



Sector-based aquaculture strategy

Subtidal mussels



Government
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Department of Primary
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Sector-based aquaculture strategy: Subtidal mussels

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Glossary

The below definitions apply unless the contrary has been specified.

<i>Word or term</i>	<i>Meaning</i>
Adverse interaction	An interaction between farming structures or other aquaculture equipment with a large marine vertebrate (marine mammal) or a seabird in a manner which results in the animal becoming entangled or otherwise confined.
Authorised person	The holder of a corresponding licence or a person acting on the authority of that person.
Aquaculture	Farming of aquatic organisms for the purposes of trade or business or research but does not include an activity declared by regulation not to be aquaculture.
Aquaculture equipment	A farming structure; or equipment used to anchor or indicate the presence of farming structures; or a barge used to feed aquatic organisms; or equipment used to mark-off or indicate the boundaries of a licence area; or other equipment used for the purposes of aquaculture.
Aquaculture waste	Waste generated in the course of carrying on aquaculture but does not include waste created by living aquatic organisms.
Aquaculture zone	An area of State waters identified in an aquaculture policy, within which aquaculture or specified classes of aquaculture is permitted.
Aquatic organism	An aquatic organism of any species and includes the reproductive products and body parts of an aquatic organism.
Backbone	A length of rope, strung horizontally along the water surface between two anchor points with large floats, used for suspending dropper culture units.
Biofouling	Accumulation of aquatic organisms (micro-organisms, plants and animals) on surfaces and structures immersed in or exposed to the aquatic environment.
Council	A council constituted under the <i>Local Government Act 1999</i> .
Department	The administrative unit of the public service responsible for assisting the Minister in the administration of the <i>Aquaculture Act 2001</i> .
Disease	Includes any bacterium, virus, parasite, insect or other organism or agent capable of causing disease in animals or humans.
Dropper	A length of rope, generally suspended vertically from a backbone at regular intervals, used for the grow-out of mussels.
Environmental harm	See section 5 of the <i>Environment Protection Act 1993</i> .
Farming of aquatic organisms	An organised rearing process involving propagation or regular stocking or feeding of the organisms or protection of the organisms from predators or other similar intervention in the organisms' natural life cycles.

Farming structures	Structures used for the farming of aquatic organisms and includes sea cages and racks, longlines and submerged lines used for aquaculture, together with their associated baskets, barrels, lanterns, and other culture units.
HDPE	High-density polyethylene.
Large marine vertebrate	A shark, seal, sea lion, turtle, dolphin, or whale.
Licensee	The holder of an aquaculture licence.
Licence area	The area of state waters specified on an aquaculture licence, within which a licensee may conduct a specified class of aquaculture.
Minister's website	A website determined by the Minister (www.pir.sa.gov.au).
Mussel sector	A class of licensee, inclusive of other persons carrying on aquaculture under a licence on behalf of the licensee, whose licence authorises the primary aquaculture of mussels (<i>Mytilus</i> sp.).
Over-settlement	An increased level of mussel (<i>Mytilus</i> sp.) seedstock collection which is likely to result in slumping.
PIRSA	The Department of Primary Industries and Regions.
Protected animal	A protected animal within the meaning of the <i>National Parks and Wildlife Act 1972</i> or a white shark (<i>Carcharodon carcharias</i>).
Reporting year	A period of 12 months commencing on 1 July.
Reporting day	31 August.
Macrofouling	Large, distinct multicellular organisms visible to the human eye, such as barnacles, tubeworms, mussels, fronds of algae and other large attached or mobile organisms.
Marine mammal	A seal or sea lion (order Pinnipedia) or a dolphin or whale (order Cetacea).
Microfouling	A layer of microscopic organisms, including bacteria and diatoms and the slimy substances they produce, which can usually be removed by gently passing a finger over the surface.
Mussock	A sock-type cotton mesh used for containing mussel spat with droppers until the spat become attached, after which the mesh biodegrades, leaving the spat uncontained.
Public authority	A Minister, statutory authority or council.
Seedstock	Juvenile aquatic organisms taken in the waters of the State for the purposes of aquaculture.
Settlement rope	A rope medium used to catch seedstock by means of natural settlement.

Slumping	The release of aquaculture stock from farming structures resulting from excessive macrofouling.
The Minister	The Minister responsible for the administration of the <i>Aquaculture Act 2001</i> .
Unusually high mortality rate	A rate of mortality of at least 20 percent higher over a period of 24 hours than the usual average mortality rate for those organisms (being the mortality rate measured daily over the preceding three months).
Waste management hierarchy	A reference to an order of priority for the management of waste, as described under section 4B of the <i>Environment Protection Act 1993</i> .

