

Management and Environmental Monitoring Plan

Barramundi Lease - Buccaneer Archipelago





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Department of Primary Industries and Regional Development

AQUACULTURE MANAGEMENT AND ENVIRONMENTAL MONITORING PLAN (MEMP) Last Updated: February 2025



AQUACULTURE MANAGEMENT AND ENVIRONMENTAL MONITORING PLAN (MEMP)

Tassal Operations Pty Ltd.

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Acronyms

BCH	Benthic Communities and Habitats
Chl-a	Chlorophyll-a
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DIN	Dissolved inorganic nitrogen
DO	Dissolved oxygen
DoF	Department of Fisheries
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EIA	Environmental Impact Assessment
EMP	Environmental Monitoring and Management Plan
EPA	Environmental Protection Authority
EQC	Environmental Quality Criteria
EQG	Environmental Quality Guidelines
EQMF	Environmental Quality Management Framework
EQO	Environmental Quality Objective
EQS	Environmental Quality Standards
EV	Environmental Values
HEPA	High Ecological Protection Area
KADZ	Kimberley Aquaculture Development Zone
LEP	Levels of Ecological Protection
MPA	Marine Produce Australia
MEMP	Management and Environmental Monitoring Plan
MEPA	Moderate Ecological Protection Area
MEQ	Marine Environmental Quality
NH ₄	Ammonia
PBC	Prescribed Body Corporate
ТР	Total phosphorous
TOC	Total organic carbon
VSS	Volatile suspended solids



WET	Whole effluent toxicity
ZoHI	Zone of High Impact
Zol	Zone of Influence
ZoMI	Zone of Moderate Influence



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1 INTRODUCTION

1.1 Background

Marine Produce Australia ("MPA") has operated in the Kimberley Aquaculture Development Zone (KADZ) in Cone Bay, Western Australia, since 2004 (Licence No. 1465). Because of the anticipated demand for premium barramundi in both the state and national markets, MPA proposed to expand from its Cone Bay operations beyond the boundary of the KADZ (the Proposal / the Ocean Barramundi Project) to 13 sites spread across the Buccaneer Archipelago. To support this expansion, MPA referred the Proposal under Section 38 of the *Environmental Protection Act 1986* (EP Act) and the *Environment Protection and Biodiversity Act 1999* (EPBC Act). Under the EP Act, MPA had to demonstrate that the Proposal met the EPA's key environmental factors and objectives. The referral was submitted under the EP Act on the 4/05/2022. The EPA published its assessment decision, which was to assess based on referral information with additional information requested under Section 40(2)(a) of the EP Act, on the 13/06/2022.

On 31/07/2023, Tassal Operations Pty Ltd ACN 106 324 127 ("TOPL") [a wholly owned subsidiary of Tassal Group (hereinafter referred to as "Tassal")] acquired MPA Fish Farms Pty Ltd and MPA Marketing Pty Ltd and is now the sole operator of the current lease in the KADZ and the proponent for the Ocean Barramundi Project.

Tassal has amended the Proposal to expand from its Cone Bay operations in the KADZ to a reduced number of sites than originally proposed (now 7), maintaining the intent to improve production volumes and meeting anticipated market demand (Figure 2.1). The expansion plan shifts operations to deeper, protected, offshore waters where current speeds are lower than in Cone Bay and operating conditions are improved. Tassal plans to produce up to 17,500 tonnes of barramundi per annum across the 7 new sites, under a single aquaculture lease, with a maximum of ~4,500 tonnes per individual site before harvesting. Tassal furthermore plans to cease using the current Cone Bay lease once enough of the proposed sites are operational.

1.2 Purpose

Unless exempt under S.92A(4), the provisions of S.92A of the Western Australian (WA) *Fish Resources Management Act 1994* (FRMA) require all applications for an aquaculture licence to be accompanied by a Management and Environmental Monitoring Plan (MEMP). In addition, any proposal which has been referred to the Western Australian Environmental Protection Authority (EPA) will likely require an Environmental Monitoring and Management Plan (EMMP) to detail monitoring requirements associated with the Proposal once it is commissioned.

