

National biosecurity plan guidelines for the Australian sea-cage finfish (non- salmonid) industry



AUSTRALIAN SOUTHERN BLUEFIN TUNA
INDUSTRY ASSOCIATION LTD (ASBTIA)



HUON
AQUACULTURE

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About this publication

The National Biosecurity Plan Guidelines for the Australian sea-cage finfish (non-salmonid) industry were developed as part of Activity 1.1 of AQUAPLAN 2014–2019, Australia's national strategic plan for aquatic animal health, under Fisheries Research and Development Corporation (FRDC) project 2019-088. The Department of Agriculture, Water and the Environment funded the project through the FRDC. In-kind contributions were provided by the Department of Primary Industries and Regions South Australia (PIRSA) Fisheries and Aquaculture, Australian Southern Bluefin Tuna Industry Association, Clean Seas Seafood, Huon Aquaculture, and Indian Ocean Fresh Australia. The Sub-Committee on Aquatic Animal Health endorsed the document in May 2021 and the Animal Health Committee endorsed it in August 2021.

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1. Introduction

Aquaculture is one of the fastest growing primary industry sectors in Australia. The gross value of production of Australia's fisheries and aquaculture sectors was \$3.18 billion in 2017-18, with \$1.42 billion (or 44%) of this attributed to aquaculture, and approximately \$700 million to the production of tuna and other finfish (excluding salmon) (Stephens et al. 2020).

Infectious diseases are a significant threat to the profitability of Australia's fisheries and aquaculture industries, particularly emerging or expanding industry sectors such as the Australian sea-cage finfish (non-salmonid) sector. The global impact of aquatic animal diseases exceeds \$6 billion per annum (Stentiford et al. 2020). In Australia, the risk of disease has been highlighted by recent major disease outbreaks in farmed prawns (white spot syndrome virus) and farmed and wild Pacific oysters (Pacific oyster mortality syndrome).

[Australia's National List of Reportable Diseases of Aquatic Animals](#) currently has 24 finfish diseases listed on it, the vast majority of which are exotic to Australia. However, new diseases may emerge at any time due to the continued growth of the aquaculture sector and the use of new farming locations, species, or production methods. Therefore, it is imperative to remain vigilant and to appropriately monitor and manage biosecurity risks on your farm.

The development of sector-specific biosecurity plan guidelines and templates was identified as a national industry-government priority in [AQUAPLAN 2014-2019](#). Biosecurity describes the systems put in place to protect your farm from the introduction, spread (for example, from one location to another) and transmission (for example, from fish to fish) of disease, as well as the emergency response measures that should be in place on your farm. Farm biosecurity plans address these areas through records management, staff training and administration of the farm.

Farm biosecurity plans should outline:

1. the disease prevention measures of your farm
2. the disease response measures of your farm
3. the biosecurity requirements of your farm (for example, for the movement, trade, and market access requirements of aquaculture livestock)

It is beneficial to apply preventative biosecurity measures rather than relying on reacting to a disease outbreak once it happens. The best way to protect your farm, and its adjacent environment, from the threat of disease is to have measures in place to mitigate disease exposure at critical control points (that is, a step at which control can be applied and is essential to prevent or eliminate disease risks or reduce it to an acceptable level). Mitigation measures should be put in place for:

- animal movements
- people (including staff and visitors)
- equipment (including vehicles and vessels)
- water
- feed
- wastes.

Mitigation measures can be applied to all types of aquaculture production systems, including open, semi-open, semi-closed and closed systems. However, not all measures will suit all systems. It is important to identify the most suitable mitigation measures for your given system and for your business. For example, although water cannot be easily controlled in an open sea-cage system,

mitigation measures can be put in place to control the movement of animals (for example, stock and predators), people (for example, staff and visitors), equipment (for example, nets and vehicles), feed and wastes.

1.1 Purpose of these guidelines

These guidelines were developed to provide the Australian sea-cage finfish (non-salmonid) industry with the tools and templates to create practical, cost-effective, and auditable biosecurity plans. Consideration was given to the current farming of:

- yellowtail kingfish (*Seriola lalandi*)
- southern bluefin tuna (*Thunnus maccoyii*)
- cobia (*Rachycentron canadum*).

National biosecurity plan guidelines already exist, or are under development, for other sea-cage aquaculture industries, including the salmonid and barramundi aquaculture industries.

These guidelines were developed as part of [AQUAPLAN 2014-2019](#) activity 1.1, through an Australian Government Department of Agriculture, Water and the Environment (the department) funded [Fisheries Research and Development Corporation](#) (FRDC) project. Specifically, FRDC project number 2019-088: Development of a national sector-specific biosecurity plan guideline and template for the sea-cage finfish (non-salmonid) industry of Australia). The authors would like to acknowledge PIRSA Fisheries and Aquaculture, the University of Adelaide, and Future Fisheries Veterinary Services for undertaking the project.

The guidelines were developed based on input from an industry-government workshop held 7 November 2019, in Adelaide South Australia, and on consultation with industry representatives after the workshop.

Other biosecurity plan guidelines were referred to in the development of this document, including the:

- National Aquaculture Farm Biosecurity Plan: generic guidelines and template
- National biosecurity plan guidelines for the Australian land-based abalone industry
- National biosecurity plan guidelines for Australian oyster hatcheries
- National biosecurity plan guidelines for Australian Barramundi farms

These guidelines are available on the department's [website](#).

Staff must understand that by preventing new disease introductions and effectively managing disease outbreaks they can help protect their jobs, and ultimately the industry.

2. How to use these guidelines

These guidelines were developed to assist farmers in the Australian sea-cage finfish (non-salmonid) industry to develop practical, cost-effective, and auditable biosecurity plans specific to their farm or business, or to strengthen an existing one.

These guidelines provide information, templates, and resources to help assess disease risks that are common to the sea-cage finfish industry in Australia. Potential routes for disease transmission are identified, including routes for:

1. disease entry on to your farm,
2. disease spread within your farm
3. disease spread from your farm.

This will help you to assess:

- the risks associated with each route of disease transmission
- the measures required to minimise the risk of disease transmission
- what other supporting documents you will need to develop to put together a comprehensive plan (for example, standard operating procedures [SOPs]).

You will also need to consider any additional risks specific to your farm, and the associated risk management measures you may require.

Each farm will have a different spectrum of biosecurity challenges and operating environments due to variations in:

- operation size
- farm location and layout
- the disease status of the region/state/territory
- proximity to other fish populations (wild and farmed) that may be susceptible to the same diseases
- proximity to other aquaculture sites or seafood enterprises (for example, processors)
- the number and type of species farmed
- available resources.

Your farm biosecurity plan should be specific to your business and should consider your farm's uniqueness. You should also ensure that it is practical for your operation and as low cost as possible to achieve the required and desired biosecurity outcomes.

Biosecurity plan templates are included as appendices to this plan. For example, a guideline on how to write an SOP is shown in Appendix 2. You will need to tailor these templates to suit your farm operation. You do not need to duplicate existing documents, systems, or records. Instead, these can be referred to within your biosecurity plan, where appropriate.

Once you have navigated through these guidelines and assessed your individual farm risks, you can create a farm biosecurity plan. Appendix 9 provides an internal or external audit checklist, which you can use to assess your completed plan. Use this checklist to highlight any remaining gaps.

When creating a farm biosecurity plan, do not duplicate existing documents, systems, or records. Simply refer to them within your plan, where appropriate.

3. Symbols used in these guidelines

R-numbered statements are risk-management measures to implement and document. These measures are auditable.



Paper icon indicates supporting details and other information to include in your farm biosecurity plan.



Tick on paper icon indicates risk management measures to implement and document. These measures are auditable.



Open file icon indicates templates provided in this guideline to help develop individual farm biosecurity plans.

4. Reportable diseases of finfish

Currently there are 24 viral, bacterial, parasitic and other diseases of finfish listed on [Australia's national list of reportable diseases of aquatic animals](#) (Table 1). These diseases are a threat to your industry, potentially the environment you are farming in and can be barriers to trade and market access.

For the full list of susceptible species refer to the [Aquatic Animal Diseases Significant to Australia: Identification Field Guide](#).