Introduction

The South Australian aquaculture industry is one of the largest primary production sectors in the State. South Australia is well placed to meet growing demand, with locally farmed species including Blue Mussels, Southern Bluefin Tuna, Pacific Oysters, Yellowtail Kingfish and Greenlip Abalone, all highly sought after by domestic and international markets. South Australia is also home to a diverse and innovative range of aquaculture production systems for subtidal and intertidal mollusc farming, sea-cage farming of finfish and various land-based systems.

The Fisheries and Aquaculture Division of the Department of Primary Industries and Regions (the Department) supports the ecologically sustainable development of the aquaculture industry through the administration of dedicated aquaculture legislation. The *Aquaculture Act 2001* provides a robust regulatory framework for aquaculture, supporting continued sustainable growth and development of the industry. The *Aquaculture Act 2001* is supported by the *Aquaculture Regulations 2016* and a number of aquaculture policies which incorporate valuable regulatory reforms and have been developed to support the preservation and future growth of the aquaculture industry through productive, commercially competitive and ecologically sustainable development principles.

The objects of the *Aquaculture Act 2001* are—

- to promote ecologically sustainable development of marine and inland aquaculture
- to maximise the benefits to the community from the state's aquaculture resources
- otherwise to ensure the efficient and effective regulation of the aquaculture industry.

Under the *Aquaculture Act 2001*, aquaculture development is ecologically sustainable if it is managed to ensure communities provide for their economic, social and physical well-being while—

- (a) natural and physical resources are maintained to meet the reasonably foreseeable needs of future generations;
- (b) biological diversity and ecological processes and systems are protected; and
- (c) adverse effects on the environment are avoided, remedied or mitigated.

Further, in making decisions as to whether development is ecologically sustainable, or to ensure development is ecologically sustainable, long-term and short-term economic, environmental, social and equity considerations should be effectively integrated.

Scope

This sector-based aquaculture strategy applies to the industry sector whose licence issued under the *Aquaculture Act 2001* authorises the primary farming of mussels (*Mytilus* sp.), hereafter referred to as the mussel sector.

Purpose

This sector-based aquaculture strategy for the mussel sector aims to ensure potential adverse effects on the environment resulting from day-to-day farming practices and other aquaculture-related conduct by the mussel sector are avoided, remedied, or mitigated where possible. It supersedes individual aquaculture strategies which were in place for licence holders of the mussel sector immediately prior to the publication of this strategy. A licensee who belongs to the mussel sector must adopt this sector-based aquaculture strategy and ensure activities undertaken under their individual aquaculture licence area(s) conform with it.

Alignment with the National Aquaculture Strategy

In September 2017, the Federal Department of Agriculture and Water Resources (DAWR) released a National Aquaculture Strategy which was developed with – and supported by – state and territory jurisdictions and industry.

The strategy is a national document designed to complement policy priorities and activities underway in jurisdictions, aimed at supporting growth of the aquaculture industry while streamlining regulatory framework and enhancing research, development and extension for aquaculture across Australia.

This sector-based aquaculture strategy aligns with the National Aquaculture Strategy (NAS) through provision of:

- **Efficient and transparent regulatory practices** by minimising unnecessary burden on aquaculture businesses in the mussel sector – consistent with the desired outcome of policy priority 1 of NAS.
- **Improved public understanding and perception** of the South Australian mussel sector as a professional industry producing safe and healthy products by promoting industry best-practice approaches to aquaculture activities undertaken by the Mussel sector – consistent with the desired outcome of policy priority 5 of the NAS.
- **Improved environmental performance** of the mussel sector by adoption of a sector-based strategy which provides a suite of best-practice farming activities, including without limitation site use and waste management – consistent with the desired outcome of policy priority 6 of the NAS.

Mussel aquaculture

The South Australian mussel sector focuses on the production of the Blue Mussel (*Mytilus galloprovincialis*) which has been farmed in South Australia since 1997. The mussel sector is now well established in the waters of Boston Bay, near Port Lincoln. Since its infancy, mussel farming on the Eyre Peninsula has developed strongly and contributes significantly to South Australia's aquaculture gross state product and provides significant social and economic benefits to the region.

A typical South Australian mussel farm consists of consecutive single or double backbone lines suspended near the surface by HDPE floats. These backbones are spaced at 20 to 25 metre intervals across a site, with each secured to the seafloor at either end with a solid concrete block. Depending on the depth of water at a particular licence area, eight to twelve-metre droppers are attached to each backbone at regular intervals (one to four metres).

In areas known to have abundant mussel seedstock, mussel spat are collected from the wild using fibrous settlement lines (settlement ropes) hung from backbones during the peak spawning season (June to September). After approximately six months of growth, when shell length is approximately twelve millimetres, mussel seedstock is transferred from settlement lines to grow-out dropper lines. During this process, juvenile mussels are separated from each other by passing them through a mussel de-clumping machine. Mussel seedstock are re-attached to droppers by feeding them through a funnel onto a grow-out rope, which is encapsulated by a cotton mussock which is biodegradable in the marine environment. By the time mussock begins to degrade, mussel stock has naturally attached to droppers through secretion of their byssal threads.

