

Appendix V Draft biosecurity management plan



NGĀI TAHU SEAFOOD

Biosecurity Management Plan: Hanani Aquaculture Project

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BIOSECURITY DEFINITIONS

Disease: A pathological condition in a living organism that impairs health or survival (producing identifiable signs or symptoms), and may be caused by pathogens or other factors

Harmful organism: In this document, 'harmful organism' is a generic term used to encompass actual or potential marine pests and/or pathogens as defined below.

Marine pest (or pest): Marine pests encompasses (mainly) invertebrate or seaweed species capable of causing harm, and include such organisms that are designated as 'unwanted' and/or 'notifiable' organisms under the Biosecurity Act 1993 (see accompanying definitions). In this document, marine pests are identified as species listed by the Ministry for Primary Industries in the 2024 'New Zealand Marine Pest ID Guide', or by Environment Southland in the Southland Regional Pest Management Plan (SRPMP), or in subsequent revisions of those documents.

Notifiable organism: An organism formally declared under the Biosecurity Act 1993 to be notifiable, meaning any suspected presence must be reported promptly to the Ministry for Primary Industries.

Pathogen: Any biological agent (including bacteria, viruses, fungi, protozoa, parasites, or prions) that is capable of causing disease in humans, animals, plants, or other organisms. Pathogens are sometimes also referred to as 'disease agents', and include such organisms that are designated as 'unwanted' and/or 'notifiable' organisms under the Biosecurity Act 1993 (see accompanying definitions).

Unwanted organism: An organism that a Chief Technical Officer (of the Ministry for Primary Industries) believes is capable or potentially capable of causing unwanted harm to New Zealand's natural and physical resources or human health. This status triggers restrictions and penalties designed to prevent the organism's spread or establishment.

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GLOSSARY

AQNZ	Aquaculture New Zealand
BMP	Biosecurity Management Plan
CAN	Controlled Area Notice
DO	Dissolved oxygen
IMO	International Maritime Organisation
MHRSS	Marine High-Risk Site Surveillance programme
MPI	Ministry for Primary Industries
NTS	Ngāi Tahu Seafood
PPE	Personal protective equipment
RCP	Regional Coastal Plan
RLO	Rickettsia-like organism
SOP	Standard Operating Procedure
SRPMP	Southland Regional Pest Management Plan

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1. INTRODUCTION

Ngāi Tahu Seafood (NTS) is seeking to establish a finfish farm on the northeastern aspect of Stewart Island. The farm is intended to be stocked with Chinook (or King) salmon (*Oncorhynchus tshawytscha*); a high quality and value fish farmed in small volumes globally.

This Biosecurity Management Plan (BMP) has been developed to detail the specific biosecurity operating standards and provisions that NTS will implement on the farm to mitigate potential risks from pathogens and marine pests, as defined at the front of this document (see p. 2). The BMP takes account of the best practices and principles for effective biosecurity, from international industry experience in both the design of, and the commercial realities of, operating biosecurity management programmes, and as outlined in various documents including:

- The Ministry for Primary Industries (MPI) Aquaculture Biosecurity Handbook and related technical documentation.
- Salmon farming biosecurity standards developed by Aquaculture New Zealand.

The BMP includes international best practices that are designed to act as generic risk reduction measures across farm operations, including equipment and vessel movements, feed use and management of people. The BMP also addresses specific pathogen risks identified in the Marine Biosecurity Assessment of Effects¹.

The biosecurity provisions in this BMP are in addition to current regulatory requirements; but the document also highlights, where appropriate, regulatory requirements with respect to finfish aquaculture biosecurity and animal health which are integral to the operation of components of this plan.

Some aspects of the BMP will need to be developed following the granting of consent when the details of the Hananui operation are known. The BMP will then be operationalised through the incorporation and further development of relevant sections into Standard Operating Procedures (SOP). There may be a need to amend the BMP as the stage of development and operational plans change, or regulations change. In this respect, the BMP will be reviewed annually or in response to a significant change in the operating parameters of the farm that could present an altered biosecurity risk to the farm itself or the wider environment.

2. FARMING AREA DESCRIPTION AND OPERATION

The proposed site is approximately 2km offshore at its closest point to Rakiura, and extends to approximately 6km offshore (Fig. 1). Water depths range from approximately 20-40m. The site covers an area of approximately 1,285 hectares. Within this area four marine farms are proposed.

- Stage 1 - Feed discharge of 15,000 tonnes per annum and the establishment of a block of 10 sea pens (arranged in a 5x2 configuration) at each of the four marine farm sites.
- Stage 2 - Overall feed discharge rise to 25,000 tonnes per annum with the introduction of a second block of 10 sea pens at each of the four marine farm sites.

¹ Forrest BM, Johnston C. 2025. Hananui Salmon Aquaculture Marine Biosecurity Assessment of Effects. Salt Ecology Report 166 prepared for Ngāi Tahu Seafood, September 2025.

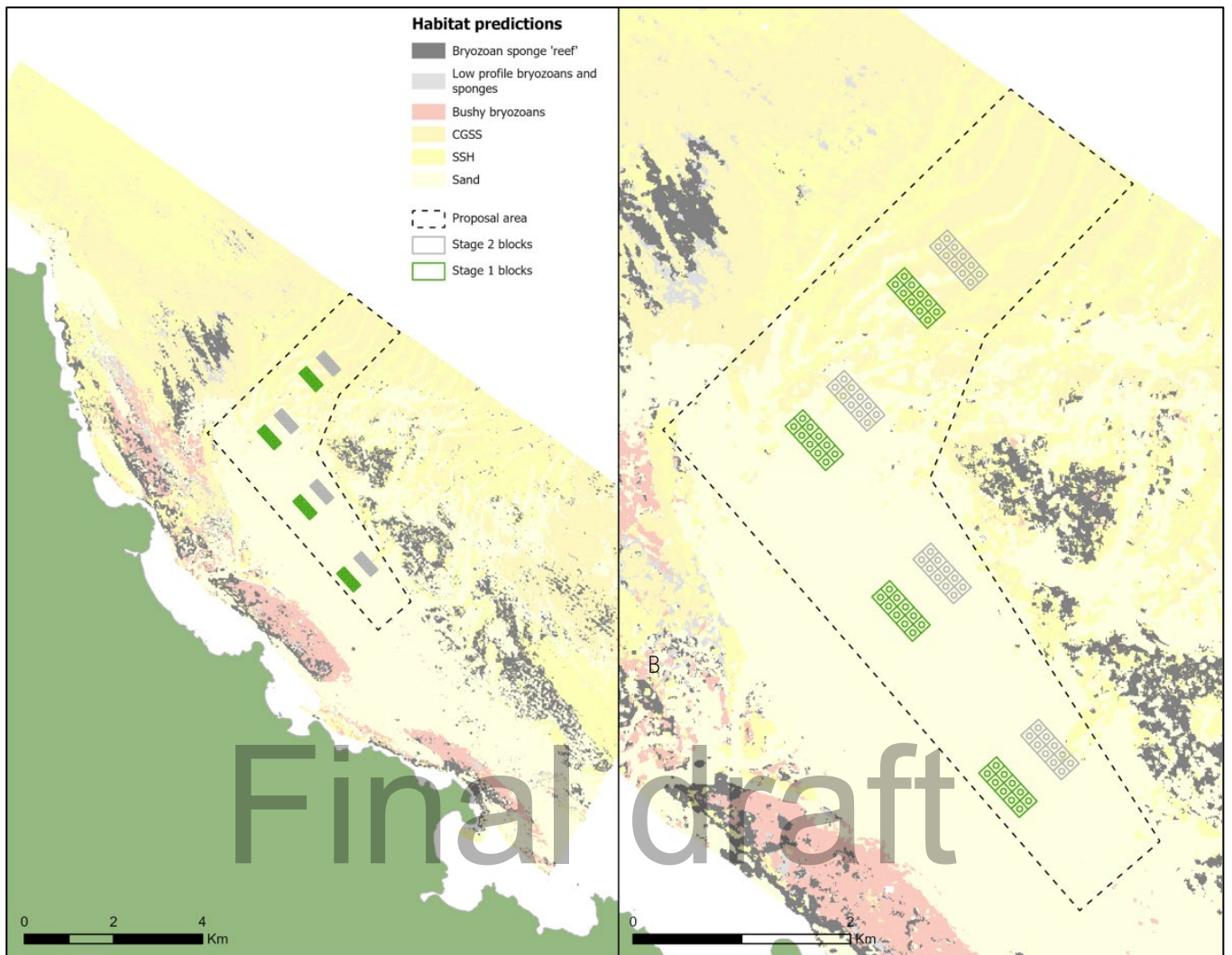


Fig. 1. Layout of farm sites.

Moving to Stage 2 would be subject to environmental monitoring over two production cycles at the Stage 1 feed input. Key features of the marine farms and pens are as follows:

- The two blocks within each farm will be separated by approximately 300m.
- Net pens will be 168m circumference polar circle type pens.
- There will be one feed barge associated with each marine farm.
- Single net systems will be used, which are anticipated to be dark coloured, have an underwater mesh size $\leq 40\text{mm}$ and made of predator resistant materials.
- The maximum net depth will be 22m. However, a minimum 5m clearance will be kept between the bottom of the pen and the seabed. This means that in some instances the net depth will be less than 22m. Pens will be fixed to the seafloor with a series of anchors, rope and chain warps.

The farm locations have been selected based on multiple drivers. For disease management purposes, NTS has separated the farming blocks as far as possible. Nonetheless, the constraints of the farming area in terms of location and total space mean that the Hananui farms are relatively close to each other, and therefore lie within the same hydrodynamically-connected epidemiological area, i.e., meaning that disease on one farm block may spread within the farming area. Recognising these constraints, NTS is nonetheless committed to implementing international best practice for biosecurity².

