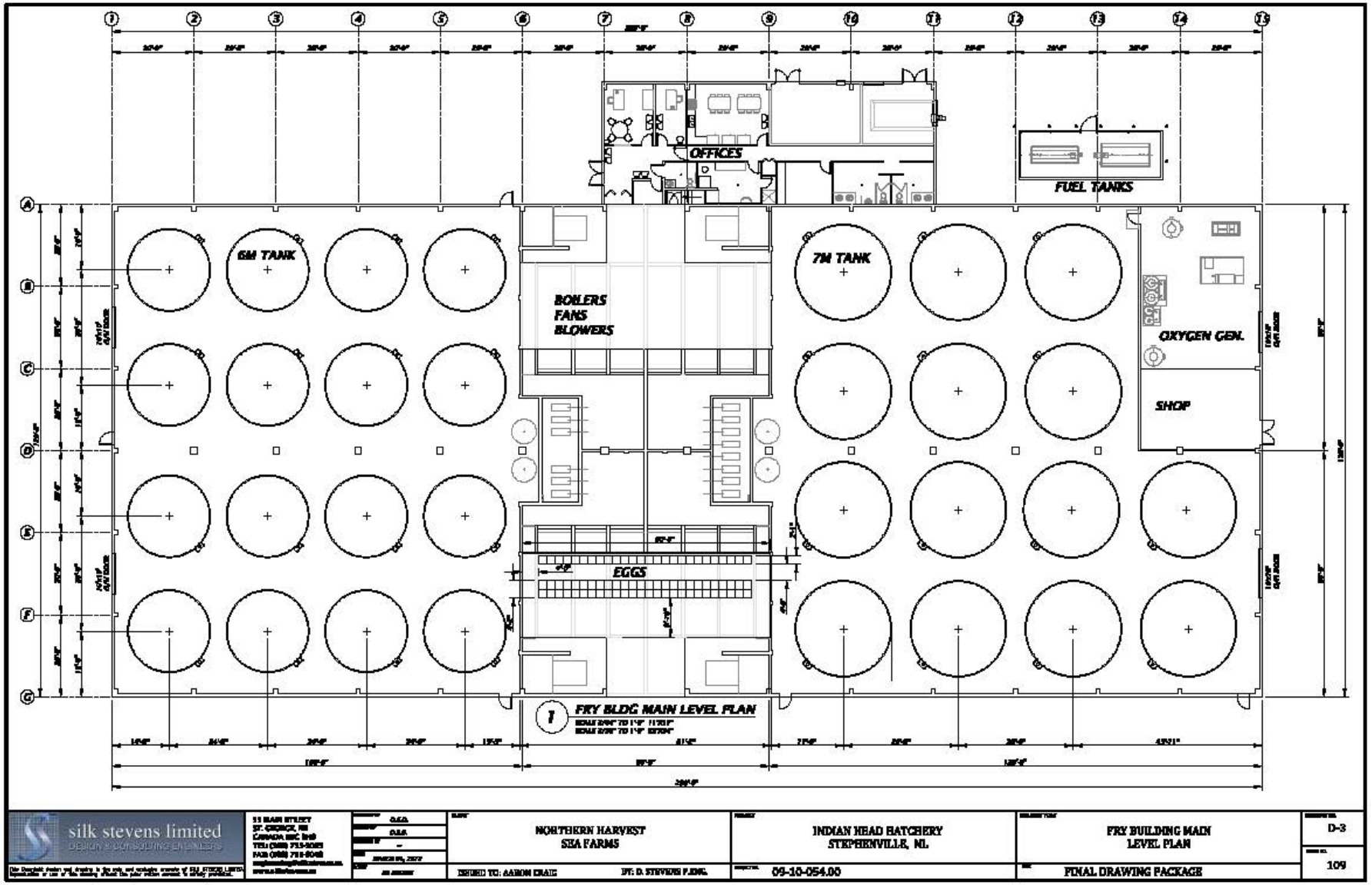

Figure 2.8. Schematic of “Fry” Building (pre-2018).

