



NSW Oyster Industry Sustainable Aquaculture Strategy

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Foreword to the fourth edition

The fourth (2021) edition of the NSW Oyster Industry Sustainable Aquaculture Strategy (OISAS) is a review of the third edition of OISAS in response to the development of new floating cultivation and the availability of new materials that can be used to construct oyster farming infrastructure. These developments highlighted the need to clarify what constitutes a tidy oyster lease. The strategy updates the essential elements of the previous edition to ensure that they reflect the current administrative and approvals processes applicable to the NSW oyster industry.

The vision of a healthy and sustainable NSW oyster industry remains and with an increasing production trend, an aspirational production goal has also been retained. This is in the belief that the recent upward production trend will be maintained and enhanced by new investment and from innovative culture technology.

Executive summary

Aquaculture is one of the fastest-growing industries in the world. Already 54% of seafood consumed worldwide is produced through aquaculture. According to the United Nations' Food and Agriculture Organization, global aquaculture production rose 520% for the period 1990-2018 (FAO, 2020). Aquaculture contributes benefits to the state economy, with a flow-on effect to seafood processing and retail businesses, providing a likely output of \$226 million, as well as 1,758 fulltime jobs to New South Wales (NSW) in 2013/2014 (Barclay et al., 2016).

The NSW oyster aquaculture industry is Australia's largest producer of edible oysters, the fourth largest Australian aquaculture industry and accounts for 73% of the value of NSW aquaculture production. It is the state's most valuable fishery.

In recent years annual production has continued to grow steadily to 3,695 tonnes valued at the farm gate at approximately \$58.6 million in the 2018-2019 financial year. This growth has been driven by increasing investment in new environmentally sustainable farming technology and steadily increasing farm gate prices.

NSW Department of Primary Industries (DPI) estimates that the sustainable production level for oysters in NSW estuaries is around 7,500 tonnes and the principal aim of NSW Oyster Industry Sustainable Aquaculture Strategy (OISAS) is to establish the regulatory environment within which the industry can grow to this level.

This growth can be achieved within the boundaries of ecological sustainability and within the boundaries developed in co-operation with all relevant State government agencies, neighbouring communities and the oyster industry.

These boundaries are set physically, by the identification of suitable 'priority' areas for edible oyster aquaculture. Specifying areas where commercial oyster aquaculture is a priority intended outcome from a state perspective is the first recommendation of the Healthy Rivers Commission in its *Healthy Oysters, Healthy Rivers Report* (HRC, 2003).

Consistent with this recommendation, every 'priority' area in the state was individually inspected and evaluated against a list of location, environmental and socio-economic suitability criteria and classified as either suitable or unsuitable for classification as a Priority Oyster Aquaculture Area (POAA). Management and operational boundaries are established in a regularly updated set of best practice standards within OISAS, which are supported by a commitment to environmentally sustainable practices.

The importance of farmed oysters to healthy estuaries should not be underestimated. They are a sentinel species, in that, if the oysters are healthy and suitable for human consumption, then it is likely that the estuarine waters in which they are grown are also healthy. On average, a farmed oyster will filter in excess of 250,000 litres of estuarine water in its lifetime, removing large quantities of suspended material, chiefly nutrients bound in phytoplankton. This means that in many estuaries oysters play an important role in mitigating man made nutrient inputs and assist in maintaining estuary health, but in performing this role they are exceedingly vulnerable to poor estuarine water quality.

In recognition of this dichotomous relationship, OISAS establishes a set of water quality and flow objectives for oyster aquaculture areas that, if met, will provide for the healthy growth of oysters that are safe for human consumption. A set of water quality protection and improvement measures are proposed to achieve the desired water quality objectives for oyster aquaculture areas.

The assessment of all environmental aspects of oyster aquaculture in this strategy, and the establishment of best practice standards, allows for a streamlined approvals process for proposals that are located in the areas identified as POAA. Oyster aquaculture in these areas

will be 'development without consent' but will require an aquaculture permit and aquaculture lease from DPI.

Oyster aquaculture outside of POAA can be undertaken, but only with development consent from the relevant local council or Department of Planning Industry and Environment for state significant proposals. In the National Park estate, planning approval from the relevant authority and written Ministerial concurrence are required.

Contents

Foreword to the fourth edition	i	
Executive summary.....	ii	
Contents	iv	
Tables	vii	
Figures	vii	
Abbreviations	viii	
Definitions	ix	
Chapter 1	Introduction	1
1.1.	Vision statement.....	1
1.2.	Scope and objectives	1
1.3.	The need for this strategy.....	1
1.4.	Ecological sustainable development.....	2
1.5.	Implementation and legislation	3
1.6.	Community and stakeholder consultation	4
1.7.	Performance indicators and review	4
Chapter 2	Industry overview	6
2.1.	Industry history.....	6
2.2.	Current industry profile.....	8
2.3.	Agency roles and responsibilities	11
2.4.	Industry management initiatives	14
2.4.1.	Department of Primary Industries.....	14
2.4.2.	Crown Lands.....	15
2.4.3	The NSW Shellfish Program.....	16
Chapter 3	Healthy oysters and healthy estuaries.....	19
3.1.	Water quality for food safety.....	19
3.2.	Water quality for healthy oyster growth	20
3.3.	Tidal range, water flow, salinity and estuary entrance intervention	20
3.4.	Water quality and flow objectives for oyster aquaculture areas	22
Chapter 4	Water quality protection guidelines.....	24
4.1.	Recognition of oyster aquaculture in land and water use planning	24
4.2.	Guidelines for harvest area protection.....	24
Prioritising actions to address existing water quality issues	26	
4.3.	Case Study – Farquhar Inlet Entrance Management Strategy.....	26
Chapter 5	Priority Oyster Aquaculture Areas	28
5.1.	Areas where oyster farming is a desired outcome	28

5.2.	Oyster aquaculture area available for leasing.....	29
5.3.	Oyster aquaculture maps	31
Chapter 6	Commitment to environmentally sustainable practices	33
6.1.	Good neighbour policy	33
6.2.	Estuarine stewardship policy	33
6.3.	Commitment to comply with, and where possible exceed, regulated standards..	35
6.4.	Oyster industry Crown land base sites	35
6.4.1.	Definitions for Crown land base sites	36
6.4.2.	Delineation of lease boundaries and identification of structures and works	36
6.4.3.	Condition and maintenance of premises.....	37
6.5.	Stocking density.....	37
6.6.	Seagrass protection	38
6.7.	Live oyster reef protection	38
6.8.	Threatened species protection	39
6.9.	Hours of operation.....	39
6.10.	Noise.....	40
6.11.	Washing and temperature control spraying of oyster crops	40
6.12.	Dredging and reclamation	41
6.13.	Platforms and sheds	41
6.14.	Pest and disease control	41
6.15.	Theft of oysters and damage to oyster aquaculture leases.....	44
Chapter 7	Lease Marking.....	45
7.1.	Marking standards 'common' to all leases	45
7.1.1.	Marker post materials.....	45
7.1.2.	Marker post maintenance and repair	45
7.1.3.	Lease corner marker posts.....	45
7.1.4.	Intermediate lease marker posts	46
7.1.5.	Intermediate lease marker post spacing	46
7.1.6.	Oyster aquaculture lease signs	46
7.1.7.	Navigation aids.....	47
7.2.	Special marking standards	47
7.2.1.	Foreshore oyster aquaculture leases	47
7.3.	Approval to mark contrary to these standards	48
7.3.1.	Fisheries Officer approval for reduced marking	48
7.3.2.	Approval to use raft infrastructure as a boundary markers	48
7.3.3.	Aquaculture Administration approval to use floating markers	49

7.3.4.	Standards for floating marks.....	49
7.4.	Lease marking compliance.....	50
Chapter 8	Lease Tidiness.....	51
8.1.	Tidy standards ‘common’ to all leases.....	51
8.1.1.	Colour	51
8.1.2.	Shape and design	51
8.1.3.	Materials and Construction.....	51
8.1.4.	Maintenance and Repair	52
8.1.5.	Mooring of oyster industry vessels	52
8.1.6.	Waste management	52
8.1.7.	Removal of derelict cultivation that has formed live oyster reef in POAA.....	53
8.1.8.	Fallow leases	53
8.2.	Special tidy standards	53
8.2.1.	Catching slats	53
8.2.2.	Raft cultivation.....	53
8.2.3.	Floating cultivation	54
8.2.4.	Wave barrier fencing	54
8.2.5.	Spray Irrigation.....	55
8.3.	Maintenance Schedule.....	55
8.4.	Lease tidy compliance.....	56
8.5.	Decommissioning oyster aquaculture leases.....	56
Chapter 9	Planning and Approvals	57
9.1.	Approval of new oyster aquaculture leases	57
9.1.1.	New lease in a POAA.....	57
9.1.2.	New lease in a POAA in a Marine Park.....	57
9.1.3.	New lease NOT in POAA	57
9.1.4.	New lease in or adjacent to the National Park estate.....	58
9.1.5.	New lease in areas containing live oyster reef.....	59
9.2.	Competitive allocation of new lease areas.....	59
9.3.	Making Local Environmental Plans that may affect oyster aquaculture	60
9.4.	Determining development applications that may affect oyster aquaculture.....	60
9.5.	Aquaculture permits	61
9.6.	Administration of oyster aquaculture leases	62
9.7.	Maintenance dredging of oyster aquaculture leases.....	64
9.8.	Aquaculture species	65
9.9.	Approval of Crown Land land base leases and licences.....	68

9.10.	Transitional provisions.....	70
Chapter 10	Risk management and business resilience.....	71
10.1.	Risk Management	71
10.2.	Biosecurity Risk Management Plan	72
10.3.	Lease Maintenance and Development Plan	72
10.4.	Environmental Management Systems	73
10.5.	Climate Change	74
Chapter 11	References.....	75

Tables

Table 1: Triggers for review.....	5
Table 2: NSW oyster aquaculture production (human consumption).....	7
Table 3: Sanitary water quality standards for oyster harvest area classification.	18
Table 4: Water quality guidelines for oyster aquaculture areas.	23
Table 5: Assessment criteria for new priority oyster aquaculture areas in NSW estuaries.	29
Table 6: Lease area for oyster aquaculture.	31
Table 7: Intermediate lease marker post spacing.	46
Table 8: Oyster aquaculture lease sign specifications.	47
Table 9: Floating lease boundary marks.....	49
Table 10: Species of oyster currently approved for commercial cultivation on oyster aquaculture leases in NSW.	66