Table 1. National reportable diseases of finfish

Diseases	Exotic to Australia
<i>Viral</i>	
Channel catfish virus disease	Yes
Epizootic haematopoietic necrosis	No
European catfish virus and European sheatfish	Yes
Grouper iridoviral disease	Yes
Infection with HPR-deleted or HPRO infectious salmon anaemia virus	Yes
Infection with infectious spleen and kidney necrosis virus (ISKNV)-like viruses	Yes
Infection with salmonid alphavirus	Yes
Infectious haematopoietic necrosis	Yes
Infectious pancreatic necrosis	Yes
Koi herpesvirus disease	Yes
Red sea bream iridoviral disease	Yes
Spring viraemia of carp	Yes
Tilapia lake virus disease	Yes
Viral encephalopathy and retinopathy	No
Viral haemorrhagic septicaemia	Yes
<i>Bacterial</i>	
Bacterial kidney disease	Yes
Enteric red mouth disease	Yes
Enteric septicaemia of catfish	No
Furunculosis	Yes
Infection with <i>Aeromonas salmonicida</i> – atypical strains	No
Piscirickettsiosis	Yes
<i>Parasitic</i>	
Infection with <i>Gyrodactylus salaris</i>	Yes
Whirling disease	Yes

Diseases	Exotic to Australia
Other	
Infection with <i>Aphanomyces invadans</i>	No

Note: Table 1 was current at the time of publication. For the latest version of the list see [Australia's national list of reportable diseases of aquatic animals](#).

Most of these diseases are listed by the World Organisation for Animal Health (OIE), according to the definitions laid out in the [Aquatic Animal Health Code](#).

Farmers, aquaculture technicians, veterinarians, researchers, or anyone else who ought to reasonably know, must immediately report suspicion or detection of these diseases to the relevant authority under state and territory legislation.

Additional jurisdiction specific diseases must also be reported to the relevant authority if suspected or detected. These diseases are commonly referred to as 'Notifiable Diseases' and lists are available on your relevant state or territory website.

Your biosecurity plan should be developed with the aim of excluding these diseases, but with the knowledge that new diseases may emerge in the future. Your plan may also address those diseases not currently listed on Australia's national list or on state and territory lists that are of significance to your farm (for example, a non-notifiable disease which impacts on production).

5. Resources for disease identification and management

Key resources to help you identify reportable diseases include:

1. Australia's National List of Reportable Diseases of Aquatic Animals.
2. The Aquatic Animal Diseases Significant to Australia: Identification Field Guide.
 - a. The field guide is available as a PDF download, or as a free mobile app. The app can be freely downloaded from the App Store (Apple devices) or Google Play (Android devices). The app should be downloaded onto staff phones and farm computers.
3. Australia's aquatic emergency animal disease response plan ([AQUAVETPLAN](#)). Operational manuals are available for destruction, disposal, and decontamination, as well as a range of finfish diseases, including furunculosis and viral encephalopathy and retinopathy.
4. The World Organisation for Animal Health's (OIE) [Aquatic Manual](#).

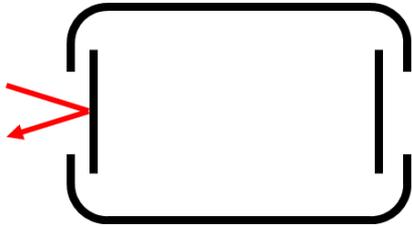
For the full list of available resources provided in this manual refer to Appendix 10.

6. Major routes of disease transmission

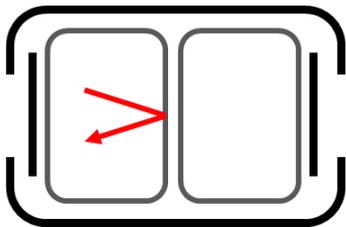
Disease is more likely to establish and spread on your farm if high levels of infection come into close contact with susceptible hosts. Diseases can be transmitted onto (entry-level), within (internal), and from (exit-level) your farm via a number of pathways (Figure 1). Examples risk pathways for each of these levels are shown in Table 2.

Figure 1 Disease transmission pathways for the establishment and spread of disease on sea-cage farms.

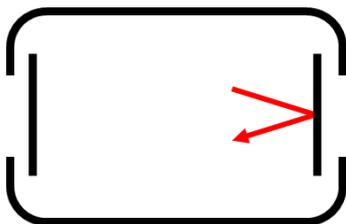
Entry-level transmission (external risks):
stop spread onto the farm.



Internal-level transmission (within farm risks):
stop spread within the farm.



Exit-level transmission (discharge risks):
stop spread off the farm.



Adapted from Ellard, 2015.

Table 2 Examples of the highest risk pathways for the establishment and spread of disease on sea-cage farms.

Transmission Level	Highest risk pathways	Example risks
Entry	Stock	<ul style="list-style-type: none"> • fingerlings • broodstock • escaped fish.
	Water	<ul style="list-style-type: none"> • oceanography • proximity to adjacent farms, processors, ports, or shipping.
	Feed	<ul style="list-style-type: none"> • baitfish • non-extruded pellets.
	People	<ul style="list-style-type: none"> • staff • visitors • researchers.
	Equipment and vessels	<ul style="list-style-type: none"> • boats • trucks.
	Other animals	<ul style="list-style-type: none"> • vermin • wild birds • wild fish.
Internal	Stock	<ul style="list-style-type: none"> • movement of fish between sites and sea-cages • dead fish • escaped fish.
	Water (and aerosols)	<ul style="list-style-type: none"> • proximity of sea-cages to land base and to one another.
	Feed	<ul style="list-style-type: none"> • as above for entry level.
	People	<ul style="list-style-type: none"> • as above for entry level.
	Equipment and vessels	<ul style="list-style-type: none"> • nets • sea-cages.
	Other animals	<ul style="list-style-type: none"> • vermin • wild birds • wild fish • dislodged biofouling.
Exit	Stock	<ul style="list-style-type: none"> • dead stock • movement of product off site (for example for processing) • discarded product • processing wastes.
	Water	<ul style="list-style-type: none"> • wastewater • processing water.
	Feed	<ul style="list-style-type: none"> • discarded feed.

Transmission Level	Highest risk pathways	Example risks
Exit	People	<ul style="list-style-type: none"> • as above for entry and internal levels.
	Equipment and vessels	<ul style="list-style-type: none"> • boats • trucks.
	Other animals	<ul style="list-style-type: none"> • as above for internal level.

7. What to include in your biosecurity plan?

Your plan should be structured so that staff, external auditors, and government staff can read and understand the plan. Below is a suggested layout and inclusions to help you develop a comprehensive and concise biosecurity plan.

7.1 Key contacts



Document key details for internal and external contacts relevant to farm management, biosecurity and stock health.

Include the phone number and email addresses of relevant contacts including:

- company manager, farm manager and specific area managers (for example, feed manager, health manager and health technician)
- consulting veterinarian and/or fish health professionals
- 24-hour Emergency Animal Disease Reporting Hotline (1800 675 888) and any additional state and territory government aquatic animal health contacts
- local government/council contacts
- laboratory details
- environmental protection agency
- port authority
- emergency services
- any relevant industry representatives (for example, other nearby aquaculture businesses, peak industry body executive officers and/or association representatives)

7.2 Production details



Summarise the details of all relevant elements of your enterprise.

Relevant details include:

- the type of enterprise (for example, grow-out enterprise or wild caught ranching)
- the fish species and size(s)
- the origin of fingerlings, broodstock, and grow-out stock (for example, the number, source location and date introduced to farm)
- the housing type(s) used (for example, sea-cage on site, tanks in a recirculating aquaculture system, and/or ponds within a biosecure hatchery elsewhere)
- stock movements between the farm site and other facilities
- the licenced maximum farm biomass
- annual production outputs
- production and administrative activities
- staff details (including numbers, positions, and areas of responsibility)
- any associated sites linked to the sea-cages, such as hatchery sites, feed storage or site office
- proximity to other biosecurity risks (for example, other farms, processors)
- details of any veterinary medicine or chemical use, including the release of veterinary medicine treatment water.

7.3 Maps and diagrams

7.3.1 Overview of the site



Provide a locality map and associated farm information.

It is likely that you will need more than one farm map in your biosecurity plan, to cover different levels of detail.

Provide fine-scale detail of each functional area of the farm in terms of:

- quarantine facilities (for example, in the hatchery)
- the flow of stock, from entry to the sea-cage through to harvest and processing
- the position of neighbouring farms
- any escapee-prevention measures

- dead stock disposal locations and type (for example, burial, silage, or freezer)
- the location of biosecurity signage (for example, quarantine area, authorised staff only, no visitors beyond this point)
- the location of biosecurity barriers (for example, visitor entry point(s), visitor office, boot-change stations, foot baths, hand-wash stations, gates [specify if kept locked] and restricted areas)
- fencing to restrict access and potential points of unauthorised access or entry
- permitted staff movements between areas of the farm (zoning)
- marinas and boat ramps
- machinery storage
- boat availability and capacity
- vehicle spray stations, net wash-down areas and disinfection bays
- feed unloading and storage
- emergency muster points
- chemical storage, including veterinary medicines
- the location of biosecurity documents.



R1. The farm has boundary markers and signage at all four corners of the lease, including navigation lighting.

7.3.2 Site biosecurity zoning



Overlay biosecurity zones on a map of your enterprise. These zones need to be described in detail within your plan and supported with standard operating procedures.

