The New Zealand King Salmon Company Ltd

- Ngamahau
- Kopāua
- Waitata
- Clay Point
- Te Pangu Bay
- Ruakaka Bay
- Otanerau Bay
- Forsyth Bay
- Waihinau Bay
- Crail Bay
- Takaka
- Waiau
- Tentburn

Biosecurity Management Plan

30 August 2017

Prepared for	The New Zealand King Salmon Co. Limited
Report prepared by	NZ King Salmon
Reviewed by	Dr Colin Johnston BVMS(Hons) MACVSc (Aquaculture Medicine) CertAqV, Tangata Whenua Panel • Ngāti Kōata Trust • Te Runanga o Ngāti Kuia Charitable Trust • Te Ātiawa o Te Waka-a-Māui Trust
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Prepared by:

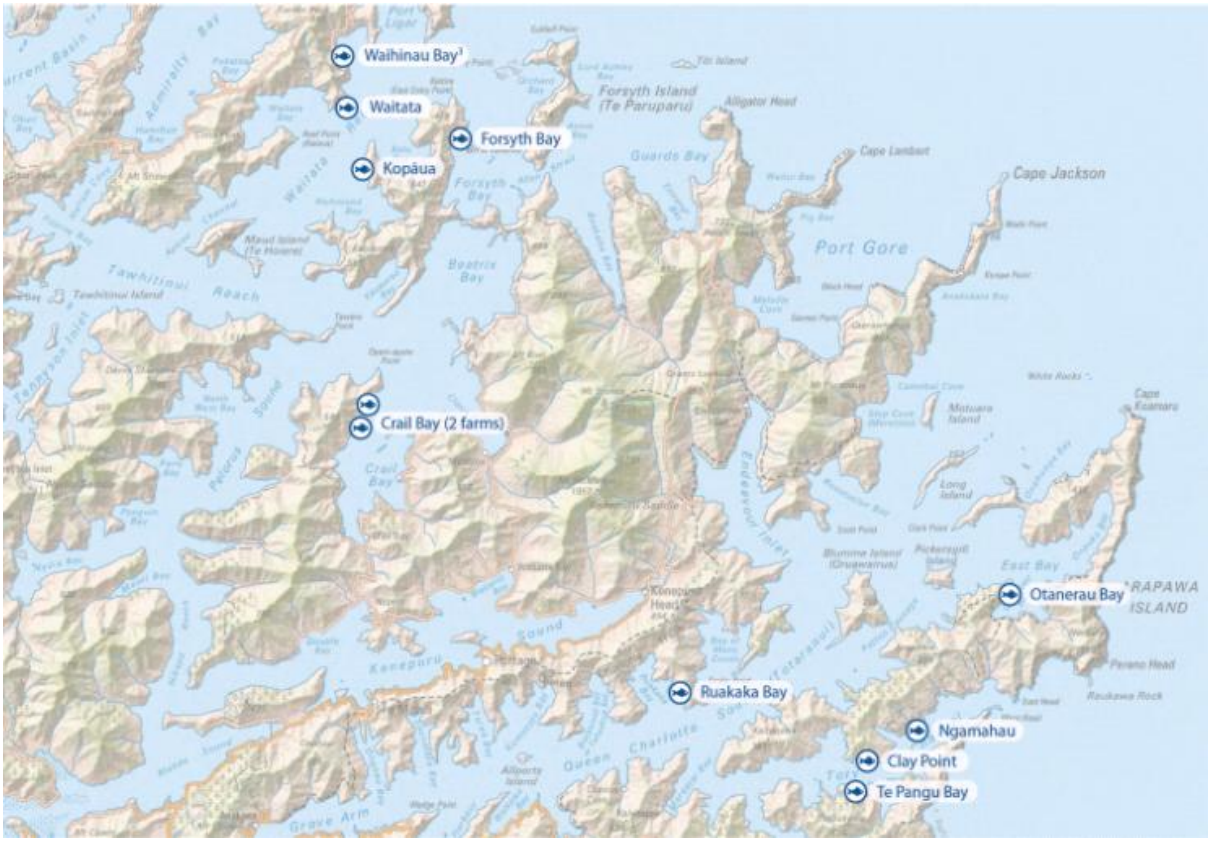
NZ King Salmon

Contents

1 Introduction

New Zealand King Salmon (NZKS) currently has eight salmon farms (eleven sites) in the Marlborough Sounds. Located in the Pelorus Sound are; Waihinau Bay, Waitata, Kopāua and two sites at Crail Bay and one in Forsyth Bay which are currently fallowed. Sites in Queen Charlotte Sound and Tory Channel are; Ruakaka Bay, Otanerau Bay, Te Pangu Bay, Clay Point and Ngamahau.

This Biosecurity Management Plan has been developed in conjunction with on-farm management measures to prevent, control or contain biosecurity risks to the extent practicable.



This management Plan has been developed to minimise the risk of spreading marine pests and infectious disease agents as a result of the establishment and operation of the salmon farms.

This Biosecurity Management Plan has been reviewed by Dr Colin Johnston BVMS (Hons) MACVSc (Aquaculture Medicine) CertAqV, who is qualified in marine biosecurity and aquatic animal diseases.

2 Consultation

This Biosecurity Management Plan has been developed in consultation with Ngāti Kōata Trust, Te Runanga o Ngāti Kuia Charitable Trust, the Tangata Whenua Panel in relation to Waitata and Kopāua and Te Ātiawa o Te Waka-a-Māui Trust in relation to Ngamahau.

This Biosecurity Management Plan has also been adopted by all existing NZKS sites.

3 Objectives

This Biosecurity Management Plan has been developed to minimise or prevent biosecurity risks from occurring and to facilitate a coordinated, well informed and timely response to the detection of biosecurity risks faced in NZKS operations, company wide.

It is designed to reduce the transmission of pathogens between or within control regions as well as develop a proactive 'hygiene culture' of on-farm, as well as vector-based, management measures to reduce the risk of spread, including:

1. Methods to manage vectors that could spread marine pests and disease agents to or from salmon farms;
2. Routine practices to manage fouling of nets and structures;
3. A passive surveillance regime to facilitate early detection of unusual or suspicious organisms associated with farm structures;
4. An effective disease surveillance regime for salmon stock;
5. The use of husbandry and harvesting methods consistent with best practice for the minimisation of disease risk;
6. On-farm management measures to prevent control or contain biosecurity risks to the extent practicable.
7. Specification of the parties to be notified should any new biosecurity risk from marine pests or disease agents be identified at the farm. These include the Tangata Whenua panel for Waitata and Kopāua and Te Ātiawa o Te Waka-a-Māui Trust for Ngamahau, land owners and tourism / recreation businesses within 1km of the farm. See Appendix 4 - List of Potentially Affected Parties.
8. This Management Plan is based on a two-tiered system of alert depending on the disease status of the company with changing actions and monitoring processes throughout the steps.

Status Green - A background (normal farming) phase of heightened hygiene awareness to disease risks within and between operational regions or zones. Causes of mortality are monitored to provide early warning and plans and equipment are kept updated ready to allow rapid response, therefore minimising risk. Communication, both on-farm and between regions / zones is critical in maintaining awareness.