Blue Mussels are generally graded twice during the growth cycle for the removal of over-settlement and biofouling and for sorting into size classes. Once a mussel size of approximately eleven centimeters is reached, mussel stock is harvested and transferred to shore for processing.

Strategies

Development

The sector-based aquaculture strategy has been developed through collaboration between the Department and other State government agencies – including the Department for Environment and Water (DEW) and the Environment Protection Authority (EPA) – and the South Australian Mussel Growers Association.

The sector-based aquaculture strategy does not vary or exempt the mussel sector from legislative requirements but rather incorporates relevant legislation applicable to aquaculture and the operational practices of the mussel sector.

The strategies outlined in this document collectively form the sector-based aquaculture strategy for the mussel sector. These include:

- Requirements for inspecting and monitoring licence areas.
- Requirements for maintaining farming structures and aquaculture equipment.
- Requirements for avoiding or minimising aquaculture waste.
- Requirements for avoiding or minimising disease and biosecurity risks (including stock escape).
- Requirements for avoiding or minimising adverse interactions with seabirds and large marine vertebrates and a response plan for dealing with such events.
- Requirements for dealing with dead aquaculture stock around farming structures and elsewhere in a licence area.

Each prescribed strategy is divided into two main parts delineated by the terms '**should**' and '**must**'. Importantly, the former is used to indicate a recommended best-practice approach for the mussel sector, whereas the latter indicates a mandatory requirement which, if ignored, may result in a breach of legislative provisions including those relating to aquaculture, fisheries management, or environmental protection.

Review

Pursuant to subregulation 19(3) of the *Aquaculture Regulations 2016*, these strategies may, subject to regulation 21, be amended following consultation with the mussel sector and any public authority likely to be affected by the strategy, and by publishing the amendment on the Minister's website.

It is expected the sector-based aquaculture strategy for the mussel sector will be reviewed at least once every ten years, to ensure the prescribed strategies remain relevant, accepted and valuable to the mussel sector. Any review should incorporate up-to date scientific knowledge, industry best practices, legislative requirements, and community expectations.

Importantly, this strategy may be subject to urgent amendment without prior notice or consultation, if it is in the opinion of the Minister that the action needs to be taken without delay in order to avoid, remedy or mitigate an adverse effect on the environment resulting from farming practices or other conduct by licensees.

Inspecting and monitoring licence areas

Prescribed strategies

To promote ecologically sustainable operational standards, the following strategies relating to inspecting and monitoring licence areas are prescribed.

(1) A licensee of the mussel sector **should** ensure—

- (a) Individual licence areas are inspected in a scheduled and consistent manner to minimise potential for environmental harm.
- (b) Frequent surveys of the seabed in and around individual licence areas are undertaken to identify slumping, the accumulation of aquaculture waste (including shells and lost equipment such as ropes and droppers) and to monitor culture units to ensure they remain at least three metres from the seafloor (unless otherwise approved in writing by the Minister).
- (c) Written records are kept for all activities relating to routine and non-routine inspections (i.e. inspections made following storm events).

(2) A licensee of the mussel sector **must** ensure—

- (a) Inspections of individual licence areas farmed during a reporting year are carried out at least once every ten (10) days, and additional inspections made within two (2) days following any storm event, weather permitting. During inspections:
 - i. The licence area is monitored for presence of aquaculture waste and other marine debris and is managed in line with the prescribed strategy for [avoiding or minimising aquaculture waste](#).
 - ii. The licence area is monitored for signs of adverse interactions with large marine vertebrates or protected animals and are managed in line with the prescribed [response plan for dealing with adverse interactions with seabirds and large marine vertebrates](#).
 - iii. Stock is monitored for signs of disease or unusually high mortality rates and if stock appears to be affected with disease, the disease (or suspected disease) is responded to in line with the prescribed strategy for [avoiding or minimising disease and biosecurity risks](#).
 - iv. Farming structures and other aquaculture equipment used to secure, anchor or mark the position of a farming structure are monitored to ensure they remain wholly within an individual licence area.
 - v. Backbones, dropper lines and any other culture units or ropes are monitored to ensure sufficient buoyancy to support culture units and ropes remaining at least three metres from the seafloor at all times, unless otherwise approved in writing by the Minister.
 - vi. Ropes are monitored for abrasion, chaffing or degradation to prevent it or any aquaculture farming structure or other aquaculture equipment from being blown, washed, or swept off the licence area.
- (b) Farming structures or any other aquaculture equipment identified during an inspection as being damaged, requiring repair or maintenance are attended to as soon as practicable and undertaken in accordance with the prescribed strategy for [maintaining farming structures and aquaculture equipment](#).