Biosecurity zones represent areas that are both physically and functionally separate. You should be able to define the location and type of biosecurity measure(s) separating those areas.

Separate zones should have infrastructure and sanitary protocols in place to prevent transfer of disease from one zone to another with movement of stock, water, wastes, people, feed, vehicles and equipment. These areas can be assigned the classifications listed in Table 3.

It is important to prioritise and manage the movement of animals, staff, visitors, equipment, and vehicles between zones. Movements should be ordered from low to high risk. Should movement from a higher risk zone to a lower risk zone be required, ensure a risk assessment is prepared to justify the activity.

Table 3 Summary of example farm biosecurity zones

Biosecurity zone	Access requirements
High level biosecurity (Most biosecure area)	Highly restricted. Authorised personnel only. No entry to any other zones following access.
Moderate level biosecurity (Moderately biosecure area)	Limited access. Authorised personnel only.
Low level biosecurity (Low level biosecurity only)	No restricted access for staff. Visitor access only after biosecurity entry assessment and approval.

Note: Refer to Table 4 for a detailed explanation of the risk-rating colour scheme used in Table 3. Where green is low risk (bottom row), yellow is medium risk (middle row) and red is high risk (top row).



R2. Divide the farm into biosecurity zones with zone-specific requirements relating to access, entry and exit procedures, and dedicated equipment and personnel.



R3. Clearly display biosecurity zone signage and use consistent biosecurity zone definitions that are familiar to all personnel.

8. Routine measures to address major disease transmission routes

This section outlines routine risk management measures to address major disease transmission routes common to sea-cage farms. Major disease transmission routes include:

- stock and animals
- staff and visitors
- equipment, vehicles, and vessels
- water
- waste
- feed.

The risk-rating categories are outlined in Table 4.

Table 4 Risk-rating categories

Risk category	Potential risk level
High	<p>Unacceptable level of risk.</p> <p>Urgent intervention is required to mitigate the level of risk.</p> <p>Failure to implement risk management measures may result in a critical risk of disease transfer.</p>
Medium	<p>Unacceptable level of risk.</p> <p>Intervention is required to mitigate the level of risk.</p> <p>Failure to implement risk management measures may result in a moderate risk of disease transfer.</p>
Low	<p>Failure to implement risk management measures may result in a low risk of disease transfer.</p> <p>Ongoing monitoring may be required.</p>

Note: Risk-rating colour scheme where green is low risk (bottom row), yellow is medium risk (middle row) and red is high risk (top row).

8.1 Animals

Objective: Minimise the risk of stock and other animal movements introducing and spreading disease.

Stock poses the most significant risk for bringing disease onto your farm, especially if you do not know their health status. Manage stock introduction and movements carefully to minimise this risk. Table 5 provides a summary of risk management measures for stock and animal movements.

Table 5 Risk management measures for stock and animal movements

Risk category ^a	Risk management measures
High	 <p>R4. In accordance with jurisdictional requirements, immediately inform relevant authorities of any significant, unexplained mortality event or suspected infectious or reportable disease via the Emergency Animal Disease Reporting Hotline (1800 675 888).</p>
	 <p>R5. Investigate health problems and mortalities (suspected disease) with assistance from a competent aquatic veterinarian.</p>
	 <p>R6. Adhere to applicable translocation requirements and legislated requirements of your jurisdiction for all stock and equipment movements as required.</p>
	 <p>R7. Permanently quarantine introduced stock of unknown or lower health status (for example, wild caught stock from different geographic areas or populations). This includes isolation in epidemiologically separate water ^b from all other farm stock and in separate production units, dedicated quarantine areas or facilities with appropriate biosecurity measures.</p>
Medium	 <p>R8. Perform routine health assessments for each sea-cage regularly (at least monthly) to identify disease and monitor the disease status of stock. This should include internal health assessments of stock pre-transfer for all movements within the jurisdiction.</p>
	 <p>R9. Appropriately control predators and scavengers (for example, birds, dolphins, seals and sharks) within regulatory parameters (i.e. seek permits as required) or exclude them from production areas.</p>
	 <p>R10. Use divers or other means to inspect nets at least twice weekly (when possible and safe to do so), mend holes to minimise stock escaping and remove mortalities using adequate biosecurity protocols (links to R37).</p>

Risk category ^a	Risk management measures
	<p data-bbox="475 286 560 398"></p> <p data-bbox="612 309 1302 376">R11. Consider options for limiting entry or aggregation of animals near production units.</p> <p data-bbox="475 472 560 584"></p> <p data-bbox="612 461 1270 595">R12. Record all stock-management activities such as grading, harvesting and treatments (including date, prescription number, application method and pre- and post-efficacy monitoring data).</p> <p data-bbox="475 696 560 808"></p> <p data-bbox="612 667 1334 842">R13. When possible, stock fingerlings onto a fallowed lease that does not have other new fingerlings cohabiting in close proximity. Record the destination cage identity and number of fingerlings stocked in your farm records. All-in and all-out and year class separation should be practiced.</p>
Low	<p data-bbox="475 958 560 1070"></p> <p data-bbox="612 909 1334 1122">R14. Fish are to be visually examined daily where possible. Record unusual observations in your farm records, including colour change, inappetence, aberrant swimming, pop-eye, bloating, immobility, excess buoyancy, and skin and fin lesions. When required investigate further with your farm veterinarian to diagnose disease (links to R5).</p>

Note: **a** Risk-rating colour scheme where green is low risk (R14), yellow is medium risk (R8-R11) and red is high risk (R4-R7). **b** Epidemiologically separate water refers to water that is not linked to any other areas of the farm (for example, in a quarantine facility). This water is always kept separate from the rest of the farm and is not allowed to mix with other water sources on the farm. Epidemiologically linked water has contact with other sources of water on the farm. Linked sources share the same level or risk. This principle can also be applied to units such as tanks or cages (refer to Appendix 11).

8.2 People

Objective: Minimise the risk of people movements introducing and spreading disease.

People pose a significant risk to your farm if they have recently visited other farms, or environments that potentially contain diseases of concern. Contaminated skin, personal equipment, clothing, and footwear can all potentially spread disease. Table 6 provides a summary of risk management measures for staff and visitors.

Table 6 Risk management measures for staff and visitor movements

Risk category ^a	Risk management measures
High	 <p>R15. Ensure workflow is unidirectional (from low to high risk zones) when staff need to access multiple zones during a day. Make sure you have an appropriate decontamination procedure in place if movement from a high risk to low risk site is unavoidable.</p>
	 <p>R16. The farm manager must approve all visitors. Visits must be unidirectional from lowest to highest risk areas. Visitors are always to be accompanied a member of staff.</p>
	 <p>R17. All visitors must complete a pre-site questionnaire and biosecurity declaration on arrival to ensure you assess their risk to the farm. Consider refusing entry to high-risk visitors.</p>
	 <p>R18. Staff are not permitted to visit other aquaculture sites or seafood processors, or undertake recreational or commercial fishing activities before entering the farm (unless they have followed your SOP to mitigate disease risks, including appropriate decontamination where required).</p>
	 <p>R19. Staff and visitors are prohibited from bringing uncooked seafood products or bait into the workplace.</p>
Medium	 <p>R20. All staff are required to wear freshly laundered clothes daily and must change into designated farm-only footwear upon entry.</p>
	 <p>R21. Staff must record overseas travel and declare any contact with other aquaculture facilities.</p>

Risk category ^a	Risk management measures
	<div data-bbox="475 293 560 398">  </div> <p data-bbox="612 293 1337 398">R22. Staff should receive annual training in disease identification and steps involved in recording, reporting, and investigating disease events.</p> <div data-bbox="475 479 560 584">  </div> <p data-bbox="612 465 1337 600">R23. Divers must disinfect between leases and use cage-specific, sanitised mortality bags. Divers must decontaminate between year classes, leases and after diving in cages exhibiting evidence of disease ^b.</p>

Note: **a** Risk-rating colour scheme where yellow is medium risk (R20-R23) and red is high risk (R15-R19).
b Decontamination reduces the microbial contamination of materials or surfaces and is achieved through physical cleaning (washing, cleaning, and rinsing) and disinfection (disinfect and rinse). Waste containment, treatment and disposal is involved in each of these steps (Le Breton, 2001a and b) (refer to Appendix 11).

- 

Appendix 3 provides a pre-employment biosecurity declaration template.
- 

Appendix 4 provides a visitor biosecurity declaration template.
- 

Appendix 5 provides a visitor log template.
- 

Appendix 6 provides a farm entry conditions template for visitors.

8.3 Equipment, vehicles, and vessels

Objective: Minimise the risk of equipment, vehicle or vessel movements introducing and spreading disease.