Status Red – An alert phase where mitigation techniques are fully utilised, effectiveness monitored; and communication increased. Full cleaning and disinfection procedures are utilised by both the control zone containing the possible disease reservoir (control of outgoing pathogens) and regions naïve to the disease (control of incoming pathogen risk). This may lead to a phase of full damage control to a major infectious disease loss. All resources are utilised to produce a coordinated response to reduce fish fatality and control the associated problems of disease spread to stocks or other control zones. This is characterised by timely mitigation and mortality disposal and encompasses legislative requirements to notify government agencies.

3.1 Control Zones

For the purposes of this document, the following **CONTROL ZONES** are defined. Although protocols between pens, leases or farms are important in minimising disease risk, due to the external constraints placed on the company under the current resource consent process, the primary focus is management of risks between CONTROL zones see Appendix 3 - Control Zones

Farming Operations:

1. Tentburn
2. Takaka
3. Waiau
4. Tory Channel – Ruakaka Bay, Clay Point, Te Pangu Bay, Ngamahau
5. Otanerau Bay
6. Outer Pelorus Sounds - Waihinau Bay, Forsyth Bay, Waitata, Kopāua
7. Crail Bay
8. Picton service base

3.2 Predisposing Factors to Infectious Disease

Some of the major losses in salmonid culture are due to factors such as natural toxins, environmental events, and nutritional issues or systems failures. In recent years the incidence of mortalities due to algal and jellyfish events have been increasing; however, the majority of global losses are caused by disease processes involving infectious agents. Aquaculture, like any other farming system, provides an environment in which disease causing organisms can multiply leading to significant morbidity, mortality and loss of productivity. Infectious agents may be parasites, fungi, bacteria or viruses. However, it is important to understand that disease does not necessarily follow just from the presence of a pathogen. Fish are more predisposed to disease if stressed; therefore farming activities should be conducted with minimal stress wherever possible. Predisposing factors to be considered are:

- *Smoltification*: A time of extreme physiological change which causes prolonged stress
- *Early or late transfer to seawater*: Osmotic shock causes immunosuppression and decreased stress tolerance.
- *Sexual Maturity/Spawning*: Changes in hormone levels cause fish to become stressed and susceptible to osmotic challenge as well as more susceptible to certain pathogens.
- *Elevated temperature*: High temperature is a major factor involved in susceptibility to disease. Disease organisms also tend to multiply more rapidly at higher temperature.
- *Poor water quality*: Sub lethal exposure to seabed out gassing, exposure to algal toxins, low flow or high stocking density. This risk can be minimised through sensible farming practices.
- *Oxygen levels*: Low oxygen or poor oxygen replenishment (poor water flow) causes respiratory distress and may induce stress response. Prolonged oxygen super saturation can also cause morbidity.
- *Physical damage to the skin, gills or protective mucus* from rough handling, predator strike, parasites, jellyfish, suspended particulates and algal blooms can

lead to infection. Good management practice is paramount in minimising damage to the stock.

- *Disease status:* Fish suffering from one health issue are already stressed and immune compromised, thus more susceptible to other diseases.
- *Behavioural Stresses* associated with social domination, crowding, unfavourable light conditions or the sudden appearance of predators within the visual range of the fish
- *Poor hygiene standards*: Failure to isolate stock from disease sources through improper cleaning and disinfection of equipment, presence of infected fish in the pen/farm /hatchery water supply (note the necessity to empty all fish from a pen before pumping more fish in), failure to remove dead or diseased fish, failure to clean divers and mort bags between pens/farms/year classes, personnel working on more than one farm, failure to clean/disinfect equipment between sites.

3.3 Modes of Transmission

Marine pests and diseases are spread through recognised conveyors including:

- *Fish stock*: Fish do not need to display 'active disease' in order to spread it as individuals may be 'carriers'. The risk of spread is increased when stock are stressed. Diseased mortalities are highly infectious and should be removed frequently during active disease. Live fish should never be exposed to processing waste (including blood water). Year classes should be kept separate wherever practical.
- *Staff and Visitors*: Movement of staff between sites; contractors; visitors from other farming regions (national or international). This risk is best countered by signage and disinfection stations to clean gear between sites within a Control Region. Gumboots, wet weather gear and PPE should not be transferred between Control Regions. Visitors should sign into each facility declaring recent previous contact with farmed fish so that farm staff may manage the risk appropriately.
- *Equipment, vehicles and transportation – including contractors and other service suppliers*: Nets, pallets and bins, vessels, handling equipment, etc. Risk increases with porosity of the surface and lack of attention to hull cleanliness through antifoul.
- *Other aquatic life*, *birds and animals*: Can be implicated in disease spread, it is good practice to exclude or remove wild animals from pens. Predators may damage or stress stock.
- *The aquatic environment (water and sediments):* Transmission through water is best negated by distance between farm sites, though water movement within Control Regions inevitably links all farms within that region. Infectious agents can survive for long periods in wet or damp conditions that exist on equipment, vehicles and personal equipment. Sediments can harbour infective stages for variable periods, this risk is best minimised through fallowing practices where that is possible.

3.4 Principles of Control and Eradication

- *Rapid Detection and Identification of disease*: Regular mortality removal (diving, mort airlifts) to establish mortality trend is essential in spotting the onset of a disease. As a guideline, diving/airlift should be carried out more regularly at higher loss levels. Due to rapid breakdown and increased pathogen production rates, mortality removal should be more frequent in summer than winter, and similarly more frequent in smolt than in growers. Behavioural observations,

including swimming behaviour, colour, feed response and clinical signs (external or internal pathology) also need to be recorded and communicated. Where disease is suspected, the company veterinarian should be consulted so that an investigation can be initiated as appropriate. Where there is an identification of a notifiable disease organism, an unwanted organism or an organism new to New Zealand (or suspicion of any of these) the MPI Hotline 0800 80 9966.

- *Staff awareness* of potential marine pests will enable rapid identification and notification to MPI. Samples should be taken and sent for formal identification. Confirmation of an unwanted organism should also be made to MDC. The suite of pest species that could affect the Marlborough Sounds is largely unknown and therefore management response cannot be clearly determined until the organism is identified. Where there is an identification of a notifiable marine pest, an unwanted marine pest or a new marine pest to New Zealand (or suspicion of any of these) the MPI Hotline 0800 80 9966.
- *Notifiable disease organisms* are listed in Table 1 – Organisms primarily affecting fish and unwanted organisms are listed in Table 2 – Organisms affecting marine of freshwater environments Table 2 – below.
- *Cleaning and Disinfection*: Decontamination of company and contractor / suppliers' equipment, materials, tanks and work areas by thorough cleaning before disinfection. See below Virkon dilution rates for details of disinfection methods and their indications. Disinfection stations should display signage to notify staff/visitors of hygiene procedures. See attached Appendix 1 - Cleaning and Disinfection Procedure
- *Quarantine and Movement:* The following practices must be considered when implementing control procedures:
    - Set up of 'quarantine areas' around infected pen, farm site or CONTROL zone
    - Live fish transportation between farms and/or between CONTROL zones
    - Fish harvesting and transportation to processing plants, discharge of harvesting effluent (blood water)
    - Movement of personnel, nets/equipment and vessels associated with the operation of the farms within and between CONTROL zones
    - Isolation of mortalities, mort bags, dive equipment and mort bins between or within CONTROL zones.
- *Disposal*: Disposal of mortalities or processing waste should be carried out regularly to an approved disposal site using approved mortality containment and transfer systems.
- *Notification*: Under sections of the Biosecurity Act (1993), any person who knows or has reason to believe there is an incidence of a notifiable disease must notify the Ministry for Primary Industries (MPI) New Zealand 0800 809966.
- *Fallowing*: Farm sites may require full fallowing (3-6 months) following significant loss from infectious disease. This may be requested by the MPI or applied internally by NZKS Management on a case by case basis.
- *Destruction*: Killing and disposal of infected animals to prevent spread of disease, usually under supervision of MPI.
- *Emergency harvest*: the removal of market size fish from the farm ahead of schedule may be considered to reduce biomass and fish numbers on a site undergoing a bio-security issue, where there is no risk to human health and fish quality is maintained.