NTS is proposing single year class farming at each proposed marine farm, recognizing that, as above, each farm exists within a potentially conjoined hydrodynamic region. However many salmon farming regions internationally recognise this issue, and accept that single year class stocking on separate farms is an acceptable solution. The four proposed farms will be sequentially stocked so that at any given point in time one has just had smolt introduced, one is mid-production cycle, one is approaching harvest, and one is in a fallow period. A full rotational cycle will be of approximately 25-27 months duration, consisting of 16-18 months production, 6 months harvesting and 3 months of fallowing. This approach contrasts with some of the current New Zealand finfish aquaculture industry, where new generations of fish may be introduced to a site containing older fish (resulting in multiple year classes on any one site) in order to maintain harvest supply throughout the year.

Key operational parameters include the following:

- Smolts will initially be sourced from commercial salmon hatcheries licensed under the Freshwater Fish Farming Regulations 1983.
- Fish will be fed from the anchored feed barges using modern camera-based technology to maximise feed use efficiency.
- Mortalities will be removed from the pens at least twice per week, and daily where possible, using air uplift systems.
- Harvest is intended to be carried out by a specialised dead-haul vessel, with fish crowded to the surface in the growout pens, and pumped aboard the harvest vessel for slaughter and bleeding. All bloodwater will be retained on the harvest vessel for pumping ashore at the landing site in Bluff and subsequent treatment via trade waste water disposal.
- Vessels involved in farm operations will be based mainly in Bluff and Oban, with specialist vessels from out of the region used if necessary. Vessels (and associated equipment) will comply with any regional and national biosecurity requirements contingent at the time of operation, and be subject to the provisions detailed in this BMP.

² There are multiple examples globally of aquaculture sites being placed at equivalent or lesser distances. Whilst in biosecurity emergencies they are linked, the majority are still operational and productive. In some respects, it is equivalent to one dairy farm being a fence line away from the neighbouring one.

3. BIOSECURITY OBJECTIVES

The objectives of this BMP are to ensure measures are implemented and carried out to achieve the following:

1. Minimise the risk of introduction to the farm site of potentially harmful organisms, as defined at the front of this document (see p. 2).
2. Early on farm detection of potentially harmful organisms.
3. Effective on-farm control and containment of potentially harmful organisms.
4. Ensure effectiveness of risk mitigation.

In addition, the BMP introduces measures to maintain fish health and performance on the farm by:

5. Monitoring fish health within the farm.
6. Responding to any abnormal clinical presentation of the fish.

4. GENERIC PATHWAY AND ON-FARM BIOSECURITY MEASURES

Generic biosecurity measures are designed to provide monitoring and controls on biosecurity risks and pathways. NTS will implement and maintain operational measures to ensure biosecurity requirements are met in relation to:

- Stock
 - Entry and movement processes
 - Health monitoring
 - Response to abnormal clinical presentation
 - Stock records
 - Fish husbandry
 - Harvest
- Feed
 - Sourcing
 - Storage
- Equipment
 - Bringing equipment onto site
 - Use on the farm
 - Taking equipment off site
- Personnel
 - Staff procedures
 - Visitor requirements
 - Training
- Wild animals (birds , wild fish)
- Solid waste
- Vehicles
- Vessels

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4.1 STOCK BIOSECURITY REQUIREMENTS

4.1.1 Stock entry to the farm

Stock sourced from freshwater hatchery

1. Stock will only be sourced from Chinook salmon hatcheries licensed under the Freshwater Fish Farming Regulations 1983;
2. There should have been no instances of large-scale unexplained mortality within the previous 6 months at the hatchery, or any ongoing mortality regardless of cause, unless it can be shown to be minor and environmental;
3. The source hatchery must have a programme monitoring the health of the eggs, fry, fingerlings, parr and smolt on the Facility. This should encompass:
 - a) Daily health observation and recording;
 - b) Surveillance of the overall health status of the site as demonstrated by routine diagnostic tests twice per year;
 - c) Investigation of any clinical abnormalities in the hatchery is carried out under direction of an appropriate veterinarian in cases of unusual clinical signs, elevated mortality or poor performance etc.;
4. There must be a quality system in place at the hatchery that demonstrates the physical quality of the smolt is adequate (in terms of morphology, fin condition, opercular condition and jaw morphology), the CV% of the population is in general less than 20%, and suitable measurements have been taken to demonstrate that the population is suitably smoltified to go to sea;
5. Smolt must be physically inspected by hatchery staff at the source site and be shown to be visibly clinically healthy at time of transfer;
6. Smolt will be inspected by Facility staff on arrival. Fish showing clinical signs of infectious disease, that is multiple fish with signs of exophthalmos, skin rash, distended abdomen, protruding eyes, reddened fin bases and blood spots in the eyes, will not be unloaded into the farm but will be euthanised. Where this is any doubt over the meaning of any clinical signs in the smolt trucks, then a suitably qualified veterinarian should be consulted (i.e. the designated Facility veterinarian; see Annex I).

4.1.2 Health monitoring

Fish on the farm will be monitored to detect any clinical issues and enable timely response.

1. Sea pens will be checked daily (weather conditions permitting) for feeding response, normal swimming behaviour, presence of moribund fish and mortalities;
2. Records of inspections will be kept, to be able to demonstrate the health status of the farm. These records will include counts of any moribund fish or mortalities noted;
3. No routine invasive diagnostic procedures are required when fish display normal clinical presentation.

4.1.3 Response to abnormal clinical presentation

Upon detection of moribund fish or mortalities, the following will occur:

1. Moribund fish, where practicable, will be removed from the pen upon detection and euthanised either by overdose of anaesthetic, or by percussive blow to the cranium overlying the brain, before being examined for a putative cause of morbidity;
2. Mortalities will be removed from the pen as soon as practically possible after detection. This frequency is ideally daily, but where that is not possible the frequency of removal must be not less than twice a week, and must take into account water temperature, mortality rate and mortality cause. Mortalities must be classified where possible as to the cause of mortality;
3. Euthanised moribund fish and mortalities will be held in secure, leakproof containers (either in a whole state or macerated and ensiled) after inspection to await removal from the farm. Once removed from the farm the material must be held and transported in a manner that prevents spillage, and disposed of in a manner approved under the laws and regulations extant at the time;
4. Where there is ongoing morbidity or mortalities daily over more than 3 days, or several pens are affected simultaneously, or inspection of fish shows exophthalmos, eye haemorrhages (caution with both these signs in fish euthanised with percussive blow), haemorrhagic rash on skin surface, reddening of fin bases, swollen abdomen, fluid in the abdominal cavity, swollen internal organs and haemorrhages (gross or pinpoint) on the internal organs or peritoneal surface or in the muscle of the flank or other unusual presentation or behaviour that might suggest an infectious disease, then the farm will:
 - a) Cease to bring more fish onto the affected farm, or permit live animals to move off the affected farm until further notice;
 - b) Contact the designated Facility veterinarian to advise of the situation and seek advice and/or a visit;
 - c) Secure samples from the affected fish as directed by the veterinarian.
5. Findings of (4) above must be escalated within the company to a person officially responsible for the implementation and operation of the BMP;
6. Large numbers of mortalities clearly caused by equipment failure will not require the above measures to be invoked, but the event must be recorded, including reasons/evidence for attributing the event to misadventure;
7. Staff must be aware of the obligation under the Biosecurity Act 1993 to report to the Ministry for Primary Industries identification or suspicion of a notifiable pathogen, unusual mortality or new clinical syndrome. Staff must communicate within the company reporting structures so that information may be conveyed to the MPI as soon as practicable.

4.1.4 Containment of stock

NTS will ensure that it has operational procedures that establish processes for:

1. The routine testing of nets for strength during their operational life;
2. Inspections and repair of nets;
3. The reporting of any potential escape of fish; and
4. The procedures for responding to any escape of fish from the pens.

4.1.5 Mass mortality contingency planning

NTS will ensure in its biosecurity operational procedures that it has established plans to enable:

1. The removal of large numbers of dead fish from the pens at any one time;

2. The secure and leakproof removal and storage of the mortalities away from the farming zone and other farming areas;
3. The biosecure disposal of the carcasses on land, e.g. via deep burial or rendering so as to prevent any biosecurity risk reaching freshwater or seawater areas.

4.1.6 Stock records

The company will maintain the following records:

1. Details of stock entering each farm (number, site of origin, confirmation of normal appearance on arrival, date of entry, identification of sea pen that stock are placed in);
2. Details of stock movement within the farm (number moved, pen of origin, pen of destination, date of movement);
3. Details of stock health inspections by pen and date, including details of moribund fish or mortalities;
4. Details of stock removal from site (number, pen identification, date, destination);
5. Any clinical records pertinent to the pen of fish to be held until at least the completion of the year class of fish;
6. Environmental data (see water quality, 4.1.9).

4.1.7 Removal of stock from site

Normal commercial growout stock will be harvested, rather than moved live off the farm.

Mortalities (either whole or ensiled) will be taken ashore in leakproof containers and consigned for biosecure disposal (e.g. rendering, landfill or composting) in a way that prevents their return to the aquatic environment in an unsterilised form.

Fish with broodstock potential may be identified during the rearing process and transferred to a land based Broodstock facility. During this process, candidate broodstock will be checked for clinical signs of infection, and a sample tested for evidence of pathogens by culture-based (bacterial and viral) and molecular tests (targeted for rickettsia-like organism and bacterial kidney disease at a minimum), plus general screening via histopathology, following movement to an interim biosecure facility.

4.1.8 Pen management and fish husbandry

The pen systems have been professionally designed to ensure the appropriateness of the holding systems for fish. This ensures that fish do not become stressed or injured by the farm structures themselves. Nets will be appropriately weighted to avoid excessive deformation in strong currents or severe weather. Such deformation could result in serious physical damage to fish and subsequent elevated mortality.

The net pen structures will incorporate a method of protecting the fish from predators – this will include a properly tensioned bird net, and single net systems for growing fish, which are anticipated to be dark coloured, have an underwater mesh size $\leq 40\text{mm}$ and made of predator resistant materials.

Fish will be fed a diet designed for the life stages being farmed. Fish will be fed sufficient feed to ensure that their minimum maintenance requirements are met (in reality fish will usually be fed to satiation or to specific ration plans designed to ensure that they grow efficiently).