Figures

Figure 1: Annual NSW oyster production (tonnes) 1938/39 to 2019/20	6
Figure 2: The location of major oyster producing estuaries in NSW.	10
Figure 3: New lease assessment and allocation process.	61

Abbreviations

Abbreviation	Definition
AHD	Australian Height Datum
ASQAP	Australian Shellfish Quality Assurance Program
CL	Department of Planning Infrastructure and Environment (Crown Lands)
CLM Act	<i>Crown Land Management Act 2016</i>
CSIRO	Commonwealth Scientific Industrial Research Organisation
DAWE	Federal Department of Agriculture Water and Environment
DPI	NSW Department of Primary Industries
DPIE	Department of Planning Infrastructure and Environment
DRNSW	Department of Regional NSW
EIS	Environmental Impact Statement
EPA	Environment Protection Authority NSW
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
ESD	Ecologically Sustainable Development
FMA Act	Fisheries Management Act 1994
ha	Hectare
HEHO	Healthy Estuaries for Healthy Oysters Guidelines 2017
LEP	Local Environment Plan
LLS	Local Land Services
MEMA	Marine Estate Management Authority
MEMS	Marine Estate Management Strategy
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NPWS	National Parks and Wildlife Service

Abbreviation	Definition
OISAS	NSW Oyster Industry Sustainable Aquaculture Strategy
POAA	Priority Oyster Aquaculture Area
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
POMS	Pacific Oyster Mortality Syndrome
PPRD	State Environmental Planning Policy (Primary Production and Rural Development) 2019
QX	A disease of Sydney Rock Oysters
REF	Review of Environmental Factors
SEE	Statement of Environmental Effects
SEPP	State Environmental Planning Policy
TARA	NSW Marine Estate Threat and Risk Assessment Final Report (2017)
TfNSW	Transport for NSW

Definitions

Term	Definition
Aquaculture	The commercial cultivation of aquatic animals or marine vegetation for the purpose of harvesting the animals or marine vegetation, or their progeny for sale, or the keeping of animals or marine vegetation in a confined area for commercial purposes as defined in <i>Fisheries Management Act 1994</i> .
Biosecurity Risk Management Plan	A document prepared to help you, your staff and visitors prepare for and understand how to reduce aquatic pest and disease risks to your aquaculture business, industry and the environment and to support a rapid response to any suspect pest or disease.
Broodstock	A parent shellfish.
Catchment area	A drainage area, for example for a reservoir, river or estuary (includes subject water body as well).

Term	Definition
Carrying capacity	The maximum biomass (weight) of shellfish that an area can support and remain commercially viable.
Culling	The division by hand of clumps of oysters into single oysters or the removal by hand of unwanted marine organisms which attach to oyster crops.
Catching	The collection of wild juvenile shellfish spat - settled onto artificial 'catching' materials such as plastic slats placed on an aquaculture lease.
Depoting	A historical practice of using blocks of catching sticks bound together. The protection of the block enables oysters to grow to a size that can withstand predation by fish, prior to separation into a single layer of sticks.
Depuration	A statutory process that requires oysters to be placed in a sterilised recirculation tank for 36 hours. During this process oysters self-cleanse in recirculation water, which is sterilised using ultraviolet light.
Development without consent	Has the same meaning as it would under the <i>Environmental Planning and Assessment Act 1979</i> .
Development with consent	Has the same meaning as it would under the <i>Environmental Planning and Assessment Act 1979</i> .
Diploid oyster	A normally reproductive oyster containing two sets of chromosomes
Floating cultivation	Sub-tidal cultivation of oysters, on sticks or in baskets suspended beneath floatation systems. Floating cultivation may include lines and/or polyethylene floats, buoys or pipes.
Endangered species	The species is likely to become extinct in nature if threats continue, or its numbers are reduced to a critical level, or its habitat is reduced.
Endemic species	A species confined in occurrence to a local region.
Environmental impact	The potential biophysical, social and/or economic effects of an activity on the community or the natural environment.
Environmental Impact Statement	A detailed assessment on the potential effects of a proposed development prepared in accordance with the requirements of the <i>Environmental Planning and Assessment Act 1979</i> .
Estuarine	Pertaining to or formed in an estuary (brackish water). Also relates to those soil materials, which have been under the influence of brackish water during their deposition.
Fish	As defined in <i>Fisheries Management Act 1994</i> .

Term	Definition
Indigenous species	A species native to a particular region or country at the time of first British colonisation.
Introduced species	A species introduced into an area where it does not naturally occur.
Keystone species	Marine keystone species provide architectural complexity that serves as essential habitat in which many other marine species find refuge for their young and also from predators.
Lease Maintenance and Development Plan	A document that describes all the oyster aquaculture lease areas held by an aquaculture permit holder, the condition of infrastructure on the lease areas and how the infrastructure will be maintained and/or the lease area will be developed in the future.
Mudworm	A group of marine boring polychaete worms which can cause significant oyster mortality.
National Parks Estate	Lands reserved or acquired under the <i>National Parks and Wildlife Act 1974</i> .
NSW Shellfish Program	A NSW oyster industry food safety program administered by the NSW Food Authority.
Notifiable matter	Pest or disease listed in Schedule 1 of the Biosecurity Regulation 2017, that if suspected is required to be reported to DPI.
Oyster aquaculture lease	An area of submerged Crown land that is leased for the purpose of oyster aquaculture.
Oyster aquaculture land base site	An area of non-submerged Crown land that is leased or licensed for the purpose of supporting oyster aquaculture.
Pathogen	An infectious agent capable of causing disease.
pH	A measure of acidity or alkalinity of a substance. A pH of 7.0 denotes neutrality, higher values indicate increasing alkalinity, and lower values indicate increasing acidity.
POMS	A viral disease of Pacific Oysters caused by the OsHV-1 micro variant.
Post supported intertidal cultivation	A series of parallel vertical posts that support horizontal rails or lines on which oyster sticks, trays and/or baskets that are attached so the oysters are submerged for varying periods of the tidal cycle.

Term	Definition
Prohibited Matter	Pest or disease listed in Schedule 2 of the Biosecurity Act 2015. It is illegal to buy, sell or otherwise deal with these pests and diseases. If a prohibited matter pest or disease is suspected it is required to be reported to DPI.
QX disease	A disease of the Sydney Rock Oyster caused by the protozoan parasite (<i>Marteilia sydneyi</i>).
Raft cultivation	Sub-tidal cultivation of oysters in trays or baskets suspended from a permanently anchored, rigid, high buoyancy structure such as a pickle drum raft. Rafts generally have a rigid frame from which the cultivation material is suspended.
Ramsar Convention	Convention on Wetlands of International Importance to which Australia is a signatory
Salinity	The measure of salt concentration of water in ponds, tanks or hatchery expressed in part per thousand or ppt.
Siltation	The deposition of silt or sand in the estuarine environment.
Single seed oyster	An individual unattached oyster that is grown from small spat produced by removing wild oysters at a very early age from plastic collectors or produced as single oysters in a shellfish hatchery.
Spat	Small juvenile oysters either wild caught or hatchery stock.
Stick cultivation	Traditional growing of wild caught oysters on the sticks that they are caught on. Suitable method for areas subject to significant wave action. 'Stick oysters' may be removed from sticks and fattened on trays or in baskets prior to harvest.
State Environmental Planning Policy (SEPP)	State Environmental Planning Policy as an instrument pertaining to issues of state, regional or district environmental planning significance made under S.3.29 of the EP&A Act.
Stocking density	Number of animals per given area.
Tray cultivation	Growing out single seed oysters on trays. Suitable method for sheltered areas. Often used for the final stage of growth prior to harvest.
Triploid oyster	A functionally sterile oyster bred to contain three sets of chromosomes (triploid oysters occur naturally at low frequency in nature)
Winter Mortality	Causative agent currently under review, thought to be caused by <i>Bonamia (Mikrocytos roughleyi)</i> .

Chapter 1 Introduction

1.1. Vision statement

The vision of the NSW Oyster Industry Sustainable Aquaculture Strategy (OISAS) is to achieve the ecologically sustainable production of 7,500 tonnes of premium NSW oyster products for domestic and export markets by 2030.

1.2. Scope and objectives

OISAS applies to the edible oyster aquaculture industry which cultivate oysters on Class 1 aquaculture leases in estuarine waters in NSW issued under the *Fisheries Management Act 1994 (FM Act)*. This strategy only applies to other non-oyster species where they are grown on an oyster aquaculture lease using oyster farming practices described in this document.

In non-estuarine waters the cultivation of oysters must comply with the provisions of the NSW Marine Waters Sustainable Aquaculture Strategy.

Oyster aquaculture is the commercial cultivation of any species of edible oyster (e.g. Sydney Rock Oyster, Native (flat) Oyster, Pacific Oyster). Oyster aquaculture includes all routine activities associated with the cultivation of oysters, including the construction and maintenance of culture infrastructure and stock management activities for nursery and grow-out operations.

OISAS:

- identifies those areas within NSW estuaries where oyster aquaculture is a suitable and priority outcome
- secures resource access rights for present and future oyster farmers throughout NSW
- documents and promotes environmental, social and economic best practice for NSW oyster farming and ensures that the principles of ecological sustainable development, community expectations and the needs of other user groups are integrated into the management and operation of the NSW oyster industry
- formalises industry's commitment to environmentally sustainable practices and a duty of care for the environment in which the industry is located
- provides a framework for the operation and development of a viable and sustainable NSW oyster aquaculture industry with a clear approval regime and up-front certainty for existing industry participants, new industry entrants, the community and decision makers
- identifies the key water quality parameters necessary for sustainable oyster aquaculture and establishes a mechanism to maintain and where possible improve the environmental conditions required for sustainable oyster production
- ensures that the water quality requirements for oyster growing are considered in the State's land and water management and strategic planning framework.

1.3. The need for this strategy

The need for OISAS arose from concerns of both the NSW government and the NSW oyster aquaculture industry, as to the existing and potential impact on the oyster aquaculture industry associated with the rapid development of the NSW coastline. The strategy has been developed by the government in partnership with the NSW oyster aquaculture industry and local community and other key stakeholders. The strategy sets out best practice in the identification and use by the oyster aquaculture industry of those estuarine areas suitable as Priority Oyster Aquaculture Areas (POAA) and provides for the protection of water quality in these areas. The strategy is one of a suite of strategies initiated by the NSW government for the management and development of aquaculture in NSW.