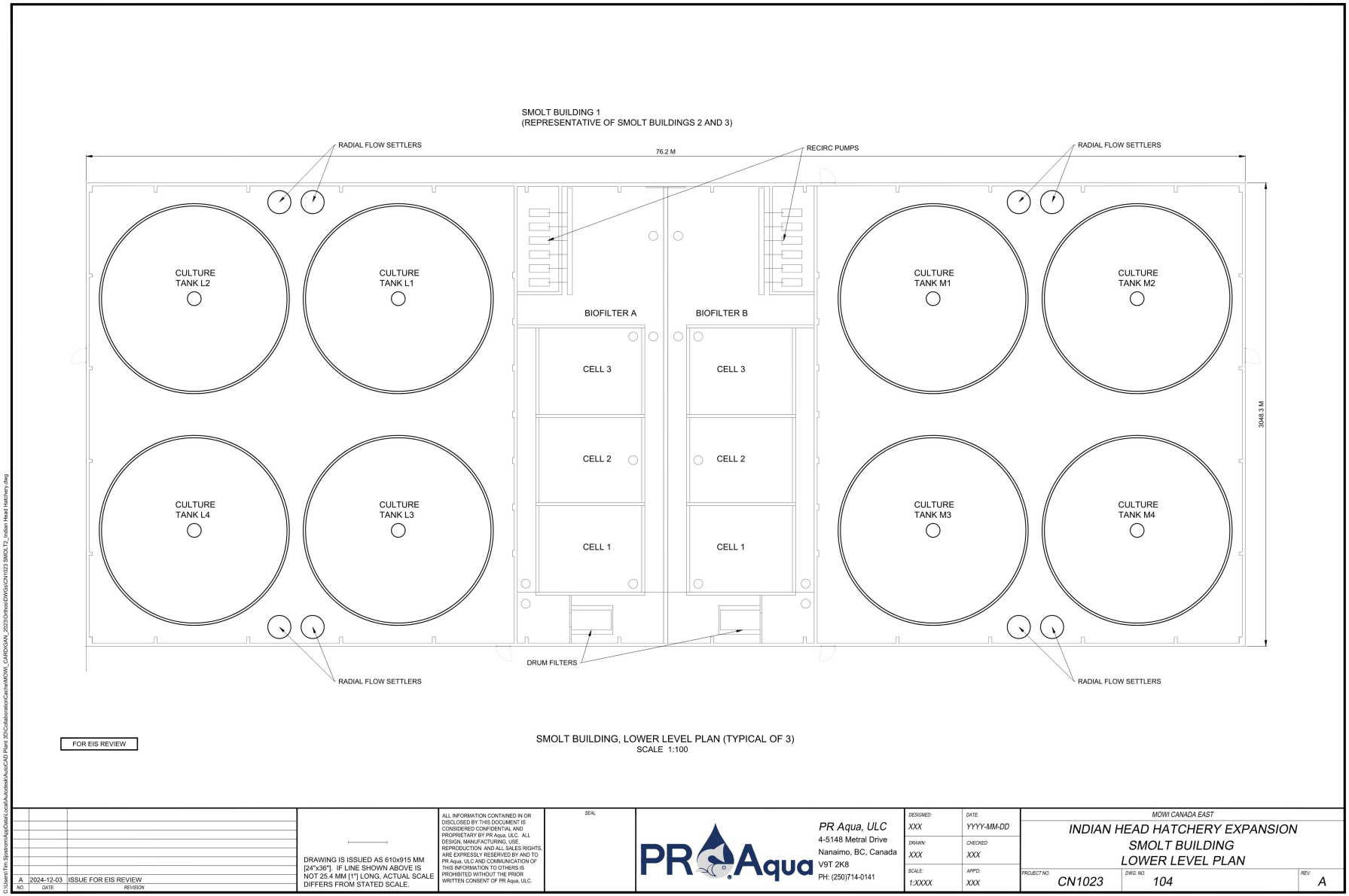

Figure 2.9. Schematic of Smolt Building 1. Smolt Buildings 2 and 3 have a similar layout.

