NSW Marine Waters

Sustainable Aquaculture Strategy Overview

A NSW Government Initiative
2018

NSW GOVERNMENT

The NSW Marine Waters Sustainable Aquaculture Strategy is a NSW Government initiative developed by the State Aquaculture Steering Committee, comprising the Department of Premier and Cabinet, NSW Department of Planning and Environment, NSW Department of Primary Industries (Fisheries), NSW Environment Protection Authority, NSW Food Authority, Department of Industry - Lands and Water, NSW National Parks and Wildlife Service, NSW Office of Environment and Heritage, NSW Department of Planning and Environment (Resources and Geoscience), Office of Local Government, Transport for NSW (NSW Roads and Maritime Services) to encourage sustainable marine waters based aquaculture.

Published by NSW Department of Industry

NSW Marine Waters Sustainable Aquaculture Strategy Overview

First published November 2018

ISBN 978-1-76058-293-7 print

ISBN 978-1-76058-294-4 web

More information

NSW Department of Industry

www.industry.nsw.gov.au

Acknowledgements

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Publication number: OUT17/46441

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INTRODUCTION

The purpose of this document is to provide an overview of marine aquaculture and the assessment and approvals process under the NSW Marine Waters Sustainable Aquaculture Strategy (MWSAS). Detailed information about the requirements for marine aquaculture projects and gaining development consent can be found in the MWSAS (https://www.dpi.nsw.gov.au/fishing/aquaculture).

The MWSAS aims to simplify the approvals process for aquaculture, giving greater certainty to investors, the community, industry and consent authorities. It also details best practice guidelines for aquaculture based on Ecologically Sustainable Development (ESD) principles and outlines the regulatory framework for NSW.

WHAT IS MARINE AQUACULTURE?

Marine aquaculture refers to the breeding, growing, keeping and harvesting of fish or marine vegetation with a view to sale or commercial purpose. 'Fish' is defined not only as finfish but also shellfish (molluscs and crustaceans), echinoderms (sea urchins) and polychaete worms.

The MWSAS applies to the three nautical mile (5.6 Km) jurisdictional limit of NSW marine waters where it meets Commonwealth waters, including Jervis and Twofold Bays. It does not apply to the cultivation of edible oysters in estuaries, which is governed by provisions of the NSW Oyster Industry Sustainable Aquaculture Strategy.

Industry Overview – Marine Aquaculture

Aquaculture is one of the fastest-growing industries in the world (Department of Fisheries, 2015). Global demand for seafood is rapidly expanding and seafood consumption per capita is increasing. World annual per capita fish consumption doubled from about 10 kg in the 1960s to 20 kg in 2016 (Food and Agriculture Organisation of the United Nations, 2016). In 2016, 50% of the seafood consumed worldwide was produced by aquaculture (Food and Agriculture Organisation of the United Nations, 2016).

2.1.1 Marine Aquaculture in NSW

Up until the 1970s coastal aquaculture in NSW was based on the intertidal cultivation of the Sydney Rock Oyster, an industry which commenced in the Georges River, Sydney in 1872. In the 1970s the University of NSW commenced experimental cultivation of Blue Mussels using rafts in Port Stephens, Botany, Jervis and Twofold Bays. During the 1990s NSW Department of Primary Industries (NSW DPI) undertook research into the longline production of scallops and Akoya Pearl Oysters in Jervis Bay and Port Stephens, scallops in Twofold Bay and ranching of scallops (placing juvenile shellfish on the sea floor) in Jervis Bay.

In the late 1980s research at Cronulla Fisheries Institute and Port Stephens Fisheries Institute expanded to include high value marine finfish species such as Snapper and Mulloway. NSW DPI began commercial scale finfish trials in sea pens in Botany Bay in 1993. The lease area was subsequently tendered to Silver Beach Aquaculture with a lease granted in 1999.

Following the approval of an environmental impact statement (EIS) in 1998, 50 hectare (ha) of lease area was approved for Blue Mussel culture in Twofold Bay and is currently operated by Eden Seafarms. The experimental Blue Mussel raft operation continued in Jervis Bay until

2008. In 2014 approval was granted to NSW DPI for 50 ha of shellfish leases in Jervis Bay following assessment of an EIS and Visual Amenity Report.

In early 1999, Pisces Marine Aquaculture began trials of Snapper in sea pens on a 30 ha lease in Providence Bay, Port Stephens. Following the submission of an EIS, the lease was approved in 2001.

In 2013 NSW DPI applied for a 20 ha Marine Aquaculture Research Lease (MARL) which was approved. NSW DPI advertised an expression of interest for a research partner and Huon Aquaculture was selected. Huon Aquaculture subsequently purchased the Pisces lease. In 2016 a modification application was approved to move the MARL and Huon Lease further offshore to deeper water to take advantage of the latest aquaculture technology in offshore sea pens. A larger lease area was required to accommodate the mooring infrastructure.

In NSW oysters are cultivated in 30 estuaries on 2,800 ha of lease area. Approximately 1,500 ha of estuarine oyster leases in NSW are currently operating in marine parks, nature reserves, national parks and aquatic reserves. Marine parks also host a number of marine waters aquaculture leases.

3.1.1 Current Industry Profile

Current businesses operating in marine waters in NSW include:

- Eden Seafarms (37.5 ha) and South Coast Mariculture (12 ha) - Twofold Bay;
- South Coast Mariculture (50 ha) - Jervis Bay;
- NSW DPI MARL (60 ha) - Port Stephens; and
- Huon Aquaculture (62 ha) - Port Stephens.