- *Advice* will be received on potential management and control options for any identified unwanted marine pest and action taken accordingly.

Table 1 – Organisms primarily affecting fish[1]

Scientific name	Common name
Aeromonas salmonicida	Furunculosis
Aphanomyces invadans	Epizootic ulcerative syndrome
Epizootic haematopoietic necrosis virus	Epizootic haematopoietic necrosis
Gyrodactylus salaris	Gyrodactylosis
Infectious haematopoietic necrosis virus	Infectious haematopoietic necrosis
Infectious pancreatic necrosis virus (exotic strains)	Infectious pancreatic necrosis
Infectious salmon anaemia virus	Infectious salmon anaemia
Koi herpesvirus	Koi herpes virus disease
Myxobolus cerebralis	Whirling disease
Oncorhynchus masou virus	Oncorhynchus masou virus disease
Red sea bream iridovirus	Red sea bream iridovirus disease
Renibacterium salmoninarum	Bacterial kidney disease
Spring viraemia of carp virus	Spring viraemia of carp
Viral haemorrhagic septicaemia virus	Viral haemorrhagic septicaemia
Yersinia ruckeri (exotic strains)	Enteric red mouth disease

Table 2 – Organisms affecting marine of freshwater environments[2]

Scientific name	Common name
Asterias amurensis	Northern Pacific seastar
Carcinus maenas	European shore crab; green crab
Caulerpa taxifolia	A green seaweed
Cherax quadricarinatus	Red claw
Cherax tenuimanus	A marron
Eriocheir sinensis	Chinese mitten crab
Haliotis rufescens	Red abalone
Ictalurus punctatus	Channel catfish
Penaeus orientalis (P. chinensis)	Chinese prawn
Potamocorbula amurensis	Asian clam
Sabella spallanzanii	Mediterranean fanworm

Photographs of six unwanted marine organisms listed above are attached on Figure 1 – Unwanted Marine Pests.

Other organisms such as *Styela clava* may be included given their potential threat to aquaculture.

[1] Schedule of notifiable organisms 2016
[2] Schedule of notifiable organisms 2016

3.5 Critical Control Points

Critical Control Points are points on the farm where actions can be taken to reduce the risk of disease introduction and / or spread.

Disease may result from exposure to pathogens such as viruses and bacteria. Disease can spread through recognised conveyors such as fish stock, staff (including contractors) and visitors, equipment, vehicles and transportation, other aquatic life, birds and animals, and the aquatic environment.

Biosecurity involves the exclusion of disease-causing organisms from the environment. It is achieved by the use of external and internal biosecurity barriers:

- External Barriers - blocking the spread of disease onto and off a fish farm.
- Internal Barriers - blocking the spread of disease within the fish farm.
- The correct use of cleaning and disinfectants is very important and ensures that pathogen challenge is minimised. This in turn will dramatically reduce the potential for disease and increased mortality.

Pathogen reduction can occur at the following locations:

Site security	Footbaths and alcohol hand washes on wharfs, cages and feed and accommodation barges as well as all major entrances to a site. Site specific protective clothing for visitors where relevant.
Personnel hygiene	Dive suits and equipment, hand hygiene, PPE, boots, other personal equipment
Equipment disinfection	Hand nets, harvesting equipment, weighing equipment, fish pumps and grading equipment, working nets etc
Floating structures	Regular removal of fouling organisms on floating structures, grower and predator nets.
Surface disinfection	Tables, floors, walls, barge decks
Rodent control	Pest Management

Prior to leaving a site for a different control zone, every item of equipment should be treated as though it is contaminated and the cleaning and disinfection procedure should be followed accordingly.

- The disinfection of personnel and equipment between sites requires a level of dedication and consistency to ensure pathogens are removed and destroyed adequately. Disinfection is not a suitable form of pathogen control on its own as it relies on a partnership with thorough cleaning. Disinfectants are not effective when there is a build up of dirt and other organic matter on the surfaces, so this needs to be removed prior to their use using appropriate detergents and freshwater. Depending upon the disinfectant used there is a degree of contact time required to allow sufficient pathogen removal and destruction.
- With all disinfectants it is important to use the correct concentrations and allow adequate contact time to be an effective pathogen control.

To simplify the disinfection, NZKS disinfection procedures will involve the use of **VIRKON**, except in situations where freshwater isn't available, in which case a quaternary ammonium compound will be used.

3.6 Virkon Dilution Rates

Dilution Rate Required

2%	1%	0.50%	
Quantity of Virkon Required			Quantity of Solution Required
20g	10g	5g	1 Litre
100g	50g	25g	5 Litres
200g	100g	50g	10 Litres
500g	250g	125g	25 Litres

1. Select the quantity of disinfectant solution required.
2. Choose appropriate dilution rate as per **Figure 2 – Virkon – Dilution Rates**.
3. Measure out the amount of **VIRKON**® indicated using the graduated measuring scoop provided.
4. Add **VIRKON**® to fresh water and stir.

There is a 20% loss of activity of 1% solution of **VIRKON**® after 14 days in 350 ppm hard water. There is a 2.1% loss of activity of the powder after 26 weeks at 20°C.

3.7 Health and Safety Precautions

- FIRE HAZARD: Non-flammable
- Keep out of reach of children.
- Powder irritating to eyes, skin and mucous membranes and may be harmful if swallowed or inhaled.
- Do not get powder in eyes.
- Avoid contact of powder with skin.
- Handle in such a way as to minimize dust release.
- Do not mix with other chemicals.
- When mixing the solution, goggles, chemical-resistant gloves, and a mask must be worn.

3.8 Disposal of Virkon

- Virkon is to be disposed into the Blackwater tank.

4 Affected Parties

List of affected parties to be contacted in the event of any new biosecurity risk from marine pests or disease agents identified at the farm is attached in Appendix 4 - List of Potentially Affected Parties.

5 Review

The Biosecurity Management Plan shall be reviewed annually by NZ King Salmon to ensure best practice and that the management practices specified in the plan are consistent with condition 51, and 52 for Waitata, Kopāua and Ngamahau.

Any revisions to the Plan shall be provided to the Marlborough District Council within one month following completion of the revisions.