This Category 30(c) MEMP, is submitted as part of an application by Tassal (the proponent), to establish a commercial aquaculture venture with 7 ocean-based sea-pen sites in the Buccaneer Archipelago under a single non-contiguous aquaculture lease. The purpose of this MEMP is to provide details of proposed aquaculture activities, identify the potential stressors and cause-effect pathways and outline the strategies to avoid and/or manage the potential adverse environmental effects (if any) of farming operations. As the Proposal will be assessed and managed jointly by the EPA under the EP Act as well as DPIRD, all environmental monitoring requirements are captured within the EMMP managed under the EPA. As such, this MEMP refers all environmental monitoring directly to the EMMP, rather than repeating said information within this plan. This is done in accordance with the FRMA and DPIRD's *Aquaculture Management and Environmental Monitoring Plan (MEMP) Guidance Statement* (August 2013).



The Proponent's overarching objective of the Proposal is to provide high-quality barramundi to both the domestic and international market, while maintaining the ecological integrity of the receiving marine environment.



2 OVERVIEW

2.1.1 Species and quantity of fish

Barramundi (*Lates calcifer*) are the sole species to be grown under this Proposal. Barramundi have been grown by MPA at the current Cone Bay site since 2004; and are a key finfish aquaculture species in Australia with total production second only to Atlantic salmon (*Salmo salar*). Barramundi is also a keenly sought after target for recreational fishers across the north of Australia.

Barramundi live in both freshwater and saltwater and grow up to 200 cm in length and 60 kgs. They are distributed throughout coastal areas from the Persian Gulf to China and southern Japan, south to Papua New Guinea and northern Australia. With a significant tolerance for a wide range of environmental conditions as well as a broad diet they make an ideal species for aquaculture production.

Tassal plan to stock each site with a maximum standing biomass of 4,500 tonnes.

2.1.2 Location

The proposed sea-pen operations are spread throughout the Buccaneer Archipelago (Figure 2.1) in 7 separate proposed sites.

Management and Environmental Monitoring Plan





Figure 2.1 Proposed development envelope/footprint of the 7 sites

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2.1.3 Farming methods and aquaculture gear

Sea-pen Infrastructure

Tassal will deploy large sea-pens developed for use in extreme weather conditions and remote locations. These pens and their associated anchorage/mooring systems have been specifically designed for use in high energy exposed sites, which frequently receive storm swells and gale force winds. The use of similar, albeit smaller, pens in Cone Bay indicates that they are sufficiently capable of tolerating cyclone force winds and the high current speeds induced by the extreme tidal exchanges in the Kimberley region.

Design features of the proposed sea-pens include:

- Either
 - A double net system that contains fish stock within the inner net (Figure 2.2; F) and an outer anti-predator net (Figure 1.2; G) that protects stock from marine predators like sharks and crocodiles.
 - Two kinds of inner net would be used, one for fingerlings and one for the grow out of adult barramundi. All net types are made from either monofilament or polyline high density polyethylene (HDPE).
 - The inner net for the fingerlings has a minimum breaking strain of 260 kg on the knot (the breaking strain is greater on the mesh then directly on the knot), the inner net for grow out has a breaking strain of 260 kg, and the outer predator net a breaking strain of 600 kg. The nets will be sufficient to prevent damage from predators known to be present in the area (e.g. crocodiles, tawny nurse sharks)
 - The mesh sizes for each net type also vary. The mesh 'gap' (i.e. size of the gap in the netting as measured on the 'bar' of the netting i.e. sides of a single mesh square) for the grow-out range from 10-35 mm and for the predator outer net it ranges from 80-150 mm.
 - The break between the inner and outer predator netting has also increased significantly between operations at Cone Bay and the operations planned for the expansion
 - OR
 - A single net system with a minimum breaking strain of 600 kg, which is still a considerable increase in net strength in comparison to the current net system. The advantage of a single net system is reduced infrastructure in the water as well as better current flow through the sea-pens, which will assist in maintaining concentrations of dissolved oxygen within the sea-pens and subsequently maintaining fish health and reducing overall environmental impacts
- Surface netting with support poles which prevent access to fish stock or feed within the pens from seabirds (Figure 2.2; B).
- Covered walkway with handrails and staff access/egress points to allow staff to access the pens safely without coming into contact with predators (Figure 2.2; A).