There are no artificial reefs for abalone or ranching leases for scallops in NSW at this time.

4.1.1 Sustainable Aquaculture Growth in NSW

The increasing gap between capture fishery supply and the growing demand for seafood can only be supplied by sustainable aquaculture. Aquaculture can support sustainable future demands of food security for the state.

NSW has areas potentially suitable for the development of marine aquaculture with access to high quality marine waters. The State's business infrastructure is well developed with the capacity to service growth in the aquaculture sector.

Aquaculture industry participants and the NSW Government's regulatory agencies are very conscious of the need to ensure that the development of the aquaculture industry in NSW proceeds in a manner that does not jeopardise its ecological sustainability. Industry and government continue to invest heavily in research, technology and management practices to provide for the sustainable growth of this industry.

Types of Marine Aquaculture

Marine aquaculture farms may be classed as either intensive or extensive, depending of the feeding regimes used to grow the farmed species.

Intensive aquaculture - involves providing the farmed species with specifically prepared feeds, which results in an input of organic matter and nutrients into the marine environment.

An example of intensive aquaculture is the farming of finfish in sea pens (see Section 2.3.1) such as the cultivation of Yellowtail Kingfish on the MARL in Port Stephens, NSW.

Extensive aquaculture - involves the farming of species which feed on naturally occurring matter in the water column. There is no input of feed into the marine environment. The cultivation of mussels and algae on longlines (see Section 2.3.2), abalone on artificial reefs (see Section 2.3.3) and seeding the seabed with scallops (see Section 2.3.4) are examples of extensive aquaculture.

Intensive aquaculture requires a higher degree of management and may involve a greater environmental risk than extensive aquaculture, due to the input of additional organic matter and nutrients into the marine environment.

1.1 Marine Aquaculture Infrastructure

1.1.1 Sea Pen Aquaculture

Sea pen infrastructure consists of a mooring grid system which is used to anchor the floating pens to the seabed (Figure 1). Buoys and anchors are connected to lengths of heavy chain and rope to secure sea pens in place.

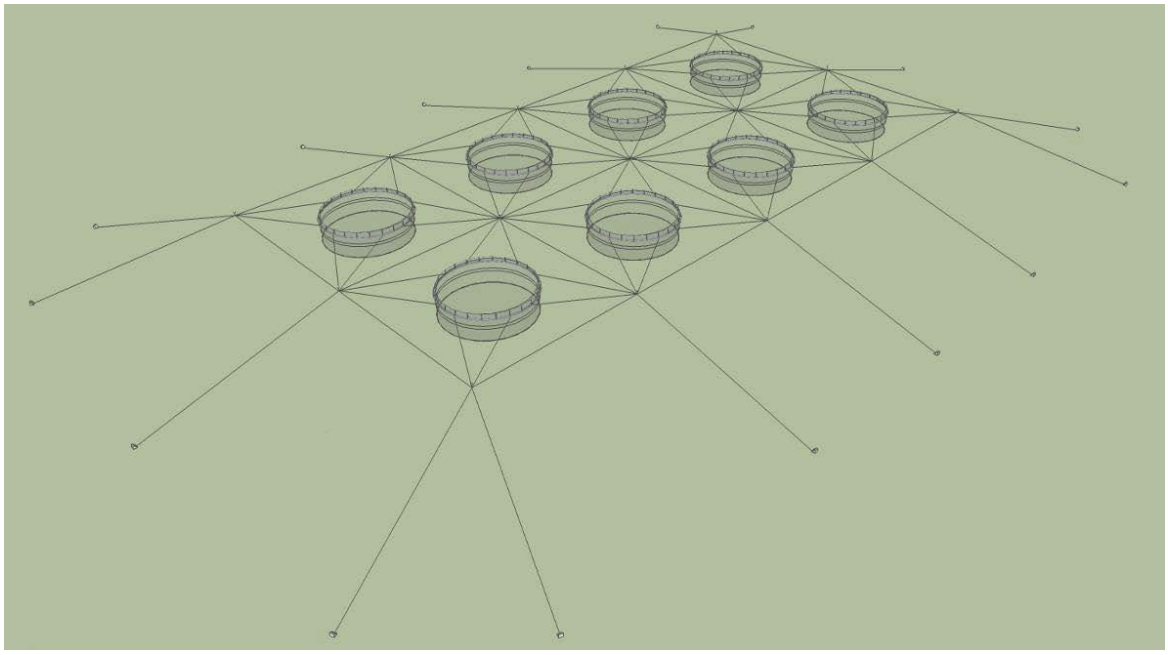

Figure 1: An example of a mooring grid system used to anchor pens to the seabed (Source: NSW DPI, 2011).

The sea pens are constructed from pipes (generally plastic) which are bent and welded to form circular floating collars (Figure 2). Floatation is aided by air contained in the pipes or by filling the pipes with expanded polystyrene foam. Pens range in size depending on the location, number and size of cultured fish.

Figure 2: Sea pens constructed using plastic pipes (Source: NSW DPI, 2017).

Stanchions are fed onto the pipes to strengthen the structure and to provide a mooring point (Figure 3). Additional pipe (with a smaller diameter) is used to form railing above the water surface. Culture and predator exclusion nets are secured to these railings and stanchions. The culture nets used to contain the fish are made with a mesh size suitable for the size class of fish being cultured. Predator exclusion nets are deployed both above and below the water to mitigate interactions with marine fauna, notably seabirds, sharks, seals, dolphins and finfish (Figure 4).