1.4. Ecological sustainable development

Ecological sustainable development (ESD) is not just about the environment, but also about the viability of businesses and the broader community's wellbeing. The principles of ecologically sustainable development were adopted by all Australian governments in the National Strategy on ESD (1992) which states that we should be:

'Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.'

At the national level ESD is being addressed in aquaculture through the National ESD Framework. The *How to Guide for Aquaculture* (Fletcher et.al. 2004) is the first stage in the development of this framework and documents the methods needed to enable the initial analyses of any aquaculture sector against the principles of ESD. OISAS has been developed with reference to this framework. More information regarding the National Strategy on ESD can be found at www.fisheries-esd.com.au/c/implement/implement0300.cfm.

Since NSW adopted the National Strategy on ESD, it has become a major objective of all NSW natural resource management, environment protection and planning legislation. A key object of the *FM Act* is to promote ecologically sustainable development and this object is being met in part through the development of state-wide Sustainable Aquaculture Strategies. ESD is now accepted as the foundation for aquaculture management in NSW.

The relevant definition for ESD in NSW is given in the *Protection of the Environment Administration Act 1991* (s.6), which states:

Ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

- the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- in the application of the precautionary principle, public and private decisions should be guided by:
 - careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment
 - an assessment of the risk-weighted consequences of various options.
- inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations
- conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration
- improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services, such as:
 - polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement
 - the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste

- environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The principles of ESD are integrated into OISAS by:

- identifying areas where oyster farming is an intended outcome and implementing measures that will lead to the protection and improvement of water quality in those areas
- permitting oyster farming in areas only where it is ecologically sustainable by virtue of its location, for example navigation channels and environmental sensitive areas are excluded
- describing best operational and management practices for the industry that are based on ESD principles.

For the oyster industry, adopting ESD principles will:

- provide a pathway to address issues affecting the industry's long-term survival
- put in place a systematic and recognised means of establishing the industry's resource management credentials with regulatory agencies, oyster consumers and neighbours
- put the industry in a stronger position to argue for the protection of the environmental conditions required for oyster growing
- support the industry's position as a legitimate user of public water land
- result in improved development outcomes that provide greater certainty and a simplified assessment and decision-making process.

For individual farmers the potential benefits are to:

- safeguard business profitability through maintaining access to existing markets, accessing new 'green' markets and reducing the cost of production
- gain the support of the local community and reduce the risk of conflict with neighbours
- understand obligations to comply with environmental and planning legislation so that the risk of breaches can be minimised
- have ongoing continual improvement that will help the business keep pace with developments in environmental legislation and community expectations.

For the broader community the potential benefits are:

- improved environmental outcomes that address cumulative issues and provide effective indicators of sustainability
- increased certainty in the scale, nature and operation of the industry
- increased confidence in the environmental performance of the industry
- improved employment outcomes with an improvement in industry viability
- improved outcomes for regional NSW with a coordinated approach to providing sustainable oyster aquaculture investment opportunities.

1.5. Implementation and legislation

OISAS is as an Aquaculture Industry Development Plan for the purpose of s.143 of the *FM Act*.

State Environmental Planning Policy (Primary Production and Rural Development) 2019 (PPRD) gives effect to planning provisions for oyster aquaculture. These provisions link to additional

planning provisions for aquaculture in the Standard Instrument – Principal Local Environmental Plan.

The implementation of OISAS requires effective collaboration between government, industry and the community. The strategy brings together the interests of economic development, land use planning and sustainable natural resource management to form a partnership that can lead to sustainable oyster aquaculture and employment generation in regional NSW.

NSW Department of Primary Industries (DPI) is the key agency responsible for delivery of the on-the-ground oyster industry management outcomes of the strategy. Local government and state agencies share responsibility for implementing the water quality measures and development assessment process detailed in Chapter 3 and Chapter 9 respectively.

The *FM Act*, requires performance indicators to be established within an Aquaculture Industry Development Plan to determine if the objectives set out in the plan are being achieved. The plan must also specify at what point a review is required if these performance indicators are not being met. The indicators in Table 1 will be used to meet these requirements.

1.6. Community and stakeholder consultation

This strategy was prepared under the auspice of the State Aquaculture Steering Committee with representatives from the following NSW government agencies:

- Department of Premier and Cabinet
- NSW Department of Primary Industries (Fisheries)
- NSW Department of Primary Industries - NSW Food Authority
- Department of Planning, Industry and Environment – Planning
- Department of Planning, Industry and Environment – Crown Lands
- Department of Planning, Industry and Environment – Environment Energy and Science
- Department of Planning, Industry and Environment - Environment Protection Authority
- Department of Planning, Industry and Environment - Office of Local Government
- Department of Planning, Industry and Environment - Resources and Geosciences
- Transport for NSW.

The strategy is the product of a whole-of-government process that integrates the requirements of all state government agencies to achieve a cohesive and consistent government position.

The NSW oyster industry was included through consultation with the NSW Shellfish Committee and an invitation for submissions sent to all oyster aquaculture permit holders.

In addition, copies of the strategy and an invitation to comment on it were sent to the agencies participating in preparation of the strategy, coastal Local Land Services and relevant Councils.

The strategy was placed on public exhibit prior to finalisation and gazettal.

1.7. Performance indicators and review

DPI, other agencies, local government and the NSW oyster industry are responsible for making recommendations on the need to review and update any aspects of the strategy as a result of cumulative impacts, technological developments or other changes in an estuary or area of an estuary.

The strategy will be reviewed at the direction of Deputy Director General DPI Fisheries and Game Licensing or if a review is triggered by the performance indicators given in Table 1. The

indicators relate to performance and cumulative issues and will provide a trigger that will initiate a review of the strategy.

DPI will review the performance indicators annually. This review shall consider the need to update the strategy generally or in relation to particular estuaries or particular aspects of environmental performance.

Table 1: Triggers for review.

Indicator	Justification	Trigger for review of the strategy (Triggers calculated at June 30 every year)
Annual production.	Production trends indicate industry viability and development.	Five-year moving average production drops by 187.5 tonnes or more.
Lease compliance.	Indicates commitment to best practice standards.	Number of compliant leases falls by more than 10% from previous year, OR More than 10% of current leases are not compliant five years after this strategy is gazetted.
Rainfall threshold for harvest closures.	Harvest closures are indicative of short-term water quality trends and are affected by catchment land use.	Rainfall threshold that triggers a closure is reduced in more than three harvest area management plans since the last review.
Harvest area classification.	Classification is an indicator of longer-term water quality.	More than two harvest areas have harvest classification downgraded due to water quality deterioration since the last review.
Leases abandoned due to water quality conditions.	Indicates sustainability of oyster farming areas and trends in water quality protection.	More than 5% of the total NSW lease portfolio abandoned due to water quality issues since the last review.

Chapter 2 Industry overview

2.1. Industry history

The utilisation of natural stocks of oysters in NSW has a long history. Oyster shells are common in Aboriginal middens along the coast, with some being carbon dated back to 6,000 BC. With the colonisation of NSW by Europeans, oysters were also gathered for food and burnt in large quantities (alive or dead) to provide lime for building mortar. As a result of these colonial activities, wild oyster stocks were quickly depleted and in 1868 legislation was passed to prohibit the burning of live oysters for lime. This legislation and the demand for edible oysters, fostered the establishment of commercial oyster cultivation practices during the 1870's. In 1884 the *Oyster Fisheries Act* was proclaimed, which regulated the gathering of oysters and the leasing of oyster beds.

The practice of commercial cultivation of oysters accompanied the early settlement and development of the NSW coast, becoming a significant element in the history of many coastal areas and towns. As such, the industry today has a strong association with the character and community of coastal NSW. It provides employment and contributes significantly to local regional economies. In many areas, oyster aquaculture leases and the industry's shore-based infrastructure delineate areas of community use and are now important elements in the historical heritage of these areas.

Oyster production grew steadily, reaching its peak in the 1976/77 financial year, by which time the industry had grown to the most important sector of the NSW fishing industry with an annual production approaching 9375 tonnes (Figure 1). This is equivalent to 17 million dozen oysters, valued (in today's dollars) at the farm gate at around \$136 million. This peak was driven mainly by a peak production of 2688 tonnes at Port Stephens and 2563 tonnes at the Georges River.

Since the mid 1970's, oyster production has declined. This has been attributed to many factors including supply-side factors such as; oyster disease; the effects of Pacific Oyster introduction and proliferation in key estuaries; the degradation of water quality in many coastal rivers, estuaries and lakes (White, 2001); and demand-side factors such as non-contested competition in the marketplace from oysters grown in other Australian states and the diversification of consumer tastes.

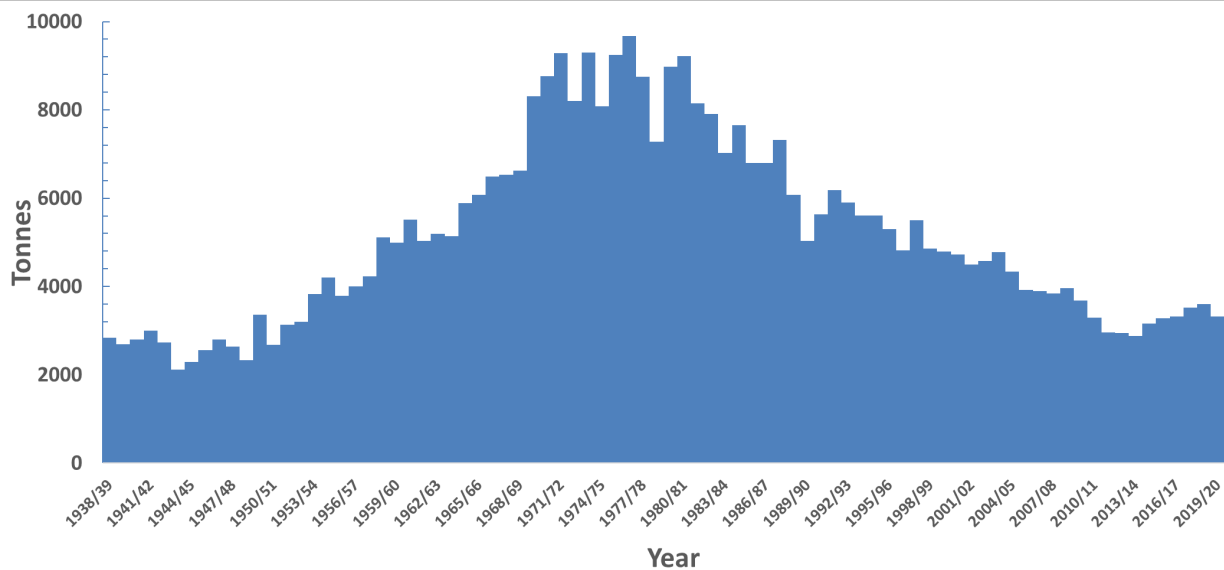


Figure 1: Annual NSW oyster production (tonnes) 1938/39 to 2019/20

Table 2 shows peak production of oysters for human consumption from the main oyster producing estuaries and the year the peak occurred. Of note is the significant loss of production due to the effects of QX disease (see Chapter 6.13) on the North Coast (Tweed to Clarence) in the early 1980's, Georges River in the mid 1990's and Hawkesbury River in 2004 and the effects of Pacific Oyster Mortality Syndrome (POMS) in Botany Bay in 2010 and the Hawkesbury River in 2013. The introduction and proliferation of the Pacific Oyster at Port Stephens in the mid 1980's and subsequent implementation of measures to control the spread of this oyster species had a significant impact on oyster production at Port Stephens and in a number of other NSW estuaries that were reliant on Port Stephens for juvenile oyster (spat) for on growing. It has been estimated that prior to the restriction on the movements of spat from Port Stephens, over 70% of all oysters sold for human consumption in NSW originated from spat sourced from this key estuary. Also of note is that peak production has occurred only recently in a number of NSW estuaries particularly on the NSW south coast driven by advances in farming technology and the resilient demand for NSW oysters.