These pen specifications are detailed in a Fish Containment Plan (Tassal 2024).

The pens to be used by Tassal will range in size from 80 to 120 m circumference, with net depths ranging between 5 to 25 m for the nets. The extra depth and circumference of the pens allows for increased dissolved oxygen concentrations within the pen. The larger nets also lessen total farm



infrastructure by reducing the required number of pens and moorings. Low-profile anchors will be used to anchor sea-pens / barges in soft sediments meaning no drilling or pile driving is required.



Source: Cheng et al. (2021)

Figure 2.2 Indicative sea-pen configuration and anchoring

Sea-pen operations

Centralised barge system/operational vessels

Each site will be controlled from a centralised barge containing a feed system, accommodation (3-4 staff on site at any given time), ablution facilities and mortality storage for any dead stock. These barges will be approximately 30-50 m long, with power for operations provided via a generator installed on the vessel. The barge may also have capacity to run on battery power as required to keep feed refrigerated, and provide lighting and power for accommodation and facility usage by staff when the generator is not running. Staff will be present on site 24 hours a day 365 days a year while stock are in the sea-pens.

Lighting required on site will be minimal, with navigational lighting (flashing LEDs) on moorings in accordance with Australian Maritime Safety Authority regulations. All operations are primarily conducted during daylight hours reducing the need for significant operational lighting at night.

Sullage will be stored in tanks pumped out for disposal when the vessel is in port following Department of Transport (DOT) sullage disposal regulations (DOT Sewage Strategy). No sullage will enter the marine environment. Other wastes will include empty feed bags, staff domestic waste and old ropes and net mesh. All non-perishable garbage will be packed into empty one tonne bulk bags and brought back to Derby for disposal. Perishable garbage will be stored in sealed containers and disposed in Derby. The operation will generate a small quantity of used oil from engine servicing at each site, which will be securely stored and returned to Derby for disposal.

Fish mortalities will be removed from the pens frequently; where practicable this will be daily, but due to weather, operational constraints or in cooler water temperatures and low mortality removal periods may be extended but with the intent to empty all pens at least twice weekly subject to operational requirements. A number of alternative mortality programs have been explored and may be implemented. The first of these involves the mincing and storage of mortalities in secure containers as silage. The silage units use formic acid to stabilise fish waste and are commercially available. Fish



silage equipment is commonly used on fish farms worldwide. The silage will be removed from the site when required and transported to Derby for further processing as by-product or disposal (following Shire of Derby/West Kimberley waste disposal regulations). Another alternative is the drying of mortalities at high temperatures, which may allow the mortalities to be used in several industries including biogas fuels or as feed ingredients (insect larvae, crocodiles, pets etc). In the event of a mass mortality, all stock would be transferred to Derby and disposed of in a licenced facility with the permission of the appropriate authorities (i.e. Shire of Derby/West Kimberley, DWER, DPIRD). If the primary licenced facility cannot take the waste, a secondary licenced facility will be used. Unlicensed facilities for waste disposal will not be used at any point.

Feed will be distributed into the sea-pens daily using an automatic feeding system from the centralised barge. The feed system works by delivering feed to the surface of the sea-pens 4-6 pens at a time, Hand-feeding and feed-boats may be used at times, though this is not the primary feeding method. A database which is updated daily and verified regularly tracks the total biomass, growth and feed being inputted into each respective pen. In this database, Tassal can track the respective food conversion ratios, which helps indicate the health of the fish as well as the efficiency at which the site is operating. The automated feed system also helps Tassal target optimal feeding times, which generally occur when dissolved oxygen concentrations are high. Dissolved oxygen concentrations are monitored constantly within the pens for this reason. Feeding at optimal times reduces the overall amount of feed which goes to waste, reducing the potential for nutrient enrichment due to the breakdown of feed in the marine environment.

In addition to the barges, a working vessel will be used to transfer staff, feed, equipment, and other materials to the sites. Each working vessel may supply multiple sites, meaning there will be two working vessels in total across the 7 sites once the phased construction is complete.