Depending on their history of use, contaminated equipment, vehicles, or vessels can carry and spread disease agents. Equipment and vehicles pose the greatest risk if used off-site or in association with stock or wild fish, especially if these are diseased (for example, dive equipment or vehicles returning from fish processors). Table 7 provides a summary of risk management measures for equipment, vehicles, and vessels.

Table 7 Risk management measures for equipment, vehicles, and vessels

Risk category	Risk management measures
High	<div style="margin-bottom: 15px;">  <p>R24. Maintain separation of marine farming structures so that adequate separation is achieved between input fingerlings and grow-out fish.</p> </div> <div style="margin-bottom: 15px;">  <p>R25. Where there is spatial separation of farming zones (for example, high and low risk zones) or areas that have different pathogen status (for example, hatchery versus grow out), vehicles, vessels, and equipment should be kept separate or decontaminated between farming areas.</p> </div> <div style="margin-bottom: 15px;"> <p>R26. Movement of equipment, vehicles, and vessels (for example, cage tows and work boats) from areas of known disease status, or other finfish enterprises, to areas of disease-free status should be avoided.</p>  <p>If these must be moved, undertake a risk assessment for the pathogen risks in your area and mitigate appropriately. The risk assessment should include implementing an appropriate disinfection protocol.</p> <p>Other mitigation strategies may include slipping the boat, removal of hull fouling, removal of all ropes and replacement with new ropes, disinfection of the vessel, air drying in sunlight, or a freshwater rinse.</p> </div> <div style="margin-bottom: 15px;">  <p>R27. Equipment which has been in contact with fish or culture water external to the farm (including contractor equipment or plant), should not be brought onto the farm. If no alternative exists, then a thorough cleaning and disinfection protocol must be followed before entry.</p> </div>

Risk category	Risk management measures
	 <p>R28. Any equipment, vehicles or vessels brought onto the farm should be assessed for biosecurity risks. Equipment, vehicles or vessels deemed to have an unacceptable level of risk must either undergo a decontamination protocol prior to entry onto the farm or be excluded from entry.</p>
Medium	 <p>R29. Stock fingerlings in new nets, or nets that have been cleaned, disinfected, and dried.</p>
	 <p>R30. All material brought onshore for cleaning and maintenance must be held in designated areas and/or segregated to prevent cross-contamination of other equipment involved in on water operations. Equipment must be decontaminated prior to redeployment.</p>
Low	 <p>R31. The farm must have the capability to rapidly collect and preserve samples for investigations (i.e. to rule out disease). The farm should maintain a compound microscope, dissection equipment and materials for necropsy, collection of tissue biopsies and impression smears, preservation of tissues for histopathology and molecular testing and have immediate access to a trained technician and an aquatic veterinarian (for example, farm veterinarian).</p>

Note: a Risk-rating colour scheme where green is low risk (R30 to 31), yellow is medium risk (R29) and red is high risk (R24-R28).

Appropriated decontamination (cleaning and disinfection) methods are outlined in the:

- AQUAVETPLAN Operational Procedures Manual – Decontamination, found on the Department of Agriculture, Water and the Environment’s [website](#).
- Australian Pesticides and Veterinary Medicines Authority (APVMA) permits found on the APVMA [website](#).

Management guidelines for minimising the spread of marine pest species are also available on the marine pest [website](#).

8.4 Water, wastes and feed

Objective: Minimise the risk of water, waste and feed introducing and spreading disease.

Contaminated water, waste and feed can carry and spread disease agents. Water and waste pose the greatest risk if contaminated products are disposed of incorrectly. Feed can also introduce diseases, particularly if high disease risk feeds are used. See Table 8 for a summary of risk management measures for water, wastes and feed.

Table 8 Risk management measures for water, wastes and feed

Risk category ^a	Risk management measures
High	<p> R32. Lease sites should be located to maintain epidemiological separation of populations with different health status wherever possible (for example, different year classes) ^b.</p> <p>If epidemiological separation cannot be achieved, multiple lease sites must be treated as the same epidemiological unit for the purpose of disease management or emergency response.</p> <p> R33. The farm should have contingency plans in place and equipment available for the management of disease and high levels of mortalities (for example, large airlifts and prearranged high-volume disposal sites).</p> <p> R34. Containment, handling, and disposal of waste products (for example, blood water and carcasses from harvesting and mortalities) should minimise identified disease transmission risks through appropriate mitigation measures (for example, decontamination and disposal protocols and training).</p> <p>R35. If feeding non-heat extruded manufactured feed (for example, baitfish in tuna ranching or non-heat extruded moist pellets), use only:</p> <p> 1) low disease risk feeds (for example, locally caught feed, or imported feed [feed imported for the purpose of aquaculture use and in line with Commonwealth import requirements])</p> <p>2) sanitised feeds that have been appropriately treated to inactivate pathogens (for example, appropriately irradiated raw feed products).</p>

Risk category ^a	Risk management measures
High	<p>For further guidance, see the national policy guidelines for domestic bait and berley.</p> <p> R36. The external biosecurity risks of local biofouling and ballast water sources should be considered and appropriate actions taken to manage any identified risks (for example, consider these risks during site selection and contact the port authority to discuss possible risks and raise awareness).</p>
	<p>R37. Dispose of other wastes (for example, uneaten medicated feed, out of date feed, algae, net biofouling, and marine pest fouling) appropriately via regulatory authority approved methods.</p> <p>R38. Remove and record dead stock daily, wherever possible, or at least twice weekly. Dispose of dead stock using a method approved by the relevant authority.</p> <p> Ensure that the disposal method poses no risk of pathogen release from the dead stock into the waterways, and excludes access for scavenger birds or animals (for example, cats, pigs, foxes and rats) that could spread a disease.</p>
Medium	<p>R39. Ensure water that is moved from a lower health status site (for example, cages) to higher health status site (for example, hatchery) is decontaminated prior to movement.</p> <p>R40. Sanitised feed (for example, heat extruded pellets) should be fed to fish whenever possible in preference to live or un-sanitised feeds.</p> <p> Batch, run, date of manufacture, country of origin, and pellet size should be recorded so it is clear which cage received which feed.</p> <p>R41. Overfeeding should be avoided to prevent waste and to manage lease benthos. This will help to avoid excessive eutrophication and subsequent water quality deterioration and stress on farmed fish. These factors can lead to poor health and disease and should be appropriately managed.</p> <p> The appetite (vigour of feeding) and volume of feed consumed should be recorded daily for every individual cage</p>
Low	

Risk category ^a	Risk management measures
	population. Use of feeding cameras on all feeds and benthic surveys to monitor seafloor condition are recommended.

Note: **a** Risk-rating colour scheme where green is low risk (R39 to 41), yellow is medium risk (R37 to 38) and red is high risk (R32-R36). **b** Epidemiologically separate units should not come into contact with other units on the farm. That is, units are always kept separate from one another and are not allowed to mix (for example, separate year classes of fish or sea-cages located on geographically separate lease sites). Epidemiologically linked units will have come into contact with other units on the farm (for example, sea-cages located on the same lease site) and will share the same level of risk (refer to Appendix 11).

Appropriate destruction and disposal methods are outlined in the:

- AQUAVETPLAN Operational Procedures Manual – Destruction, available on the Department of Agriculture, Water and the Environment’s [website](#).
- AQUAVETPLAN Operational Procedures Manual – Disposal, available on the Department of Agriculture, Water and the Environment’s [website](#).

9. How to assess additional risks associated with your farm

When developing your farm-specific biosecurity plan, you will also need to assess any additional risks associated with your specific farm, not covered in these guidelines. You will need to implement appropriate risk management measures.

We have outlined this process below, but for further detail refer to the national [Aquaculture Farm Biosecurity Plan: generic guidelines and template](#).

9.1 Identify risks and perform a risk assessment

Identify farm-specific risks (or routes of disease transmission) and perform a risk assessment for each hazard (for example, transmission pathway) identified. To perform the risk assessment, you will need to:

- Estimate the likelihood of disease entering the farm by this route.
- Determine the consequence of disease entering by this route.

The level of risk posed by each hazard (or pathway) you identify will be disease dependent.

9.2 Likelihood

The likelihood of a disease occurring can be estimated by considering the transmission pathways necessary for entry of a disease, and for exposure of your fish to the disease (Figure 2).

The likelihood ratings are:

- remote
- unlikely
- possible
- likely
- certain.

The likelihood of entry and exposure might be 'certain' for a known endemic disease that has been historically monitored and managed. However, as your farm biosecurity plan is not targeted at a specific disease, it is best practice to consider the worst-case scenario – an exotic or other emergency (or significant) finfish disease.

9.3 Consequence

The consequences of a disease occurring can be estimated by considering the impacts of a disease on the productivity of your farm (Figure 2). The consequences could include multiple aspects of production (for example, increased mortality; reduced growth, food conversion, product quality or market access; and increased treatment costs).