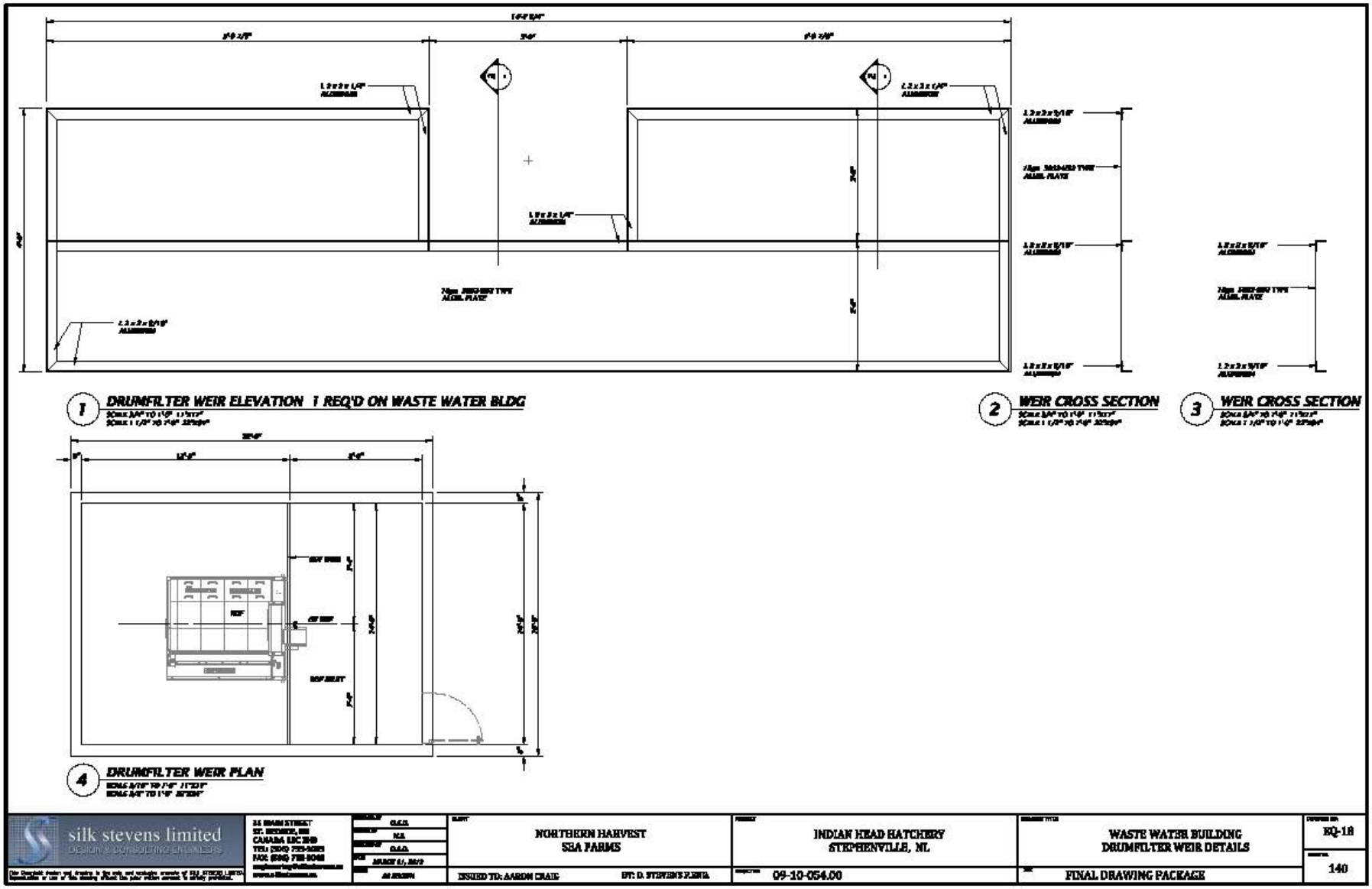

Figure 2.10. Schematic of Effluent Treatment Building No. 1.