Harvesting will also occur directly from each barge. Once the stock has reached the optimal size (~4 kgs) all stock will be harvested from the site. Stock will then be transferred to the Derby shore base for transport to market.

Vessel movements

The central barges will remain on site at each site during culture operations. The operational vessels may service multiple sites, and as such will move between them periodically depending on operational requirements (e.g. transport of feed, harvested stock, fingerlings for grow-out).

Predator control

The sea-pen infrastructure proposed prevents access to the sea-pens from any predator, including sharks, crocodiles or seabirds. The breaking strain of the netting (minimum outer net breaking strain of 600 kg) is such that it will prevent any tearing by marine predators known to be present in the region.

Feed

Feed for the barramundi will likely be sourced from Skretting's production (or other suitable commercial supplier), as is currently the case for Tassal's Cone Bay operations. The feed will be shipped in bulk bags to each of the respective sites. The bulk of feed will be stored on site in the centralised barge system. The specific feed type is a combination of agricultural crops, wild fish meal, by-products from farmed animals and farmed fish as well as vitamins and minerals added to the feed. The feed type currently used by Tassal is best suited to the environmental conditions present in the Kimberley (e.g. water temperature), though Tassal will continue exploring the use of new feeds as they become available if they are proven to be more sustainable and allow for more efficient growth rates or positive environmental outcomes.

Production model



Tassal aims to implement a continuous production model under this Proposal, operating across multiple sites (once multiple sites are operational). This approach will operate in a manner such that total standing biomass at any site does not exceed 4,500 tonnes. The cycle would operate as follows:

- 1. A site is stocked with barramundi fingerlings (~110g)
- 2. Biomass within the site increases as the barramundi grow to harvestable size. Cycle takes approximately 18-24 months for the barramundi to grow to harvestable size at ~4kg
- 3. Harvesting commences once barramundi within the site have reached harvestable size.
- 4. Once an individual site has had all stocked barramundi harvested, it will be fallowed for a minimum of one month prior to restocking.

Following best-practice procedures, Tassal are not intending to stock all sites together with high biomasses at the same time. Rather, the stocking of sites will be such that those on the same point of the production cycle are in a different area altogether (i.e. following a paired site approach). This reduces the overall nutrient loading on the environment at a particular location at any point in time as a result of finfish faeces and uneaten feed.

Anti-fouling

Anti-fouling will be used only where necessary to reducing foul load on the netting of the pens. Regular cleaning of the netting will reduce the need for anti-foul usage as much as possible. Only non-copper based anti-fouling will be used to ensure no toxicants leach into the marine environment from the anti-foul.

Broodstock

Fingerlings will be grown out to a size of approximately ~110g at the nursery at the Broome Tropical Aquaculture Park (BTAP) site. The monitoring associated with this facility is currently included within a separate MEMP.



3 ENVIRONMENTAL MANAGEMENT AND MONITORING

See the EMMP (BMT 2024b) for all environmental management and monitoring requirements of this Proposal as managed under the EP Act by the EPA.



4 IMPACT ON AQUATIC SPECIES AND OTHER AQUATIC FAUNA

See the EMMP (BMT 2024b) for all environmental management and monitoring requirements of this Proposal as managed under the EP Act by the EPA.



5 BIOSECURITY

Biosecurity monitoring has been aligned to meet the National Biosecurity Plan Guidelines for Australian Barramundi Farms (Landos et al. 2019) where applicable.

5.1 General facility information

5.1.1 Layout of the facility

The sea-pen facilities will consist of the following key components:

- Each site will be controlled from a centralised barge system containing a feed system, accommodation (3-4 staff on site at any given time), ablution facilities as well as mortality ensilage for any dead stock
- Sea-pens
- Operational vessels (1 vessel per 4-5 sites)
- Floats/lighting indicating the exclusion zone around the sea-pens

As the sea-pens are at sea, no visitors will be allowed to the facility, with Tassal staff the only personnel to have access.