Pen structures must be checked on a routine basis for evidence of damage or wear that could lead to infrastructure failure that could result in injury or death of fish, or release of fish into the wider environment.

Fish will be stocked in pens to a maximum of 15 kg/m³, although this may on occasion be permitted to reach 17 kg/m³ in the 3 months before harvest. Maintaining a relatively low stocking density reduces stress and decreases opportunity for pathogens to spread between infected and susceptible fish.

To ensure an adequate flow of water through the fish pens, nets will be cleaned *in-situ* to remove biofouling. This net cleaning will be carried out as frequently as required to maintain high water quality in the pens (and minimise biofouling). The specific frequency will be determined according to the rate of biofouling development on the nets. To achieve this, a net fouling assessment and scoring system will be developed and implemented once the farm is operational. Nets will be scored weekly either by divers operating in the pens during the course of their normal work, or via the feed cameras. Scores (between 1 and 10) will be attributed for each of the following areas of the net:

- Top 5m of the side wall;
- Remaining depth of side wall;
- Base of net.

Trigger scores based on maximum permitted score for upper side wall, and total score will result in net washing being carried out. The final approach will be detailed as part of the SOPs developed for farm operations.

In addition, during fallowing, the collars and net bases will be cleaned to remove as much bivalve biofouling as possible. Where this aligns with summer, it may be necessary to refrain from removal if flat oysters of >35mm are found, as this is primary risk period for disruption of oysters leading to *Bonamia* spread. It is recognised that bivalve biofouling may represent, for a period of time, a potential reservoir of finfish pathogens, although the absolute infectivity of this biofouling has not been adequately demonstrated in the commercial environment. Whilst some pathogens have been detected in molluscan biofouling, many others have not. However, NTS is committed to ensuring the removal of as much as possible as part of an overall risk reduction ethos.

4.1.9 Water quality

Water quality is critical to the health and wellbeing of the fish on the farm.

Dissolved oxygen (DO) and water temperature will be measured at least daily at each pen group; it is preferable that these readings are taken continuously and automatically, e.g. via the camera-based feeding system.

Nominal water quality specifications are:

- Dissolved oxygen ≥ 5.5 mg/L
- Water temperature 12 – 19 °C

In addition, once per day, before feeding commences, a water sample will be examined for harmful and ichthyotoxic microalgae. Levels of specific species of algae above predefined triggers (see Annex 2) must be escalated to management. Appropriate responses include cessation of feeding, cancellation of crowding or stressful husbandry processes or use of a venturation-type system to encourage water flow through the pens.

Other water quality emergencies may be encountered which require contingency capacity. For example, in the event of jellyfish swarms threatening production, pens may be towed in the vicinity of the farms for the purpose of flushing water through the nets to protect fish welfare. Where such water quality emergencies result in high numbers of dead

or dying fish, mass mortality contingency capacity and procedures as required by 4.1.5 may be implemented, or emergency harvest of remaining stock.

4.1.10 Harvest requirements

Harvest involves crowding fish within the pen structure, then removing them from the water usually using an airlift system for delivery to a de-watering table on the harvest vessel.

It is important that fish do not remain crowded for periods in excess of two hours, and repeated crowding of a pen should be avoided. Both increase stress on the fish and render them more susceptible to pathogens.

Once stunned, the gills of the fish are cut so that the fish bleeds out and will not regain consciousness. This blood mixes with residual water on the harvest table and is termed 'bloodwater'. This bloodwater must be retained on the harvest vessel for pumping ashore and disposal on land according to regulatory requirements. No bloodwater is to be returned to the sea.

4.2 FEED REQUIREMENTS

4.2.1 Sourcing

Feed will consist solely of commercially extruded pellet feed. The extrusion process eliminates biosecurity risks from the feed.

4.2.2 Storage

Feed will be stored in a cool, dry place, secured from vermin to prevent contamination of feed once at the farm and to maintain the quality of the feed.

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4.3 EQUIPMENT BIOSECURITY

4.3.1 Bringing equipment onto the farm

Equipment brought onto the farm must be either new, or cleaned and disinfected prior to entry. Decontamination of used equipment must be carried out according to Annex 3 at a location away from the farm. Records of the decontamination must be supplied to the farm and kept in the farm records.

4.3.2 Use on the farm

Equipment used to handle fish, e.g. graders, pumps etc., must be cleaned and disinfected in accordance with Annex 3 after every use. Records of decontamination must be kept on the farm and the equipment tagged as decontaminated and ready for use.

Equipment used in the pens, e.g. hand nets or mortality nets, must be either cleaned and disinfected between each pen where the equipment is shared, or be specific for an individual pen.

Where pen equipment is shared it must be rinsed in clean freshwater and then soaked in disinfectant solution (as per Annex 3 or 4) for 15 minutes, before rinsing and use in the next pen. Where equipment is pen specific (and for shared equipment at the end of the day) it must be rinsed in clean freshwater, soaked in disinfectant solution (as per Annex 3 or 4) for 15 minutes, then rinsed and left to dry.

4.3.3 Taking equipment off the farm

Equipment to be removed from the farm must be cleaned and disinfected prior to removal from the farm. Decontamination of used equipment must be carried out according to Annex 3. Records of the decontamination must be kept in the farm records. Preliminary cleaning and disinfection may be carried out at the feed barge, but a more thorough decontamination can occur at shore base, although this must occur in an area segregated from items going out to the farm.

Waste materials and infrastructure leaving the farm should be taken ashore as soon as possible and stored well above high tide levels where no runoff can enter surface waters, until disposed of in a manner permitted by regulations.

4.4 PERSONNEL

4.4.1 Staff procedures

Staff must wash hands and arms before commencing work on the farm. Farm-specific clothing and gumboots must be worn.

In general, workflow must occur from smolt farm to growout farm, to harvest farm; juvenile, more naïve life stages are managed first. Routine procedures not involving fish handling may be carried out across all sites without changing personal protective equipment (PPE). Where fish have been handled and PPE has become contaminated with blood, mucus, scales or faeces, then the PPE must be washed and disinfected or changed if moving to another site.

Waterproof PPE must be disinfected each night by washing down and spraying with disinfectant then being left somewhere warm to dry.

Divers and dive vessels represent a recognised elevated biosecurity risk where divers are handling mortalities. Specific procedures will be enacted on farms to ensure that divers rinse and disinfect their equipment between pens and farms. Dive suits will be thoroughly cleaned and disinfected and left to dry overnight at the end of the day. The dive vessels will be washed down and disinfected before leaving each farm (see general vessel requirements in 4.8). Where possible, pens with highest mortality will be dived last or by a separate dive crew, although in the interests of fast removal of mortalities affected pens may be prioritised and the divers and vessel decontaminated before moving to other duties. This is at the discretion of farm senior management under veterinary advice.

4.4.2 Visitor requirements

All visitors (including contractors) to the site must:

1. Complete a visitor book entry detailing date, name, company, staff member responsible for their visit and details of any aquaculture/fisheries/seafood processing establishments visited in the last 48 hours;
2. Where they have been on another aquaculture/fisheries/seafood processing establishment in the last 48 hours the farm manager must make a risk assessment and decide on any additional measures, which may include denial of entry. In general terms, if the visitor is wearing different, laundered clothes and has washed in the intervening period, entry may be permitted;
3. Visitors must change footwear into farm specific gumboots and wash their hands and arms with soap and water. A disinfectant hand cleaning solution may also be made available;
4. Visitors will be accompanied by a member of staff at all times;

5. Contractors' equipment should be checked for contamination and disinfected as necessary according to Annex 3;
6. Visitors and contractors will receive a site-specific biosecurity induction from the farm manager or nominated representative. This will cover avoidance of handling fish or contact with water where possible, appropriate equipment biosecurity, including disinfection between pens.

4.5 WILD ANIMAL INTERACTIONS

4.5.1 Birds

While the risk is low, birds may represent a conveyor of biosecurity risk and stress in small fish. It is preferable therefore to prevent direct bird access to the pens. Each pen must therefore have an appropriately fitted and tensioned bird net.

4.5.2 Wild fish interactions

Marine net pen farming systems cannot prevent the entry of wild fish, however the use of appropriate mesh size will minimise the entry of larger wild marine fish. In addition, wild fish in the pens will be removed and either euthanised or released (depending on the legal requirements, and refer to shark management plan) during any husbandry procedures involving removal of the salmon from the pens.

Pens and nets will be designed to be fit-for-purpose for the expected environmental sea conditions and maintained to preserve their integrity, including net strength testing and regular inspections, to reduce the potential for hole development or net failure and thus mitigate against loss of salmon from the net pens (see 4.1.8).

4.6 SOLID WASTE MANAGEMENT

All solid wastes deriving from the farming sites must be securely contained and dispatched to land-based disposal facilities, which ensures the material is securely buried and prevents leaching to waterways. This does not include feed that falls through the pen during feeding, nor fish faeces.

4.7 VEHICLE REQUIREMENTS

To minimise risk of pathogen cross-contamination, fish delivery tankers (smolt trucks) must be decontaminated to the standard detailed below, before onloading of fish to be delivered to the farm and at the end of each day when fish are off loaded into tanks on a vessel for transport to the farm (where acclimation of fish to seawater occurs in the tanks on the vessel):

1. All water should be drained from transport tanks. Any fish, faecal matter or other soil should be cleaned from tanks by flushing with clean water. All pipes and associated pumps should also be inspected and flushed to ensure that carcasses or organic material trapped within are removed and disposed of according to local regulatory requirements, ensuring that potentially harmful organisms cannot reach surface waters;
2. Equipment such as gas diffusers, electrical monitoring equipment and other delicate or porous items should be removed for individual cleaning, disinfection or replacement;

3. The complete exterior of the truck and/or transport containers should be thoroughly washed, beginning at the top and working down to the wheels. The underneath of the truck and tanks should also be washed;
4. The interior of transport containers should be washed preferably using high pressure water systems and mechanical scrubbing. Cleaning should start from the top of the internal surface and move downward;
5. Surfaces should be thoroughly rinsed if detergents have been used. All surfaces should then be allowed to drain.
6. Internal surfaces of tanks should be disinfected using wet heat (on suitable surfaces) or chemical disinfectants. Suitable chemical disinfectants include hypochlorite solutions, chlorine dioxide solutions, chloramine-T or iodophors as per the details in Annexes 3 & 4.