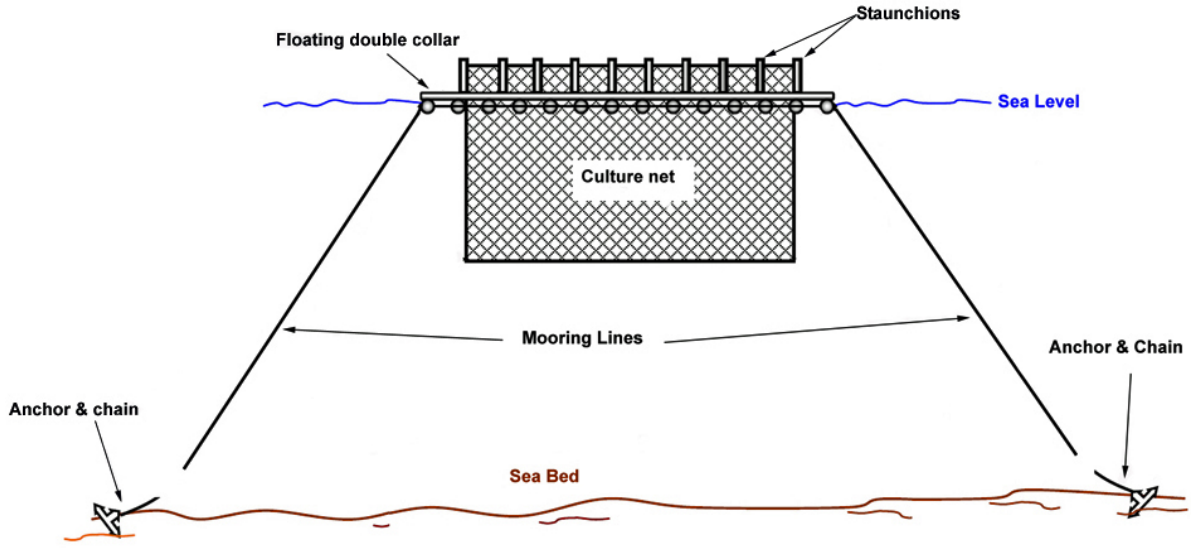

Figure 3: The basic components of sea pen infrastructure (Source: NSW DPI, 2012).

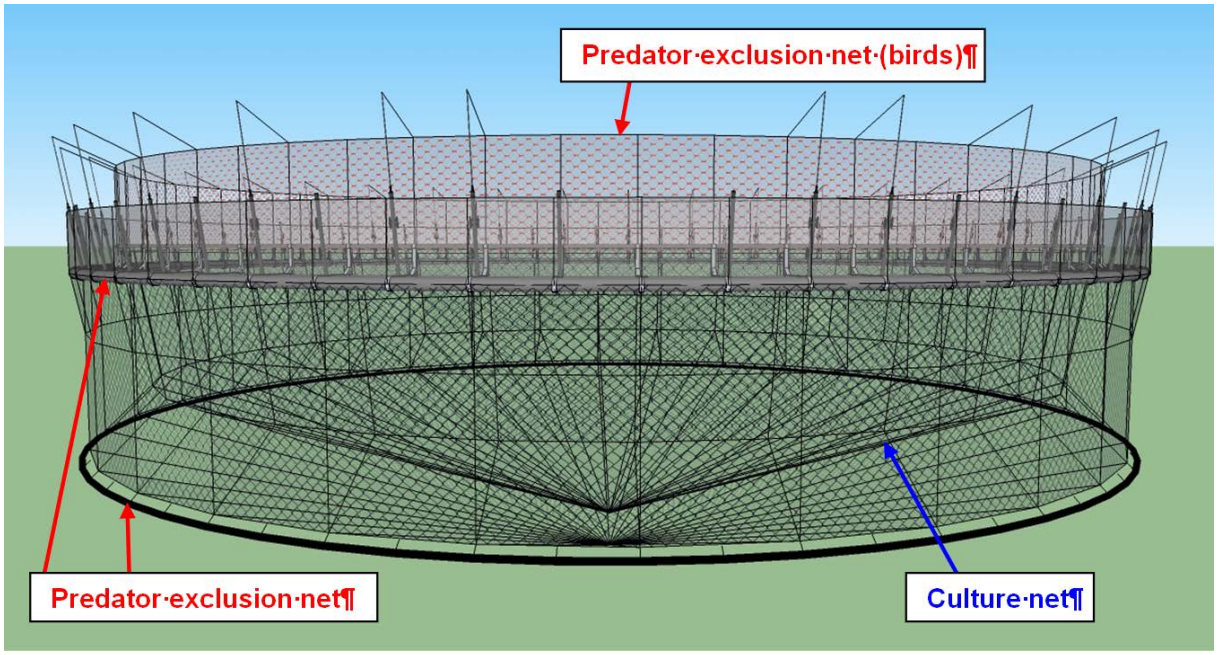

Figure 4: Predator exclusion nets above and below sea pens to mitigate interactions with marine fauna (Source: Huon, 2015).

1.1.2 Longline Aquaculture

Longline infrastructure consists of a mooring system that is connected to backbone ropes from which the culturing apparatus is suspended. The mooring system consists of anchors at each secured length of chain and rope, which is connected to the main backbone rope. Longline systems may comprise a single backbone or double backbone. The size of the primary and smaller stabilising anchor blocks is dictated by the weight of the farmed product, the overall length of longline and the site's wave climate.