6 Protocols

Status Green - Normal Farming Practice:

Action	Aim	Method
Site access	To reduce the risk of disease and marine pest transfer by personnel, visitors and vehicles	• No access allowed for personnel who have been on a status red site that day. • No access for personnel who have been on non NZKS farms, aquariums or similar facilities that day without first receiving permission of the farm manager who will instruct regarding appropriate disinfection and attire. • All visitors and arriving staff to use footbaths as they enter the site and wash hands before handling fish or equipment.
Clothing and equipment	To reduce the risk of disease and marine pest transfer by clothing and equipment	• All NZKS-issued work clothing and personal protective equipment must remain on site and not be moved between sites without permission from the site manager • All NZKS-issued personal protective equipment that is removed from site must be disinfected each time it leaves a site. • All non-work personal equipment that comes into contact with the water (eg. fishing rods, kayaks etc) to be allowed on site only at managers discretion, and must be disinfected each time it comes onto site
Disease awareness	To create an understanding of disease and marine pest status and risks for each control zone.	• Brief all staff and transport contractors as to potential inter and intra – regional diseases threats, and required biosecurity procedures to manage risk of infection. • Each farm to display a map/document detailing the current status of all other NZKS farming sites.
Contact List	Current contact details for all suppliers and service providers (see emergency response protocol)	Update Tel/Mob/Email for: • Key NZKS personnel • All NZKS farms • Vet services • MPI • Any non NZKS fish farms in the region • Mortality cartage/tipping
Cleaning and Disinfection	Minimise the risk of spreading disease and marine pest transfer to other sites or control zones.	• Clean and disinfect all equipment and personnel moving between control zones – Appendix 1 • Clean all equipment that is transferred within a control zone Appendix 1 - Cleaning and Disinfection Procedure

Action	Aim	Method
Signage	To maintain staff awareness of local alert level.	• Place notice of alert level at main entry point of farm / site, including the alert level of all other control zones. Refer to Appendix 2 - Signage for Status RED and GREEN
Stock and Egg Transfer	To minimise risk of disease and marine pest transfer within control zones.	• Smolt transfer equipment to be disinfected directly before smolt transfers and also between hatcheries. The disinfection is to occur between each group of transfers not each individual transfer. • Green and Eyed egg transfer equipment to be disinfected before each transfer between hatcheries • Smolt production facilities will monitor the health of their fish and any unexplained health issues shall be referred to the company veterinarian for investigation • Smolt should be physically inspected before transport. There must not be movement of smolt from the site where fish are displaying clinical signs of disease.
Diving	To minimise risk of disease and marine pest transfer to stock within control zones while gathering information on mortality trends, symptoms and behaviour.	• Smolt or younger stock must be dived first during normal diving duties or by a separate diver. • Mortalities removed from pen should be transferred to a “mort coffin” immediately • Wash down and disinfection of equipment and diver must occur between control zones.
Mortality Investigation	To improve detection of disease	• All fresh mortalities are to be checked for obvious signs of disease
Mortality Disposal	To minimize risk of disease and marine pest transfer to other stock between or within control zones.	• Mortalities to be stored in non-leaking bins or coffins with sealable lids. • Mortality removal equipment on farm to be cleaned and disinfected each day • Mortality cartage contractors to clean and disinfect “mort bins / coffins” on shore. Bins should be labelled with the last time of disinfection and who carried out the work.
Biomass Assessments	To minimise risk of disease and marine pest transfer to stock through Biomass assessment procedures and gear between and within control zones.	• Biomass assessment gear should be cleaned & disinfected before being moved between control zones.

RESPONSIBILITIES

	Description	Person Responsible
Foot Bath Maintenance	Ensuring the footbaths are located in the correct location at entry/ies to farm Ensuring the footbaths contain clean and active disinfectant (replaced twice per week) Ensuring that records are kept of recent Virkon re-fills	Regional Manager / Hatchery Manager
Stock Movement	Site stocking Inter-site stock movement Year class separation (where possible)	Production Manager Freshwater Manager Production Manager
Mortality Storage	Ensuring the mortality bins are located in the correct location Ensuring the mortality bins are structurally sound Ensuring that the mortality bins are not over filled and that the mortality bin area is kept clean	Regional Manager / Hatchery Manager
Field Team Boat Hygiene	Cleaning of the field team boat Disinfection of dive and other equipment	Field Team Manager
Contractor Vessel Hygiene - (other company vessels)	Hull Maintenance	Contractor / Regional Manager
Reporting Stock Losses		Regional Manager / Hatchery Manager
Preliminary Disease Investigation	Collection of appropriate pathology samples Submission of pathology samples to IDC Reporting of results	Regional Manager / Hatchery Manager Fish Health Manager
Annual Audit	Ensure compliance with the Biosecurity Management Plan	Sustainability Manager / Fish Health Manager
Pest Control	Maintenance of Baits on Farm Maintenance of Baits in Food Warehouses Disposal of carcasses	Regional Manager / Hatchery Manager Third party managers
Visitor Gear	Ensure visitor gear is available Ensure visitor gear is maintained in an acceptable fashion	Regional Manager / Hatchery Manager

Status Red – Widespread Mortality to Confirmed or Suspected Infectious Disease

Diseases would include notifiable diseases such as furunculosis, rickettsia, VHS, IHN and IPN. High mortalities resulting from an unknown cause may also be included in this category. Widespread Mortality is defined as:

- Disease has spread or is spreading rapidly through a farm.
- Loss in excess of an average 0.3% per day over 2 consecutive weeks

Action	Aim	Method
Site Access	To reduce the risk of disease and marine pest transfer by personnel, visitors and vehicles	• All non-essential visits are to be halted • No visitors or personnel may visit a non-Status Red site, following a visit to a Status Red site on the same day. • All visitors must wear site specific gear • All vehicles including delivery vehicles must park in a specifically designated car park (Freshwater sites)
Clothing and Equipment	To reduce the risk of disease and marine pest transfer by clothing and equipment	• No clothing, personal protective equipment or non-work personal equipment that comes into contact with water is allowed on site.
Communication	To inform all stake holders about current disease and marine pest status	• Inform all control zones, relevant authorities, local staff and local contractors about the change in disease and marine pest status and the required procedures. • Notify legislative authorities of losses due to notifiable disease or identification of marine pests
Increased Observations	To raise awareness of increased mortality trends, mortality types and disease symptoms and observations of marine pests.	• As described in 'status green' observations section • Ensure that dive frequency is adequate to follow mortality trends (min. daily mortality removal for each pen). • Ensure suitable samples are subject to analysis for diagnosis/identification. This may include submitting samples to IDC for confirmation of an infectious disease agent or to MITS for marine pests where an unwanted/notifiable organism is suspected or where cause of elevated mortalities or moribund fish cannot be ascertained from urgent routine diagnostic testing and an infectious agent cannot be ruled out.
Cleaning and Disinfection	Minimise the risk of spreading disease and marine pests to Stock, sites or control zones.	• Movement of equipment or PPE out of areas under STATUS RED to be halted unless deemed to be of the highest urgency and approved by Fish Health Manager • All equipment leaving the STATUS RED zone must be thoroughly cleaned and disinfected before transportation. • Refer to Appendix 1 - Cleaning and Disinfection Procedure.