Table 2 also shows the maximum 10 year moving average production from historical records. These records date back to 1930's for most estuaries and cover periods of high and low production. Ogburn (2011) uses the maximum 10 year moving average to estimate sustainable production levels at approximately 7500 tonnes taking into account the effects of production losses due to QX disease, POMS and Pacific Oyster infestation. This equates to approximately 2.6 tonnes per hectare grown on the currently leased area in NSW (June 2020).

At the estuary level, production records do not include spat produced and sold within the industry or the inter-estuarine transfer of oysters prior to sale for human consumption, so the actual biomass production from some estuaries greatly exceeds the DPI data records which only report annual oyster production of human consumption.

Table 2: NSW oyster aquaculture production (human consumption).

Estuary	2019/20		Historic Peak		Historic maximum 10 year moving average
	(tonnes)	dozens	(tonnes)	(year)	(tonnes)
Tweed River	*	*	246.5	1980/81	152.1
Brunswick River	*	*	60.3	1981/82	24.8
Richmond River	*	*	48.2	1940/41	31.9
Clarence River	*	*	131.6	1974/75	97.5
Woolli River	*	*	54.3	1966/67	39.6
Bellinger River	*	*	54.1	2001/02	30.3
Nambucca River	47.1	82326	191.6	1985/86	115.1
Macleay River	32.6	57041	367.6	1974/75	248.9
Hastings River	134.4	235155	433.9	1987/88	320.3
Camden Haven	132.7	232050	229.5	1977/78	167.1
Manning River	37.9	66414	428.4	1960/61	303.4
Wallis Lake	709.8	1241550	1802.6	1987/88	1448.8
Port Stephens	591.5	1034749	2695.6	1976/77	2123.3
Hunter River	*	*	42.9	1993/94	25.9
Brisbane Waters	74.1	129570	842.1	1982/83	557.7
Hawkesbury River / Patonga	108.98	189090	1328.3	1969/70	1049.9
Georges River/ Botany Bay	*	*	2566.8	1971/72	2057.7

Estuary	2019/20		Historic Peak		Historic maximum 10 year moving average
	(tonnes)	dozens	(tonnes)	(year)	(tonnes)
Shoalhaven*/ Crookhaven	74.6	130554	208.7	1990/91	143.4
Conjola/Burrill Lake & Narrawallee Creek	*	*	354.9	1980/81	59.1
Clyde River	345.2	603880	494.8	2003/04	381.5
Moruya & Tomaga	*	*	74.7	1981/82	31.8
Tuross Lake	51.0	89152	137.8	1994/95	87.0
Wagonga River	190.4	332969	204.8	1987/88	141.1
Bermagui & Cuttagee Lakes	*	*	62.5	1998/99	22.7
Nelson Lagoon	*	*	10.6	2001/02	6.9
Wapengo Lake	90.5	158376	113.3	1988/89	69.6
Merimbula Lake	405.5	709395	180.5	1999/00	134.8
Pambula River	156.2	273238	99.3	1986/87	59.8
Wonboyn Lake	59.0	103110	141.9	1990/91	66.6
Miscellaneous Estuaries	76.7	134427			
State Production	3,318.1	5,803,046	9,166.6	1976/77	

* A small number of permit holders farm these estuaries and data is combined and reported as 'Miscellaneous Estuaries' to ensure confidentiality.

2.2. Current industry profile

Oyster aquaculture is currently undertaken in 32 estuaries spread along the entire length of the NSW coast from the Tweed River on the Queensland border to Wonboyn Lake adjacent to the Victorian border (Figure 2). The industry comprises approximately 262 oyster aquaculture permit holders that hold between them 2,352 oyster aquaculture leases occupying 2,944 hectares of submerged Crown lands (April 2021).

While the NSW oyster industry is based almost entirely on the cultivation of the Sydney Rock Oyster (*Saccostrea glomerata*) which accounts for over 90% of the state's oyster production. The production of this species, which is native to the NSW and southern Queensland coast, is increasingly being supplemented by the expansion of production of the introduced Pacific Oyster (*Crassostrea gigas*) and small numbers of the Native Oyster (*Ostrea angasi*) being produced in a small number of estuaries in southern NSW.

Since the late 1990's the oyster industry has been moving away from the use of treated timber infrastructure developed in the early 1900's to the use of resilient UV stable and recyclable high density polyethylene (HDPE) infrastructure which includes the use of HDPE encapsulated recycled timber support posts and HDPE mesh baskets and trays for the cultivation of oyster crops. There has also been a significant shift away from traditional intertidal post and rail supported farming methods to the use of floating and post supported long-line basket farming systems. Due to significantly reduced seagrass shading impacts this production technology has reduced the impact of oyster farming activities on seagrass and benthic communities within lease areas. The use of these systems has also reduced the industry's demand for high value native marine grade timbers that are in short supply and significantly reduced the amount waste generated by the industry. It has also enabled the development of more efficient and cost-effective farming methods and an increase in the productive capacity existing oyster lease areas.

Currently around 80% of the supply of juvenile seed oysters to be on-grown by the NSW oyster industry is derived from the natural seasonal settlement of wild Sydney Rock Oysters on catching material placed on reliable catching lease located near the mouths of a number of key estuaries. This natural settlement which is caught on reusable plastic slats is removed by flexing the slats to produce single unattached oysters (single seed oysters). These single seed oysters are then placed in plastic mesh baskets and moved to nursery and grow-out lease areas where they usually remain for between two to three years. During this time, they are regularly returned to the farm land base site for size grading and thinning before being returned to the grow-out lease area. When the oysters are approaching a marketable size, they are moved to high value fattening leases where they remain for a short period prior to sale for human consumption. While the majority of oysters produced by the NSW oyster industry originate from wild catch the oyster hatchery supply sector is growing steadily. The development of hatchery technology for the production of Sydney Rock Oyster seed stock has enabled the development of fast growing and disease resistant breeding Sydney Rock Oyster which are now available to the NSW oyster industry. All Pacific Oyster and Native Oyster production in NSW is based on hatchery produced seed stock.

The increasing uptake of recent advances in oyster growing technology facilitated a 25% increase in production from 2882 tonnes in 2012/13 to 3,603 tonnes in 2018/19. Over the same period, strong demand and increasing farm gate prices, resulted in the state's farm gate value of production increasing by 67% from \$32.1 million to \$58.6 million. Unfortunately, the impact of catastrophic bushfires and the COVID 19 pandemic saw production fall to 3,318 tonnes (farm gate value \$53.6 million) in 2019/20.

The oyster aquaculture industry is the largest aquaculture industry in NSW by production value and accounts for approximately 32% of the State's total commercial fisheries production. In 2018 the industry was the fifth largest aquaculture industry in Australia, behind Tasmanian Atlantic salmon, South Australian southern bluefin tuna, Queensland prawn and the Western Australian pearl aquaculture industries. Oyster aquaculture is also one of the State's most valuable per hectare agricultural enterprises with long term gross average production of \$20,000/ha across the state and as high as \$40,000/ha in some estuaries, and with some individual high value leases in excess of \$400,000/ha.

Aquaculture has contributed benefits to the state economy, with a flow-on effect to seafood processing and retail businesses, providing a likely output of \$226 million, as well as 1,758 fulltime jobs to New South Wales (NSW) in 2013/2014 (Barclay et al., 2016). The NSW oyster aquaculture industry is Australia's largest producer of edible oysters, the fourth largest Australian aquaculture industry and accounts for 73% of the value of NSW aquaculture production. It is the state's most valuable fishery. White (2001) estimated that the total capital investment in the industry was in the vicinity of \$268 million. Currently the establishment cost for modern best practice oyster cultivation lease infrastructure is between \$50,000 and \$85,000/ha. DPI estimates that the current lease capital replacement cost for the NSW oyster industry is between \$102 and \$173 million at 70% lease utilisation. This does not take into account investment in land-based facilities and other plant and equipment which is estimated to be in the vicinity of \$60 million.

Around 85% of all oysters grown in NSW are sold within the State, while the majority of the remaining oysters are sold to interstate markets, there is also a small but growing number of oysters exported overseas. Classification of harvest areas under the NSW Shellfish Program (NSW SP), which is recognized internationally, is required to achieve export approval.

To export oyster overseas export approval is also required from the Federal Government Department of Agriculture, Water and the Environment (DAWE). While this enables access to most markets it currently excludes the EU and USA. To date NSW oysters and other shellfish

have been exported to a number of countries including China, Malaysia, Dubai, Japan, Singapore and Fiji. NSW currently has 32 export approved harvest areas.