The apparatus used to culture stock will vary depending on the species cultured, and may include:

- dropper lines, which are lengths of specially manufactured rope that enables certain cultured stock or algae to adhere to them (Figure 5). Dropper lines can also be continuous, where they are looped along the backbone in a continuous line
- pyramid nets and/or cages, which are meshed containers in the shape of a pyramid in which the cultured stock are contained (Figure 6)
- pocketed panel nets, which are generally a rectangular shaped structure that has a mesh consisting of a number of 'pockets' in which stock are placed for culture (Figure 6)
- lantern nets and/or cages, which are cylindrical shaped apparatus with an outer cover of mesh and a number of cross sectional layers in which the stock are placed for culture (Figure 6)
- baskets or trays which are generally constructed from plastic mesh and are available in a range of shapes and sizes. This apparatus is commonly used for intertidal culture of oysters.

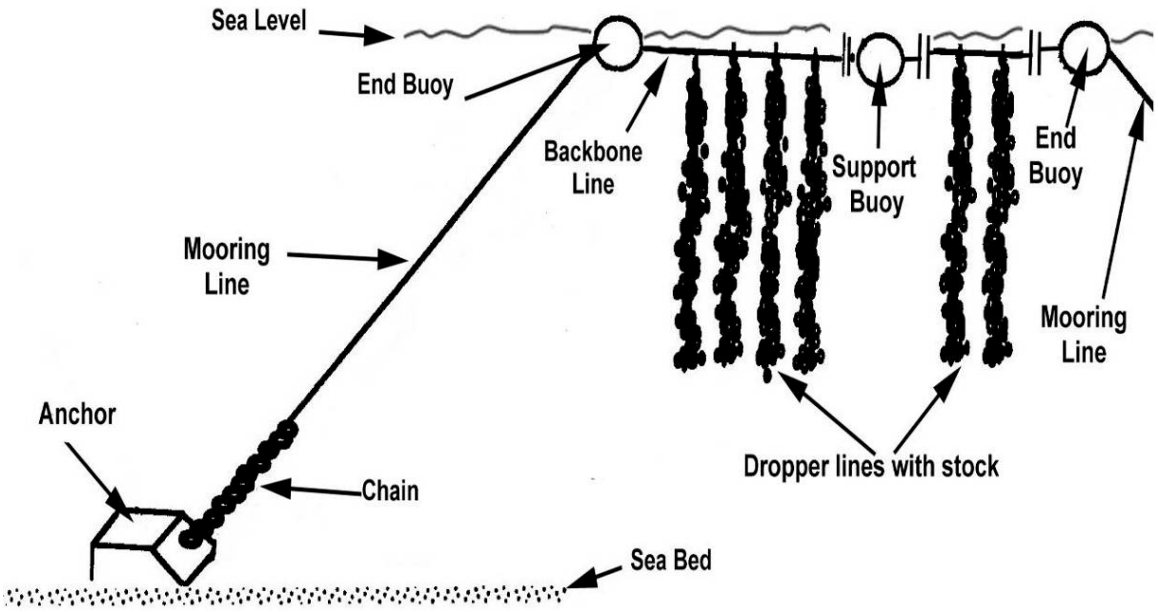

Figure 5: A schematic diagram of a longline system with dropper lines which is typically used for Blue Mussel culture (Source: NSW DPI, 2012).

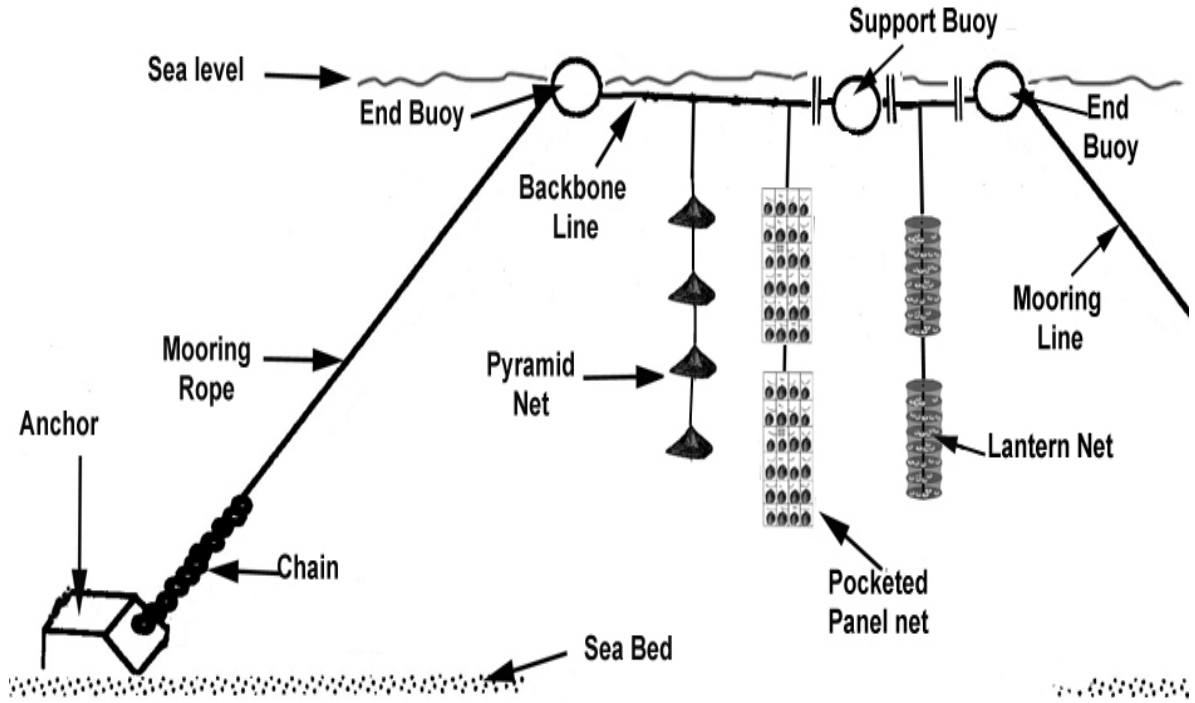

Figure 6: A schematic diagram of a longline system with pyramid, pocketed panel and lantern nets (Source: NSW DPI, 2012).