Action	Aim	Method
Smolt and Egg Input	To minimise risk of disease transfer to stock	• Smolt inputs must be immediately halted into or from control regions under STATUS RED. • Movement can only recommence with authorization from the Chief Operating Officer under advice from the company veterinarian. • Eggs and equipment to be disinfected before transfer between hatcheries and control zones.
Diving	To remove mortality from stocked units to prevent shedding of infective organisms: to gather information on mortality trends, symptoms and behaviour. To identify marine pests.	• Youngest stock must be dived first during normal diving duties or as a separate dive by a separate diver. • Fish that are experiencing high/irregular pathogen loads or disease associated mortalities must be dived last during normal diving duties or as a separate dive by a separate diver. • Wash down and disinfection of equipment and diver must occur between diving different pens within a control zone • Personal dive gear should not be transferred between control zones.
Mortality / Marine Pest Investigation	To improve monitoring for the disease	• All fresh mortalities are to be checked for signs of disease and marine pests monitored.
Mortality Handling	To minimise risk of disease and marine pest transfer between and within control zones.	• Separate mort bags must be used for fish of differing year classes, species. • "Mort bags and ropes are to be cleaned of physical debris and disinfected between pens • If used, Crane, hooks and Barge areas are to be cleaned and disinfected after mortalities have been unloaded.
Biomass Assessments	To minimise risk of disease and marine pest transfer through biomass assessment procedures and gear between and within control zones.	• All weight checking procedures to cease in Status red zones. • Biomass assessments can only continue with authorization from the Fish Health Manager
Harvests	To reduce the risk of blood borne pathogen transfer.	• Harvest fish should not leave areas under STATUS RED without the consent of the Chief Operating Officer in consultation with legislative authorities. • All attempts must be made to contain Blood water from STATUS RED fish.
Destruction	Killing and disposal of infected animals and marine pests to prevent spread.	• This may be directed by MPI and may come under legislative requirements; otherwise all mortalities should be subject either to disposal via land-fill or rendering at ≥80°C for 20 minutes. • Marine pests to be disposed of under guidance from MPI.

RESPONSIBILITIES

	Description	Person Responsible
Foot Bath Maintenance	Ensuring the footbaths are located in the correct location Ensuring the footbaths contain clean and active disinfectant (replaced twice per week) Ensuring that records are kept of recent Virkon re-fills	Regional Manager / Hatchery Manager
Mortality Storage	Ensuring the mortality bins are located in the correct location Ensuring the mortality bins are structurally sound Ensuring that the mortality bins are not over filled Ensuring that the mortality bin area is kept clean	Regional Manager / Hatchery Manager
Field Team Boat Hygiene	Cleaning of the field team boat including hull maintenance	Field Team Manager
Contractor Vessels – other company vessels	Cleaning of the vessel including hull maintenance	Contractor / Regional Manager
Reporting suspected disease outbreak or identification of marine pest		Regional Manager / Hatchery Manager
Preliminary Disease Investigation	Immediate discussion with company veterinarian Collection of appropriate pathology samples Submission of pathology samples	Regional Manager Hatchery Manager Fish Health Manager
On-going Disease or Marine Pest Investigation		Veterinarian / MPI / Fish Health Manager
Medication	Ordering of medication from a veterinary wholesaler Organizing medicated feed Issuing prescriptions Arranging RMA consent Arranging importation if required	Veterinarian Fish Health Manager Veterinarian Sustainability Manager Logistics Manager
Liaising with MPI/IDC	As part of this process MPI will investigate where necessary including the potential for spread of the disease or marine pest.	Chief Operating Officer / Fish Health Manager

	Description	Person Responsible
Stock, Boat & Staff Movement Control		Chief Operating Officer / Regional Manager / Hatchery Manager
Emergency Harvesting Schedule		Chief Operating Officer
Farm Quarantine		Chief Operating Officer / MPI

7 Key Biosecurity Areas

(source: http://www.antecint.co.uk/main/virkaquause.htm)

BROODSTOCK / HATCHERY	FRESHWATER PRODUCTION	SEA WATER PRODUCTION	PROCESSING	Key Biosecurity Task	Critical Control Point	Application	Frequency
	•	•		Work boats and other vessels	Deck Equipment Harvesting	Clean thoroughly and rinse with clean water then disinfect with Virkon or Quaternary Ammonium Compound	Daily or as required
					Protective clothing	Rinse with clean water immerse in Virkon or Quaternary Ammonium Compound for 10 mins and hang to dry	Daily or as required
					Foot dips	Fill with freshwater solution of Virkon at a dilution rate of 1:100 (1%) or Quaternary Ammonium Compound	Replenish every 4 days or when heavily soiled
	•	•		Diving Teams	Diving suit Equipment "Mort Bags"	Remove any organic debris by brushing then immerse all items in Virkon or Quaternary Ammonium Compound for 20 mins then rinse with clean water. Record the treatment in the vessel logbook, stating what was cleaned, when it was cleaned and who did it. This must be signed off by the supervisor. Each diver should add a comment in their logbook if their dive gear has been disinfected.	On completion of operation
		•	•	Harvesting	Plant Equipment Bins and lids Stacker Boxes	Clean thoroughly and rinse with clean water then disinfect with Virkon or Quaternary Ammonium Compound. Record the treatment on the daily harvest report, stating what was cleaned, when it was cleaned and who did it and sign off by the supervisor.	Daily or as required
			•	Surfaces	Tables / Floors/ Walls	Clean thoroughly and rinse with clean water then disinfect with Virkon or Quaternary Ammonium Compound	Between production breaks
			•	Processing equipment and utensils	Gutting machines, knives	Clean thoroughly and rinse with clean water then disinfect with Virkon or Quaternary Ammonium Compound	Between production breaks or as required
			•	Effluent	Blood water	Treat blood in holding tank with a 1% Virkon solution, added to tank, leave for 10 minutes and then release to waste. Cover spillage with Virkon S powder. Leave until the liquid is absorbed. Scrape powder/spillage mixture into receptacle for disposal. Rinse and disinfect the affected area with 1% Virkon	As required

Routine Biosecurity Tasks (source: http://www.antecint.co.uk/main/virkaquause.htm)

BROODSTOCK/ HATCHERY	FRESHWATER PRODUCTION	SEA WATER PRODUCTION	Critical Control Point	Product	Dilute Rate	Application Rate	Frequency
VEHICLE BIOSECURITY							
•	•	•	Vehicles	Virkon	1:100	All vehicles entering site should pass through a wheel dip or be sprayed with solution of Virkon – this includes the bulk tankers for harvest and smolt haul trucks	On arrival
PERSONAL BIOSECURITY							
•	•	•	Foot dips	Virkon	1:100	Place footbaths at all entrances, wharves and cages. Fill with a freshwater solution of Virkon at a dilution rate of 1:100 (1%)	On passing through area
•	•	•	Skin hygiene	Hand sanitizer	-	Hands should be washed and sanitised between areas using a hand cleanser	On passing through area
•	•	•	Protective clothing	Virkon	1:200	Rinse with clean water immerse in Virkon for 10 mins and hang to dry	After each period of use
EQUIPMENT							
•	•	•	Transport tanks & equipment	Virkon	1:200	Visibly clean	After each period of use
•	•		Carry bins, hand nets, weighing equipment	Virkon	1:200	Visibly clean	After each period of use
	•		Dip nets & tank brushes	Virkon	1:200	Immersion	After daily use
•	•	•	Grading equipment	Cleaning: Biosolve Disinfection: Virkon	1:200 1:200	Clean and disinfect thoroughly with Virkon solution	Daily after use
•	•	•	Tanks	Cleaning: Biosolve Disinfection: Virkon	1:200 1:200	Clean and disinfect thoroughly with Virkon	When empty
WASTE DISPOSALS							
•	•	•	Waste disposal area including skips and bins	Cleaning: Biosolve Disinfection: Virkon	1:200	Rinse with clean water immerse in Virkon for 10 mins to dry and hang to dry	Daily