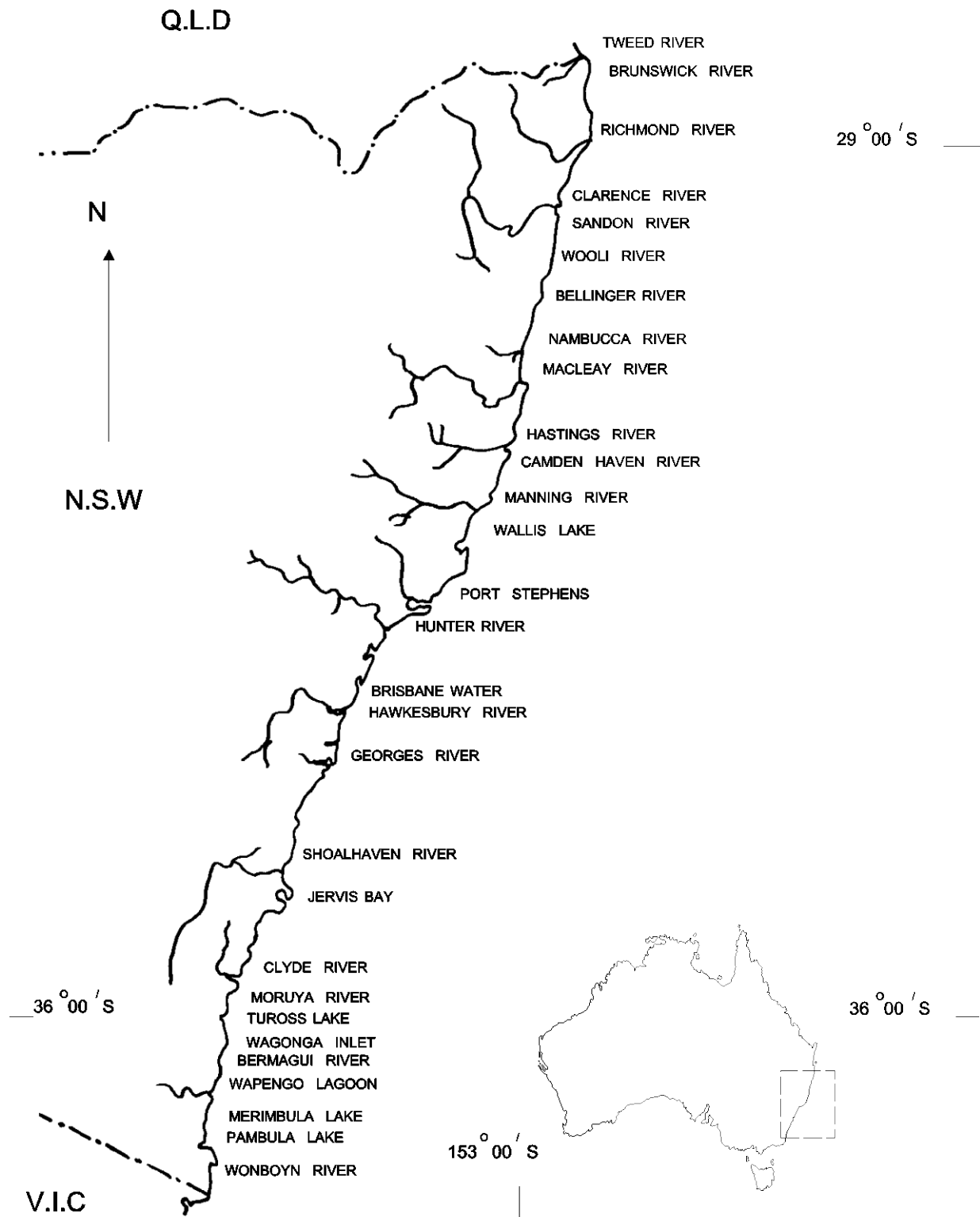


Figure 2: The location of major oyster producing estuaries in NSW.

2.3. Agency roles and responsibilities

The key agencies, and their responsibilities with respect to the NSW oyster industry, are summarised below.

NSW Department of Premier & Cabinet

The Department of Premier & Cabinet (DPC) has provided direction and leadership to ensure a whole of government approach to the development of this strategy.

NSW Department of Primary Industries (an agency within the Department of Regional NSW cluster)

NSW Department of Primary Industries (DPI) is the key regulatory agency for the NSW oyster industry. The department administers leases and permits, collates production data and develops policy. The department is also the key NSW aquatic habitat protection, biosecurity and compliance agency and develops policies and guidelines for the industry that are consistent with habitat protection objectives.

NSW Department of Planning, Industry and Environment

The NSW Department of Planning Industry & Environment (NSW DPIE) cluster comprises four key areas relevant to the oyster industry:

- Environment, Energy and Science (including the National Parks and Wildlife Service and NSW Environment Protection Authority);
- Housing and Property (Crown Lands);
- Planning and Assessment;
- Water

NSW DPIE Planning and Assessment is the key department for the oyster industry in ensuring that the OISAS is integrated into the state land use planning and development control frameworks. This part of DPIE ensures that strategies such as OISAS integrate the government's social, economic and environmental agendas to promote sustainability.

NSW DPIE Environment, Energy and Science (National Parks and Wildlife Service) has statutory responsibilities for protected and threatened wildlife throughout NSW, whether on or off the National Parks Estate. Of particular relevance to oyster aquaculture leases is the agency's role in the protection of marine mammals and reptiles, such as dolphins and sea turtles which may swim into shallow water, and shorebirds or waders which often forage in the intertidal zone and roost nearby. NSW DPIE (via the NPWS) has care and control of parks and other lands reserved or acquired under the *National Parks and Wildlife Act 1974 (NPW Act)* throughout NSW, and these are often located in estuarine areas. Although oyster aquaculture leases are granted under the *FM Act*, any new lease on the National Parks Estate requires the written concurrence of the Minister administering the *NPW Act* (currently the Minister for Energy and Environment).

NSW DPIE Environment, Energy and Science supports local government through the Coastal Management Programs which provides guidance and support for both coastal and estuary management planning and actions. NSW DPIE also works with the oyster industry to provide estuary process information when available to help resolve issues such as dredging and estuary opening.

NSW DPIE Water also has a lead role in developing environmental objectives for water quality and river flows for government and has developed a number of resources and tools for water managers, including local councils, and Local Land Services (LLS).

NSW Food Authority (an agency within the NSW Department of Primary Industries)

The NSW Food Authority (NSW FA) provides the regulatory framework for safe and correctly labelled food to be produced in NSW. Of particular importance to the oyster industry, the NSW FA has responsibility for implementing the NSW SP that classifies and establishes management plans for oyster harvest areas. The NSW FA also licenses oyster depuration, processing, transport and handling facilities.

Environment Protection Authority (an agency within the NSW Department of Planning Industry and Environment cluster)

The NSW Environment Protection Agency (EPA) is the primary environmental regulator for New South Wales. The EPA regulates pollution from activities specified in Schedule 1 of the POEO Act (scheduled activities) and those undertaken by a public authority. In most other cases, the local council is responsible for regulating environmental impacts from land based activities and Transport for NSW (TfNSW) regulate water pollution from vessels.

Crown Lands (an agency within the NSW Department of Planning Industry and Environment cluster)

Crown Lands (CL) is the primary administrator for Crown land tenures, Crown roads and Crown Reserves across NSW. CL leases and licences Crown land to the oyster industry for land based activities oyster farming activities and also gives land owners consent to lodgement of development applications for new oyster aquaculture lease areas and development on oyster land base tenure sites where development consent is required.

Future management of land-based sites located on Crown land will be driven by the need for both the oyster farmer and CL to maintain an environmentally sensitive and professionally well managed land base. This will be achieved through the process of lease and licence agreements and an associated Work Plan that is developed in partnership with the oyster farmer to achieve sound environmental and social outcomes.

Another key role for CL is the determination of Aboriginal land claims over the Crown estate under the *Aboriginal Land Rights Act 1983* and consideration of native title under the *Commonwealth Native Title Act 1993*.

Transport for NSW

Transport for NSW (TfNSW) is the state government's maritime regulator responsible for providing safe and sustainable ports and waterways. TfNSW helps to establish oyster aquaculture lease marking requirements and helps to determine if a lease area will adversely affect navigation. TfNSW also has responsibilities for pollution from vessels.

Marine Estate Management Authority NSW

Marine Estate Management Authority (MEMA) manages the NSW marine estate including the Marine Parks estate. MEMA seeks to conserve all forms of marine plant and animal species (biodiversity) in the NSW marine estate. MEMA brings together key agencies including DPI, Environment Energy and Science, Planning and Assessment and TfNSW for the declaration, management, selection and zoning of marine parks and the regulation of ecologically sustainable use of these areas and other marine areas in NSW.

Office of Local Government (an agency of NSW Department of Planning Industry and Environment cluster)

Local government has a diverse role covering town planning, building approvals, local roads, parking, public libraries, public toilets, water and sewerage, approval and inspection of septic systems, waste removal, domestic animals and community facilities. Of particular importance to the NSW oyster industry is councils' part in managing estuarine water quality and resolving land

and water use conflicts through estuary management planning, land use planning and development control. Councils' may also provide waste management services to the industry. Councils also assist the oyster industry with water quality monitoring and have a role in investigating water pollution incidents.

Local Land Services (an agency within the Department of Regional NSW cluster)

Local Land Services (LLS) coordinate natural resource management at the catchment scale. The LLS are responsible for involving regional communities in catchment planning and identification of natural resource management priorities for their region, and are the primary means for the delivery of funding from the NSW and Commonwealth Governments to help land managers improve and restore the natural resources of the State. Key roles include preparing Catchment Action Plans, managing investment programs to implement the plans, and promoting community participation in regional natural resource management action and decision making. Implementation of the Catchment Action Plans in the coastal LLS regions will lead to favourable outcomes for the oyster industry.

2.4. Industry management initiatives

2.4.1. Department of Primary Industries

DPI is the key agency responsible for the licencing and administration of aquaculture leases and permits issued under the *FM Act*.

Oyster aquaculture lease bond system

In January 2001 the oyster aquaculture lease Security Arrangements (bond) came into effect in NSW. Payment of a bond applies to all oyster farmers in NSW. The bond system was introduced to ensure that the industry shares responsibility for problems arising from lease management and maintenance issues.

The bond is either a cash deposit or bank guarantee to the value of \$1000 per hectare OR an annual non-refundable contribution of \$40 per hectare.

Leasing and re-leasing

DPI has a competitive biannual tender process for letting all vacant lease areas so that the commercial value of these areas can be realised. Leases with derelict infrastructure on them will be re-let subject to the new lessee removing all old materials prior to placing new infrastructure on the lease.