5.2 Administrative biosecurity procedures

5.2.1 Translocation and quarantine

Translocation approval for the proponents planned operations has already been granted. The requirement to translocate fish both interstate and intrastate is expected to be in accordance with existing business operations, following the DPIRD translocation policy and the points below, which will be applied when fingerlings are received at Tassal's nursery:

- Review of the DPIRD translocation policy
- Contact DPIRD
- Ensure relevant employees are suitably trained in quarantined stock handling and decontamination
 procedures
- Seek relevant certification. This will include translocation approval from DPIRD including health screening of stock approved by the DPIRD Diagnostics and Laboratory Service as required for stock movements from nursery systems to sea-pens.
- Wait for receipt of the batch number
- Maintain all relevant documents with the batch number

Quarantine of all live fish not previously certified for transit will be undertaken as follows:

• Isolation for a minimum of 14 days with daily observations



- Prophylactic treatment with a combination of freshwater bathing and parasitic worm treatment using Standard Operating Procedures (SOP) kept on site
- Maintenance of suitable record of origin (capture or purchase, hatch date, tag number and location)
- Fish will then be moved to the relevant holding systems.

5.2.2 Record keeping

It is the policy of Tassal that all licence and/or exemptions are kept on site and with stock during transport. The following records will be taken during operations (Table 5.1)

Table 5.1	Records	kept for	onaoina	stock	management
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Record	Purpose	Details
Captive stock	Captures individual stock histories in the context of their species, number and origin	Source Source date Capture/ hatch date/ hatch location Number Tag numbers (if applicable) Sexes (if applicable) Identification markings Comments
Propagated stock	Captures individual stock histories in the context of their species, number and origin	Source Batch number Frag / asexual reproduction date Parent / lineage Sexual reproduction date Number Tag number (if applicable) Sexes (if applicable) Identification markings Comments
Water quality	Capture water quality records for each system, including time series with daily and monthly increments	Date Tank / source Temperature (time series). pH (time series) Nutrients (time series) DO / Salinity (time series) Alkalinity (time series)
Daily system sheets (all species, all systems)	Designed to capture all environmental, feeding, water quality and all activity on each system They are also used as a management tool to ensure that	Date Tank / Source Water quality (as above) Quantity and type of food. Maintenance activities



Record	Purpose	Details
	work process and procedure is followed consistently, and to facilitate disease management and appropriate maintenance of mortality records Also used to disseminate work instructions	Mortalities, changes in behaviour, signs of disease and other observations Actions taken Actions pending Prophylactics / medications administered Manager notified (yes/no)

5.2.3 Aquaculture gear and vehicles (equipment)

The following decontamination procedures will be followed to manage aquaculture gear and vehicles used at the sites.

- Divers to undertake basic contamination measures between newly stocked cages and other farm populations, including disinfection of wetsuits, gloves and dead stock-collection bags. The deck of the vessel should be decontaminated when moving between sea-pens
- Where there is spatial separation of areas of grow-out (e.g. separate sites), equipment should be decontaminated between sites
- Movements such as pen tows, work-boat movements from areas of known disease status, or other aquaculture finfish enterprises, to areas of disease-free status should be avoided. If boats or new cages must be moved, then a thorough disinfection protocol should be put in place, including slipping the boat, removal of all ropes and replacement with new ropes, and disinfection of the vessel.
- Equipment which has been in contact with fish or culture water external to the farm (including contractor equipment or plant), should not be brought into the farm. If no alternative exists, then a thorough cleaning and disinfection protocol must be followed before entry.

5.2.4 Staff, contractors and visitors

The following guidelines will be applied to staff and visitor entry:

- No visitors will be allowed to the sea-pen operations unescorted by Tassal staff.
- All untrained personnel must be escorted through the facility and supervised by trained staff, following suitable inductions covering site amenity, biosecurity and safety.
- In the event of disease, site access shall be restricted until the incident is resolved .
- All visitors, contractors and researchers must complete the visitor log and biosecurity questionnaire and sign a biosecurity declaration before being considered for access. Visitors who are assessed as high risk will not be allowed entry
- Visitors/contractors are to follow routine disinfection entry protocol, including changing into farm-supplied boots and using the footbath and hand-sanitising equipment