Appendix 1 - Cleaning and Disinfection Procedure

Large Equipment (eg. Vessels, Grade/Harvest Gear, Nets, Pens, Vehicles)

1. Position equipment in cleaning and disinfection area to contain runoff and solids.
2. Spray with either a hose to remove any dirt, scales, mucus from the surfaces.
3. Using a stiff broom or scrubbing brush with soap/detergent scrub all surfaces thoroughly and systematically to ensure all surfaces and grooves are cleaned appropriately. All solids are to be disposed of to a licensed landfill and no spillage to occur.
4. Mix up disinfectant in a spray bottle and spray down all surfaces and allow to stand for recommended time.
5. Spray down with freshwater to remove all chemicals and allow to dry.
6. Tag cleaned equipment with date, site and name of cleaner.
7. Place equipment in designated hygiene area.
8. Where reasonably practicable, prior to movement between zones, efforts will be made to clean net pens, flotation structures and other large inwater structures to reduce the level of biofouling.

Small Equipment (eg. PPE, Dive Gear, Dip Nets, Assessment Gear, Rope Etc.)

1. Cold water pressure wash all equipment to remove organic debris.
2. Immerse all equipment in Virkon for 10 minutes.
3. Rinse thoroughly in freshwater.
4. Rinse in fresh water and dry in a well ventilated area.

The setting up of a large container (harvest bin) with pre-mixed disinfectant in it will allow for an easier application across the farm site. It will become habit to dip equipment into the solution as required because it is there and doesn't require mixing up solutions each time. It is important to ensure that this solution is changed regularly to allow for degradation of the chemicals.

In A Situation Where Virkon And Quaternary Ammonium Compounds Are Not Available, The Following Table Provides A Guide To Other Disinfection Methods:

Process	Indications	Method of Use	Comments	Brand Names
Soaps and Detergents	Bacteria and viruses All solid non porous surfaces	Use as required in conjunction with drying of equipment in sunlight	Only suitable for larger viruses	
Sodium hypochlorite 100-1000mg/L in freshwater. Chlorine based	Bacteria and viruses on all clean surfaces and in water. Nets, Boots, Wet Weathers, Hands, Fish Handling Equipment	Mix up a solution of 100-1000mg/L. Dip all equipment in a freshwater solution for 30 mins. Ensure all surfaces are cleaned pre-treatment	Becomes inactive by salt water and over time. Need to regularly replace shelf stock. A good broad spectrum disinfectant.	Chlorofoam Virkon
Quaternary ammonia 10mg/litre for one minute 2mg/litre for 15 minutes	Viruses, bacteria, hands, plastic surfaces.	Spray or dip equipment into solution for 1-5 minutes depending upon concentration.	A good agent for pre-disinfection cleaning.	Quadhygelene Diverfoam Farmquat
Iodophor 100-200mg/L	Bacteria & Viruses Hands, Smooth Surfaces, wetsuits, porous objects	Mix up solution of 100mg/L allowing 10 mins contact time. 200mg/L 10 seconds contact time.	Contact time is important to allow maximum effectiveness. Nets, ropes and other absorbant material should be soaked for 20 mins.	Betadine Vetadine Povodine
Chloramine-T 2% by weight for 10 minutes	Bacteria and fish pathogens Wetsuits, ropes, nets,	Mix up solution in freshwater and dip all equipment in it.	Requires freshwater to maintain effectiveness. Change solution regularly	Halamid Halasept
Formic Acid: pH<3.9 for 24 hours	Ensilage of mortalities Processing waste, blood water	Not currently recommended	Not currently recommended	Not currently recommended
Sodium hydroxide Mixture of 100g Sodium Hydroxide, 10g. Teepol, 500g Calcium hydroxide in 10 litres of water.	Fish pathogens on solid surfaces with cracks. Cleans and breaks down animal greases.	Spray on cleaned surfaces and leave for 48 hours.	A very active disinfectant and stains the cleaned surfaces. Ideal for porous objects, slabs, waste pits, “mort bins” Do not use on Aluminium	Caustic Soda Washing Soda.

Process	Indications	Method of Use	Comments	Brand Names
Heat >55°C for at least 5 mins	Fish Pathogens in Transportation tanks.	Use a blow torch or steam cleaner on objects to raise temperature for a period of time.		
Ozone 8mg/L for 4 mins	Fish Pathogens Sterilisation of water	Requires ozonation equipment	A costly method	
UV irradiation 130mJ/cm2 Physical desiccation by sunlight.	Fish pathogens on equipment	Dry for 3 months above 18°C	Can be shortened when used with chemical disinfection	

The use of all chemical agents will require following label directions and supplied Material Safety Data Sheets (MSDS). OH&S approval may be required to ensure that safety procedures are followed when handling disinfection chemicals during use.

Appendix 2 - Signage for Status RED and GREEN

The following standard signage is to be displayed by each site during Status Red.

New Zealand King Salmon

BIOSECURITY

STATUS RED

STRICTLY NO ACCESS WITHOUT PERMISSION

PHONE _____ TO GAIN ACCESS

PLEASE RESPECT OUR FARM BIOSECURITY AND HELP PROTECT THE HEALTH OF OUR FISH

The following standard signage is to be displayed by each site during Status Green.

New Zealand King Salmon

BIOSECURITY STATUS GREEN

BEFORE GOING ANY FURTHER:

1. IF YOU HAVE BEEN AT ANOTHER FISH FARM IN THE LAST 7 DAYS, STOP AND SEEK PERMISSION FOR ACCESS FROM THE FARM MANAGER

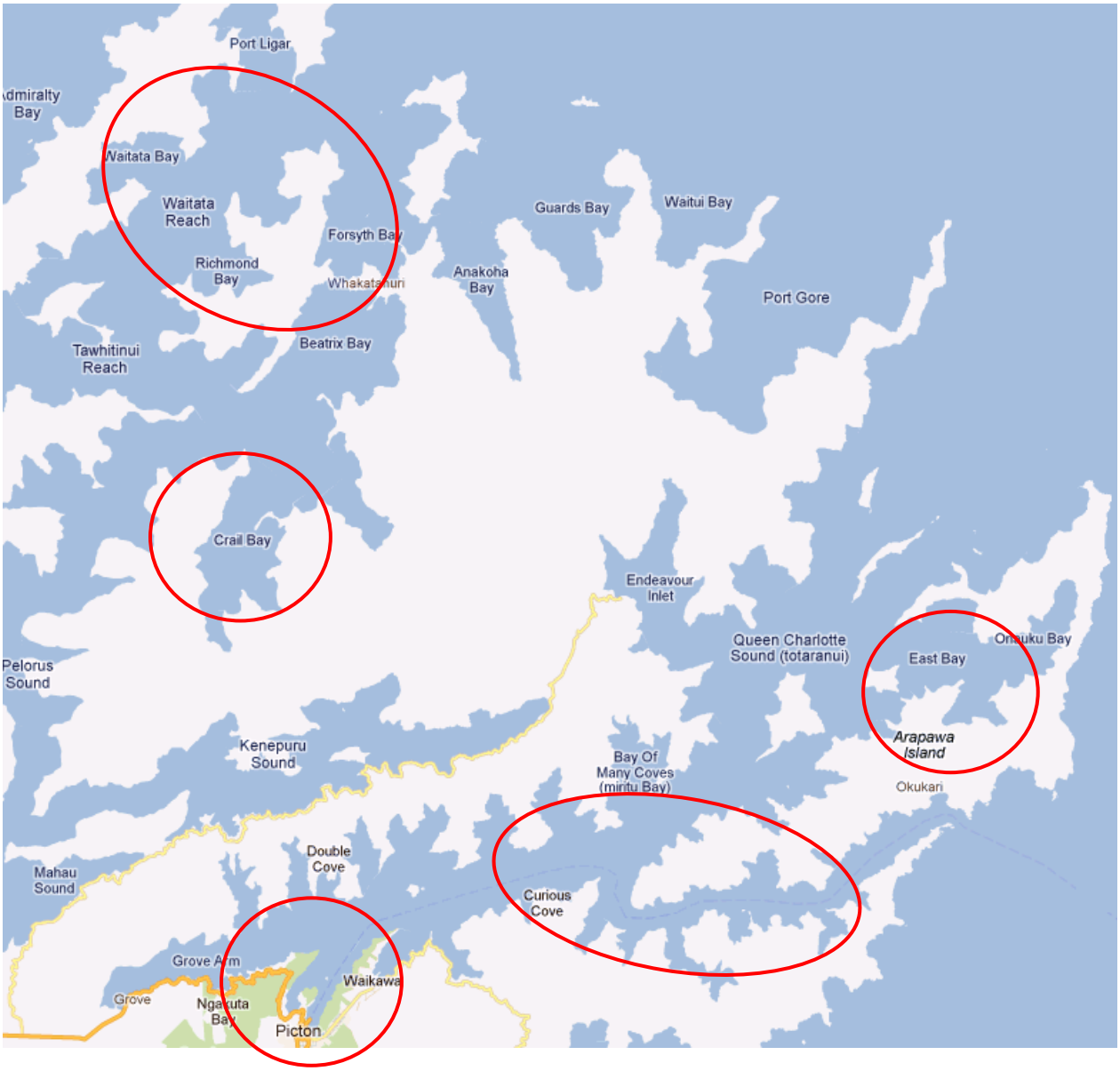
2. DIP YOUR SHOES IN THE FOOTBATH AND SIGN THE REGISTER

3. DISINFECT ALL EQUIPMENT THAT HAS BEEN IN CONTACT WITH WATER

CURRENT BIOSECURITY STATUS OF OTHER NZKS FISH FARMS:

Appendix 3 - Control Zones

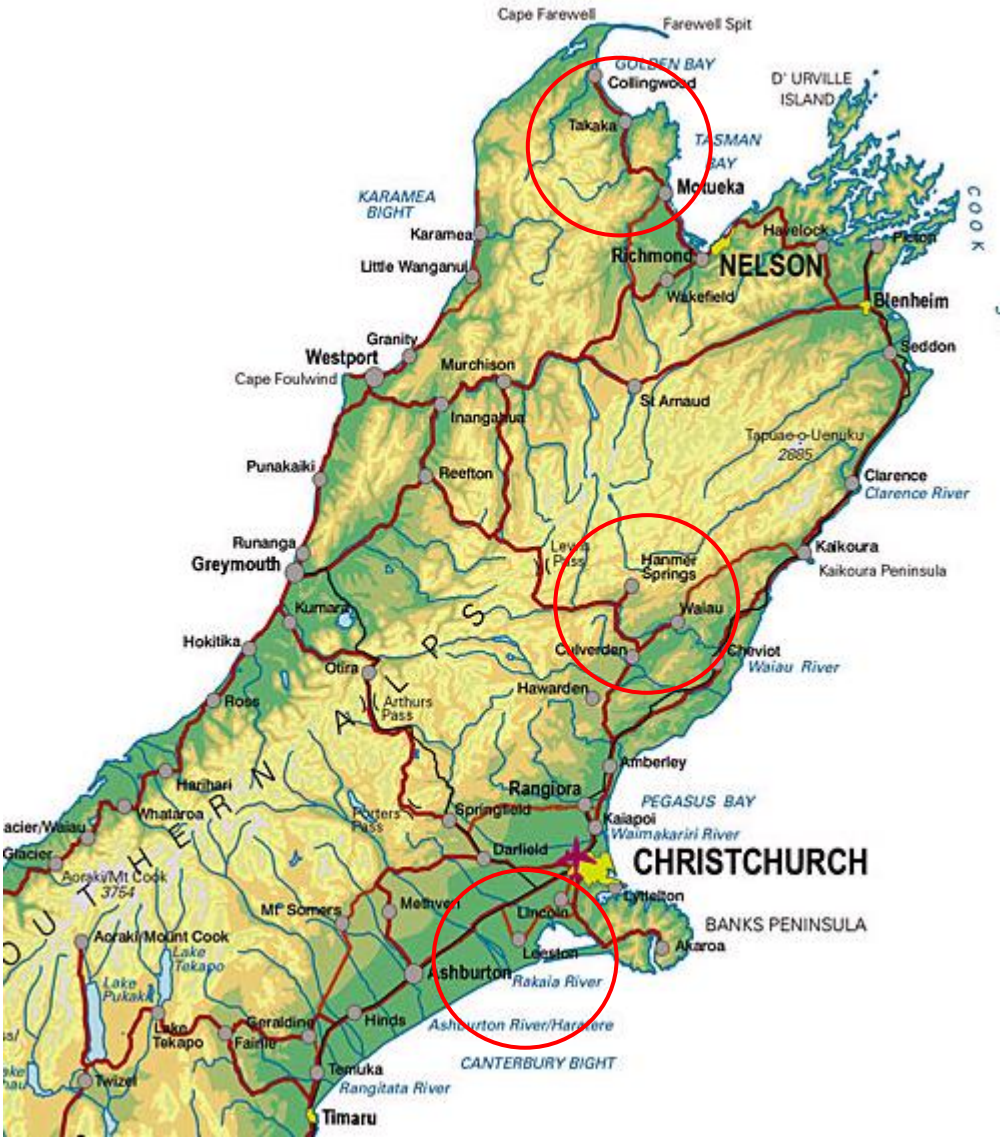
Sea farm sites



Zones:

1. **Tory Channel** – Ruakaka Bay, Clay Point, Te Pangu Bay, Ngamahau
2. **Otanerau Bay**
3. **Outer Pelorus Sounds -** Waihinau Bay, Forsyth Bay, Kopāua, Waitata
4. **Crail Bay**
5. **Picton service base**

Freshwater Farms



1. Takaka
2. Waiau
3. Tentburn

Additional Control Zones within freshwater farms

- All hatchery / spawning buildings and facilities are considered a control zone
- The family area at Takaka is considered a control zone