Oyster aquaculture on-line business platform

DPI has developed an e-business platform for aquaculture lease and permit holders. The system enables oyster farmers to:

- set up an online account so they can view their lease, permit, farm holdings
- organise for other individuals (agents) to view their lease, permit, farm holdings
- submit their annual production returns.

Aquaculture compliance strategy

In order to ensure high standards of environmental and operational performance by industry, DPI provides a combination of consistent management, monitoring, education and enforcement.

This involves:

- **Regular permit and lease condition inspections conducted by DPI** – The standard inspection period is every three years, however where required a lease condition inspection may be undertaken at any time.

Permit holders are also required to electronically acknowledge that they understand their lease and permit obligations regarding lease marking and tidiness when completing their annual production return online. It is compulsory for all aquaculture permitholders to submit an annual production return to DPI.

Where an inspection conducted by a DPI Fisheries Officer indicates that the lease is not compliant the leaseholder will be issued with a formal Notice to Comply which outlines the work required and the time period in which the work must be completed. Failure to comply with a Notice to Comply may result in a financial Penalty Infringement Notice (PIN) being issued to the permitholder or leaseholder; and in a worst-case scenario may lead to permit and lease cancellation.

- **Outstanding debt** – An application for a new lease or lease transfer, consolidation, sub-division, renewal or sublet will normally be refused if the applicant has outstanding debt in relation to their business.

- **Poor record of management** – Where the permit holder/lessee has a poor record of management, administrative sanctions and civil action may be taken as described in Chapter 9.6.
- **Notice to Comply – extension of time to comply** – Oyster aquaculture permit holders and lessees may submit a request for approval to extend the time given in a Notice to Comply where there is a large quantity of work, extenuating circumstances or high seasonal workloads. Where their request is approved, they will be issued with a new Notice to Comply. The conditions of the new Notice to Comply will be negotiated between by the permit holder/lessee and the relevant District Fisheries Officer.

Lease marking notices – Lease marking and signs must be attended to in the time given on all Notices to Comply and this work cannot be extended in a new Notice to Comply due to navigation safety issues.

- **Removal of infrastructure from a terminated lease** – Lessees are required to remove all improvements (including cultivation material, lease markings and structures) from expired or otherwise terminated leases within six months.
- **Extenuating circumstances may reduce time periods for removal of improvements from terminated lease** – Time allowed to bring leases into compliance for the removal of infrastructure from terminated leases may be issued for shorter periods if the issue requires more immediate attention to reduce risks to navigation, environmental damage or serious public nuisance.

Historic and current legacy oyster aquaculture leases clean-up initiatives

It is the intention of the NSW oyster industry to phase out the use of historic preservation products used to treat timber infrastructure by the end of 2025.

The majority of legacy oyster aquaculture leases are the result of catastrophic disasters such as the QX disease outbreaks in the Georges and Hawkesbury Rivers and the incursion of the Pacific Oyster into the waters Port Stephens in the mid to late 1980's. These events resulted in the financial collapse of a significant number of oyster farming businesses.

When clean-up costs cannot be recovered from the lessee or the bond, responsibility for the clean-up of oyster cultivation material passes to the State (as landowner).

More than 300 oyster aquaculture leases (more than 360 hectares) have been cleaned up since the Oyster Aquaculture Lease Clean-up Project commenced in July 2009. Some historic derelict leases have also been cleaned up as a result of grants from Local Land Services. Others have been cleaned up by farmers who have taken up derelict lease area. The majority of leases have been cleaned up as a result of legal and administrative action undertaken by DPI.

The number of leases becoming derelict and adding to the list of State legacy leases has dramatically decreased as a result of the oyster aquaculture lease bond system; the oyster aquaculture lease compliance program; legal action against individuals who do not meet their clean-up responsibilities; and administrative policies which prevent individuals with outstanding clean-up responsibilities from completing lease transactions.

2.4.2. Crown Lands

CL issues land tenures under the NSW *Crown Land Management Act 2016 (CLM Act)* and is committed to working with the oyster industry to provide opportunities for oyster farming/aquaculture activities on Crown land.

Applications for use of Crown land under a lease or licence for oyster farming/aquaculture activities (oyster land base site) are assessed on merit. CL consider a range of factors when

making an assessment, such as compliance with the *CLM Act*, land capability, native title, Aboriginal land claims, the Crown land Community Engagement Strategy and OISAS.

Leases and Licences

A Crown land lease provides exclusive possession to the holder to occupy and use Crown land for a specified term and purpose. While applicants may prefer a lease to a licence, it may not be possible to lease certain Crown land sites.

Where an oyster farmer is proposing a substantial development on the Crown land that involves significant capital investment, a lease may be more appropriate than a licence, providing there are no constraints that preclude CL from granting a lease. The consent of the Minister is usually required prior to the transfer of a lease, and you can't transfer a lease if there is any debt to the Crown outstanding on the lease.

Tenure agreement

A tenure holder has responsibilities under the terms and conditions of their tenure agreement. This includes using the site in accordance with the permitted use, paying rent, complying with environmental obligations and other relevant laws, and holding current insurances.

A holder of a Crown tenure for oyster farming/aquaculture activities must be a bona fide oyster farmer and hold a current:

- aquaculture permit under the *FM Act*
- NSW FA Licence issued under the Food Regulation 2015 (FR 2015) to cultivate and/or harvest oysters (including spat).

Work plan compliance

The tenure holder is responsible for ensuring that they meet obligations outlined in their individual work plan agreements issued by CL. CL may initiate compliance actions if an oyster farmer does not comply with work plan requirements or tenure conditions, or if they do not pay rent. Actions may include lease forfeiture or licence revocation.

Subletting or sale

Should an oyster farmer wish to sublet or sell a leased or licenced Crown land land-based site they are encouraged to have early discussions with CL. Sublicensing and on-selling is not permitted on sites licenced for oyster farming/aquaculture activities. In many cases, tenures are not directly transferrable.

More information

You can find general information about leases and licences in Chapter 9.9 below and on the department's website at: industry.nsw.gov.au/lands/use/, or by contacting CL by phone on 1300 886 235.

2.4.3 The NSW Shellfish Program

The NSW Shellfish Program (NSW SP) is a quality assurance program that assists in ensuring the public health safety of oysters and other shellfish grown and harvested from NSW waters. The NSW SP is administered by the NSW FA under the *Food Act, 2003* (FA 2003). This strategy does not affect the operation of the program. Full details of the NSW SP including water quality monitoring details can be obtained from the NSW FA at:

www.foodauthority.nsw.gov.au/industry/shellfish

The objective of the NSW SP is to protect the health of shellfish consumers through the administration and application of procedures described in the NSW Shellfish Industry Manual (NSW SIM) that:

- assess the risk of shellfish contamination by pathogenic bacteria and viruses, biotoxins and chemicals derived from the growing area
- control the harvest of shellfish in accordance with the assessed risk
- protect shellfish from contamination after harvesting.

In addition the NSW SIM describes administrative procedures for the operation of Local Shellfish Programs as specified under the Food Regulation, 2015. The NSW SP adheres to the principles and objectives of the Australian Shellfish Quality Assurance Program (ASQAP).

To ensure compliance with the NSW SP and conditions attached to the oyster farmers Seafood License issued by the NSW FA regular audits of licensed business are carried out by auditors authorised under the FA 2003. These audits assess food safety compliance, food handling practices, reviews food safety documentation and compliance with the NSW SP. Auditors carrying out audits of export registered establishments are also authorised officers under the *Export Control Act 1982*.

Classification of oyster harvest areas

Harvest area risk assessment (also known as a comprehensive sanitary survey) is the cornerstone of the NSW SP. The completion of a risk assessment for each harvest area is an objective process that is taken independently of the oyster aquaculture industry and follows the requirements of the ASQAP Operations Manual 2019 and the NSW SIM (NSW Food Authority, 2018).

Each initial risk assessment is completed over a period of one to three years and results in each harvest area being classified as either approved, restricted or prohibited according to its sanitary status. The harvest area classification then determines the food safety controls to be applied to shellfish harvested from the area. Additionally, where a harvest area's classification is 'conditional' (essentially meaning it is subject to closure in prescribed conditions), a specific harvest area management plan is prepared which details harvest area closure and opening parameters as well as other requirements for the efficient and effective management of the area.

Components of the risk assessment process

The following are key components of the risk assessment process:

- shoreline survey which includes a thorough physical examination of the catchment area draining into the shellfish harvest area in order to identify the actual or potential sources of pollution that may adversely affect water quality
- a bacteriological survey of the shellfish growing waters, which provides quantitative data to explore and develop preliminary findings of the shoreline survey, data that describes the extent of faecal contamination of the harvest area and quantitative data for the classification of the area (see Table 3)
- a bacteriological and chemical examination of the shellfish which includes an assessment of the microbial, chemical and algal biotoxin contaminants
- an evaluation of the meteorological, hydrographic and geographic characteristics to assist the development of a harvest area management plan
- an algal biotoxin risk assessment to assist in the appropriate classification of the area.

Table 3: Sanitary water quality standards for oyster harvest area classification.

Parameter	Classification Status		
	Approved	Restricted	Prohibited (Nursery)
Faecal (thermotolerant) coliforms	90th percentile of randomly collected Faecal coliform samples do not exceed 43MPN or 21 MF/100mL ASQAC	90th percentile of randomly collected Faecal coliform samples do not exceed 300MPN or 85 MF/100mL	A sanitary survey has not been completed for this area.

Note: MPN – mean probable number, MF – membrane filtration

Implications for oyster cultivation and harvest

Classification determines the management regime under which oysters are harvested. Also, oysters may only be exported from classified areas according to DAWE export criteria for shellfish.

Under the risk assessment process oyster growing areas are classified into one of the following five categories:

1. **Approved Harvest Area.** Direct harvest for human consumption under prescribed conditions
2. **Conditionally Approved Harvest Area.** May operate as an Approved Harvest Area under prescribed conditions and when the Approved Harvest Area is closed under prescribed conditions may operate as a Restricted Harvest Area under prescribed conditions
3. **Restricted Harvest Area.** Product requires depuration in an approved depuration plant under prescribed conditions or relay to an Approved area for a specified time prior to sale for human consumption
4. **Prohibited Area (Nursery).** The harvest of shellfish for sale for human consumption is not permitted; or
5. **Prohibited Area (Closed Safety).** Identifies areas that are not suitable for growing or harvesting shellfish due to significant or unpredictable contamination, e.g. areas directly adjacent to sewage treatment plant outfalls.