Proof of meeting these requirements must be sighted by farm staff at the wharf before offloading of fish commences. Smolts must be acclimated by slow pumping of seawater into the tanks during transport to the smolt pens.

As fish will remain on the site of stocking until harvest, there are no specific biosecurity risks associated with stock movement between farm sites.

4.8 VESSEL REQUIREMENTS

4.8.1 Vessel topside (above waterline) requirements

The following general measures will be implemented by NTS to mitigate risk from vessel topside mechanisms, other than equipment which is addressed separately in 4.3:

1. Farm vessels must be kept clean at all times and washed down at the end of each day and disinfected as per Annex 3. Each vessel must have capacity to permit staff to wash their hands and arms and have freshwater with which to make up disinfectant solution;
2. Between sites the deck and any contaminated equipment on the vessel must be washed down and then sprayed with disinfectant solution at the last pen of the site before travel to another site in the farming area, as per Annex 3;
3. Where vessels have ballast water or residual seawater³ (e.g. in bilge or compartments on deck) such water is to be retained on board and not discharged at farm sites or in Foveaux Strait, except in a safety emergency. Water should preferably be pumped ashore for disposal and compartments disinfected as per Annex 3;
4. In the event that anchoring is necessary for farm operational or safety reasons, anchors and ground tackle (rope, chains, etc.) should be visibly clean, and free of fouling, debris, and sediment.

³ Sinner et al. (2013) refer to residual seawater as "Bilge and retained water" and define as "...any seawater that accumulates within the hull of a vessel; including in the engine room of larger vessels (i.e. seawater that enters the vessel via the stern glands) and in the bilge sumps of smaller vessels; seawater contained in or on the vessel (e.g. for fish or bait); and uncontained water on the deck area of a vessel, including in gear storage areas". (Sinner J, Forrest B, Newton M, et al. 2013. Managing the domestic spread of harmful marine organisms, Part B: Statutory framework and analysis of options. Cawthron Report No. 2442, Cawthron Institute, Nelson. 72p. plus appendix).

4.8.2 Vessel hull biofouling (below waterline) requirements

1. Vessels will have a hull antifouling coating applied in accordance with the coating manufacturer's instructions. The coating will be within the in-service period planned at the time of coating application⁴. NTS are considering options for biocidal and biocide-free coatings and antifouling systems, with their decision depending on the vessels that are used in their operations, the rates at which fouling is expected to accumulate, and regional limitations and restrictions on vessel hull cleaning;
2. NTS or contracted operational vessels will meet the following standards with respect to hull biofouling, with a rationale for these standards provided in Annex 5:
 - a) Vessels that have operated in territorial waters outside Southland since last antifouling: These vessels will have a 'clean hull'. A hull is considered to be a 'clean hull' when no biofouling of live organisms is present other than that within the following thresholds:
 - No visible macrofouling will be present on the hull, except for gooseneck barnacles, upon first arrival at the farm site or Bluff. Evidence of meeting this standard will be determined either by hull inspection within one week of arrival (see 3), or by proof of vessel haul-out and cleaning (e.g. water blasting) within 14 days of departure from the source region;
 - At all other times during subsequent vessel operation, macrofouling will not exceed 5% cover on the combined surface area of main hull and niche⁵ areas, and should be visibly free of the target organisms listed in 5 below. Vessels remaining in the region for 6 months or longer will be subject to hull inspection requirements described in 3.
 - b) Regional vessels that have operated only in Southland or offshore (outside territorial waters) since last antifouling: Macrofouling will not exceed 5% cover on the combined surface area of main hull and niche areas, and should be visibly free of the target organisms listed in 5 below. These vessels will be subject to hull inspection requirements described in 3;
3. Hull inspections to determine compliance with the hull biofouling standards will be undertaken at least twice per year at approximately 6-monthly intervals. Inspections will be in-water except where a vessel has been hauled out for survey or maintenance requirements. The frequency of hull inspection is intended to ensure that any new marine pests not yet known to be in Southland, yet which could arrive from elsewhere in New Zealand, are detected before they become reproductively viable. A provisional template outlining the assessment and record keeping needs for vessel hull inspections is provided in Annex 6. A more comprehensive template for reporting (considering sampling design, documentation and record keeping considerations) that is modelled on MPI guidance⁶, will be developed as an SOP after consent is granted and operational details are finalised. The key elements of vessel hull inspections will be as follows:

⁴ Guidance on antifouling can be found in the Australia and New Zealand 'Anti-fouling and In-water Cleaning Guidelines'.

⁵ Niche area are locations on a vessel hull that are more susceptible to biofouling due to different hydrodynamic forces, susceptibility to coating system wear or damage, or being inadequately, or not, painted, e.g. sea chests, bow thrusters, propeller shafts, inlet gratings, rudders, keels, trim tabs, dry-dock support strips.

⁶ Georgiades E, Kluz D 2020. Conduct of in-water biofouling surveys for domestic vessels. Biosecurity New Zealand Technical Paper No: 2020/04. 38p.

- a) Inspections will be conducted by a suitably qualified and trained person, able to assess vessel biofouling against the thresholds prescribed in 2, and able to identify the target organisms referred to in 5;
 - b) As described in Annex 6, an inspection report will be produced that describes and documents (using photos and video) hull biofouling percentage macrofouling cover and the presence of any target organisms. The report will describe the nature and extent of any remedial action taken to achieve compliance (e.g. type and extent of cleaning undertaken);
 - c) In the event that vessel biofouling is non-compliant with the relevant hull biofouling standard, one of the following remedial or subsequent actions will be undertaken:
 - Land-based cleaning of the vessel by haul-out and water blasting within a contained facility;
 - In-water spot cleaning (e.g. by divers) to remove macrofouling to the extent enabled by regional or national rules, standards or guidelines, considering (see Annex 5):
 - Biosecure measures for cleaning that do not lead to the release of potentially harmful organisms;
 - The extent to which cleaning will result in the release of chemical contaminants from antifouling coatings;
 - In-water encapsulation and chlorine treatment to kill macrofouling, to the extent enabled by regional or national rules, standards or guidelines (see Annex 5);
 - Proactive hull grooming to remove 'slime layer' fouling (e.g. bimonthly to monthly hull wiping with a soft cloth) may be adopted where such an approach is feasible;
 - A further biofouling risk assessment as described in 4.
4. As an alternative to meeting the hull biofouling standards outlined in 2 above, a suitably qualified expert approved by Environment Southland may be engaged to undertake a vessel-specific risk assessment. The vessel will be considered to meet the hull biofouling standards if the assessment demonstrates that the level of risk is equivalent to, or less than, that posed by the relevant standard. The intention of this approach is to provide vessel operators with an alternative management option for situations where a vessel is non-compliant with the biofouling standard but is unable to be cleaned to the level of that standard; for example, due to unavailability of haul-out facilities or regulatory restrictions on in-water cleaning (see Annex 5). The specific risk assessment approach undertaken should be determined by the expert, but must at least include an assessment of:
- a) The species present on the vessel and, where known, their: (i) geographic origin (indigenous, cryptogenic⁷, non-native); (ii) distribution in Southland; and (iii) distribution in New Zealand;
 - b) The abundance or percentage cover of new-to-Southland non-native species, if present, and their size (if relevant);
 - c) Whether any new-to-Southland non-native species, if present, are known to have a history of becoming invasive or causing harm in New Zealand or in other locations globally;
 - d) The potential of any new-to-Southland non-native species, if present, to establish, survive, reproduce in the vessel's intended operating area (e.g. considering temperature tolerances if known, or which

⁷ The term cryptogenic refers to organisms whose geographic origins (i.e. whether indigenous or exotic) are uncertain.

can be inferred from the known distribution), and cause adverse effects. The level of uncertainty associated with this element of the assessment should be made clear.

5. Target species for the purposes of vessel hull surveillance conducted under this BMP are as follows:
 - a) Marine pest species as defined at the front of this document (see p. 2), except for the Asian kelp *Undaria pinnatifida*⁸. That definition includes species designated as marine pests by the Ministry for Primary Industries in the 2024 'New Zealand Marine Pest ID Guide', or by Environment Southland in the Southland Regional Pest Management Plan⁹ (SRPMP);
 - b) Any species of bivalve (e.g. any oyster or mussel species), on the basis that such organisms could host in a readily transmissible form, or significantly multiply, cells of the parasite *Bonamia*, which are a threat to the Foveaux Strait Bluff oyster fishery. While *Bonamia ostreae* has been reported under certain conditions to be found in other species (e.g. ascidians, brittle stars), the primary risk is the flat oyster (*Ostrea chilensis*). The greatest risk of entry, multiplication and release of significant numbers of *Bonamia ostreae* infectious particles comes from flat oysters post spawning, and potentially infected oyster larvae released from infected oysters (see 5.1).
6. The vessel operator will maintain records of measures undertaken and information they have used when determining compliance with 1-5. Where requested, the records are to be provided to the NTS farm manager prior to arrival at the farm site. The maintenance of a Biofouling Record Book as outlined by the International Maritime Organisation (IMO), would be an appropriate format for record keeping relating to vessel biofouling management (e.g. antifouling certificates, hull inspection reports, maintenance actions undertaken).

5. ADDITIONAL MEASURES FOR SPECIFIC PATHOGENS

A separate pathogen risk assessment identified two genera (*Bonamia* spp. and *Piscirickettsia* spp.) that present a non-negligible risk that requires active mitigation.