- (c) If an inspection of an individual licence area farmed during a reporting year cannot be undertaken within the timeframe specified in clause 2(a) due to inclement weather, an inspection is made as soon as practicable but within two (2) days of inclement weather abating.
- (d) If farming structures or other equipment have been damaged in a manner that may lead to the escape of aquaculture stock, the damage is attended to in accordance with the prescribed strategy for [avoiding or minimising disease and biosecurity risks](#).

Maintaining farming structures and aquaculture equipment

Prescribed strategies

To promote ecologically sustainable operational standards, the following strategies relating to maintaining farming structures and aquaculture equipment are prescribed.

- (1) A licensee of the mussel sector **should** ensure—
 - (a) Farming structures and other aquaculture equipment used to secure, anchor or mark the position of a farming structure located within an individual licence area, are installed and maintained in accordance with the manufacturer's specifications.
- (2) A licensee of the mussel sector **must** ensure—
 - (a) Farming structures and other aquaculture equipment located within an individual licence area are securely fixed or moored in place to remain wholly within the licence area and anchored in a manner that minimises impacts to the seabed and to prevent them from being blown, washed, or swept off an individual licence area.
 - (b) Farming structures and other aquaculture equipment located within an individual licence area are maintained in good working condition. This includes the following minimum activities:
 - i. Inspections of individual licence areas within a reporting year are undertaken in line with the prescribed strategy for [inspecting and monitoring licence areas](#).
 - ii. Longlines, ropes and other aquaculture farming structures and aquaculture equipment are kept taut and with as little undesirable macrofouling as practicably possible.
 - iii. Aquaculture farming structures and other aquaculture equipment are monitored for general wear and tear and any such structure identified as requiring repair or replacement are attended to as soon as practicable but in any event within seven (7) days, weather permitting.
 - (c) Activities undertaken for maintaining farming structures and other aquaculture equipment located within an individual licence area do not result in excessive sedimentation, accumulation of waste, or damage to seagrass or other benthic organisms on the benthic environment by:
 - i. Regularly cleaning unwanted biofouling from farming structures and aquaculture equipment in accordance with the Anti-fouling and in-water Cleaning Guidelines¹, or by taking equipment to shore for cleaning at land-based facilities away from where any resulting waste is likely to interact with any natural water body.
 - ii. Managing aquaculture waste in accordance with the prescribed strategy for [avoiding or minimising aquaculture waste](#).
 - (d) Any farming structure or other aquaculture equipment identified during an inspection to have been blown, washed, or swept off an individual licence area, is – if possible to do so – recovered as soon as practicable but in any event within seven days, in accordance with subregulation 12(1) of the *Aquaculture Regulations 2016*.
 - (e) If farming structures or any other aquaculture equipment requiring attendance cannot be attended to within the timeframe specified in clause 2(b)(iii) due to inclement weather, the structure or aquaculture equipment is recovered, repaired or replaced as necessary within two days of inclement weather abating.

¹ Department of the Environment and New Zealand Ministry for Primary Industries (2015). *Anti-fouling and in-water cleaning guidelines*. Department of Agriculture, Canberra. CC BY 3.0

Avoiding or minimising aquaculture waste

The *Aquaculture Regulations 2016* defines aquaculture waste as ‘waste generated in the course of carrying on aquaculture but does not include waste created by living aquatic organisms’ (i.e. faecal waste). Aquaculture waste can include general waste in the form of old ropes and buoys, shells and biofouling organisms once removed.

Mussel stock may become dislodged from farming equipment and fall to the seafloor through major weather events, grading, harvesting or due to over-settlement during the culture cycle. The *Environment Protection Act 1993* prescribes a waste management hierarchy which provides an order of priority for the management of waste. These methods in order of preference include:

- Avoidance of the production of waste.
- Minimisation of the production of waste.
- Reuse of waste.
- Recycling of waste.
- Recovery of energy and other resources from waste.
- Treatment of waste to reduce potentially degrading impacts.
- Disposal of waste in an environmentally sound manner.

Further to the above, the *Environmental Protection (Water Quality) Policy 2015* made under the *Environment Protection Act 1993* stipulates a person must not discharge a class 1 pollutant into any waters or onto land in a place from which it is reasonably likely to enter any waters. Class 1 pollutants relating to aquaculture can include but are not limited to:

- Putrescible waste (e.g. macrofouling, dead mussels and other organic wastes).
- High-pressure water blasting waste.
- Rubbish and litter
- Cleaning agents.
- Detergents and their byproducts.
- Washdown water from cleaning vehicles, plant or equipment.
- Wash-down water from commercial or industrial premises or wharves.