Oysters may be progressed to a higher category by relaying those oysters into the higher category waters, under prescribed conditions, for a set period of time. More information can be found at: www.foodauthority.nsw.gov.au/sites/default/files/2020-02/Relay_Operational_Procedure.pdf

Most oyster growing areas currently fall within the approved or restricted classification and operate under rainfall and salinity management plans. Oysters may be harvested from Approved harvest areas and sold directly for human consumption without the additional cost of the depuration process. These areas are therefore the most valuable and sought-after areas for oyster aquaculture in NSW.

Chapter 3 Healthy oysters and healthy estuaries

Estuaries (where all NSW oyster farming occurs) are essentially the confluence point for all runoff and groundwater flow yielded by their catchments. Estuarine health is therefore a good indicator of the sustainability of catchment activity.

There are numerous potential sources of pollution that may affect estuaries, including urban and industrial effluent discharges, boat discharges, contaminant transport by rivers and agricultural run-off.

Raised concentrations of pollutants can have serious effects on the health of marine plant and animal populations. Oysters are particularly susceptible because they rely on high quality water for their food. On average, a farmed Sydney Rock Oyster will filter an estimated 250,000 litres of estuarine water in its lifetime. It has been estimated that the farmed oysters in NSW remove over 1 million tonnes of suspended material, chiefly phytoplankton, in their lifetime (White, 2001). Oysters are recognised globally as a “keystone species” and provide additional important ecosystem services, including acting as sinks for anthropogenic nutrients and in many instances shoreline erosional buffers. The key role oysters play in the ecology of estuaries is indisputable.

As oysters filter such large volumes of water, they are particularly sensitive to changes in water chemistry. For this reason, they are also excellent biological indicators of estuary health. Their feeding habits and lifestyle make oysters extremely valuable, integrative indicators of water quality in estuaries and coastal lakes (White, 2001).

3.1. Water quality for food safety

Bacteria, viruses, marine biotoxins and environmental pollutants may all impact on the suitability of oysters for human consumption. Most are a direct result of human activity with the exception of marine biotoxins.

Sources that may pose a risk to food safety include:

- sewerage system and septic tank overflows and leaks
- sewage discharges from vessels
- contaminated sediments
- stormwater run-off
- discharges from industrial premises or runoff from agricultural activities.

To provide local councils, state government agencies, private landowners and developers with advice on how to ensure development in close proximity to estuaries is compatible with the requirements of oyster aquaculture the *Healthy Estuaries for Health Oysters – Guidelines* (HEHO) were published in 2017. The guidelines were prepared to meet the requirements of management action (MA 7) of the NSW Diffuse Source Water Pollution Strategy (NSW DECC, 2009). This strategy identified pathogen levels exceeding the Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) as one of the top three priority problems from diffuse source water pollution in NSW. The HEHO also compliment initiatives under the Marine Estate Management Strategy 2018-2028 to address water quality and ecosystem protection.

The intended outcome of HEHO is to see development that protects the oyster industry and that estuarine water quality objectives are being met. Where water quality objectives are not being met, development should contribute to the objectives being met within a specified timeframe and subsequent monitoring results indicate desired targets are being achieved. These outcomes will not only protect the environmental conditions required for healthy oyster production but will also result in improved estuarine health, increased amenity for tourism and improved conditions for recreational and commercial fisheries. HEHO is available online at:

www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/738972/Healthy-Estuaries-for-Healthy-Oysters-Guidelines.pdf

3.2. Water quality for healthy oyster growth

Oyster growth and production shows a wide variation from lease to lease, season to season and year to year. The majority of this variation would be explained by natural variations in water chemistry, temperature and food availability although, surprisingly, there are gaps in knowledge on the Sydney Rock Oysters basic physiology and ecology (White, 2001).

On top of these natural effects, oyster growth and production can be affected by water quality problems caused or exacerbated by human activity. This activity is predominantly catchment land use and activities close to the estuary.

The 'healthy growth' water quality parameters most likely to be affected by human activity are:

- **Suspended solids.** Silt affects the sensitive feeding apparatus of oysters and can lead to infestations of mudworm and poor natural oyster settlement and recruitment. In general, oysters feed more efficiently in relatively clear waters (White, 2001). Increased turbidity may also reduce primary production and available food levels. Suspended solids levels can be raised by any catchment land use that exposes and leaves soil bare to erosion or by excessive wave wash arising from activities such as power boating, within the estuary
- **pH.** The optimal pH range for oysters appears to be between 6.75 to 8.75 with growth rates rapidly declining at either side of this range (White, 2001). Large areas of acid sulfate soils occur in coastal floodplains in NSW and the drainage of acid waters from these areas is a major concern to the oyster industry (White, 2001). An oyster can survive in low pH waters for a time, but eventually the shell dissolves and the oyster dies (Dove and Sammut, 2007a)
- **Toxic elements and substances.** Detailed knowledge of all substances that may affect oyster growth is not available, however Dove et al. (2007b) observed that elevated soluble concentrations of iron and aluminium at low pH could cause significant mortality in oysters. Suspended iron compounds (flocs) associated with acid drainage can also smother growing oysters and clog the oyster's gill structures (Dove et al., 2007b).

3.3. Tidal range, water flow, salinity and estuary entrance intervention

Traditional oyster aquaculture ideally requires a stable mean water level that varies with each tide cycle. This allows oysters to be grown at a height where predictable periods of inundation and drying can be achieved that provides commercially viable growth rates while eliminating most competing intertidal organisms (biofouling). Modern floating oyster aquaculture methods are less reliant on tidal levels.

Tidal variation also drives currents that exchange water through lease areas, delivering planktonic food. In some instances, stream flow and wind driven circulation may supplement tidal currents, although these are highly variable and cannot be relied upon alone.

Salinity affects oyster growth and larval distribution and therefore catchment diversions, extractions, periodic releases of freshwater or changes to estuary entrances and channels may pose a threat to long established farming intertidal farming practices and optimal oyster production. Salinity is also an important parameter in the operation of the NSW SP.

Tidal range and flows are affected by the morphology (shape and depth) of the estuary and the size of the entrance. Oyster farming is situated mainly in permanently open estuaries and estuaries that close infrequently.

Estuaries are also dynamic environments and the shape and position of channels and the estuary entrance has a natural pattern of variation. The state of the entrance and channels is a balance between the river and tidal flows, sediment dynamics and coastal (oceanic) process.

Entrance closures and channel movements often occur during extreme climatic conditions, but may be exacerbated by regulated river flows, abstractions and catchment land use leading to accelerated estuarine sedimentation.

When an estuary entrance closes or major flow channels become clogged this may lead to increased periods of low salinity (or high salinity during drought conditions), higher water temperatures, poor circulation and poor water quality. Under these conditions, oyster aquaculture may experience:

- increased mortality, increased susceptibility to disease, reduced production and poor oyster growth
- increased restrictions on harvest due to increased periods of low salinity
- increased production costs as oysters may need to be moved frequently to other parts of the estuary or to different growing heights or other estuaries.

High water and flood levels associated with closed entrances may also adversely affect infrastructure and property; recreational and commercial fishing; recreational use of the estuary; and estuarine ecology.

The oyster industry recognises that inappropriate interventions in natural geomorphological processes at estuary mouths can have significant impacts on estuarine and fringing habitats.

DPI policy does not support the artificial opening of Intermittently Closed and Open Lakes and Lagoons (ICOLLs) unless it can be demonstrated that the social, environmental and economic benefits greatly outweigh any potential adverse impacts. The Department supports using Coastal Management Programs and environmental assessment processes to analyse the issues relating to opening a particular ICOLL, and where appropriate the development of an entrance management plan or entrance management policy. Where a problem is clearly identified, DPI will support the development of an interim strategy prior the development of an entrance management plan. The interim strategy should be developed in consultation with all relevant natural resource management agencies. Criteria to be met may include:

- a pre-set water level above which a breach is recommended
- a pre-set range between which a breach is recommended if heavy rainfall is predicted
- a pre-set duration of high-water level and/or wetland/pasture inundation over which a breach may be recommended
- other environmental parameters (e.g. avoiding the breeding season of threatened species such as the Little Tern).

Further information regarding management of coastal lakes and lagoons is available on the DPI Fisheries website at: www.dpi.nsw.gov.au/fishing/habitat/aquatic-habitats/wetland/coastal-wetlands/management-of-coastal-lakes-and-lagoons-in-nsw

The oyster industry also recognises that any decision to artificially open an estuarine entrance or dredge a channel has to balance all potential social, economic and environmental impacts and is ideally planned well ahead of the need to undertake the work.

The oyster industry will encourage and support this course of action where there are imperatives for intervention such as flood impact mitigation or seriously deteriorating water quality. The social and economic cost of potential impacts on the oyster industry are relatively easy to determine and need to be considered in the preparation of Coastal Management Programs,

entrance opening strategies and estuary dredging strategies that may affect salinity, tidal range and flows in an oyster growing estuary.

The NSW Shellfish Committee determined that changing pressures on estuaries due to human induced factors such as climate change and catchment development also impact opening/closing regimes and need to be addresses in developing Coastal Management Programs.

3.4. Water quality and flow objectives for oyster aquaculture areas

Objectives

The water quality objective and flow objective for areas identified as POAA mapped in Chapter 5 are:

- protecting water quality for safe human consumption and viable production of edible oysters
- maintain or rehabilitate estuarine processes and habitats.

Background

The NSW Government has established water quality objectives for 31 NSW catchments which recognise existing principals and guidelines recommended in the National Water Quality Management Strategy.

These water quality objectives aim to provide policy direction for local government, state government agencies and LLS for the protection of the identified objectives for each catchment. Objectives identified include aquatic ecosystem protection, visual amenity, recreation, water supply and aquatic foods (cooked).

Objectives are used by these agencies to guide the issuing of permits, approvals, development consents and licenses for activities that may impact on water quality. They also provide a reference against which the state of water quality in a particular area can be assessed and help to determine whether water quality studies and improvement strategies should be initiated.

Oyster production requires water quality that supports healthy oyster growth and results in a product that is safe to eat following harvest under the NSW SP. The water quality guidelines (Table 4) established in this strategy, are designed specifically to meet this objective.

The most important water quality parameter in oyster aquaculture is sanitary water quality. The most relevant guideline for sanitary water quality in oyster growing areas is the internationally accepted ASQAP Operations Manual 2019 (ASQAPOM) and the NSW SP Operations Manual 2018 (NSWSPOM).