The pyramid, pocketed, lantern, basket and tray culture apparatus may be attached in multiples along a culture rope suspended under the backbone of the longline system. They are spaced at intervals that ensure efficient feeding of shellfish.

Buoys are attached to longlines to assist with supporting the system. The number of buoys used along each longline varies, depending on the growth stage of the stock and the need to secure cultured stock at an appropriate depth off the seabed, away from potential predators. Buoys are usually positioned 20 to 30 m apart when stocked with juveniles and as the crop increases in biomass, additional buoys are placed along the longlines (Figure 7).

Figure 7: Longline mussel infrastructure – dropper lines suspended below double backbone lines and buoys (Source: NSW DPI, 2009).

Longlines are typically positioned 15 to 50 m apart depending on the depth and prevailing sea conditions at the lease site. Figure 8 shows an example of a schematic plan of a longline lease, illustrating the layout of the structural components from an aerial and cross sectional view. Depending upon the water depth, longlines may be floating or suspended beneath the water surface.

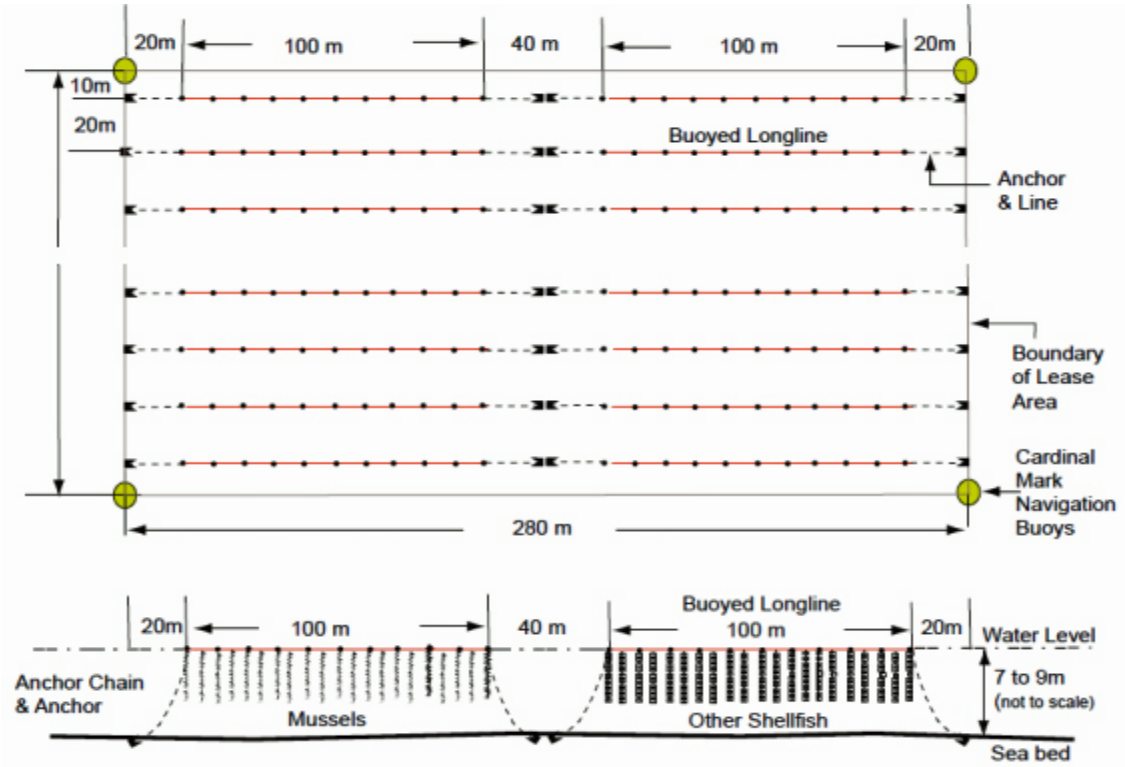

Figure 8: An example of a schematic plan of a longline lease illustrating the layout of the structural components from an aerial and cross sectional view (Source: Marine Pollution Research, 2008).

1.1.3 Artificial Reefs

Artificial reefs are manufactured structures placed on the seabed to provide habitat for cultured species. Artificial reef infrastructure comes in varying sizes, shapes and models. For example, cube-shaped modules constructed from reinforced concrete are used for abalone culture (Figure 9). The weight of the structures act as an anchor to maintain the structure within a lease area.

Once installed on the seabed, juvenile stock produced from land based hatcheries is transferred to the habitat modules to grow. The cultured species feeds on the naturally occurring matter (for example algae) that drifts past the submerged modules. When the stock reach the desired size, they are harvested by divers for processing on land.

Figure 9: Abalone growing on artificial reefs in the open ocean (Source: Ocean Grown, 2016).

1.1.4 Ranching

Sea ranching involves introducing juveniles into the marine environment where they are allowed to grow without containment structures (that is, no infrastructure is used) (Figure 10). Juveniles are placed on the seabed and the cultured species feeds on naturally occurring matter; there is no input of feed from the farmer.

Sea cucumbers (bêche-de-mer) and shellfish such as scallops are commonly grown around the world under ranching conditions. Scallops are normally grown in deep water and harvested using trawl boats. Sea cucumbers are normally harvested by hand, either by diving or hand-harvesting at low tide in shallow water.