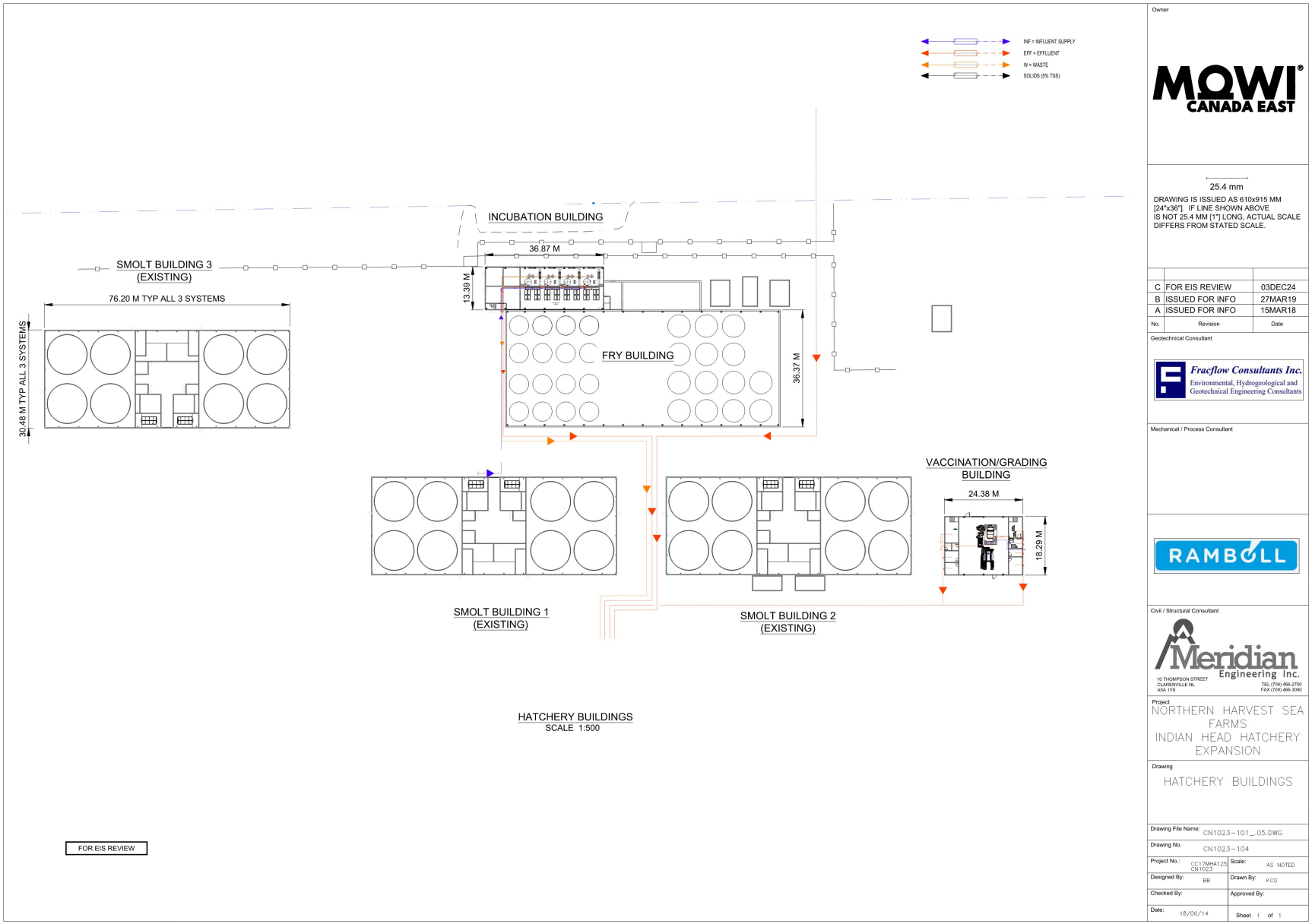

Figure 2.11. Schematic of “Fry” and Smolt Buildings (post 2018).