5.1 *BONAMIA* SPECIES

The pathogen risk assessment evaluated the life cycle of wild flat oysters and mussels, to develop a targeted on-farm biofouling management routine that would minimise their risk as hosts for *Bonamia* spp. The full details are in the pathogen risk assessment and should be referred to by NTS for further advice. The specific measures recommended for infrastructure other than nets (which have an ongoing cleaning regime) are:

1. Primary annual clearance of oysters in winter (July). This approach will also remove mussels after their settlement period (March to June);

⁸ The Hananui farms (and area of regional operations) are within a Southern *Undaria* Exemption Area, for which vessels operating exclusively within this area are exempt from an Environment Southland rule that they be free of the Asian kelp *Undaria pinnatifida*. The rationale is that *Undaria* is well-established in suitable habitats across this area, such that its management would have no significant benefit.

⁹ Southland Regional Pest Management Plan 2019-2029. Publication No 2019-03, Environment Southland. 114p. This Plan lists six marine pests that are managed under an exclusion programme, for which the goal is prevent establishment in Southland.

2. Hot-spot cleaning. Monitor and more frequently clean high-risk areas, i.e. deep structures and low-flow or shaded areas. Cleaning in March/April may be particularly triggered by heavy spat fall or pockets of 25-25mm oysters being located;

Avoid major cleaning during January/February unless absolutely necessary, i.e. unless it coincides with a farm-level fallow period when cleaning to manage *Piscirickettsia salmonis* risk is indicated. During this late summer period, any older oysters on the farm may be carrying higher *Bonamia* loads. Disturbing them can release a pulse of pathogens into the environment. If removal is needed in this window do not use water blasting or destructive methods, but try to remove those over 35mm intact (to prevent them gaping and releasing parasites in situ).

If there is heavy spat fall noted, or the primary annual clearance is becoming difficult due to oyster numbers, then a spat clean in **Early Autumn (March/April)**, immediately after the summer breeding season ends, may become beneficial. *Rationale:* This will remove the new cohort of spat that settled during spring/summer *before* they overwinter and grow larger. By March, those spat are ~5–25 mm and not yet sexually mature nor significantly infected, so removing them is easier and poses low disease risk. It prevents these juveniles from surviving into the next spring (when they would be one year old and ready to spawn as males).

5.2 RICKETTSIA-LIKE ORGANISM (RLO)

The pathogen risk assessment identified that infection with rickettsia-like organisms (*Piscirickettsia* spp.) is a **low** risk, but as it does not appear to date that NZ-RLO has established in Southland, risk mitigation will incorporate measures for broodstock, juveniles and stock on the marine farms (see risk assessment for full details). These measures are as follows:

1. Smolt will be sourced only from hatcheries with high biosecurity standards, routine health surveillance (including for RLO) and either no history of RLO detections, or where each population of smolt is tested to be clear of RLO using a statistically significant sample size designed to detect 2% prevalence with 95% confidence;
2. Smolt will only come from broodstock that have spent their entire lives in freshwater, or have been screened by sensitive molecular methods for RLO;
3. Source hatcheries will not utilise marine water in their production systems and have barriers to wild salmonid intrusion;
4. Smolt will be certified as healthy prior to movement to sea, including batch testing for RLO;
5. Smolt transport will be conducted according to best practice, with oxygen control during transport and suitable transport densities for the size of the smolt;
6. Smolt transport water will be sterilised freshwater (ozone or UV treated or from bores);
7. Transport tanks/tankers must be cleaned and disinfected before returning to the freshwater site;
8. Acclimation to full strength seawater will occur during the transport from shore site to sea site;
9. Stock will be managed on the farm so as to reduce stress;
10. Each farm will contain a single year class of fish;
11. Each farm will be fallowed for 12 weeks minimum;
12. RLO surveillance will be implemented on the farm designed for early detection of RLO.

Where a commercial, efficacious vaccine is available, it is recommended that the smolt be vaccinated against RLO in the freshwater hatchery (allowing at least 460 Degree Days post vaccination before transfer). It is however recognised that RLO has not been reported from the area at the time of writing this plan and it is not strictly a necessity.

If an outbreak of RLO occurs the farm should be prepared to treat pen-by-pen with an antibiotic in feed. Ideally florfenicol would be used, but oxytetracycline may be used if RLO is detected early enough, used at a high enough dose for an extended period, and florfenicol is not available.

6. ADDITIONAL MEASURES FOR MARINE PESTS

6.1 ON-FARM MARINE PEST SURVEILLANCE

On-farm marine pest surveillance will be an embedded part of farm operational activities, and will aim for early detection of potentially harmful organisms. It is not feasible for routine surveillance to encompass all of the potentially new-to-New Zealand or new-to-region species that could be introduced. Rather, the approach is based on visual (e.g. diver) surveys for:

- Recognised marine pests as defined at the front of this document (see p. 2), except for the Asian kelp *Undaria pinnatifida* (for reasons described above (see footnote 8)).
- Any unrecognised but potentially harmful organisms, especially those that show invasive behaviour (e.g. unknown or unfamiliar organisms that become abundant). This element is consistent with the national Marine High-Risk Site Surveillance (MHRSS) programme, and general MPI advice, and is intended to identify potential new species (which could be new-to-New Zealand or represent range extensions of established species).

Surveillance will be conducted as part of day-to-day farm operations and during operational inspections of farm structures. Key elements of the surveillance programme will be as follows:

- As part of daily camera-based monitoring of feed usage and feeding behaviour, camera operators will be vigilant for the presence of target organisms on nets and other visible parts of the farm structure.
- As part of daily above-water farm activities, farm workers will be vigilant for the presence of target organisms on parts of the farm structure visible from the surface.
- The presence of target organisms on growing nets will be checked as part of the routine net biofouling assessment described above in 4.1.8 (Pen management and fish husbandry). It is expected that these checks will be undertaken at intervals of weeks to months. The exact frequency will depend on the rate at which biofouling accumulates under the site-specific conditions of the farming environment, with inspections triggered according to the SOP and related net scoring system that is developed.
- At least twice per year, all parts of the farm structures (i.e. in addition to growing nets) will be visually inspected for target organisms, by either diver, remote camera, or deployed settlement surfaces. This frequency of comprehensive surveillance is consistent with the MHRSS programme in Bluff Harbour and other high-risk New Zealand ports.
- As part of benthic monitoring, the seabed will be inspected for the presence of target organisms.
- Records will be kept of all surveillance activities.

Further specific details of on-farm surveillance will be embedded into an SOP that will be developed after consent is granted and operational details are finalised.

6.2 RESPONSE TO ON-FARM DETECTION OF TARGET ORGANISMS

An SOP will be developed after consent is granted and operational details are finalised, which will outline the actions to be undertaken (e.g. reporting and response procedures) in the event that surveillance detects target organisms. Among other things, the SOP will outline roles and responsibilities of NTS, regional (Environment Southland), and national (MPI) agencies. Reporting procedures in the SOP will describe standard MPI requirements for suspect organisms (and related Biosecurity Act obligations), and reporting obligations described in S5.3 (Part 1c) of the SRPMP.

Subject to agreement and certification by Environment Southland, it is anticipated that marine pest responses would be hierarchical according to risk:

1. Targeted eradication: Due to practical barriers to pest management in the marine environment, situations where eradication by NTS is envisaged will likely be limited to the following:
 - a) In the unlikely event that the Hananui farms were the first point of detection of a new-to-region pest.
 - b) If eradication of an established pest was being undertaken by Environment Southland or MPI as part of a wider regional or national response.
2. Targeted suppression: Where eradication is not feasible, suppression of pests to low densities will be undertaken, mirroring the approach taken for oysters and other bivalves to minimise *Bonamia* spp. risk (see 5.1).
3. Generic biofouling control: Other than target pest management, all biofouling will be controlled to low levels as part of routine operations, in particular through net cleaning (see 4.1.8), but also to manage other operational risks (e.g. to reduce hydrodynamic drag on farm structures). Note that NTS do not propose to routinely undertake capture of routine defouling waste, which is consistent with aquaculture practice nationally.

7. STAFF TRAINING

All aquaculture staff will receive training in the importance of, and reason for, biosecurity measures and the specific biosecurity requirements of the farm. This will include the normal appearance of the fish, how to spot abnormal behaviours or clinical presentations and the signs to look for with regard to unwanted or notifiable pathogens.

A designated staff member (or members) will also receive additional training in sampling for diagnostic testing. This will include bacteriology, virology, histopathology and molecular sampling. These individuals will also be responsible for the maintenance of a fish health kit on the Facility containing sufficient equipment, consumables and preservatives to permit emergency sampling under the instruction of the designated veterinarian.

Similar to pathogen training, farm staff will receive training in the identification of marine pests, with designated staff trained in related recording, sampling and preservation procedures. Training shall be provided by a suitably qualified person.

All aquaculture staff will be trained in reporting procedures within the NTS management structure when target (or other suspected harmful) organisms are found. In addition, all personnel must be aware of their legal obligations with

respect to unwanted and notifiable organisms, and in the importance of adhering to any immediate measures undertaken by NTS in response to the identification of a biosecurity risk or potential biosecurity risk.

A specific member of staff will be tasked with managing and monitoring biosecurity compliance with this BMP and biosecurity legislation.

8. REPORTING, REVIEW AND AUDIT

8.1 REPORTING

The BMP has outlined a range of requirements that involve record keeping, reporting of information, and reporting of marine pests and pathogens (or symptoms of disease). The exact nature of the reporting requirements, frequency of reporting, and relevant organisation for submission of reports, will be described in an SOP following the granting of any consent.

8.2 REVIEW AND AUDIT

This BMP will be subject to review by both management and an individual (or individuals) with appropriate biosecurity expertise and experience in marine pests and aquatic animal diseases under the following situations:

1. Annually;
2. When there is a significant change in operating parameters of the farm that potentially presents an altered biosecurity risk to the farm itself or its environment;
3. If new technologies or methods arise that could significantly improve the biosecurity outcomes for the Hananui area.
4. If BMP requirements need to be amended to be consistent with any broader regulatory developments (e.g., new regional or national pathway plan rules that are stricter than those currently in the BMP).

In such cases a record will be kept of the review and the decisions to change or otherwise the biosecurity provisions laid down in the BMP.