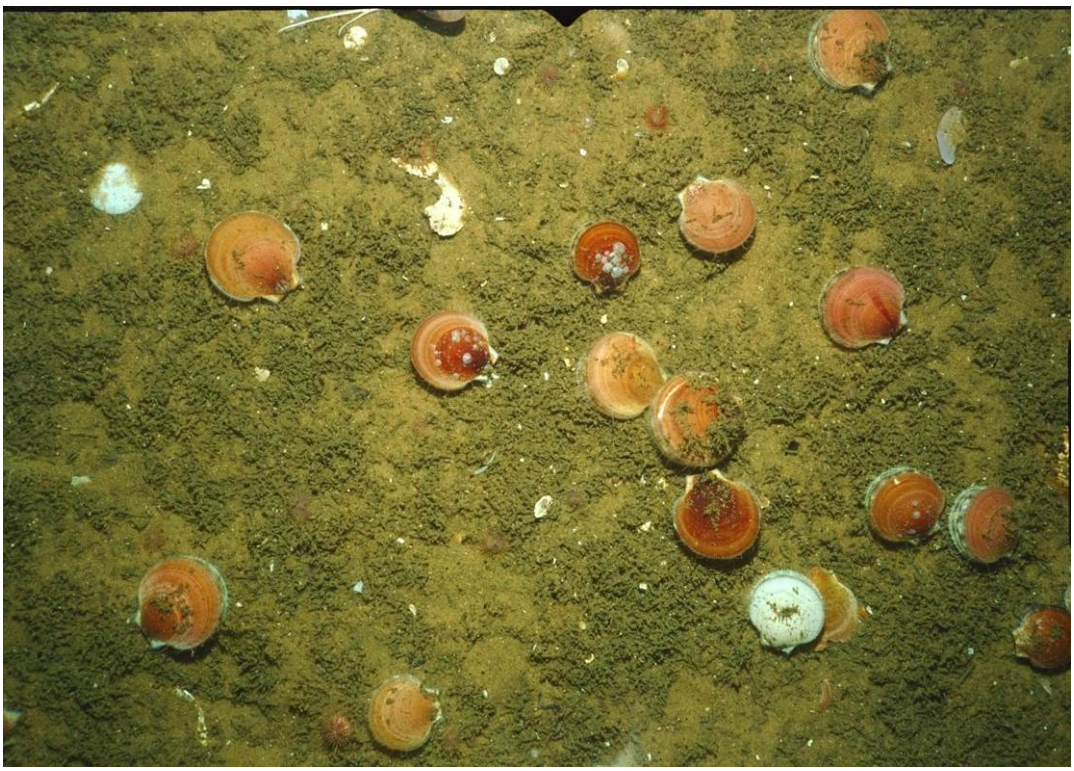

Figure 10: Ranching of scallops on the seabed (Source: NOAA, 2016).

1.2 Marine Aquaculture Activities

Marine aquaculture activities can be undertaken on a relatively large scale, producing many tonnes of product, or on a small scale, producing a smaller number of high value species.

In addition to the installation of infrastructure outlined in Section 2.3, a marine aquaculture farm may require land based facilities for:

- holding, breeding, hatchery, harvesting and pre-market conditioning of stock
- associated facilities for the preparation or storage of feed
- processing, manufacturing, packaging or distribution of products
- administration, laboratory, storage and maintenance
- waste management
- water extraction, storage, reticulation and recirculation systems
- transport facilities
- research and education
- related tourist activities.

2 The plannning approval process

2.1 Introduction

The planning controls for marine aquaculture are set by the *Environmental Planning and Assessment Act 1979* (EP&A Act). The EP&A Act provides a framework for environmental planning in NSW and includes provisions to ensure that proposals with the potential to

significantly affect the environment are subject to detailed assessment. The EP&A Act is administered by NSW Department of Planning and Environment (NSW DPE) under the *State Environmental Planning Policy - State and Regional Development 2011* (State and Regional Development SEPP).

All proposed marine aquaculture applications are required to be assessed by NSW DPE and require approval from the Minister for Planning and Environment. If approved, the project will be subject to consent conditions issued by NSW DPE.

2.1.1 How does the NSW Marine Waters Sustainable Aquaculture Strategy help the assessment process?

The MWSAS provides a regulatory and industry best practice framework within the context of ESD, for a simplified assessment and approvals process for marine aquaculture projects in NSW. The strategy aims to assist and guide the private sector and government (proponents), as well as industry and consent authorities. The MWSAS is given effect as an Aquaculture Industry Development Plan for marine aquaculture in NSW, under the provisions of the *Fisheries Management Act 1994*.

Mandatory locational constraints and approval requirements in the MWSAS are required to be addressed in an application for marine aquaculture. Additional constraints and requirements may be identified and applied depending on location and operational activities of a particular development.

The MWSAS provides the NSW Government with a platform to identify suitable marine aquaculture investigation areas and invite tenders for leases within these areas. The MWSAS also provides the community and stakeholders with relevant advice to inform them about sustainable marine aquaculture.

A streamlined assessment process will be applied to marine aquaculture projects that are appropriately sited, employ industry best practices and pose a low risk to the environment.

2.1.2 Who should you consult when planning your aquaculture project?

Before undertaking a marine aquaculture project, proponents must check what government approvals are required and consult with applicable stakeholders (see Table 1).

Table 1: A list of government agencies that may need to be consulted when undertaking a marine aquaculture project.