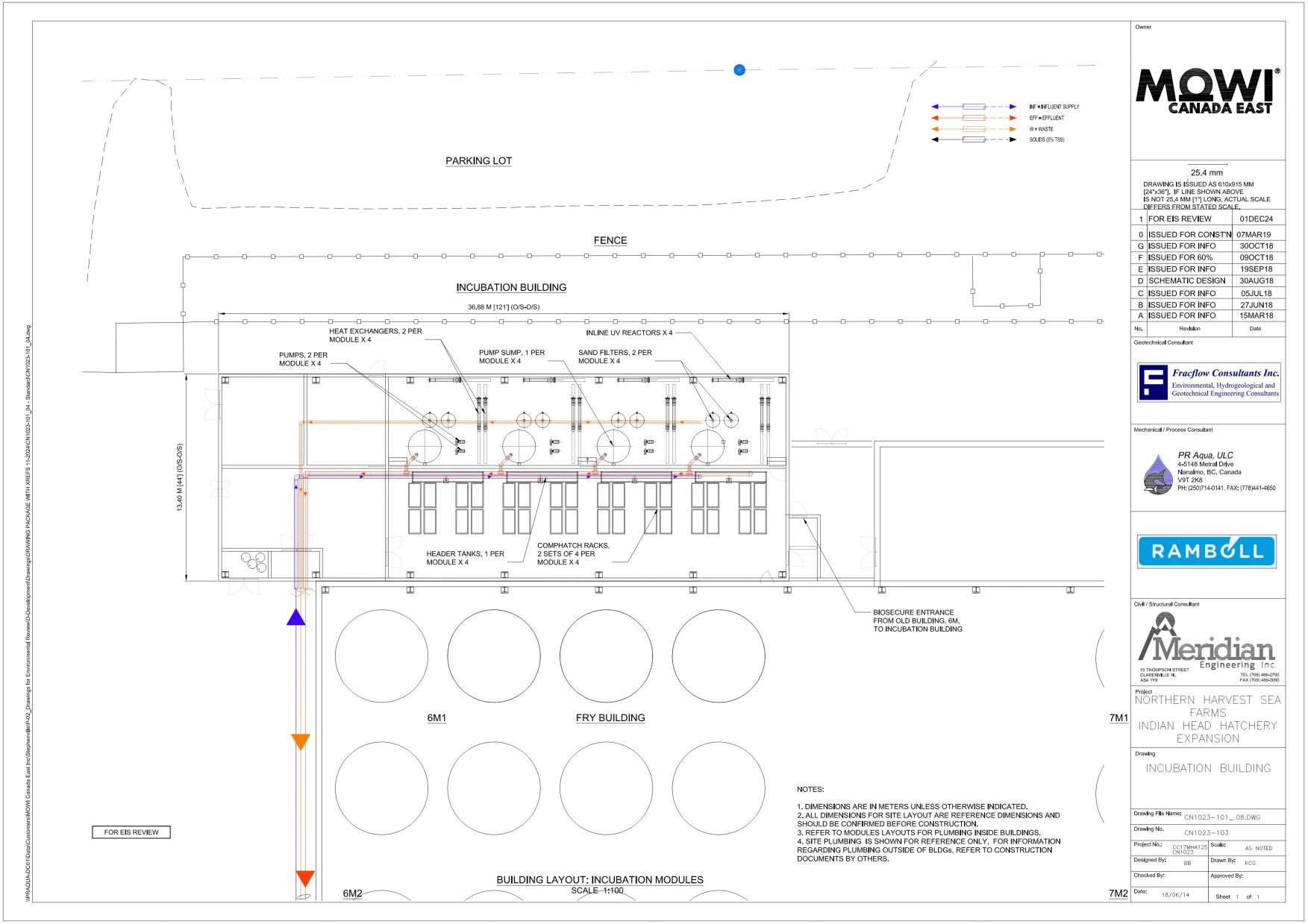

Figure 2.12. Schematic of the Incubation Building (post 2018).