Prescribed strategies

To promote ecologically sustainable operational standards, the following strategies relating to avoiding or minimising aquaculture waste are prescribed.

- (1) A licensee of the mussel sector **should** ensure—
 - (a) Aquaculture farming structures and equipment used for the grow-out of seedstock are selected with consideration of the following factors to minimise the production of aquaculture waste:
 - i. The size of seedstock.
 - ii. The seeding density.
 - iii. The productivity (i.e. feed availability) of an individual licence area.
 - iv. The physical characteristics (i.e. sea conditions) at an individual licence area.

(b) Harvesting or grading of aquaculture stock is undertaken as soon as reasonably practicable prior to the establishment of undesirable macrofouling – including over-settlement – to prevent slumping of biological material to the sea floor.

(2) A licensee of the mussel sector **must** ensure—

(a) All reasonable and practical measures are undertaken to prevent or minimise the production of aquaculture waste on an individual licence area by managing waste in accordance with the waste management hierarchy.

(b) All aquaculture waste produced on an individual licence area is secured or treated in a manner designed to prevent it being blown, washed or swept off an individual licence area until such time it can be reused, recycled or disposed of in an environmentally sound manner.

(c) Debris identified during the inspection of an individual licence area is recovered immediately and contained appropriately after being recovered and during transport.

(d) Aquaculture waste does not cause an unsightly or offensive condition at an individual licence area, or cause damage to the benthic habitat within an individual licence area by:

- i. Undertaking regular inspections of individual licence areas in line with the prescribed strategy for [inspecting and monitoring licence areas](#), and carrying out maintenance activities in line with the prescribed strategy for [maintaining farming structures and aquaculture equipment](#).
- ii. Recovering any substantial amounts of aquaculture stock dislodged from aquaculture farming structures from the sea floor. If an accumulation of aquaculture waste is observed (including mussel shell biota) the Department shall be notified as soon as reasonably practicable, but within two (2) days of becoming aware of the accumulation, to allow appropriate management actions to be implemented.

Avoiding or minimising disease and biosecurity risks

Spat collection

In South Australia, juvenile mussels (spat) are predominantly collected from the wild using settlement ropes. Blue Mussels (*Mytilus galloprovincialis*) naturally occur in South Australian waters with settlement taking place between May and November each year and in numbers ranging from 500 to 5000 individual mussels per metre of settlement rope. The mussel industry is exempt from the requirement to hold a permit under the *Fisheries Management (Miscellaneous Broodstock and Seedstock Fishery) Regulations 2013* – to collect mussel spat – if the mussel spat are taken from areas subject to an aquaculture lease and pursuant to an aquaculture licence authorising the farming of mussels.

Due to natural variation in wild spat availability hatchery-reared spat is occasionally sourced by the mussel sector, when required, for which Ministerial approval must be obtained and specified translocation protocols adhered to in accordance with the *Livestock Act 1997*. Historically, spat have been obtained from hatcheries based in Western Australia, Tasmania, and Victoria. It is noteworthy that Blue Mussels are naturally occurring in all growing regions of South Australia and show little to no genetic differences between Australian populations (Joana *et al.*, 2014).

Escape or release of aquaculture stock

While mussels cannot technically ‘escape’ from a licensed area, their loss from farming structures to the natural environment within or around a licensed area can occur during spat collection, stock grading, harvesting and/or other processing activities undertaken on individual licence areas. Factors such as mortality – both natural and disease induced – along with environmental conditions such as temperature, water quality and strong weather events can influence the level of aquaculture stock dislodged from farming structures and deposited to the benthic environment.

Allowing aquaculture stock to be intentionally deposited onto the seabed is considered the release of aquaculture stock into natural (unconfined) waters. Section 78(2)(b)(i) of the *Fisheries Management Act 2007* specifies it is an offence to release or permit aquaculture fish to escape into any waters, unless authorised by a permit issued by the Minister.

Where a person or business has authorisation under an aquaculture licence to culture mussels in state waters leased pursuant to the *Aquaculture Act 2001*, aquaculture stock is only considered escaped or released stock when located outside the boundary of an individual licence area. However, an accumulation of stock on the seafloor within an individual licence area – while not technically considered escaped stock – can lead to impacts to the benthic habitat which need to be managed. See above section “avoiding or minimising aquaculture waste”.

Disease management

Aquatic animal disease (endemic and exotic) or poor aquatic animal health (non-disease related) – is a limiting factor for both fisheries and aquaculture production and for trade and market access. Causes include both controllable factors at the farm level (e.g., a build-up of decaying biological material, the movement of livestock, vessels, and equipment) and uncontrollable factors (unfavourable environmental conditions, the movement of non-farm vessels or seafood products, and other external anthropogenic factors). The Department’s aquatic animal health program works closely with industry to safeguard the seafood industry from the impact of aquatic animal diseases, maintain South Australia’s disease-free status which in turn supports trade and market access.