Stakeholders	
Department of Industry - Lands and Forestry	NSW Food Authority
Local Land Services	NSW Marine Estate Management Authority
Native Title Services Corp	NSW National Parks and Wildlife Service
NSW Aboriginal Land Council	NSW Office of Environment and Heritage
NSW Department of Planning and Environment	Office of Local Government
NSW Department of Planning and Environment (Resources and Geosciences)	Port Authority of NSW
NSW Department of Primary Industries	Transport for NSW -NSW Roads and Maritime

Stakeholders	
	Services
NSW Environment Protection Authority	

2.2 Planning Approval

2.2.1 Is it permissible?

The first thing to consider when planning a marine aquaculture project is whether it is permissible in the proposed area. The proposed location must comply with the mandatory locational constraints criteria listed in the MWSAS (see Table 2). These locational constraints prohibiting marine aquaculture development will be outlined in the *State Environmental Planning Policy No 62 – Sustainable Aquaculture* (SEPP 62). If aquaculture is permissible in the proposed area, an application for development consent must be submitted to NSW DPE which addresses the mandatory approval requirements contained in the MWSAS.

Table 2: Constraints for NSW marine aquaculture projects.

Criteria	Constraint
1. Conservation exclusion zones	Must not be within land reserved or acquired under the *National Parks and Wildlife Act 1974*, nature reserves, Aboriginal or European historic sites.
2. Marine conservation areas	Must not be within marine park Sanctuary Zones (or equivalent) or aquatic reserves.
3. Pipelines and cables	Must not be within 1 km of sewage outfall pipelines or protection zones for submarine communication cables.
4. Navigation channels and shipping port approaches	Must not be within 1 km of navigation channels and established shipping port approaches.
5. Department of Defence operational areas	Must not be within Department of Defence operational areas (for example, Naval Trace area at Jervis Bay).
6. Substrate type	Must not be located over rocky reefs (as defined by NSW DPI).
7. Seagrass beds	Must not be located over seagrass beds (as defined by NSW DPI).
8. Marine heritage items	Must not be within 1 km of maritime heritage items (for example, historic plane and shipwrecks).
9. Artificial reefs	Must not be within 1 km of purposefully constructed artificial reefs.
10. Marine infrastructure and monitoring	Must not be within 1 km of marine infrastructure (for example, moorings, boat ramps, and marinas) and monitoring equipment (for

Criteria	Constraint
equipment	example, Wave rider buoys). **Note:** *This distance will be regularly reviewed by NSW RMS and will require consultation prior to any site investigation.*
11. Species	Culture species must be spawned from the endemic population or from broodstock originating from the east coast of Australia. Culture species must not be genetically modified through the addition of any foreign genetic material (DNA) into an organism.
12. Distance between aquaculture leases	Must address biosecurity separation distances between farm operations.

2.2.2 Is it SSI or SSD?

Marine aquaculture projects are to be assessed under State Significant Infrastructure (SSI) or State Significant Development (SSD) of the EP&A Act. To enable this, amendments will be made to relevant environmental planning instruments to create streamlined approval pathways for marine aquaculture in NSW.

For projects requiring development consent that are in NSW coastal waters, these will be assessed as SSD consistent with the requirements of the State and Regional Development SEPP. For activities being undertaken by public/government authorities (such as marine aquaculture research projects) these will be considered in accordance with the environmental impact assessment requirements of SSI.

When an SSI or SSD application is made, NSW DPE must provide the proponent with the Secretary's Environmental Assessment Requirements (SEARs). In preparing the SEARs the Secretary must consult with relevant public/government authorities and consider any issues raised by them. This may also include a pre-SEARs request meeting or planning focus meeting to discuss any perceived issues regarding a proposed NSW marine aquaculture project. The SEARs for a proposal must be made publicly available on the NSW DPE's website.

The SEARs will require proponents to prepare an EIS in accordance with the EP&A Regulation. Once an EIS is lodged with NSW DPE it will be placed on public exhibition for a minimum of 30 days. During the public exhibition period any person can make a written submission regarding the proposal. These submissions, along with public and government agency submissions received during the exhibition period, will be made available on NSW DPE's website.

The Secretary will provide copies of submissions to the proponent and request that a response to the submissions received during the public exhibition period be prepared to:

- address the matters raised in the submissions
- provide additional information as required
- outline any proposed changes to the SSI/SSD.

The response to the submissions document will also be made publically available on NSW DPE's website.

Upon receipt of all required information, the Secretary will prepare a report for the Minister of Planning. The Minister in determining a proposed SSI or SSD development may:

- approve the application outright, or with modifications, or with conditions
- refuse the application, providing reasons for the disapproval to the proponent.

The Minister's decision regarding the SSI or SSD will be publicly available on NSW DPE's website.

The consent conditions within the SSI or SSD determination may be written to allow adaptive management to optimise future production management and sustainability assessment within marine aquaculture leases.

Utilising a SSD or SSI pathway will mitigate an ad hoc approach to development assessment and ensure that all NSW marine aquaculture projects are subject to rigorous and transparent assessment through the preparation of an EIS.

2.2.3 Additional State Approvals

There are a number of approvals in addition to the SSI or SSD process which may be required for marine aquaculture projects in NSW (see Table 3). These approvals are applicable to all marine aquaculture projects except the marine park permit, which is only required if the aquaculture lease is within a marine park. The Food Authority licence is also only applicable if the cultured stock is intended for human consumption.

Table 3: Additional assessments and approvals for marine aquaculture developments in NSW.