There will be a bi-annual internal audit of selected portions of the biosecurity management system. The findings and any corrective actions will be documented for evidence and reported to senior management in the finfish farming sector of NTS. The findings, corrective actions and suggestions of staff for biosecurity improvements will be considered as part of the annual review of the biosecurity management system.

ANNEX 1: FACILITY DESIGNATED VETERINARIAN

The designated provider of veterinary services for the farm is:

[NAME &/OR PRACTICE NAME]:

[PRACTICE ADDRESS]:

[EMERGENCY CONTACT DETAILS]:

Cell phone:

Office phone:

Email:

Final draft

ANNEX 2: PHYTOPLANKTON TRIGGERS

Harmful Concentrations Guide

CLASSIFICATION			STATUS - Cells/mL			
			ALERT LEVELS = Notify Management Immediately			
CLASS	GENUS	SPECIES	PHYSICAL	CHEMICAL	ALERT	ACTION
DIATOMS	CHAETOCEROS	<i>Phaeoceros</i>	X		Present	2
		<i>Hyalochaeta</i>	X		Present	5000
		<i>C. socialis</i>	X		100	10000
	SKELETONEMA		X		Present	5000
	PSEUDONITZCHIA	<i>P. seriata group</i>	X		1000	5000
		<i>P. delicatissima group</i>	X		1000	5000
<i>P. pungens</i>		X		1000	5000	
DINOFLAGELLATES	KARENIA			X	Present	250
	TAKAYAMA			X	Present	Unknown
	KARLODINIUM	<i>K. veneficum</i>		X	Present	50
	NOCTILUCA	<i>N. scintillans</i>		X	Present	Unknown
	GYMNODINIUM	<i>G. catenatum</i>		X	400	2000
	ALEXANDRIUM	<i>A. tamarense</i>			Present	400
	CERATIUM				100	1000
RAPHIDOPHYTES	CHATTONELLA	<i>C. marina</i>		X	Present	10
	HETEROSIGMA	<i>H. akashiwo</i>		X	Present	100
PRYMNESIOPHYTES	PRYMNESIUM	<i>P. parvum</i>		X	50	250
	CHRYSOCHROMULINA			X	50	250
SILICOFLAGELLATES	DICTYOCHA	<i>D. speculum</i>	X		40	200
	OCTACTIS		X		40	200

ANNEX 3: DECONTAMINATION STANDARDS

This section specifies minimum decontamination standards required.

Decontamination is used as the preferred term, rather than disinfection, as proper and effective decontamination is a combination of cleaning and disinfection. Surfaces must have organic debris removed, followed by detergent scrubbing where necessary to remove smaller adherent material or biofilms, then rinsed and allowed to stand for at least 1 hour to allow water to drain so that disinfectant is not diluted. The chosen disinfectant solution is then applied as per the information below

Product name (active ingredient)	Use	Dosage	Application method
Virkon (potassium monopersulfate and sodium chloride)	Disinfection of pre-cleaned surfaces (e.g. culture tanks, walls, floors, tables, fish handling equipment)	1:100 (freshwater only)	Wipe or spray at 300mL/m ²
	Disinfection of equipment (e.g. hand-held meters, refractometer, secchi disk, algae nets, aeration systems, weigh scales)	1:100 (freshwater only)	Wipe or spray at 300mL/m ² ; or Immerse in solution for 10 min, rinse clean with fresh water and air dry
	Foot baths	1:100 (freshwater only)	Fill baths with solution and replenish every 4 days or when moderately fouled
	General disinfection of farm equipment (e.g. feed hoppers, feeding equipment)	1:200 (freshwater only)	Spray 300mL/m ² and air dry
Quaternary ammonium compounds – can be used where freshwater is not available but lack efficacy for some pathogens	Disinfection of equipment	2 ppm (fresh or saltwater)	Immerse in solution for 15 min, rinse clean with fresh or saltwater and air dry.
	Foot baths and vehicle tyre baths (alternatively vehicle wheels may be sprayed with the solution)	10 ppm (fresh or saltwater)	Fill baths with solution and replenish every 4 days or when moderately fouled

If neither Virkon nor quaternary ammonium compounds are available or the Facility wishes to use other compounds e.g. hypochlorite, then the information in Annex 3 should be consulted for appropriate active ingredient selection and concentration/time parameters.

ANNEX 4: ADDITIONAL DECONTAMINATION INFORMATION

Disinfectant application and recommended doses (DAFF 2022).

Disinfecting agent	Application	Pathogens	Recommended dose	Comments
Hypochlorite solutions (sodium hypochlorite or calcium hypochlorite)	Treatment of clean, hard surfaces	All pathogens	Minimum 30 mg/L available chlorine	Use as a general disinfecting solution
	Treatment of water (assuming low organic loading)	All pathogens	Minimum 30 mg/L available chlorine Maintain a minimum of 5 mg/L of residual chlorine	Hold for a minimum of 24 hours to inactivate Test chlorine level before discharge or neutralise with thiosulfate Less active in the presence of high levels of organic matter Re-dose if necessary
	Treatment of net pens	All pathogens	Initial dose of 1000 mg/L available chlorine Maintain a minimum of 5 mg/L of residual chlorine	Thoroughly mix to ensure even distribution Immerse for a minimum of 6 hours
	Dip treatment of absorbent material such as dip nets, clothing, ropes or absorbent surfaces	All pathogens	Solution of > 200 mg/L available chlorine	Allow time to completely saturate plus a further 2 minutes (minimum) Rinse items in fresh water or neutralise with thiosulfate
	Treatment of tanks, floors and walls in culture facilities	All pathogens	Spray with a solution > 1500 mg/L available chlorine	Leave solution for 2 hours, then rinse to free any remaining soils Tanks should be filled with freshwater and dosed with 200 mg/L available chlorine Leave for 24 hours in the case of whirling disease
Chloramine-T	Treatment of water	Bacteria, viruses, fungi	20 mg/L of chloramine-T (or as per manufacturer's instructions)	Hold for a minimum of 24 hours Test chlorine level before discharge or neutralise with thiosulfate

Disinfecting agent	Application	Pathogens	Recommended dose	Comments
				Concentrations and doses vary between products
	Treatment of previously cleaned hard surfaces	Bacteria, viruses, fungi	20 mg/L of chloramine-T (or as per manufacturer's instructions)	Hold for a minimum of 24 hours Test chlorine level before discharge or neutralise with thiosulfate Concentrations and doses vary between products
	Footbaths	Bacteria, viruses, fungi	50 g/L of chloramine-T (or as per manufacturer's instructions)	Concentrations and doses vary between products
	Treatment of hard surfaces	All pathogens	1% solution for > 60 minutes (or as per manufacturer's instructions)	Concentrations and doses vary between products
Peracetic acid	Treatment of porous surfaces	All pathogens	2% solution for > 60 minutes (or as per manufacturer's instructions)	Concentrations and doses vary between products
	Treatment of waste slurries (high organic matter)	All pathogens	40 L concentrate solution/1000 L	Contact time > 1 hour May cause excessive foaming and tank overflow in presence of high levels of protein
Monosulfate compounds	Treatment of hard surfaces	All pathogens	10 g/L (or as per manufacturer's instructions)	Application rate of 400 mL/m ² for > 10 minutes Concentrations and doses vary between products
	Treatment of porous surfaces	All pathogens	20 g/L (or as per manufacturer's instructions)	Application rate of 400 mL/m ² for > 10 minutes Concentrations and doses vary between products
	Footbaths	All pathogens	50 g/L (or as per manufacturer's instructions)	Remove all organic matter on footwear before immersion Immersion time > 1 minute

Disinfecting agent	Application	Pathogens	Recommended dose	Comments
				<p>Replace solution daily in areas of heavy use; every 4 days in areas of light use</p> <p>Concentrations and doses vary between products</p>
Chlorine dioxide	Treatment of water	All pathogens	As per manufacturer's instructions	Can produce volatile fumes when first activated
	Treatment of hard surfaces	All pathogens	As per manufacturer's instructions	Can produce volatile fumes when first activated
Iodophors	Treatment of hard surfaces	Bacteria, viruses, fungi	> 200 mg/L available iodine	Apply to surface 1-2 minutes
	Spray disinfection of equipment	Bacteria, viruses, fungi	> 100 mg/L available iodine	Apply to previously cleaned and dried equipment.
	Footbaths	Bacteria, viruses, fungi	> 200 mg/L available iodine	<p>Clean boots before disinfection</p> <p>Replace daily in high-use areas, or when solution has lost colour</p>
	Use as a hand or skin wash, or on angling or other delicate equipment	Bacteria, viruses, fungi	> 200 mg/L available iodine	Povidone-iodine solution only, do not use acidified iodine solutions
	Treatment of water	Bacteria, viruses, fungi	30 mg/L available iodine, left for 12 hours	Treat with thiosulfate before release
Calcium oxide	Earthen-based ponds	All pathogens	0.5 kg/m ² for 1 month	Repeat dose on at least two occasions in wet areas or in event of flooding
Sodium hydroxide	Treatment of concrete or cracked surfaces of appropriate materials	All pathogens	Applied as a mixture with CaOH and Teepol	NaOH generally sold as pellets
	Treatment of appropriate surfaces where high	Viral pathogens on suitable	Applied as a solution of 20 g/L NaOH for > 10 minutes	Repeat dose on at least two occasions in wet areas or in event of flooding