The consequence ratings are:

- insignificant
- minor
- moderate
- major
- catastrophic.

9.4 Risk estimation

The risk of a disease occurring is estimated as a product of likelihood and consequence, by multiplying the likelihood rating by the consequence rating, resulting in risk ratings of 1–25.

Risks are highest when both likelihood and consequence are high. However, the risk may be low even if the consequence is ‘catastrophic’, as the likelihood may be ‘remote’ for that circumstance. Similarly, even if the likelihood is ‘certain’, the consequence may be ‘insignificant’.

Risk ratings can be determined by applying estimates of likelihood (in which 1 is remote and 5 is certain) and consequence (in which 1 is insignificant and 5 is catastrophic) to the risk matrix (Table 9).

Figure 2. Risk estimation matrix

		Consequence rating				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood rating	Remote	1	2	3	4	5
	Unlikely	2	4	6	8	10
	Possible	3	6	9	12	15
	Likely	4	8	12	16	20
	Certain	5	10	15	20	25

Table 9 Risk levels and management responses

Risk level	Explanation and management response
1–2 Negligible	Acceptable level of risk. No immediate action required.
3–5 Low	Acceptable level of risk. Ongoing monitoring may be required.
6–10 Medium	Unacceptable level of risk. Active management is required to reduce the level of risk.
12–25 High	Unacceptable level of risk. Urgent intervention is required to mitigate the level of risk.

Medium and high risks are considered unacceptable and require the implementation of management measures (Table 9). Monitor low and negligible risks to ensure the risk profile does not change over time.

9.5 Identify appropriate risk management measures

A variety of measures can be used to manage and control risks including:

- physical (for example, infrastructure and equipment)
- procedural (for example, production practices and training)
- other supporting measures (for example, signage).

To address any specific additional risks identified for your farm, consider each of these measures as part of a standard approach.

9.6 Develop or identify associated supporting documentation

Support risk management measures with appropriate documentation (for example, standard operating procedures [SOP], checklists and record keeping templates) outlining detailed risk management measures. Reference the appropriate supporting documentation in your farm biosecurity plan, using a document number, name, or other relevant code. Standard operating procedures should be accompanied by a date-stamped checklist wherever possible, to provide evidence that an accountable staff member is following the SOP.

9.7 Staff training measures

Ensure all staff are appropriately trained so they understand both farm-specific and role-specific biosecurity requirements and understand their responsibility for maintaining farm biosecurity.

You can also use a training record to:

- ensure you do not overlook staff training
- document additional role-specific training such as sample collection, packaging, and submission
- remind you to refresh training regularly (annually at a minimum)
- remind you to refresh staff training after procedures or associated documents are updated



R42. Ensure the farm has a biosecurity manager responsible for creating, maintaining and reviewing the biosecurity plan, associated documents and activities including staff training, with annual (or more frequent) reviews and updates.



R43. Ensure that staff can readily access the farm biosecurity plan and all associated documents at all times.



R44. Provide all staff with a farm biosecurity induction and ongoing, documented biosecurity training relevant to their role.

Document all staff training and ensure it encompasses:

- the farm's biosecurity plan
- the farm's emergency response plan
- the farm's standard operating procedures
- any associated documents, including checklists and work practices that support these plans.
- identification of disease signs and symptoms, and the steps involved in recording, reporting, and investigating disease events
- familiarity with the [Aquatic Animal Diseases Significant to Australia: Identification Field Guide](#).



Appendix 7 provides suggested training record template.

10. Emergency procedures

Objective: Ensure that you develop emergency procedures for your farm and identify additional biosecurity measures to implement if there is a suspected emergency animal disease outbreak or a serious endemic disease. This could be on the farm or due to an increased threat of disease introduction if an outbreak is suspected in the state/territory or region.



R45. Ensure the farm has an emergency response plan, which is subject to critical review and annual updating.

An emergency response plan is an essential farm document for each farm and must provide clear guidelines as to:

- the specific trigger(s) for an emergency animal disease alert (for example, mortality rate and abnormal stock behaviour)
- the key emergency contacts

- the notification pathways and responsibilities, including the emergency animal disease hotline (1800 675 888) and jurisdictional contacts
- the high-risk biosecurity management measures that need to be immediately implemented when the emergency plan is activated
 - this includes stock movement and farm access restrictions (examples of these are included within the emergency response plan template; Appendix 3.8)
- the sample collection, storage, and submission guidelines
- the disposal and quarantine protocols
- the physical location and web link of key response resources or documents (for example, AQUAVETPLAN, jurisdiction disease response plan(s), or the farm disease response plan(s)).

The emergency response plan must be in line with AQUAVETPLAN and other jurisdictional requirements.

Your farm emergency plans should also include the procedures you need to follow in the event of a non-disease emergency that may influence farm biosecurity (for example, a power failure, cage failure or stock escape, water treatment failure or natural disaster). This will ensure you have clearly identified responsibilities, notification pathways and other procedures before such an event.



Appendix 8 provides an emergency response plan template.

11. Legislative and jurisdictional regulatory requirements

Farm practices must comply with license conditions and relevant agency and jurisdictional legislation, including local, state and territory, and federal legislation.



R46. Only species listed on the farm licence and obtained from a permitted source are kept at the farm.



R47. Veterinary medicines provided to stock are compliant with relevant state and national legislation (including the Commonwealth regulator, the Australian Pesticides and Veterinary Medicines Authority).



R48. All veterinary medicines provided to stock are used under the guidance of the registered farm veterinarian.

12. Document control and revision record

Include document control information and a revision record in your farm biosecurity plan. This ensures that you provide evidence to demonstrate your plan is being maintained as a living document and is continually reviewed and updated based on:

- changed biosecurity threats
- ongoing learnings
- infrastructure upgrades
- changes in farm practices
- newly available risk management tools or information
- audit recommendations.



R49. The farm biosecurity plan is regularly reviewed (annually at a minimum).

13. Audit record

Farmers can use internal auditing (self-auditing) and external auditing (by a second-party or third-party provider) to evaluate the effectiveness of their biosecurity plan and to identify gaps or areas for improvement.

It is important to include a record of all internal and external audits. Note the key outcomes and audit recommendations for future reference, and to demonstrate that you are critically reviewing your plan.



R50. The farm biosecurity plan is regularly audited (annually at a minimum) to ensure that the plan is implemented effectively and continually improved.

An internal (self-audit) and external audit can be used.



Appendix 9 provides an internal-external biosecurity audit template.

14. Supporting documents

Ensure that your biosecurity plan contains a list and location of all the supporting documents. This will help you to:

- readily identify supporting documents
- make them accessible for review and audit.

Supporting documents may be included as appendices to the biosecurity plan or kept elsewhere to maintain version control.

14.1 Standard operating procedures

Depending on the size and scale of your farm, and the number of staff employed, you may wish to incorporate multiple topics into the same standard operating procedure (SOP) or have a separate SOP for each procedure.

Regardless, the following farm procedures should all have an SOP:

- induction and training procedures for new and existing employees
- procedures for farm visitors
- procedures for stock arrivals, movements, and dispatch
- procedures for escapee prevention, and stock inspection and collection
- procedures for the collection and disposal of mortalities and other wastes
- decontamination procedures (including cleaning and disinfection)
- identification, delineation, and application of farm biosecurity zones
- initiation and implementation of the farm emergency response plan

14.2 Checklists

Checklists are an essential supporting document that should be used in association with SOPs, wherever possible. Checklists provide evidence that an accountable staff member(s) is following the procedure(s) outlined in the SOP at the correct intervals. At a minimum, we suggest that you include the following checklists in your farm biosecurity plan:

- pre-employment biosecurity declaration
- visitor biosecurity declaration
- visitor log
- farm entry conditions for visitors
- staff training record



R51. Clearly identify supporting documents associated with the farm biosecurity plan (e.g. new employee induction and training, SOPs, checklists and templates) and keep them readily available.

Appendix 1 Biosecurity sign

You can purchase a farm biosecurity gate sign from [Animal Health Australia](#) or alternatively you can download a template from the [farm biosecurity website](#) to get them printed by your local printer. An example sign is provided in Figure 3.

Figure 3 Farm biosecurity sign for visitors



Appendix 2 How to write a standard operating procedure

Standard operating procedures (SOPs) provide clear, detailed instructions on how to carry out a particular task(s). It is written such that any employee can carry out the task(s) correctly every time. A well-written SOP will help trainers cover all the relevant details.