Assessment or Approval	Consent Authority	Legislation
Land owner's consent (Crown land)	Department of Industry – Lands and Forestry (Crown Land Division)	*Crown Lands Act 1989*
Aquaculture lease	NSW Department of Primary Industries	*Fisheries Management Act 1994 – Section 163*
Aquaculture permit	NSW Department of Primary Industries	*Fisheries Management Act 1994 – Section 144(1)*
Marine park permit	NSW Department of Primary Industries	*Marine Estate Management Regulation 2009 – Clause 12*
Food Authority licence	NSW Food Authority	*Food Regulation 2015*
Matters of National Environmental Significance	Commonwealth of Australia Department of Environment and Energy	*Environment Protection and Biodiversity Conservation Act 1999*

2.2.4 Commonwealth Assessments and Approvals

Marine aquaculture projects are also subject to assessment under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). Under the EPBC Act a project requires approval from the Minister for Environment and Energy (the Minister) if the action has, will have, or is likely to have, a significant impact on matters of national environmental significance (see Figure 11).

The Minister decides whether the proposed action is:

(1) a 'controlled action' which requires assessment and approval under the EPBC Act

(2) 'not controlled action – particular manner' which does not require approval if the action is taken in accordance with the manner specified

(3) 'not controlled action' which does not require approval if the action is taken in accordance with the referral.

If the Minister decides an action requires approval, then an environmental assessment of the action must be carried out. The Commonwealth accredits the NSW environment impact assessment process so only one assessment is required for development that also requires Commonwealth approval under the EPBC Act.

After considering the environmental assessment report, the Minister decides whether to approve the action, and what conditions (if any) to impose.

Further assessment may also be required under other Commonwealth legislation such as the *Control of Naval Waters Act 1918, Historic Shipwrecks Act 1976, Native Title Act 1993, Environment Protection (Sea Dumping) Act 1981* and *Submarine Cables and Pipelines Protection Act 1963.*

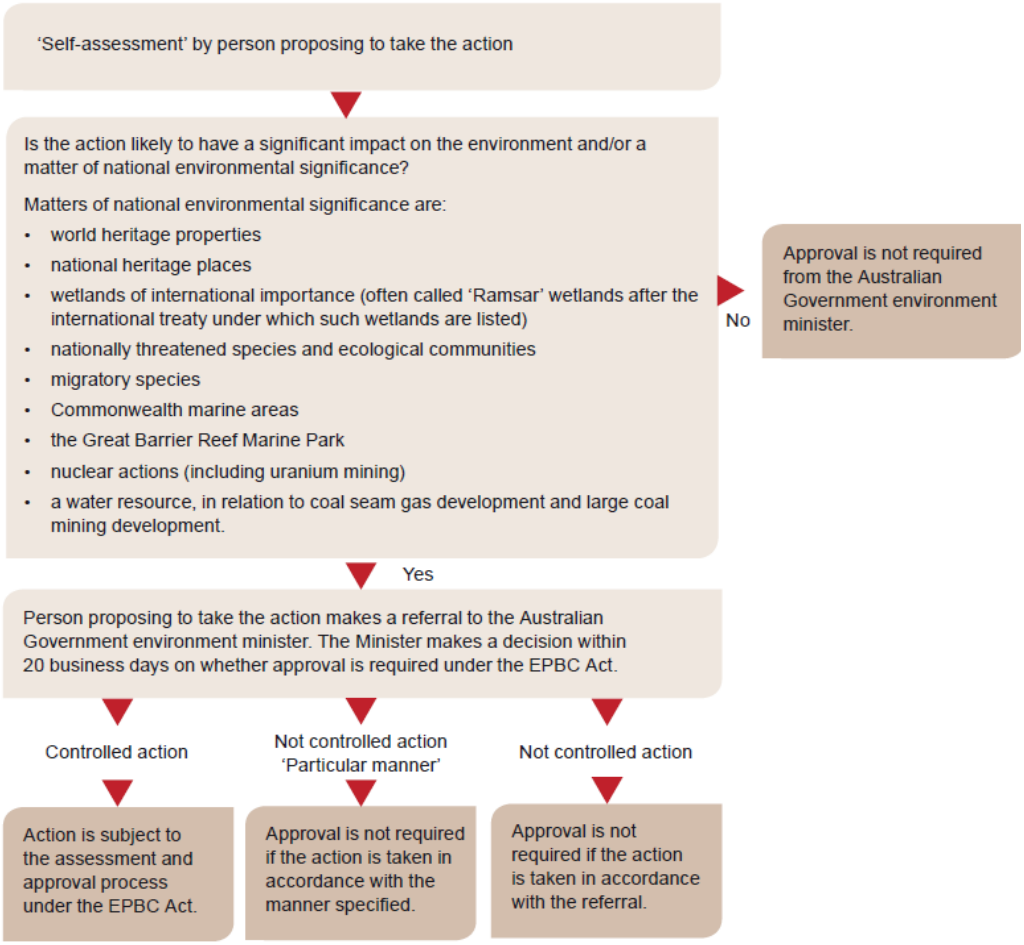

Figure 11: EPBC Act referral process (Source: Commonwealth of Australia, 2013).

2.2.5 Land Based Approvals

Any land or port based assessment requirements need to be confirmed up-front by discussing the project with NSW DPE and the relevant planning authority.

3 References

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4 ADDITIONAL READING

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NSW Land Based Sustainable Aquaculture Strategy (2009), NSW Department of Primary Industries

NSW Oyster Industry Sustainable Aquaculture Strategy (2016 – 3rd edition), NSW Department of Primary Industries

For further information

Visit: www.dpi.nsw.gov.au/fisheries/aquaculture

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