Disinfecting agent	Application	Pathogens	Recommended dose	Comments
	organic loading may be a problem	Surfaces		May also be used as a 0.2% solution as a cleaning agent for equipment Teepol (wetting agent) enhances penetration through soil and into concrete
	Treatment of wastewater	All pathogens	At a rate to achieve pH > 12 for 24 hours	
	Treatment of waste slurries (high organic matter)	All pathogens	50% (wt/vol) solution at a rate of 30 L/1000 L of slurry	Dose should achieve a pH of > 12 Treat for >4 days
Calcium hydroxide	Treatment of waste slurries (high organic matter)	All pathogens	40% (wt/vol) solution at a rate of 60 L/1000 L of slurry	Dose should achieve a pH of > 12 Treat for > 4 days
Glutaraldehyde	Treatment of small items or those subject to corrosion	All pathogens	2% (wt/vol) for 30 minutes	Available as concentrate solution
Formalin solution	Treatment of hard or porous surfaces	All pathogens	8% (vol/vol) for 30 minutes	Available as 40% solution Dilute 1:12 for use Use only in well-ventilated areas
	Foot baths	All pathogens	8% (vol/vol) for 30 minutes	Available as 40% solution Dilute 1:12 for use Use only in well-ventilated areas
	Treatment of waste slurries (high organic matter)	All pathogens	40 L formalin solution/1000 L (40%)	Must be distributed evenly
	Treatment of pipelines or sewage channels (<i>in situ</i>)	All pathogens	300 mL of commercial grade formalin solution/10 L of water	Completely fill pipeline with disinfecting solution and leave for 24 hours

Disinfecting agent	Application	Pathogens	Recommended dose	Comments
Quaternary ammonium compounds	Use on skin or delicate items	Some bacteria, some viruses	1 mg/L for > 1 minute	Limited range of efficacy
	Use on hard surfaces	Some bacteria, some viruses	2 mg/L for > 15 minutes	Limited range of efficacy
Heat	Treatment of wastewater	Most pathogens Enveloped viruses and some bacteria may be resistant	60°C for 10 minutes 70°C for 6 minutes 75°C for 5 minutes 80°C for 4 minutes	
	Treatment of hard surfaces and equipment	Most pathogens Enveloped viruses and some bacteria may be resistant	Steam cleaning at 115-130°C for 5 minutes	Difficult to regulate, best used as an adjunct to other disinfection methods Especially suitable for treatment of transport tanks
Desiccation and light	Earthen tanks	Most pathogens	Dry for > 3 months at an average temperature of > 18°C	Drying period can be reduced if combined with an appropriate chemical disinfectant Use drying and sunlight as a general adjunct to all disinfection if possible
UV light	Treatment of wastewater	Viruses, bacteria, Fungi	> 25 mJ/cm ²	Requires pre-treatment with chemical precipitation or filtration
	Treatment of water	Myxosporidean species spores	> 35 mJ/cm ²	May requires pre-treatment with chemical precipitation or filtration
Ozone	Treatment of water	All pathogens	1 mg/L for > 1 minute	

Note: Levels recommended in this table come from a number of sources and have been provided here as a general guide. Since the disinfecting capability of disinfecting agents will vary depending on the conditions, concentrations and contact times given should be viewed as minimum acceptable levels for decontamination purposes.

EFFICACY OF TYPES OF DISINFECTANTS AGAINST VIRUSES, BACTERIA, FUNGI AND SPORE FORMING PROTOZOA

Disinfecting agent	Virus category A	Virus category B	Virus category C	Fungi	Spore-forming protozoa
Strong alkalis	++	+	++	++	+
Aldehydes	++	+	++	++	+
Peracetic acid	++	++	++	++	+
Chlorine	++	+	++	++	+/- ^a
Chlorine dioxide	++	++	++	++	+
Iodophors	++	+/-	++	++	+/- ^a
Ozone	++	+	++	+	+/-
Ultraviolet	+	+/-	+	+	?
QACs	+/-	-	-	+	-
Acids	+	-	+/-	-	-
Biguanides	+	-	-	-	-

QAC = quaternary ammonium compound

a = High concentrations required to be effective

Disinfecting agent	Gram-negative	Gram-positive	Mycobacteria	Rickettsia-like	Bacterial spores
Strong alkalis ^a	++	++	+	++	+
Aldehydes ^b	++	++	+	+	+
Peracetic acid	++	++	++	++	+
Chlorine dioxide	++	++	++	++	+
Chlorine	++	++	++	++	+
Iodophors ^b	++	++	++	++	+
Ozone	++	++	++	++	+
Ultraviolet	++	++	+	++	?
QACs	+/-	+	-	+	-
Acids ^b	+	+	+/-	+	+/-
Biguanides	+	+	-	+	-

QAC = quaternary ammonium compound

a = High concentrations required to be effective

b = Prolonged contact times required in some circumstances; in particular, for spores

Key:

++: Highly effective

+: Effective

+/-: Limited activity

-: Not recommended

?: Limited information

EXAMPLE FISH VIRUSES AND CATEGORIES FOR DISINFECTION:

Epizootic haematopoietic necrosis	Iridoviridae	C
Infectious haematopoietic necrosis	Rhabdoviridae	A
Infectious pancreatic necrosis	Birnaviridae	C
Infectious salmon anaemia	Orthomyxoviridae	A
Iridoviral diseases of finfish	Iridoviridae	C
Oncorhynchus masou virus disease	Herpesviridae	A
Viral encephalopathy and retinopathy	Betanodavirus	B
Viral haemorrhagic septicaemia	Rhabdoviridae	A

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ANNEX 5: RATIONALE FOR BIOFOULING THRESHOLDS AND INSPECTION REQUIREMENTS

BACKGROUND

The BMP for NTS stipulates biosecurity requirements that vessels (NTS or contracted) must meet. Among the mitigation measures are hull biofouling standards that can be summarised as follows:

1. **Vessels from outside Southland:** For vessels that have operated within territorial waters outside Southland since last antifouling, no visible macrofouling except for gooseneck barnacles will be present on the hull upon first arrival at the farm site.
2. **Regional vessels:** For vessels that have operated only within the Southland region since last antifouling (or visiting vessels in the region for 6 months or longer), biofouling cannot exceed 5% cover on the combined surface area of main hull and niche areas, and should be visibly free of a suite of listed target organisms.

The standard for regional vessels is less stringent than for vessels from outside Southland, due to the latter presenting a greater risk in terms of introducing new risk organisms. Additionally, applying stringent standards to regional vessels is not justified based on the relatively greater risk from unmanaged vessels and pathways, and due to vessel cleaning issues in Bluff, which are: (i) insufficient cleaning infrastructure; and (ii) restrictions on in-water cleaning imposed by rules in the Southland Regional Coastal Plan. The regional standard achieves a balance between risk reduction and practicality, and still meets the key goal of minimising the risk of NTS operations being a pathway for the spread of potentially harmful organisms. Moreover, NTS operational vessels are being managed to a level whereby their biosecurity risk is expected to be less than minor by comparison with other vessels operating within the same general area of Southland. For these other vessels, there are few biosecurity requirements currently in place. The text below provides some further detail and rationale.

BIOFOULING STANDARDS

Standard for vessels arriving from outside Southland

For vessels that have operated in territorial waters outside Southland since last antifouling, the proposed standard (i.e. that biofouling will not exceed micro-fouling and/or goose barnacles upon arrival) has been recommended to minimise, to extent practical, the risk that NTS activities introduce new marine pests or other potentially harmful organisms into the area of NTS operations in Southland. This standard:

- Mirrors MPI's border standard for biofouling on 'long stay' (vessels that longer than 28 days) international vessels arriving in New Zealand (CRMS 2023)¹⁰.
- Is stricter than Aquaculture New Zealand (AQNZ) standards for vessel biofouling. The AQNZ mussel industry biofouling requirement for vessels moving among six defined aquaculture Operational Zones (Otago and Southland together form the 'Lower South' zone) is that vessels must be free of designated

¹⁰ CRMS 2023. Craft Risk Management Standard: Vessels. Ministry for Primary Industries, Wellington, New Zealand, 13 October 2023. 8p.

pests¹¹. AQNZ salmon farming standards do not address biofouling on vessels moving among Operational Zones¹².

It is noted that there are limited existing management measures in place for biofouling on inter-regional domestic pathways within New Zealand, with the main requirements of relevance to Southland being:

- The AQNZ requirements for the mussel industry as noted above.
- Provisions under a Controlled Area Notice (CAN) put in place to manage risk to the Bluff oyster fishery from the non-native parasite *Bonamia ostreae*.
- Vessels going to Fiordland are managed in terms of hull fouling risk and topside mechanisms (e.g. gear) under a Fiordland Marine Regional Pathway Management Plan¹³.
- Vessel going to the sub-Antarctic Islands (as part of a Regional Coastal Plan administered by the Department of Conservation) have strict measures relating to vessel hull fouling¹⁴.
- The Southland Regional Pest Management Plan (SRPMP) lists six marine pests that are managed under an exclusion programme, for which the goal is to prevent establishment in Southland. Related Rule 3 of the SRPMP states, with reference to these marine pests, that “No person....shall possess, keep, hold, enclose or otherwise harbour any pest....”. In order to give effect to this rule, vessels would need to be free of the marine pests listed in the SRPMP.

Despite the above requirements, there has to date been little or no compliance verification other than in Fiordland. This situation means that many domestic vessel movements into Southland to the wider area of NTS farm operations are unlikely to have effective biosecurity management measures in place. The strict standard proposed for NTS vessel movements into Southland from regions outside is consistent with national and international best practice in that it does not negate risk, but reduces it to a negligible level.

Standard for regional vessels

For vessels that operate within the area of NTS farm activities in Southland, the 5% cover threshold, combined with target surveillance for potentially harmful organisms, has been proposed as a practical standard that achieves an acceptable level of residual risk. The 5% threshold is consistent with the Regional Pest Management Plan or pathway plan requirements of other regional councils in New Zealand (Northland, Auckland, Marlborough, Nelson, Tasman), although top of the North councils are currently developing a stricter standard to be applied to vessels only when they move. No other regional councils have generic pathway-based hull fouling management requirements. It would be inappropriate to require a more stringent standard for regionally-operating NTS vessels, except where other regional vessels operating in the wider project area were also required to meet such a standard, which is not presently the case.

¹¹ AQNZ 2023. Greenshell Mussel Industry Biosecurity Standards. Aquaculture New Zealand, May 2021 (reviewed September 2023). 35p.

¹² AQNZ 2024. Salmon Biosecurity Standards. Aquaculture New Zealand, May 2019 (reviewed . 25p.

¹³ Fiordland Marine Regional Pathway Management Plan. Southland Regional Council, New Zealand. 15p.