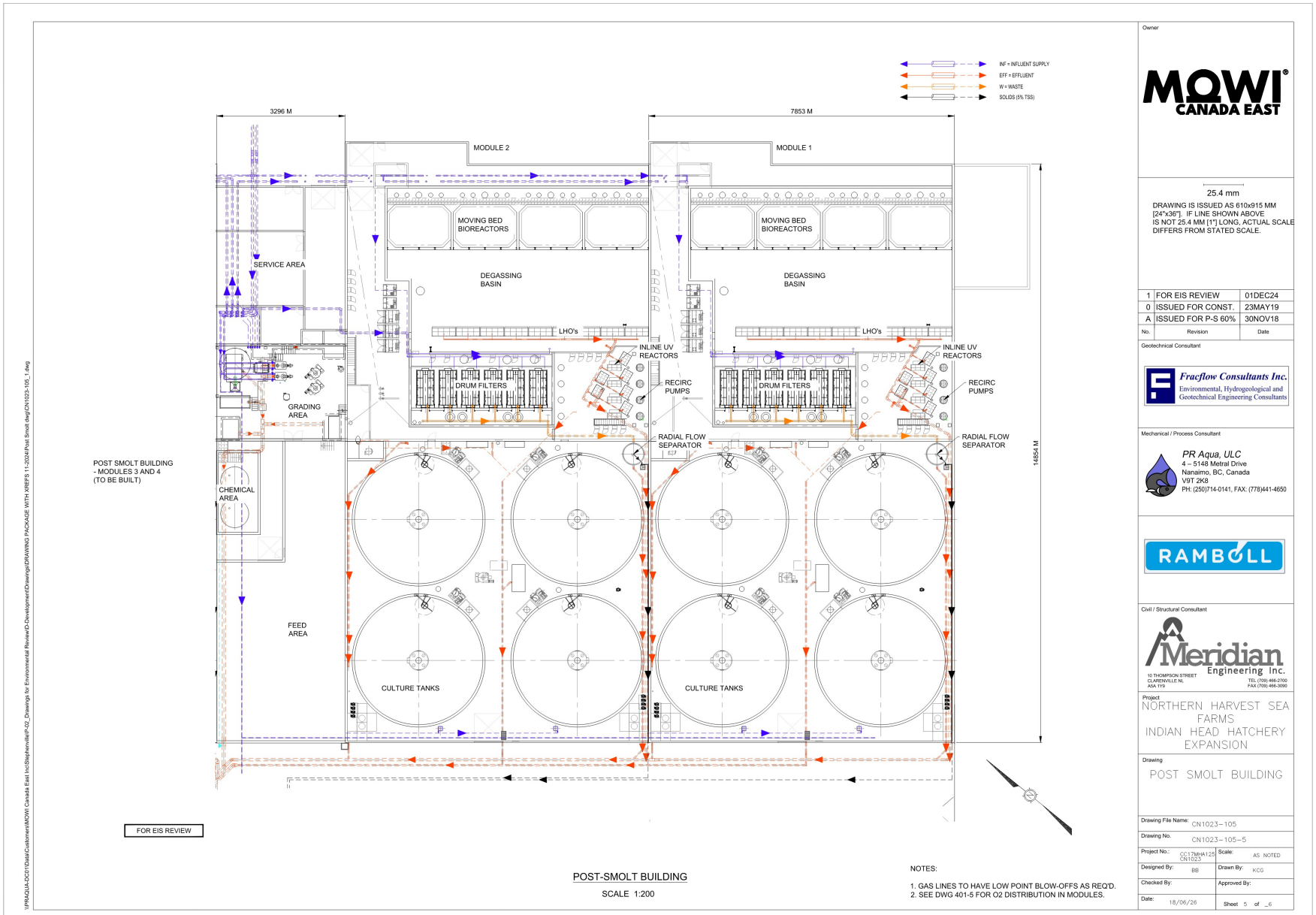

Figure 2.13. Schematic of Post Smolt Buildings 1 and 2.