The most effective options for disease management are:

- Prevention and preparedness (minimise the risk of disease entering an area)
- Response (new diseases inadvertently introduced are responded to quickly to reduce the chance of their establishment and reduce impact).

The Department has the capacity to investigate aquatic animal mortalities and suspected disease events, to rule out notifiable and infectious disease. Negative results (no notifiable disease pathogen present) support the state's aquaculture (and fisheries) production health status, which underpins trade and market access requirements. Positive results (notifiable disease pathogen present) may trigger an emergency response (largely for exotic diseases) by the Department, in collaboration with industry, to manage a disease outbreak and minimise impacts to the fisheries and aquaculture industries, and the environment. Demonstrating that a disease is being effectively managed also supports trade and market access which is important for the economic viability of the seafood industry. The Department also investigates numerous reports of wild 'fish kills' each year (including bivalves) to rule out disease as a cause.

Further information relating to aquatic diseases, including the latest list of South Australian notifiable diseases outlined in the South Australian Government Gazette, can be accessed from the Department's website ([Aquatic diseases - PIRSA](#)).

Licensees are encouraged to develop and implement a farm biosecurity plan to demonstrate how they are minimising the risks of disease. Such plans not only provide a safeguard for their business but provides both government and trade partners with the understanding and confidence in their disease prevention and management processes, which is particularly important during a disease outbreak. Generic guidelines and templates for aquaculture farm biosecurity plans are available from the Australian Government's Department of Agriculture, Fisheries and Forestry website (www.agriculture.gov.au).

Stock translocation

In South Australia, aquatic livestock translocations are regulated under the *Livestock Act 1997* primarily for the purpose of preventing disease introduction and spread. Legislative restrictions are in place to mitigate high risk movements of aquaculture stock, including the movement of certain species within South Australia, the movement of wild-caught broodstock or seedstock to an aquaculture licensed area and the movement of aquaculture stock into South Australia from other jurisdictions (i.e. interstate translocations).

In July 2020, the *Prohibition of Entry into and Movement within South Australia of Aquaculture Stock Notice 2020* (the Notice) was issued under section 33 of the *Livestock Act 1997* via publication in the South Australian Government Gazette. The Notice prohibits aquaculture stock that has been hatchery reared outside of the state or taken in waters other than waters of the state from entering South Australia unless the prior written approval of the Chief Inspector of Stock has been obtained and all conditions of the approval complied with. For interstate translocations of mussels, this includes adherence to the specified translocation protocol relating to the entry of the species into the state.

With each interstate translocation request received, the Department identifies and evaluates the risk of disease introduction and typically mitigates risks through consideration of the following key points:

- Stock health status, ensuring—
 - Traceability of sourced aquaculture stock
 - Appropriate batch testing is undertaken, and routine surveillance results are provided to rule out notifiable and infectious disease
 - health certification from an accredited diagnostic laboratory and/or veterinarian, and declaration from the hatchery are provided.

- Hatchery biosecurity status, ensuring—
 - Land-based hatcheries providing aquaculture stock have adequate water filtration to prevent disease entry or spread
 - Land-based hatcheries have an auditable farm biosecurity plan in place
 - Health statements from the relevant regulatory body and/or State government are obtained.

Stock translocation application forms and further information relating to moving aquatic animals can be accessed through the Department's website ([Moving or importing aquatic animals - PIRSA](#)).

Prescribed strategies

To promote ecologically sustainable operational standards, the following strategies relating to avoiding or minimising disease and biosecurity risks are prescribed.

- (1) A licensee of the mussel sector **should** ensure—
 - (a) A farm biosecurity plan is developed and implemented to reduce the risks of disease and demonstrate how disease will be managed if an outbreak occurs.
 - (b) Staff are trained in procedural matters relating to aquatic animal health management and disease reporting requirements, including without limitation, the legislative requirements of the *Livestock Act 1997* and *Aquaculture Regulations 2016*.
 - (c) Staff are trained in procedural matters relating to stock losses and escapes, and the associated reporting requirements.
- (2) A licensee of the mussel sector **must** ensure—
 - (a) Ministerial approval is sought to translocate aquaculture stock comprising mussels produced outside of South Australia for the purpose of aquaculture and is obtained prior to moving such aquaculture stock into South Australia, in accordance with the Notice.
 - (b) Aquaculture stock (including dead aquaculture stock) comprising mussels is not released or permitted to be released into waters of the state outside the boundaries of an individual licence area unless authorised through a permit issued by the Minister issued under and pursuant to section 78 of the *Fisheries Management Act 2007*.
 - (c) Details of all aquaculture stock introduced to or moved between individual licence areas (whether or not each licence area is occupied by the same licensee) is recorded in each licence holder's stock register in accordance with regulation 15 of the *Aquaculture Regulations 2016*.
 - (d) Aquaculture farming structures and equipment are maintained in line with the prescribed strategy for [maintaining farming structures and aquaculture equipment](#), to prevent the build-up of decaying biological material.
 - (e) Aquaculture stock comprising mussels, which have become detached from aquaculture farming structures and remain within the boundaries of a licensed area, are managed in line with clause 2(d)(ii) of the prescribed strategy for [avoiding or minimising aquaculture waste](#).
 - (f) All reasonable and practicable measures are taken to prevent aquaculture stock from being released from an individual licence area. If aquaculture stock has been released from an individual licence area, or if farming structures have been damaged in a manner that may lead to the release of stock:

- i. The licensee must as soon as practicable after becoming aware of the release or damage, take all reasonable measures to contain or prevent the release or further release of stock.
- ii. The licensee must within four (4) hours after becoming aware of the release or damage, notify the Fishwatch hotline on 1800 065 522 and provide as much detail known by the licensee relating to—
 - the species of aquatic organisms involved
 - the date (or estimated date) on which the release or damage took place
 - the number and biomass (or estimated number and biomass) of aquatic organisms that were released
 - the age or developmental stage of the aquatic organisms at the time of their release
 - details of the circumstances in which the release or damage took place
 - any action taken to contain or prevent the release of the stock or otherwise address the release or damage and the outcome of that action.
- iii. Written notice of the prescribed details relating to the release or damage reported under clause 2(f)(ii) is provided to the Department within two days of becoming aware of the incident, by completing and submitting the mandatory 'Notification of escape or damage which may lead to escape' form, available from the Department (PIRSA Reference: A341199).

Avoiding or minimising adverse interactions with seabirds and large marine vertebrates

There are few reports of adverse interactions between seabirds, large marine vertebrates and other protected animals within the mussel sector. This is likely because no netting is used, there are no supplementary feed inputs and shellfish are not considered a highly attractive food source for large marine vertebrates (Kemper *et al.*, 2003).

It is not uncommon for large marine vertebrates (marine mammals) and other protected animals to be present in or move through individual licence areas operated by the mussel sector. Although passive in nature, such interactions has the potential to lead to an animal becoming entangled or otherwise confined in a farming structure or other equipment used in connection with aquaculture.

Marine mammals

The *National Parks and Wildlife (Protected Animals – Marine Mammals) Regulations 2010*, made under the *National Parks and Wildlife Act 1972*, outlines the legal requirements relevant to approaching marine mammals when encountering them on land or on water and includes minimum distances to be kept with respect to operating marine vessels near them. Essentially, those regulations provide a person must not approach a marine mammal unless—

- The person is acting reasonably in the best interests of a marine mammal which is suffering from injury, disease or exhaustion, is stranded, or is entangled or otherwise incapacitated by a material of human origin.
- The person is responding in a reasonable manner to an emergency involving danger to human life or damage to the environment.
- The person is acting in accordance with the directions or instructions of an authorised warden under the *National Parks and Wildlife Act 1972*.

Prescribed strategies

To promote ecologically sustainable operational standards, the following strategies relating to avoiding or minimising adverse interactions with seabirds and large marine vertebrates are prescribed.

- (1) A licensee of the mussel sector **should** ensure—
 - (a) Staff are trained and inducted in farm management practices relating to interactions, so they are fully aware of the potential for adverse interactions with seabirds and large marine vertebrates, and the necessary actions and reporting requirements.
- (2) A licensee of the mussel sector **must** ensure—
 - (a) Sudden or repeated changes in vessel direction, or generating excessive noise, near large marine vertebrates or other protected animals present within or near an individual licence area are avoided.
 - (b) Individual licence areas are inspected and monitored in accord with the prescribed strategy for [inspecting and monitoring licence areas](#), to avoid adverse interactions with seabirds, large marine vertebrates and other protected animals.

- (c) Aquaculture farming structures and equipment are maintained in accord with the prescribed strategy for [maintaining farming structures and aquaculture equipment](#), to minimise the risk of adverse interactions with seabirds, large marine vertebrates and other protected animals.
- (d) If a marine mammal has become entangled or otherwise incapacitated within an individual licence area – or by aquaculture farming structures associated with an individual licence area – it is only approached if acting reasonably in the best interests of the marine mammal and is only approached in accord with the prescribed [response plan for dealing with adverse interactions with seabirds and large marine vertebrates](#).