It is important to consider the following when writing up your SOPs:

- Standard operating procedures form stand-alone documents that allow staff to perform particular tasks or methods.
- Standard operating procedures should be clear and concise but still contain all of the necessary information to perform the task.
- Standard operating procedures must follow a logical thought process and have clear, numbered steps.
- Where possible consider breaking down long SOPs down into shorter SOPs that capture specific parts in the process.
- Where appropriate, use tables, lists, flow diagrams, photos, icons or other graphics rather than large blocks of text. These tools can be more effective than text alone.
- Standard operating procedures should be written for the target audience (that is, those using the SOP). Use plain English and avoid using vague statements such as 'please use' or 'should use' in your SOPs, instead use clear, direct language such as 'must use'.

Table 10 shows that type of information that should be included in an SOP.

Table 10 Suggested format and contents for a standard operating procedure

SOP section	Explanation
SOP category or code	Assign a reference code or number that you can use in your farm biosecurity plan and other documents (for example, SOP-B01 (Standard Operating Procedure – Biosecurity 1)).
Title	The title should be clear and unambiguous (for example, 'Emergency procedures for high mortality').
Objective	What is the aim of the SOP? The objective should be clear and unambiguous (for example, 'Describe procedures to be followed in the event of high unexplained mortality on the farm').
Responsibilities	Describe who the SOP applies to and the roles they must perform. For example: <ul style="list-style-type: none">• All staff: understand this procedure, be able to follow initial response actions, report to biosecurity manager.• Biosecurity manager: coordinate initial response, report to farm manager, liaise with farm veterinarian.• Farm manager: decide response actions, report incident to government authorities.

SOP section	Explanation
Definitions	Include definitions of any technical terms or acronyms used. Omit this section if not required.
Procedure	<p>Clearly describe the steps that should be taken, and any equipment that is required. For example:</p> <ul style="list-style-type: none"> • Cease all farm activity, including feeding, cleaning, and stock movement. • Check water-quality parameters, such as dissolved oxygen, pH, and temperature. • Secure the area to prevent access by unnecessary personnel and to prevent movement of equipment or stock. • Assess the extent of the situation, for example, how many tanks are affected, the proportion of sick or dead animals, and any obvious signs of disease.
Precautions	<p>Clearly describe any activities that must be avoided, for example:</p> <ul style="list-style-type: none"> • Staff must not visit other production areas of the farm. • Equipment and animals must not leave the affected area.
Review date and further information	The SOP should include the date it came into effect, author's contact information, approving manager, date for review (within 12 months), any supporting information, and cross-references to the relevant components of the farm biosecurity plan.

Appendix 3 Pre-employment biosecurity declaration template

Pre-employment biosecurity declaration

I, hereby agree to abide by the [*INSERT FARM NAME*] biosecurity plan and will follow the SOPs provided.

I understand that the following must always be applied:

I must:

- attend work in clean and laundered clothes
- only enter the areas of the farm which I am approved to access
- follow the one-directional flow of work from the low-risk (cleanest) areas of the farm to the highest-risk areas
- immediately report any biosecurity breaches to management
- immediately report any suspicion of disease emergence to management.

I must not:

- visit other aquaculture sites or seafood processes for 24 hours before entering to the farm, unless I have had a full head-to-toe shower and have changed into clean, laundered clothes and sanitised footwear
- wear or take boots worn in a specific production area of the farm outside of that designated production area
- move any equipment designated to stay within a specific farm zone outside of that zone.

Signature: Date:

Appendix 4 Visitor biosecurity declaration template

Visitor biosecurity declaration

Questionnaire

1. Are you entering production areas of the farm?

Yes (go to question 2) No (go to signature section)

2. Have you been in contact with any of the following in the last 24 hours:

- aquaculture enterprises
- ornamental (aquarium) fish
- the aquatic environment (including recreational fishing, seafood processors and water sports or activities)

Yes (go to question 3) No (go to question 4)

3. Have you had a head-to-toe shower and changed into clean clothes and shoes since?

Yes (go to question 4)

No (postpone non-essential visits or manager to assess risk before farm entry being permitted)

4. Are you bringing any equipment (for example, dive gear or fishing gear), uncooked seafood products or bait or fish feed products onto the farm?

Yes (go to question 5) No (go to signature section)

5. Have equipment, products and other items been decontaminated to eliminate fish pathogens?

Yes (go to signature section)

No (stop equipment entry onto farm or manager to assess risk before farm entry)

Declaration and signature

I have read and agree to abide by the entry conditions for visitors. (please tick to confirm)

Name:

Signature:

Date:

Appendix 6 Farm entry conditions for visitors template

Farm entry conditions for visitors

Entry to this farm is subject to the following conditions:

-  Entering visitors **MUST NOT** have been in contact with any other aquaculture, seafood processors, ornamental fish or the aquatic environment on the same day of entry, or within the previous 24 hours.

-  Visitors **MUST** complete a visitor biosecurity declaration.

-  Visitors **MUST** complete the visitor's log.

-  Visitors **MUST** wear farm boots provided.

-  Visitors **MUST** clean and decontaminate hands and boots at wash stations before entering production areas of the farm.

Appendix 8 emergency response plan template

The emergency response plan outlines employee actions and responsibilities if an aquatic emergency disease is suspected on the farm. A farm response plan will provide sufficient detail to guide reasonable control efforts, before the receipt of laboratory results, in the face of a disease outbreak at the specific farm site. This template can be used by farms to draft their own emergency response plan.

Define the trigger points to execute the emergency response plan

Licence conditions commonly define triggers for an emergency response as ‘unusually high, unexplained mortality’. Triggers to execute the emergency response plan need to be defined for the individual farm areas. Triggers may differ between locations or fish size. Triggers can be defined by numerous factors including increased daily mortality rate, abnormal stock behaviour or certain clinical signs such as ‘pop-eye’ (exophthalmos) or reddening at the fin bases and in eyes.

Important contacts

Include contacts appropriate to your farm. Table 11 contains some example contact points.

Table 11 Emergency response plan contact list template and examples

Position	Name	Contact details
National Emergency Animal Disease watch hotline		1800 675 888
Company or general manager		Mobile: Phone: Email:
Farm manager		Mobile: Phone: Email:
Biosecurity manager		Mobile: Phone: Email:
State government aquatic animal health officer		Mobile: Phone: Email:

Position	Name	Contact details
Farm veterinarian		Mobile: Phone: Email:
State government laboratory		Mobile: Phone: Email:
Industry contact		Mobile: Phone: Email:

Notification and responsibilities

Allocate responsibilities to relevant personnel. When the plan is triggered, employees must immediately implement these practices (Table 12). All staff should have capacity to elevate their concerns about a major disease outbreak.

Table 12 Emergency response plan notification and responsibilities template and examples

Action	Responsibility	Signed / dated
1. Contact farm manager.	Name: Position:	_____ _/_/_
2. Contact farm veterinarian.	Name: Position:	_____ _/_/_
3. Contact the relevant authority through the relevant reporting pathway for your state or territory (for example, district veterinary officer, aquatic animal health officer, the emergency animal disease watch hotline).	Name: Position:	_____ _/_/_
4. Document and follow instructions as directed by Government authority.	Name: Position:	_____ _/_/_
5. Collect, package, and immediately submit samples (typically affected sick fish) for pathology.	Name: Position:	_____ _/_/_
6. Contact neighbouring farms, or farms which have received stock from the farm suspected to be affected.	Name: Position:	_____ _/_/_

Action	Responsibility	Signed / dated
7. Halt all movement of live fish from the farm until disease status known and approval granted.	Name: Position:	_____ _/_/___
8. Isolate any suspected disease stock from other stock on farm.	Name: Position:	_____ _/_/___
9. Check for escapees.	Name: Position:	_____ _/_/___
10. Restrict farm access to visitors: <ul style="list-style-type: none"> • Deny access to non-essential visitors • Postpone routine repair/maintenance • Postpone non-essential deliveries, including stock 	Name: Position:	_____ _/_/___
11. Advise farm staff not to move any equipment from the area suspected of disease to other farm areas.	Name: Position:	_____ _/_/___
12. Restrict all non-essential staff movement into the area suspected of disease.	Name: Position:	_____ _/_/___
13. Ensure you make all staff aware of the actions being taken and their individual responsibilities.	Name: Position:	_____ _/_/___
14. Compile a list of all movements of stock, staff, equipment, feed, visitors, and machinery in the previous two weeks.	Name: Position:	_____ _/_/___

Sample collection, packaging, and dispatch

Collect samples as the relevant authority advises. Document which staff members are trained in sample collection and packaging.

Sample collection

The following guidelines must be followed when submitting fresh samples to the laboratory:

1. for advice on sampling priorities contact the state laboratory and speak to a pathologist, or contact your government aquatic animal health officer, or contact the farm veterinarian.
 - a. Information can also be found in the Australian and New Zealand Standard Diagnostic Procedures available on the Department of Agriculture, Water and the Environment's [website](#).