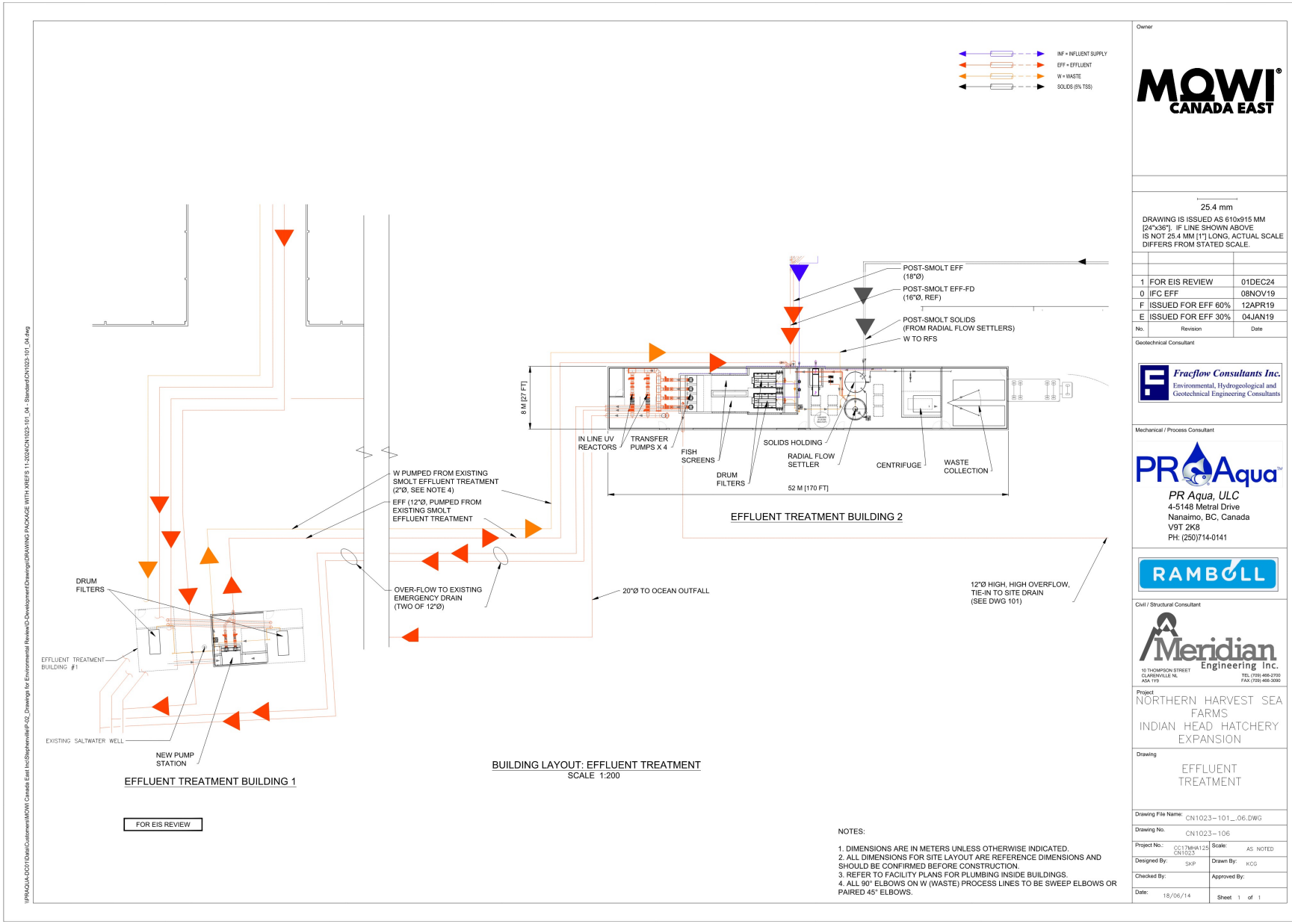

Figure 2.14. Schematic of Effluent Treatment Building No. 2.

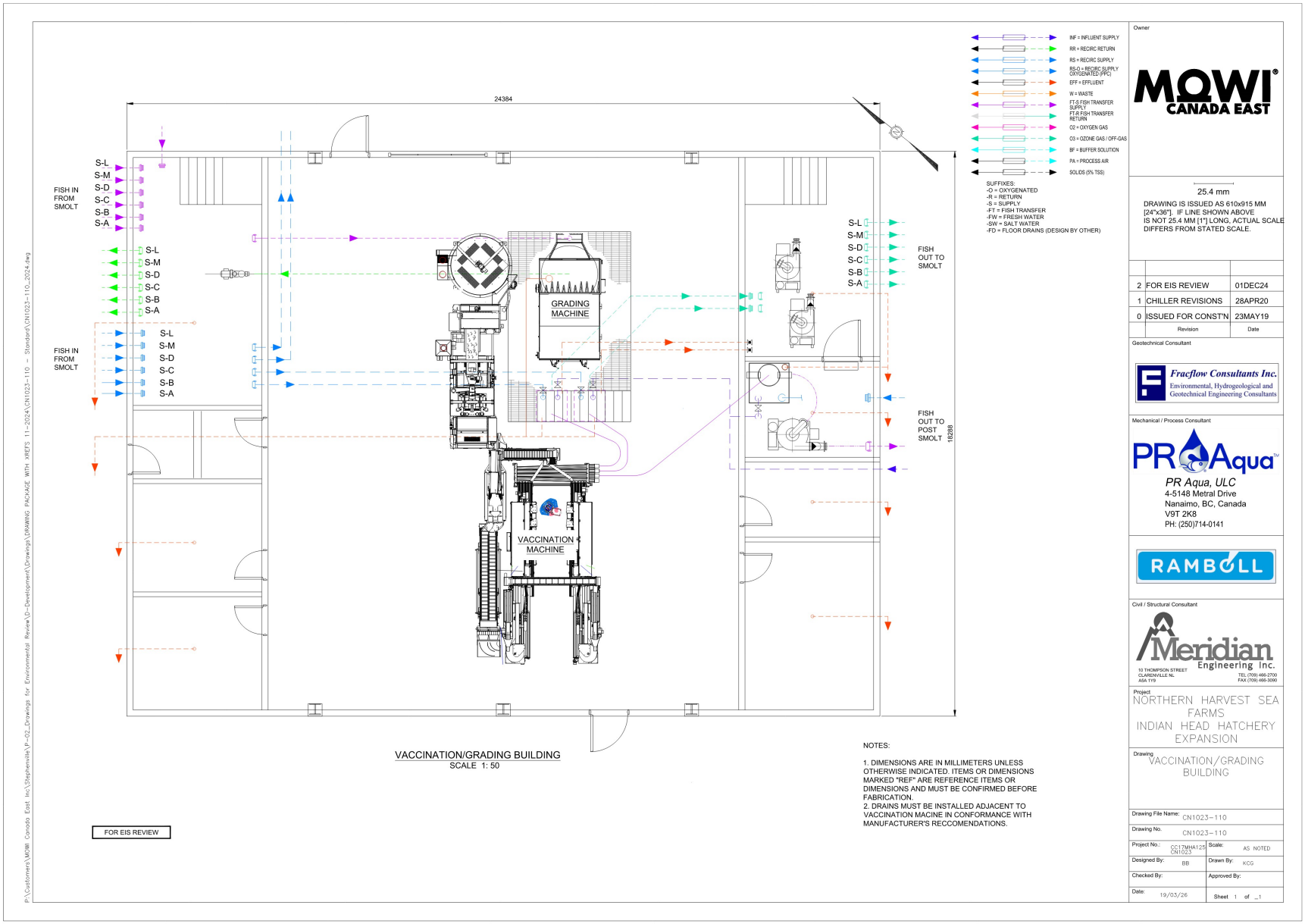

Figure 2.15. Schematic of the Vaccination/Grading Building.