5.2.5 Access to and movement in the facility

Access to the facility is only via vessel. Under the Marine Navigations Act, recreational vessels are allowed within the proposed sites, however only Tassal vessels will be allowed to access the sea-pens. The following will apply for movements around the sea-pens:

- Staff must come direct to the sea-pens. They must never come via other farms, seafood processors, or recreational, commercial fishing and diving activities. All staff are required to wear freshly laundered clothes daily and change into work footwear before entry to farm vessels
- Live holds/wells and/or equipment which has direct contact with farmed fish must be disinfected between sites and the nursery
- Only designated and authorised staff may enter quarantine areas

5.3 Operational biosecurity procedure

Tassal will monitor several parameters as part of their general operations at the sea-pens (Table 5.2). Additional biosecurity procedures are described below.

As Tassal (as MPA) have been operating in Cone Bay since 2004, they have had the opportunity to make several changes to their operations which have reduced their environmental footprint. Examples of these improvements include:

- Testing of alternative feed types (i.e. floating/sinking) which has reduced feed wastage
- Introduction of an underwater camera surveillance system to manage feed efficiency
- Introduction of a vaccination program to help reduce the risk of the spread of disease on site at the sea-pens and the requirement for anti-biotic usage

Through its ongoing monitoring program, Tassal will continue to make changes to further improve the sustainability of their overall operations.

Table 5.2 Operational Monitoring conducted by Tassal at each site

Parameter	Reason for monitoring	Frequency	Location	Reporting
Dissolved oxygen	Important for health of fish stock as well as feeding at optimal times when DO is high	Constantly	Within each sea- pen	Information is fed into Tassal's database, which is reviewed and re-calibrated every 60 days
Fish stock weight	Important to understand the growth rates of the stock within each sea-pen	Weekly	Within each sea- pen	Information is fed into Tassal's database, which is reviewed and re-calibrated every 60 days
Feed input	Important to understand the level of feed input to the cages and the respective growth of the fish stock to ascertain food conversion ratios, while also indicating fish health due to consumption of feed.	Constantly	Within each sea- pen	Information is fed into Tassal's database, which is reviewed and re-calibrated every 60 days



Parameter	Reason for monitoring	Frequency	Location	Reporting
Sea-pen condition	Important to ensure bio-fouling is removed, there are no holes in the mesh etc	Twice weekly	Netting of each sea- pen	Any damage to the netting is reported internally
Mortalities	Important to understand if mortalities are natural or the result of an environmental pressure (water quality, disease)	Daily	Within each sea- pen	Information is fed into Tassal's database, which is reviewed and re-calibrated every 60 days. Mass mortalities are reported to the respective authorities as required under State and Federal legislation.

5.3.2 Broodstock

Fingerlings (~15 g size) for grow-out in Tassal's nursery site and eventual transfer to the sites once they reach ~110g will be supplied by hatchery facilities located and licenced in Australia, as currently required for the Cone Bay operations managed under Licence No. 1465, the *Fisheries Resources Management Regulations 1995* and DPIRD's translocation policy (DoF 2012). Fingerlings are grown out from larvae at hatchery facilities, which are themselves sourced from eggs laid by adult barramundi within the facility. This represents a fully enclosed system for the fingerlings, removing any pressure on sourcing eggs from wild populations and reducing the risk of introduction of pathogens or other diseases into the hatcheries operations. The stock supplied by the hatcheries are managed such that they are pathogen free and pose minimal risk of transfer of diseases or parasites to wild stock if the barramundi escape from sea-pens. Genetically, the stock are a domesticated strain from Queensland which, although distinct, is genetically similar to that of the wild barramundi present in the Kimberley.

Currently Licence No. 1465 details the risks of the importation of the fingerlings and the management processes required to mitigate these risks. These management processes include but are not limited to

- A limit on where barramundi can be sourced from, such that they can only be provided by hatchery facilities located and licenced within Australia
- Testing of fish for diseases during transport to or from sites
- Provision of a fish health certificate from a DPIRD Fish Health Pathologist as required before stock can be moved on site

The management processes detailed in Licence No. 1465 and the associated Environmental Monitoring Management Plan (EMMP; DoF 2014) have previously been deemed sufficient to manage the risk of disease introduction and genetic drift in relation to the wild population of barramundi present in the region (MS 996). Tassal will continue to manage the introduction of fingerlings to the nursery site and sites in accordance with the requirements noted under Licence No. 1465 (noting that a new licence with potentially different conditions may be implemented).