2. collect freshly killed sick (preferably moribund) fish from affected cages.
 - a. place samples into individually labelled plastic bags on ice.
 - b. do not collect and submit dead animals unless specifically requested to do so
3. where requested, collect healthy fish for comparison
 - a. do not mix these 'healthy' fish with affected moribund fish
4. keep samples refrigerated or on ice to prevent decomposition
 - a. do not freeze fresh samples unless specifically requested to do so by the fish pathologist or farm veterinarian (for example, for molecular investigation and toxicological testing).
5. include sufficient ice with the samples during transport to ensure they stay cool all the way to the laboratory.
6. when samples cannot be readily moved to the laboratory some samples should be preserved in 10% neutral buffered formalin.
 - a. do not freeze the formalin-preserved samples.

Sample labelling

The following guidelines must be followed when labelling samples:

- ensure sample labels will remain attached and legible. Labels should include:
 - the farm name and licence number
 - the contact details of the submitter
 - the date of collection
 - an appropriate descriptor (for example, moribund fish from affected cage, cage 1).
- A key list of samples must be included with the samples to identify each sample in the package being sent to the laboratory. On the laboratory submission form, include:
 - site address
 - contact details
 - date of collection
 - history of the event: when, where, which stock were affected, or previous case number (if previous submissions have been sent to the laboratory)
- keep documentation separate from the samples and ice (for example, place paperwork in separate zip-lock bag), as ice and condensation will damage documentation and make ink unreadable.

Packaging samples

The following guidelines must be followed when packaging samples:

- carefully pack samples to avoid breakage, leakage, or contamination
- pack samples in an appropriate container (for example, a disposable polystyrene box or foam cool box) together with sufficient paper or absorbent material to soak up any leakage. Secure the lid with tape and pack into a cardboard box.
- use the [IATA 650 packaging instructions](#).

Sample submission

Samples must be submitted as soon as possible after collection (particularly any fresh material on ice). Decomposed samples are of limited diagnostic value. Notify the laboratory that samples are being sent and provide courier details, if possible, to allow tracking.

Submission details should include:

- the name of government laboratory
- the address that samples are to be submitted to
- the contact number of laboratory liaison person or case manager
- the name and contact number of the courier
 - transport may be arranged directly through the relevant authority or laboratory (ensure these arrangements are clear in this plan).

Stock destruction, disposal, and quarantine protocols

Preventing the spread of disease might require:

- the efficient and humane killing of stock
- the safe transport and disposal of carcasses, animal products, materials, and wastes
- the decontamination of the production environment.

AQUAVETPLAN has several operation manuals which provide guidance on:

- Destruction
- Disposal
- Decontamination

These manuals are available for download on the Department of Agriculture, Water and the Environment's [website](#).

Farms need to consider the following when disposing of their fish, including:

- the volume of stock that needs to be disposed of (based on the farm's size)
- the methods of collection (fish should be collected into a double lined fish bin or equivalent)
- methods to prevent dead stock from entering the environment, including the exclusion of scavenging animals
- methods to prevent possible leakage of dead stock while in transit to the approved burial site.

Include details of your farm's quarantine protocols, including isolation and disinfection protocols, or refer to a site-specific SOP relating to quarantine.

Supporting documents

Generic and specific AQUAVETPLAN Disease Strategy Manuals are the Department of Agriculture, Water and the Environment's [website](#). You can find disease strategy manuals for:

- furunculosis
- infectious salmon anaemia
- piscirickettsiosis
- viral encephalopathy and retinopathy

- viral haemorrhagic septicaemia
- whirling disease

The farm will also need to refer to:

- any state-specific emergency response documents (including their electronic and/or physical location in site)
- any directions from the relevant authority

Insert details of any other response plans or documents for other fish diseases if applicable.

Appendix 9 Internal or external audit checklist template

Internal or external audit checklist

An audit can be an internal-self audit (first party) or an external audit (second or third party). An internal audit is conducted by a person within the company. External audits (second and third-party audits) are conducted by parties outside the company. A second party audit is conducted by someone with an interest in the organisation, such as customers (second party audits), while a third party audit is conducted by an external, independent auditing organisation (for example, governmental agencies or those providing certification or registration). Below is an example guideline for an internal audit.

Date of internal audit		
Date of last internal audit		
Auditor		
Audit objectives		
Audit scope		
Audit start time		
Audit finish time		
This report is a true, fair, and accurate assessment of operations on day of audit	Auditor: Date:	
I acknowledge the findings of this report and non-conformance/s and suggestions raised	Auditee: Date:	
Discussion of findings		
Corrective Actions Request (CAR): Auditor to complete for each CAR		
<i>Audit reference</i>	<i>Non-conformance</i>	<i>Due date</i>
Observations		
<i>Audit reference</i>	<i>Observation and suggestion</i>	

Associated risk	Audit questions	Yes/ No	Audit evidence generated comments (for example, SOP's, farm records, staff interviews or photos)
R1	Does the farm have boundary markers and signage at all four corners of the lease with navigation lighting?		
R2 & R3	Does the farm have clear biosecurity zones and do zone-specific procedures support this (for example, specific disinfection requirements in relation to access, traffic direction, entry and exit procedures, clothing, and equipment)?		
R4 & R22	Are staff able to identify signs of disease and the steps involved in reporting, recording, and investigating disease events?		
R4, R6, R14, R37, R47 & R48	<p>Can you provide evidence to demonstrate that you adhere to applicable legislative and jurisdictional requirements? Including:</p> <ul style="list-style-type: none"> • Reporting significant mortality events or suspected notifiable diseases • Import requirements and obtain translocation permits for all stock and equipment movement • Veterinary medicines used on fish (under guidance of a registered farm veterinarian) • Dispose of waste (for example, uneaten medicated feed, out of date feed, algae, biofouling-net clean waste and marine pest fouling). 		
R5	Are records of investigations of sick or mortality events available?		
R7	Does the farm hold new broodstock, fry and fingerlings in a permanent quarantine system on arrival?		

R8, R13, R14 & R38	Are there records to demonstrate routine health assessment to identify disease, stock observations, feed intake, mortality counts and appropriate procedures for mortality disposal?		
R9	What methods do you use to effectively prevent and control farm access by wildlife, vermin or domestic animals?		
R10	Can you provide records that demonstrate divers inspect and repair nets to prevent fish escape?		
R13, R28 & R30	Have new fingerlings been stocked into a sea-cage that has been cleaned and decontaminated from biosecurity risks, and does not contain other fish?		
R15, R18, R19 & R21	Are staff aware of requirements (for example, workflow, prohibition of visiting other aquaculture sites or seafood processors, or not bringing uncooked seafood products to work) to avoid spreading pathogens?		
R16 & R17	Is there a visitor and contractor log, biosecurity questionnaire and declaration that is completed by all visitors before assessing permission for entry?		
R16	Are visitors accompanied by a staff member at all times?		
R20	Do staff ensure their entry to the production areas does not risk the entry of pathogens (on boots, hands or clothes)?		
R23	Can you provide records that demonstrate that divers disinfect between leases and use sanitised mortality bags?		

R24, R25, R26, R27 & R29	Are dedicated equipment and routine decontamination protocols available for each production biosecurity zone, so disease-transfer risks associated with movement between and within zones are minimised?		
R26, R28 & R30	Can you provide appropriate documents for biosecurity measures used for boats and cages to demonstrate control of disease-transfer risks between leases of differing disease status?		
R31	Does the farm have a laboratory with a compound microscope, dissection equipment, materials for preservation of tissues for histopathology and molecular testing, with guiding SOPs to support diagnostic investigations?		
R32	Are sea-cages epidemiologically separated or are they treated as the same epidemiological unit for the purpose of disease management or emergency response		
R33, R34 & R45	Does the farm have an emergency response plan?		
R33 & R34	Does the farm have equipment and contingency plans to manage high-mortality events, such as large airlifts, and prearranged high-volume disposal sites?		
R35 & R40	Are all feeds sanitised (extruded or irradiated) with records of batch run, date of manufacture and date of feed out recorded? If not, how does the farm manage this?		
R35 & R40	If feeding non-heat extruded manufactured feed (for example, baitfish in tuna ranching or non-heat extruded moist pellets, are they used strictly in accordance with any import requirements and are appropriate import documentation available?		
R36	Has the biosecurity risk of a ballast water been considered and appropriate actions taken to manage any identified risks?		