Appendix 4 - List of Potentially Affected Parties

Ministry of Primary Industries	Pests and Diseases Hotline	0800 80 99 66
Marine Farmers Assn	MFA Environmental Hotline	0800 433 27 47
	Debbie Stone	03 578 5044
Marlborough District Council	Compliance Officer	03 520 7400
	biosecurity@marlborough.govt.nz	
Aquaculture New Zealand	Colin Johnston	03 5488944 / 021 2444157

Tourism - Pelorus

Pelorus Mail Boat	Jim & Amanda Baillie	03 574 1088
Pelorus Boating Club	Mike Connolly (Commodore)	03 3515824 / 027 4732677
Bulwer Lodge	Mark Pengelly	09 4208459 / 021 2690117
Tui Nature Reserve	Brian Plaisier	0800107077 / 0274483447

Tourism – Tory Channel

Waikawa Boating Club

Water Taxi operators

Tangata Whenua Panel

- Ngāti Kōata Trust — 03 548 1639
  projects@koata.iwi.nz
- Te Runanga o Ngāti Kuia Charitable Trust — 03 546 7556
  raymond@ngatikuia.iwi.nz — 027 2535043

Te Ātiawa o Te Waka-a-Māui Trust — 03 573 5170

RM@teatiawatrust.co.nz

Waitata

Kopāua

Ngamahau

A list of private neighbours for Waitata, Kopāua and Ngamahau is available from the NZKS Farm Regional Managers.

Figure 1 – Unwanted Marine Pests

SIX INTERNATIONAL MARINE PESTS THAT COULD CAUSE SERIOUS PROBLEMS HERE

These pests are already established close to or in New Zealand and could flourish in our waters.
If you think you have seen any of these, note the location, grab a sample if you can, and call us on **0800 80 99 66.**

ASTERIAS AMURENSIS – NORTHERN PACIFIC SEA STAR

LOOK OUT FOR: Five rays or arms with upturned tips. Yellow, orange or red with purple markings on top. These starfish can measure up to 50 cm across.

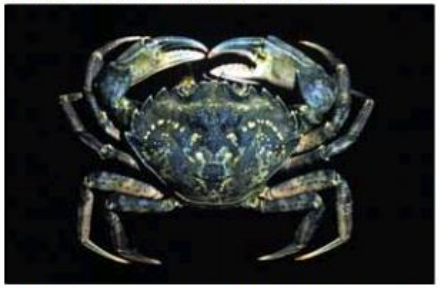
CAULERPA TAXIFOLIA – A MARINE AQUARIUM WEED

LOOK OUT FOR: Bright green seaweed with horizontal runners up to 9 metres. Fronds are flattened with a smooth distinct midrib.

SABELLA SPALLANZANII – MEDITERRANEAN FANWORM

LOOK OUT FOR: A single spiral fan that is white and banded with orange/brown, in a parchment-like tube up to 40 cm tall. The fanworm is present in Lyttelton and Auckland. Let us know if you see it elsewhere.

CARCINUS MAENAS – EUROPEAN SHORE CRAB



LOOK OUT FOR: Greenish body shell (sometimes with reddish/ orange tint) about 8 cm wide. Three spines between eyes. Five sharp spines behind each eye on side edge of body shell. Has no paddles on hind legs.

ERIOCHEIR SINENSIS – CHINESE MITTEN CRAB

LOOK OUT FOR: White tipped hairy front claws and a deep notch between the eyes.

POTOMOCORBULA AMURENSIS – ASIAN CLAM

LOOK OUT FOR: A dirty white, yellow or tan clam with very visible overbite (two shell halves different sizes), 2–3 cms across.

Freephone 0800 80 99 66
www.biosecurity.govt.nz/pests/salt-freshwater/saltwater

Figure 2 – Virkon – Dilution Rates

ONE POINT LESSON

Theme	Virkon™ mixing for spray disinfection of equipment					Ref:	001
						Area:	Aquaculture
						Date:	22.03.16
						Version:	1
Classification	X	Basic Knowledge		Improvement		Health & Safety	

RE: Procedure for mixing Virkon™

Storage:

- Store Virkon™ in a dry area away from combustible goods.

Wear correct PPE:

- Gloves, eye-wear, dust mask and overalls are required for handling.

Mixing (1:200 or 0.5% for tanker and vehicles):

- Put 15 litres of freshwater into the knapsack sprayer
- Add 75ml of Virkon™ powder (about half the small cup) to the sprayer and shake

Disinfecting equipment:

- Remove organic matter from the equipment to be disinfected
- Apply a light spray of Virkon™ over the equipment to be disinfected
- Ensure at least 10 minutes soak time before the equipment is moved outside the 'infected zone'

Training given to:	Sig:								
	Name:								
	Sig:								
	Name:								

Prepared by:	Mark Preece	Department:	Aquaculture

ONE POINT LESSON

Theme	Virkon mixing for footbaths					Ref:	001
						Area:	Aquaculture
						Date:	23.06.16
						Version:	3
Classification	X	Basic Knowledge		Improvement		Health & Safety	

RE: Procedure for mixing Virkon™ for footbaths

Storage:

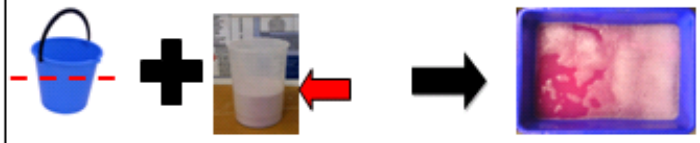
- Store Virkon™ in a dry area away from combustible goods.

Wear correct PPE:

- Gloves, eye-wear, dust mask and overalls are required for handling.

Mixing (1:100 or 1% for footbaths):

- Put 5 litres of freshwater into a bucket (half a bucket)
- Add 50ml of Virkon™ powder to the bucket and mix
- Add the mixture to the footbath



Disposing of old footbath material:

- The footbath should be changed when Virkon™ discolours and depending on use, at least twice a week
- Transfer old footbath water into a bucket
- Tip the bucket into the black water system (down the toilet/bund on the barges) as we don't have consent to discharge it to sea

Training given to:	Sig:								
	Name:								
	Sig:								
	Name:								

Prepared by:	Mark Preece	Department:	Aquaculture

Appendix 5 - Sample contractor letter for change in biosecurity status

date

Addressee
Name of Company
PO Box / Street Address
Suburb
City
Country

Dear CONTRACTOR

Re: Change in bio-security status at FARM

We have changed the status of bio-security at FARM to 'status red' until further testing confirms we are 'pathogen-free'. During this time we would ask that you:

- Continue using the footbaths
- Ensure that you do not visit a 'green' farm on the same day after visiting a 'red farm'
- All vehicle wheels are disinfected by spray or wheel dipping (forklifts and trucks) after visiting a 'red farm'
- After discharging the mortalities from a red farm the deck of the barge is rinsed with Virkon™
- After visiting a red farm the barge deck is disinfected with Virkon™
- Minimise the number of people entering and exiting the farm
- Treat this letter in confidence, as we tend to react to trigger these responses to ensure a precautionary approach to protecting the marine environment.

If you have any queries regarding the contents of this letter, please don't hesitate to give me a call.

We will advise you when we change back to 'status green'.

Regards

....

PERSON'S NAME CELLPHONE NUMBER