5.3.3 Disease risk

Staff will monitor daily for signs of diseases, focussing on particular criteria (Table 5.3).



Table	5.3	Disease	monitorina	criteria
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Record	Purpose
Finfish	Lack of appetite
	Poor skin colour/changes in colouration
	Missing or raised scales or buds
	Cloudy eyes
	Tattered fins
	Irregular or elevated operculum rate
	Flared operculum
	Irregular swimming behaviour
	Buoyancy problems
	Floating or long training faecal strands
	Loss of body mass
	Bloating
	Presence of ectoparasites (via microscopic analysis)

Therapeutants (e.g. anti-biotics and anti-parasitics) may be used to manage clinically significant diseases and ensure fish welfare. However, the use of therapeutants will be limited to the approval via an accredited veterinarian, who prescribes the specific dosage and usage of the therapeutant in the event of their usage. Only approved therapeutants which have been thoroughly tested for potential impacts to human health / environmental damage will be used. Furthermore, a vaccination program will be put in place which reduces the necessity of therapeutant usage. Finally, to limit risk of disease transfer, Tassal are required to follow DPIRD's regulations for translocation of barramundi, which includes the following:

- The numbers of fish stocked into each pen
- The movements of fish from one pen to another
- The numbers of fish culled and removed from the pens
- The numbers of fish removed from the pens at the time of harvesting
- Barramundi sourced from interstate must be sourced from licensed hatcheries only and be health tested to the satisfaction of the Senior Fish Pathologist at DPIRD
- Testing standards shall meet with a 95% degree of confidence that the imported population is free of 'nominated' diseases¹ ('nominated' refers to those relevant 'notifiable' diseases as listed under the *Enzootic Disease Regulations 1970*, and any other diseases nominated by the Senior Fish Pathologist at DPIRD for the particular populations to be imported)

5.3.4 Feeds

All feeds will be sourced form reputable suppliers produced and packaged under ISO standards, with ISO information available from the feed supplier. Each relevant supplier and feed item is to be registered as part of the monthly accounts process. Dry and frozen feeds will be maintained in

¹ Freedom from Disease is internationally accepted as meaning a prevalence of detectable pathogen found in less than 2% of the population of animals.



refrigerated and freezer storage. All goods are labelled on arrival with the date and then again when opened.

5.3.5 Waste management

Mortalities collected as part of routine activities will be first inspected for signs of disease and then disposed via the proposed mortality storage system. Mortalities resulting from cannibalism, handling damage or as a result of poor water quality are not considered a risk to biosecurity. Several alternative mortality programs have been explored and may be used. The first of these involves the mincing and storage of mortalities in sealed drums as silage. The silage units use formic acid to stabilise fish waste and are commercially available. Fish silage equipment is commonly used on fish farms worldwide. The silage will be removed from the site when required and transported to Derby for further processing as by-product, or disposal if no use can be found. Another alternative which has shown promise is the drying of mortalities at high temperatures, which may allow the mortalities to be used in industries including as biogas fuels or as feed ingredients for certain animals (insect larvae, crocodiles, pets etc). In the event of a mass mortality, all stock would be transferred to Derby and disposed of in a licenced facility with the permission of the appropriate authorities (i.e. Shire of Derby/West Kimberley, DWER, DPIRD). If the primary licenced facility cannot take the waste, a secondary licenced facility will be used. Unlicensed facilities for waste disposal will not be used at any point.

5.3.6 Unidentified, non-scheduled and exotic species

Any unapproved aquatic organisms found on site will be euthanized, labelled and preserved according to standard procedures, before notifying DPIRD at the following email (aquaticbiosecurity@dpird.wa.gov.au). Unidentified and exotic species (those listed in Schedule 5, noxious fish; FRMR, 1995) will also be euthanized, labelled and preserved before being sent to DPIRD for identification.