Response plan for dealing with adverse interactions with seabirds and large marine vertebrates

Protected animals including large marine vertebrates (marine mammals) and seabirds are considered entangled or confined if:

- The animal is showing signs of disturbance and cannot freely leave an individual licence area without intervention.
- The animal has been injured because of aquaculture farming structures or other equipment used in connection with aquaculture.

Prescribed strategies

To promote ecologically sustainable operational standards, the following strategies for responding to and dealing with adverse interactions with seabirds and large marine vertebrates are prescribed.

(1) A licensee of the mussel sector **should** ensure—

- (a) Sudden or repeated changes in vessel direction, increased speeds or generating excessive noise, near large marine vertebrates or other protected animals are avoided.
- (b) Appropriate protective clothing is worn to stop zoonotic disease transfer while undertaking any action to free a protected animal. This includes rubber gloves, a face mask, eye protection, long pants and long sleeves.
- (c) All reasonable care is taken to avoid unnecessary touching of entangled or confined protected animals when undertaking any action to free an animal from being entangled or otherwise confined in a farming structure or other equipment used in connection with aquaculture.
- (d) The local National Parks and Wildlife Service office duty officer is contacted for advice prior to attempting to assist with marine mammals, and marine mammals are only assisted if safe to do so under any circumstance.

(2) A licensee of the mussel sector **must** ensure—

- (a) In the event of becoming aware of a seabird being present within an individual licence area, only acceptable non-lethal methods are used to exclude the seabird from the area, if necessary.
- (b) If a protected animal becomes entangled or otherwise confined in a farming structure or other equipment used in connection with an individual licence area, the incident is immediately reported through the Fishwatch hotline (1800 065 522), providing as much detail on as many of the following prescribed details that are known at the time:
 - the species of animal
 - the expected period of entanglement or confinement
 - the condition of the animal – to the extent known or reasonably ascertainable
 - details of the circumstances in which the incident took place
 - any action taken to free the animal and the outcome of that action.
- (c) Within two (2) days of becoming aware of a protected animal becoming entangled or confined in aquaculture farming structures associated with an individual licence area, written notice of the prescribed details listed above is provided to the Minister, through the Department, by completing and submitting the mandatory 'Notification of entanglement or confinement of protected animals' form, available from the Department (PIRSA reference: A348921).

Response plan for dealing with dead aquaculture stock around farming structures and elsewhere in a licence area

The South Australian Environment Protection Authority (EPA) has developed guidelines for managing aquaculture stock mortalities, which include a range of options for holding, transporting and disposing of mortalities. The guidelines (available at epa.sa.gov.au) aim to assist aquaculture licensees with selecting suitable methods to dispose of aquaculture mortalities which comply with the *Environment Protection Act 1993* and associated environment protection policies (EPA, 2019).

Aquaculture waste, including dead aquaculture stock, should be managed in a manner that prevents release to state waters (or onto land in a place from which it is reasonably likely to enter any waters) and disposed of appropriately in line with the waste management hierarchy and does not result in the establishment of offensive conditions within an individual licence area. Alternative or novel uses for aquaculture waste generated by the mussel sector is supported, however, such alternative practices must remain ecologically sustainable, must not cause disease risks and must be within current legislation (including without limitation, the *Environment Protection Act 1993*, the *Fisheries Management Act 2007*, the *Livestock Act 1997* and the *Aquaculture Act 2001*). Therefore, licensees are advised to consult with the Department if alternative waste disposal options are being considered.

Prescribed strategies

To promote ecologically sustainable operational standards, the following strategies relating to dealing with dead aquaculture stock around farming structures and elsewhere in a licence area are prescribed.

- (1) A licensee of the mussel sector **should** ensure—
 - (a) Staff are aware of the procedures for managing and responding to stock losses through provision of relevant training during inductions.
- (2) A licensee of the mussel sector **must** ensure—
 - (a) Aquaculture waste (including dead aquaculture stock) is disposed in accordance with the waste management hierarchy or at an EPA-approved waste disposal facility – authorised to receive the aquaculture waste – unless the aquaculture waste is used for alternative or novel purposes that do not cause disease risks or breach legislation.
 - (b) Alternative or novel uses for aquaculture waste generated though the course of aquaculture carried out on an individual licence area comply with the mandatory provisions of part 2 of the prescribed strategy for [avoiding or minimising disease and biosecurity risks](#).
 - (c) If ten (10) percent or more of the sea floor within an individual licence area becomes covered by aquaculture stock dislodged from aquaculture farming structures, a report is made to the Minister in accord with clause 2(f)(ii) and (iii) of the prescribed strategy for [avoiding or minimising disease and biosecurity risks](#).

References

Environment Protection Authority (2019). *Waste Guidelines: Managing aquaculture stock mortalities*, 7 pp. Available online at: https://www.epa.sa.gov.au/files/477888_guide_mortalities.pdf

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