R39	If water is moved from a low health status sites (for example, cages), to high health sites (for example, hatchery), does the farm have documentation to demonstrate that the water is appropriately decontaminated?		
R41	Can farm records demonstrate how overfeeding is managed?		
R41	Does the farm have records to demonstrate that the farm undertakes appropriate monitoring to ensure the suitable management of the lease benthos?		
R42	Who is the farm biosecurity manager? Do they create, maintain, and review the farm biosecurity plan, associated documents, and activities, including staff training?		
R43	Is the biosecurity plan (including supporting documents) readily available?		
R44	Do staff understand the requirements and SOPs around the farm biosecurity zones after receiving their biosecurity induction?		
R46	Are the only species at the farm the species that are listed on the farm licence?		
R49, R50 & R51	Is the farm biosecurity plan, including supporting documents, regularly reviewed and audited (internal or external)? Can the farm demonstrate document control information and the document revision record?		

Appendix 10 Links to available resources and websites referred to in this guideline

Resource	Hyperlink to website or specific webpage
Animal Health in Australia	https://www.animalhealthaustralia.com.au/
AQUAPLAN 2014-2019	www.agriculture.gov.au/animal/aquatic/aquaplan
Aquatic Animal Diseases Significant to Australia: Identification Field Guide	www.agriculture.gov.au/animal/aquatic/guidelines-and-resources/aquatic_animal_diseases_significant_to_australia_identification_field_guide
AQUAVETPLAN	www.agriculture.gov.au/animal/aquatic/aquavetplan
Australia's National List of Reportable Diseases of Aquatic Animals	https://www.agriculture.gov.au/animal/aquatic/reporting/reportable-diseases
Australian Pesticides and Veterinary Medicines Authority – permits portal	https://portal.apvma.gov.au/permits
Farm biosecurity website	https://www.farmbiosecurity.com.au/
Fisheries Research and Development Corporation	http://www.frdc.com.au/
IATA 650 packaging instructions	https://www.iata.org/whatwedo/cargo/dgr/Documents/packing-instruction-650-DGR56-en.pdf
Marine Pest website	https://www.marinepests.gov.au/commercial/aquaculture
National Aquaculture Farm Biosecurity Plan generic guidelines and template	http://www.agriculture.gov.au/animal/aquatic/guidelines-and-resources
National biosecurity plan guidelines for: <ul style="list-style-type: none"> • the Australian land-based abalone industry • Australian oyster hatcheries • Australian Barramundi farms 	http://www.agriculture.gov.au/animal/aquatic/guidelines-and-resources
OIE Aquatic Code	https://www.oie.int/en/standard-setting/aquatic-code/access-online/
OIE Aquatic Code glossary	https://www.oie.int/index.php?id=171&L=0&htmfile=glossaire.htm

Note: Hyperlinks shown were correct at the time of publication (August 2021). However, hyperlinks may be subject to change. For the most up to date version refer to the national sea-cage guideline available on the Department of Agriculture, Water, and the Environment's website.

Appendix 11 Glossary

Adapted from the glossary of the OIE Aquatic Code (2019). Terms most relevant to these guidelines have been included below. For the full glossary refer to the [OIE's website](#). Additional relevant terms included in this glossary, which are not from the OIE glossary, are marked with an 'a'.

Term	Definition
Aquaculture	means the farming of aquatic animals with some sort of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc.
Aquaculture establishment	means an establishment in which amphibians, fish, molluscs or crustaceans for breeding, stocking or sale are raised or kept.
Aquatic animals	means all viable life stages (including eggs and gametes) of fish, molluscs, crustaceans and amphibians originating from aquaculture establishments or from the wild.
Aquatic Code	means the OIE Aquatic Animal Health Code.
Aquatic Manual	means the OIE Manual of Diagnostic Tests for Aquatic Animals.
Biosecurity	means a set of management and physical measures designed to mitigate the risk of introduction of pathogenic agents into, or spread within, or release from, aquatic animal populations.
Biosecurity plan	means a document that identifies potential pathways for the introduction of pathogenic agents into, or spread within, or release from an aquaculture establishment and describes the measures applied to mitigate the identified risk.
Disease	means clinical or non-clinical infection with one or more pathogenic agents.
Disease transmission ^a	can be horizontal or vertical: <ul style="list-style-type: none">a) horizontal transmission means transmission of an infection from an individual to any other individual in a population but excluding vertical transmission.b) vertical transmission means transmission of an infection from one individual to its offspring.
Disinfectants	means chemical compounds or physical processes capable of destroying pathogenic agents or inhibiting their growth in the course of disinfection.
Disinfection	means the process of cleaning and applying disinfectants to inactivate pathogenic agents on potentially contaminated items.

Term	Definition
Emerging disease	means a disease which has a significant impact on aquatic animal or public health resulting from: <ul style="list-style-type: none"> a) a change of known pathogenic agent or its spread to a new geographic area or species; or b) a newly recognised or suspected pathogenic agent.
Endemic ^a	used in two senses to describe: <ol style="list-style-type: none"> 1. the usual frequency of occurrence of a disease in a population 2. the constant presence of a disease in a population.
Epidemic ^a	means an occurrence of disease in excess of its expected frequency.
Epidemiological unit	means a group of animals that share approximately the same risk of exposure to a pathogenic agent with a defined location. This may be because they share a common aquatic environment (e.g. fish in a pond, caged fish in a lake), or because management practices make it likely that a pathogenic agent in one group of animals would quickly spread to other animals (e.g. all the ponds on a farm, all the ponds in a village system).
Fallowing	means, for disease management purposes, an operation where an aquaculture establishment is emptied of aquatic animals susceptible to a disease of concern or known to be capable of transferring the pathogenic agent, and, where feasible, of the carrying water. For aquatic animals of unknown susceptibility and those agreed not to be capable of acting as vectors of a disease of concern, decisions on fallowing should be based on a risk assessment.
Feed	means any material (single or multiple), whether processed, semi-processed or raw, as well as live organisms, which is intended to be fed directly to aquatic animals.
Feed ingredient	means a component, part or constituent of any combination or mixture making up a feed, including feed additives, whether or not it has a nutritional value in the animal's diet. Ingredients may be of terrestrial or aquatic, plant or animal origin and may be organic or inorganic substances.
Hazard	means a biological, chemical or physical agent in, or a condition of, an aquatic animal or aquatic animal product with the potential to cause an adverse effect on aquatic animal health or public health.
Infection	means the presence of a multiplying or otherwise developing or latent pathogenic agent in a host. This term is understood to include infestation where the pathogenic agent is a parasite in or on a host.
Monitoring ^a	means the routine collection of information on disease, productivity and other characteristics possibly related to them in a population.

Term	Definition
Morbidity ^a	the amount of disease in a population.
Moribund ^a	means a diseased animal on the verge of death, in a state of dying.
Mortality ^a	a measure of the number of deaths in a population.
Outbreak	means an occurrence of one or more cases in an epidemiological unit.
Pathogenic agent	means an organism that causes or contributes to the development of a disease.
Pathological material	means samples obtained from live or dead aquatic animals, containing, or suspected of containing pathogenic agents, to be sent to a laboratory.
Prevalence	means the total number of infected aquatic animals expressed as a percentage of the total number of aquatic animals in a given aquatic animal population at one specific time.
Quarantine	means maintaining a group of aquatic animals in isolation with no direct or indirect contact with other aquatic animals, in order to undergo observation for a specified length of time and, if appropriate, testing and treatment, including proper treatment of the effluent waters.
Risk	means the likelihood of the occurrence and the likely magnitude of the biological and economic consequences of an adverse event or effect to animal or human health.
Risk analysis	means the process composed of hazard identification, risk assessment, risk management and risk communication.
Risk assessment	means the scientific evaluation of the likelihood and the biological and economic consequences of entry, establishment and spread of a hazard.
Risk communication	is the interactive exchange of information and opinions throughout the risk analysis process concerning risk, risk-related factors and risk perceptions among risk assessors, risk managers, risk communicators, the general public and other interested parties.
Risk management	means the process of identifying, selecting and implementing measures that can be applied to reduce the level of risk.
Surveillance	means a systematic series of investigations of a given population of aquatic animals to detect the occurrence of disease for control purposes, and which may involve testing samples of a population.

Term	Definition
Susceptible species	means species of aquatic animals that have been demonstrated as susceptible to infection with a specific pathogenic agent, in accordance with Chapter 1.5 of the Aquatic Code.
Unit	means individually identifiable elements. This is a generic concept used to describe, for example, the members of a population, or the elements selected when sampling. In these contexts, examples of units include individual animals, ponds, nets, cages, farms, villages, districts, etc.
Vector	means any living organism that transports a pathogenic agent to a susceptible aquatic animal or its food or immediate surroundings. The pathogenic agent may or may not pass through a development cycle within the vector.
Vehicle	means any method of transport by land, air, or water.
Veterinarian	means a person with appropriate education, registered or licensed by the relevant veterinary statutory body of a country to practise veterinary medicine/science in that country.

Note: Definitions marked with an **a** are adapted from Thrusfield, M.V., 2005, Veterinary Epidemiology (3rd Edition), Blackwell Publishing.

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