5.3.7 Disposal of water

Harvest boats and well boats will not spill blood-water or holding waster as they move past sites.

5.3.8 Disposal of waste

Sewage from the centralised barge systems may be treated via onboard incinerator toilets. Alternatively, it may be stored in tanks pumped out for disposal when the vessel is in port. Other wastes such as garbage generated on the site will include empty feed bags, staff domestic waste and old ropes and net mesh. All non-perishable garbage will be packed into empty 1 tonne bulk bags and brought back to Derby for disposal. Perishable garbage will be stored in sealed containers and stored for disposal in Derby. The operation will generate a small quantity of used oil from engine servicing at each site, which will be stored in a 44-gallon drum and returned to Derby for disposal.

5.3.9 Quarantine and testing areas

When translocating stock, new fingerlings must be put into separate sea-pens from those that already contain stock to prevent disease transmission. Testing will be conducted at the nursery prior to fingerlings being translocated, as detailed in the MEMP for the BTAP nursery site (Tassal 2024).

5.3.10 Prevention of escapes

Operational monitoring will be conducted by Tassal at all sites, including measures to help prevent stock escapes (Table 5.2). Specifically, the condition of the sea-pens will be monitored twice weekly as a minimum. Any damage to the sea-pens will be reported immediately and nets repaired as soon as practicable to ensure any escapees are minimised.



5.4 Incident and emergency procedures

5.4.1 In the event of disease outbreak and/or mass mortality event

High biosecurity risk mortalities include fish demonstrating lesions, sores, spots, abnormalities in morphology, scale loss, abnormal swimming behaviour prior to death, gill lamella fusion, liver and/or kidney discoloration and excess mucous secretion. In the event of a disease outbreak or mortality event leading to the mortality of >20% of the stock, the carcasses shall be collected and DPIRD notified at the earliest possible time. Any rates of unexplained mortality or signs of disease in any taken specimens will be reported to the DPIRD Diagnostic and Laboratory Services on 1300 278 292 within 24 hours as per FRMR r69, and emailed to <u>aquaticbiosecurity@dpird.wa.gov.au</u> and CC'ed to <u>aquaculture@dpird.wa.gov.au</u>.

Precautions to prevent the spread of disease are as follows:

- In the event of a disease, the affected cage will be isolated to prevent the spread of pathogen and/or infection.
- Infected stock will be treated using standard treatments, or according to DPRD advice.
- Stock are to be taken off feed until disease outbreak is brought under control.
- Any equipment used in the affected area will be disinfected.
- Personnel access to the affected area will be limited to essential staff.

No other stock shall be moved from the site until clearance is given by DPIRD.



6 AUDITING

6.1 Internal Auditing Process

Internal auditing procedures will be undertaken against the administrative and operational biosecurity procedures and commitments outlined in Section 4 and other record keeping commitments outlined in Section 3.



7 ADAPTIVE MANAGEMENT AND REVIEW OF THE MEMP

7.1 MEMP implementation

The proponent will submit an Annual Compliance Report summarising the results of the monitoring to DPIRD annually. A separate compliance report which includes the results of the environmental monitoring, as required by the EPA, can be jointly submitted to DPIRD, along with a compliance report which outlines the results of the biosecurity monitoring.

Annual Compliance Reports should include as a minimum:

- An executive summary summarising the results of the program
- A methods statement
- A description of the results of the program, including the appropriate use of Tables and Figures to summarise the outcomes of:
 - Water and sediment monitoring and analyses
 - Benthic video surveys and analyses
 - Farm operational data, including any correlations with environmental data
 - Campaign monitoring, if undertaken during the reporting period
 - Any additional analyses i.e. multivariate or control charting analyses
 - Appropriate appendices, providing farm operational data and results of any reviews / risks assessments

7.2 Program evolution

This Plan is an interim plan designed to monitor the effects of aquaculture in the first 5 years of operation. The Plan will be reviewed and revised at the end of the 5-year period by Tassal and DPIRD, which is the relevant Decision Making Authority in this case. The intent of the review is to ensure the program is appropriately scaled to the level of risk, which may increase with increasing production.



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