¹⁴ <https://www.doc.govt.nz/globalassets/documents/about-doc/conservation-management/coastal-management/regional-coastal-plan-kermadecs-subantarctics.pdf>

The absence of a national or regional (Southland-wide) pathways approach, means that many other vessels that are active in the wider area of NTS operations will likely present a relatively greater risk in terms of biofouling. These vessels include fishing and recreational boats, which have operational profiles (e.g. slow voyage speeds, long periods idle) that can make them particularly high risk. As such, the proposed NTS regional standard, although based on risk reduction, provides for a greater level of regional marine biosecurity protection than is currently the case for most maritime activities, given that it: (i) Restricts hull biofouling to a maximum of 5% cover; (ii) Does not allow designated marine pests; and (iii) Does not allow bivalve species that are the primary risk organisms for the transport of the parasite *Bonamia*. As such, compliance with the proposed region standard will lead to NTS vessels being a considerably lower biosecurity risk than most other vessels operating in Southland (except those going to Fiordland).

HULL CLEANING ISSUES

In order to comply with the proposed standards, NTS will need the ability to undertake hull cleaning outside of routine land-based maintenance (and antifouling) that is undertaken (typically every 2-3 years for commercial vessels) as part of Maritime New Zealand safety requirements. The capacity to clean vessel hulls in Southland is currently limited.

The preferred hull cleaning method is land-based haul-out and water blasting, with capture of cleaning waste. However, existing land-based facilities are insufficient to meet NTS needs. The Southport synchro-lift will likely be too small for the larger vessels NTS is likely to operate, and access to the synchro-lift can be limited due to availability. This situation means that 'reactive' local land-based cleaning (i.e. triggered by a breach of the regional biofouling threshold) may not be a feasible management option. As such, NTS may need to go to another region (e.g. Otago or Canterbury) to be cleaned (which itself raises operational and biosecurity issues) or be locally cleaned in-water.

The most common form of in-water cleaning nationally is diver cleaning using hand-held or mechanical devices, and is practiced around the country irrespective of regional restrictions. However, Policies and Rules in the Regional Coastal Plan (RCP) have significant implications for the type of in-water cleaning likely to be acceptable. Policy 7.8.2.3 has related rules as follows:

Rule 7.3.8.2.4 - Hull cleaning of ships within the coastal marine area resulting in the discharge of paint or abrasive sand blasting materials containing bioaccumulating, toxic or noxious substances into the coastal marine area is a non-complying activity.

Rule 7.3.8.2.5- Hull cleaning of ships, where viable 'unwanted or pest marine organisms' (note – this wording is from the RCP) enter the coastal marine area, is a prohibited activity.

These rules were put in place at a time when marine biosecurity issues were not well understood, and they did not consider contaminant risk relative to the biosecurity risk context, nor account for the possibility of cleaning methods that would lead to a negligible contaminant risk. The NTS BMP and related vessel biofouling management activities are intended to ensure that the RCP rules are met, as follows:

Contaminant discharges: NTS are considering two complementary approaches to vessel coatings:

Biocidal coatings – mechanical cleaning (e.g. brushing) of commonly-used ‘ablative’ biocidal coatings would lead to some release of copper. The mass load and effects of any copper discharged would likely be negligible due to the infrequency and small scale of the cleaning, and the occurrence of cleaning in a port environment that is already exposed to elevated levels of copper and other contaminants. Nonetheless, in the event that NTS use biocidal coatings, cleaning will be restricted to diver hand removal and collection for land disposal of target organisms, to avoid the risk of contaminant discharge.

Non-biocidal coatings – NTS are exploring the option of using a non-biocidal coating that is amendable to regular (e.g. monthly) hull grooming (i.e. cleaning before conspicuous biofouling develops). In this way the discharge of antifouling contaminants would be avoided, and the main cleaning consideration would be biosecurity risk, as discussed next.

Biosecurity risk: The ways in which vessel cleaning can lead to biosecurity risk have been reviewed in a number of studies (e.g. Hopkins & Forrest 2008; Scianni & Georgiades 2019)¹⁵. The purpose of following biosecure practices undertaken by NTS will ensure that there is no release of viable marine pests or other potentially harmful organisms:

- Whole organisms will safely be removed by divers and collected for land disposal. During the removal process, whole organisms will be enclosed (e.g. in sealable bags) to ensure that the organisms themselves, or viable material, is contained during the removal process.
- Vessel inspection twice per year is proposed as a minimum. This frequency will ensure that significant new pests not yet recorded in Southland (including but not limited to SRPMP-listed pests such as the clubbed tunicate *Styela clava* and Mediterranean fanworm *Sabella spallanzanii*), are detected and removed before becoming reproductively mature. This approach negates the risk that physical disturbance during the removal process triggers the release of viable material (e.g. larval release due to spawning).

In addition to the above risk mitigation approaches, the following is also noted:

- Diver hand removal of marine pests is a common management tool in New Zealand.
- On most marine farms and other structures in Southland, defouling is undertaken with no regard to waste capture or biosecurity considerations, which is also the situation nationally (except in the case of responses to specific organisms). This situation contrasts the strict Environment Southland rules relating to vessels.
- As a general principle, it is by far preferable to remove locally-acquired pest organisms from a vessel hull, than risk spreading such organisms if the vessel moves (including movement to dry dock or another region that allows in water cleaning, in order to have the pest organism removed).

¹⁵ Hopkins GA, Forrest BM 2008. Management options for vessel hull fouling: an overview of risks posed by in-water cleaning. ICES J. Mar. Sci. 65(5): 811-815.

Scianni C, Georgiades E 2019. Vessel In-Water Cleaning or Treatment: Identification of Environmental Risks and Science Needs for Evidence-Based Decision Making. Frontiers in Marine Science 6(467).

- Given the hull biofouling standards that are proposed for NTS, the detection of pest species on NTS vessels would almost certainly point to a local source population of viable organisms (e.g. in Bluff) that would be equally likely to infect other local vessels for which there is limited risk management. In this respect, unless there is a population management programme in place for that organism, the risk of viable material being lost is negligible.
- In the event that a new marine pest is discovered in the region, a wider consideration of risk and response is expected to be undertaken by Environment Southland, as has recently been the case with the discovery in Bluff in July 2025 of the SRPMP-listed pest Mediterranean fanworm.
- As an alternative to the hull cleaning measures proposed above, NTS may consider (as a last resort) a containment and cleaning approach based on encapsulation of the hull in an impermeable material and dosing the encapsulated water with an EPA-approved compound such as chlorine (Morrisey 2015)¹⁶. Environment Southland already hold a consent for this activity as part of its marine pest response toolbox, and NTS also have the option of later seeking a similar consent.

As a final comment, note that coupled with the revised standards is explicit adoption of international best management practices for biofouling by following International Maritime Organisation (IMO) Biofouling Guidelines¹⁷, elements of which are already embedded in the draft BMP. Among other things, this approach would require NTS to keep a Biofouling Record Book on each vessel, which documented the best practice measures being implemented to manage biofouling risk. This concept mirrors the CRMS (2023) approach for international vessels arriving in New Zealand, whereby one of three listed "*acceptable measures*" for complying with the strict border standards for hull fouling is described as demonstration of continual maintenance using best practice, including: application of appropriate antifouling coatings; operation of marine growth prevention systems on sea-chests; and in-water inspections with biofouling removal as required. By way of guidance, MPI considers following IMO Biofouling Guidelines as an example of best practice.

¹⁶ Morrisey DJ 2015. Addition of biocide during vessel biofouling treatment - an assessment of environmental effects. Prepared for Nelson City Council. Cawthron Report No. 2715. 46p. plus appendices.

¹⁷ IMO 2023. 2023 Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species. International Maritime Organisation, Annex 17 Resolution MEPC.378(80)), adopted on 7 July 2023. 62p.

ANNEX 6: PROVISIONAL GUIDANCE FOR INSPECTION OF VESSELS

This guidance is for NTS or contracted vessels, to support biosecurity management plan vessel inspection requirements.

High-level guidance of information needs that outlines the general approach is captured in the Table below. A comprehensive description of survey design, documentation and record keeping considerations is available from MPI (*Georgiades E, Kluza D 2020. Conduct of in-water biofouling surveys for domestic vessels. Biosecurity New Zealand Technical Paper No: 2020/04. 38p*). A more comprehensive template for reporting, modelled on the MPI guidance, will be developed as a Standard Operating Procedures (SOP) after consent is granted and operational details are finalised. As well as written records, inspections will include photographs and video that are representative of the biofouling present in each of the three hull locations described in the Table below. Where biofouling is removed in a biosecure manner during an inspection, photographs and video will be taken that are representative of the fouled area after removal, demonstrating that fouling has been reduced to a level allowed under the relevant hull biofouling standard outline in the BMP. Photographs and video will include a label identifying the location on the hull that the imagery depicts.

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GENERAL INFORMATION

Date:	Regions visited since last antifoul:
Assessor and contact information:	Date of last antifoul (mm/yyyy):
Location of assessment:	Date of last inspection (mm/yyyy):
Assessment method (circle):	Dive Remote camera
Vessel name:	Date of last out of water clean (mm/yyyy):
Skipper and contact information:	Date of last out of water clean or spot removal (mm/yyyy):
Vessel length (m):	Planned duration of stay in region (months):
Vessel last port of call:	Planned duration of visit to NTS farms in next year (months):

INSPECTION RECORD

Overall vessel level of fouling (%): |

Area inspected	Location on vessel	Fouling cover (%)	Fouling description in relation to BMP standards	Target species found	Pass/fail	Remedial action to achieve BMP standards (if any)
Main Hull	Port bow					
	Port amidships					
	Port stern					
	Starboard bow					
	Starboard amidships					
Wind/water line	Starboard stern					
	Port bow					
	Port amidships					
	Port stern					
	Starboard bow					
Niche areas	Starboard amidships					
	Starboard stern					
	Rudder					
	Propeller and shaft					
	Trim tabs					
	Gratings					
	Pipe intakes/outlets					
	Maintenance support					
	Keel					
	etc					