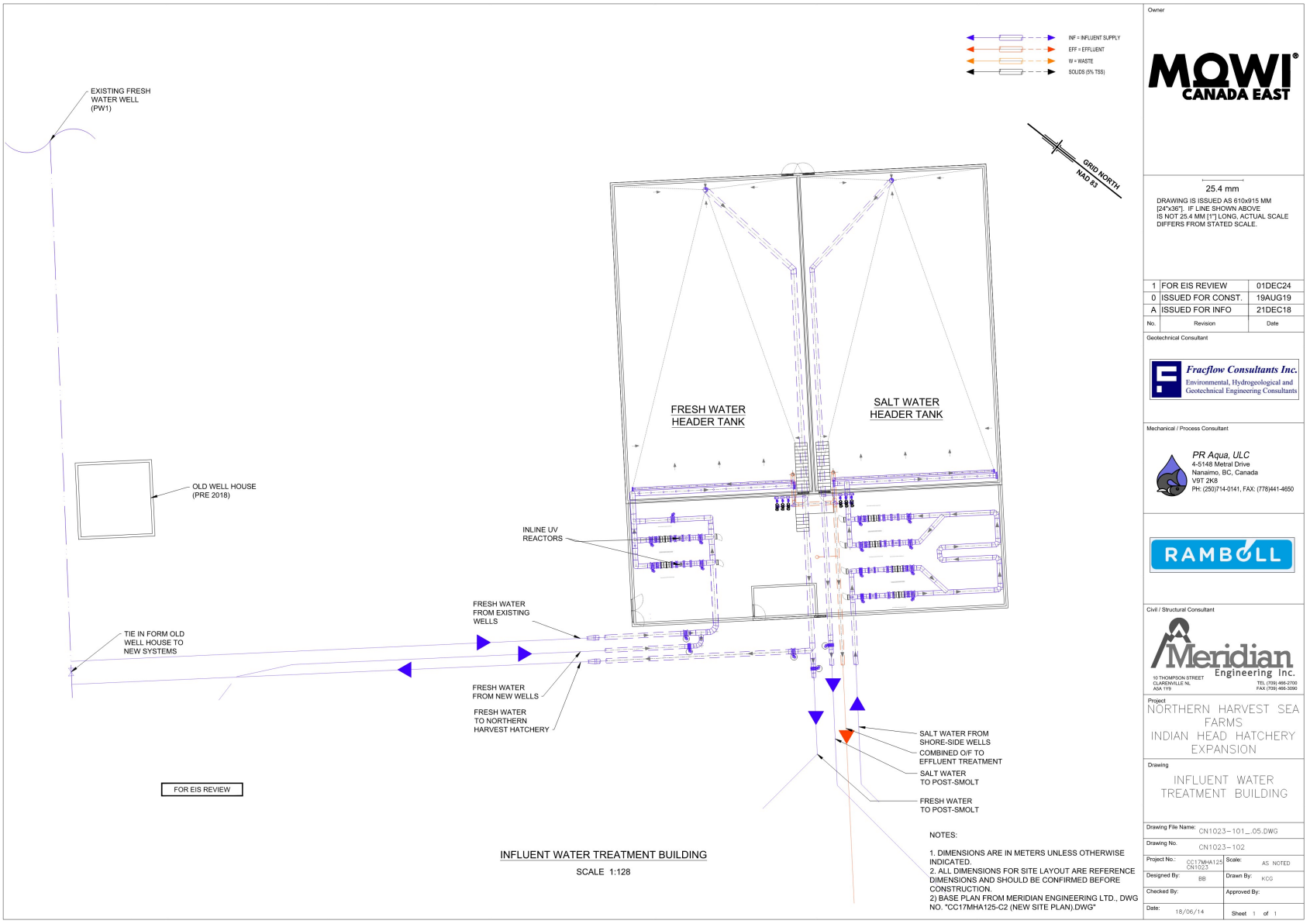

Figure 2.16. Schematic of the expanded Influent Water Treatment Building.