These two manuals use faecal coliform bacteria as an indicator of faecal pollution. The standard for Approved classification has been used as the objective for oyster aquaculture so that current Approved and Restricted Harvest areas may see an improvement in water quality that results in a future upgrading.

NSW DPI has partnered with the University of Technology Sydney and the Food Agility Cooperative Research Centre to explore the application of new technologies for faecal pollution monitoring and risk assessment. However, the current faecal coliform/E.coli standards that apply to the regulation of the harvest of shellfish for human consumption are based on established national and international standards. Any amendments to these standards will require extensive method development, validation, risk assessment and agreement between national and international jurisdictions.

Five other key water quality guidelines have been set. The objectives are based on published values and are given in Table 4.

The NSW Government has also established river flow objectives for 31 NSW catchments. Four objectives have been set for estuarine areas:

- Maintain or rehabilitate estuarine processes and habitats
- Maintain wetland and floodplain inundation
- Manage groundwater for ecosystems
- Minimise effects of weirs and other structures.

The most relevant to the protection of the environmental conditions required for oyster aquaculture, has been specifically adopted by this strategy, but achieving the other three will also assist in providing the environmental conditions required for healthy oyster growth.

Table 4: Water quality guidelines for oyster aquaculture areas.

Parameter	Guideline	Source
Faecal (thermotolerant) coliforms	90th percentile of randomly collected Faecal coliform samples do not exceed 43MPN or 21 MF/100mL	ASQAP Operations Manual 2002 and the NSW Shellfish Program Operations Manual 2001.
pH	6.75 – 8.75	Shumway (1996).
Salinity	20.0 – 35.0 g/L	
Suspended solids	<75 mg/l	Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018)
Aluminium	<10µg/L	
Iron	<10µg/L	
Other parameters	For other parameters please refer to the Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018)	

Note: MPN – mean probable number, MF – membrane filtration

Chapter 4 Water quality protection guidelines

4.1. Recognition of oyster aquaculture in land and water use planning

The aim of this strategy is that water quality, tidal range and flow in oyster growing areas is maintained and where possible improved to ensure the long-term security and sustainability of the NSW oyster aquaculture industry. Three of the five triggers for OISAS review relate to water quality.

The maintenance of existing water quality, tidal range and flow will be achieved primarily through establishing links between the requirements for the sustainable cultivation of healthy oysters and catchment land and water use planning.

Three such links are established by this strategy.

Firstly, when preparing statutory environmental management plans that govern activities (both upstream and downstream) that may influence POAA the relevant agency is required to:

- consider the potential impact of the activity or plan on oyster aquaculture areas
- include specific actions that will contribute to the protection and/or improvement of water quality for oyster aquaculture.

Secondly, in determining applications for consent or approval under the *Environmental Planning and Assessment Act 1979 (EP&A Act)* the consent or determining authority needs to consider the potential impacts of the activity on oyster aquaculture areas in the locality. Of particular concern is whether catchment or foreshore development will reduce the suitability of an oyster aquaculture area for its intended purpose.

Thirdly, the NSW oyster industry is recognised as a neighbour/stakeholder and will be notified of relevant applications for approvals and consents and natural resource plan making activities.

These links are established through the planning system described in Chapter 9.4.

4.2. Guidelines for harvest area protection

This section lists some specific actions that will contribute to the protection and/or improvement of water quality for oyster aquaculture. Wherever possible, local government, state government agencies, private landowners and developers should directly implement these actions. They should be included in strategic land and water use planning as development standards and considered in determining development applications.

Non point sources

Some specific actions include:

- riparian zones in agricultural areas being fenced to prevent access of livestock to estuary
- encourage establishment of riparian filters and settlement areas for run-off drainage in landscape with potential high animal faecal/fertiliser/chemical contamination (e.g. livestock, golf link, turf farm)
- elevate monitoring and awareness of septic safe programs in areas adjacent to harvest zones
- where practicable, implement the installation and careful regulation of vessel pump out facilities at marinas
- carefully regulate marinas and mooring areas to minimise the risk associated with vessel discharges
- the provision of educational and advisory signs for recreational boating warning of the need to protect sanitary water quality

- avoid artificially attracting large numbers of birds into an oyster harvest area
- investigate the need for exclusion of recreational/private boating in specific oyster harvest area to protect sanitary water quality if required
- inclusion of buffer zones between foreshore sub-divisions and the shoreline.

Point sources

Some specific actions include:

- sewerage management authorities prepare and implement an On-site Sewerage Management Strategy that includes classifying systems in close proximity to POAA as high risk with annual compliance inspection
- the preferred on-site sewerage management system for sites close to POAA is secondary treatment (aerated wastewater treatment system) with disinfection, sub-surface irrigation and a minimum buffer of 100 m to a water body or drain. In circumstances where these requirements cannot be met then additional risk management measures should be incorporated in the design
- sewer systems improved, maintained and operated so that overflows do not occur as a result of maintenance or operational failure, overflows in dry weather are eliminated or occur only under exceptional circumstances and wet weather overflows are minimised
- addressing illegal discharges from recreational or commercial boating
- identification of priority urban storm water drains and installation of suitable treatment systems
- priority treatment drains would include those with a catchment from large hard stand car parks and roadway car parks, caravan parks, golf links, subdivision, commercial/business and shopping centres and industrial areas
- at source control of stormwater for new developments to reduce stormwater impacts.

Community Responsibilities

Members of the community have a general duty of care responsibility to:

- have their on-site sewerage management system approved by the local Council and to operate it in accordance with that approval
- understand how to use their on-site sewerage management system and to make sure regular maintenance inspections are conducted by suitably qualified and experienced technicians
- quickly have their on-site sewerage management system repaired if it fails and report any discharge of effluent to the local Council
- report any pollution incidents to the NSW EPA Environment Line 131555
- remove stock access to the riparian zone adjacent to oyster harvest areas
- ensure that stormwater run-off is not contaminated with chemicals, animal effluent or manure
- use pump-out systems and ensure that no effluent, rubbish or waste goes from your boat to the waterway
- participate in community programs that build resilience in the natural environment and help improve water quality.

The NSW oyster industry has an established record of engaging with land holders and environmental agencies such as LLS to achieve effective remediation of riparian zones in oyster farming catchments. Examples of this work include the long-term efforts to improve water quality in the Wallis Lake catchment and work with specific dairy farmers in the Shoalhaven and Crookhaven River estuary and at Wapengo Lagoon.

Prioritising actions to address existing water quality issues

Declining water quality trends may be detected by the routine monitoring undertaken by the oyster industry for the NSW SP, from growing area production records and from visual impacts detected while working on leases. State government agencies and local councils also undertake water quality monitoring.

The NSW LLS and the Marine Estate Management Authority (MEMA) have responsibility for establishing regional standards and targets for natural resource management, including water quality. These standards and targets are implemented through a Catchment Action Plan and the Marine Estate Management Strategy (MEMS).

In setting regional water quality objectives, LLS and MEMA refer to the state-wide Standards and Targets prepared by the NSW Natural Resources Commission and any relevant water quality objectives. The water quality objectives and guidelines for oyster aquaculture, established in this strategy, will assist LLS and MEMA to set specific objectives relevant to the protection of estuaries and their catchments, including oyster growing areas.

The relevant LLS, MEMA and local council have responsibility for establishing priorities for action through their planning processes. Where it is identified that water quality is degraded in an oyster aquaculture area the issue needs to be brought to the attention of the relevant LLS, and local government Coastal Management Program for prioritisation.

The oyster industry fully supports the NSW Government's coastal management framework to manage the coastal environment in an ecologically sustainable way, for social, cultural and economic well-being of the people of NSW. In this regard the oyster industry plays an active role in the preparation of Coastal Management Programs by councils.

4.3. Case Study – Farquhar Inlet Entrance Management Strategy.

The problem:

Early in 2008 a series of moderate rainfall events kept the lower Manning River fresh for an extended period but none of the events were large enough to naturally deepen the south arm of the river or to trigger a mechanical opening. A severe oyster mortality event occurred and water quality in oyster growing areas and adjacent to residential properties in the south arm deteriorated significantly. However, at that time the existing entrance management plan for the south arm of the river at Farquhar Inlet only allowed for mechanical opening of the estuary when Taree, some 18 km upstream was threatened by flood.

What the local oyster industry did:

- initiated action to find a solution
- engaged the council, community and other key stakeholders
- participated in the preparation of a revised entrance management plan
- helped to raise money to support the work being done.

The outcome:

The Farquhar Inlet Management Group was formed and in partnership with the Greater Taree City Council and water quality triggers were built into the Farquhar Inlet Entrance Management Plan (FIMP) to ensure that prolonged periods of static fresh water would be avoided. The local

community purchased a dredge to assist in the implementation of plan and in partnership with the Greater Taree City Council dredging commenced to improve flushing, recreational boating access and navigation in the south arm. Dredge spoil has been being used to construct Little Tern nesting habitat in consultation with the NPWS.

In 2020 flooding that followed extensive bushfires in the Manning River catchment led to large amounts of nutrient rich ash and other debris being washed into the estuary. These events quickly resulted in significant water quality issues in the estuary. Due to the existence of the FIMP and its approvals pathway enabled the south arm at Farquhar Inlet to be quickly opened and problems associated with rapidly deteriorating water quality were alleviated. Again, in the major flooding event of March 2021 the existence of the FIMP enable action to be taken early in the event which more than likely significantly reduced flood impacts in the south arm.

For more information see the Greater Taree City Council website at: www.gtcc.nsw.gov.au

Chapter 5 Priority Oyster Aquaculture Areas

5.1. Areas where oyster farming is a desired outcome

Since its inception in the 1870's, the oyster aquaculture industry has undertaken extensive and on-going commercial assessment of sites that appeared to the 'experienced industry eye' to be suitable for oyster aquaculture. Much of this process took place in an era where there were few productive uses, other than fisheries, for the States estuarine waterways and urban development on estuary foreshores was relatively limited. This process of commercial assessment was often dynamic, with the suitability of sites often changing as industry cultivation practices evolved in each estuary.

In addition to commercial considerations, however, the modern oyster industry recognises that a range of environmental and socio-economic factors must also be considered in determining suitable oyster farming areas.

The potential impacts of oyster aquaculture on the marine estate are assessed in the NSW Marine Estate Threat and Risk Assessment Final Report 2017 (TARA). The TARA identified oyster aquaculture as a low to minimal threat other than in seagrass areas where it identifies as a potentially moderate threat due to physical disturbance from propellers, sediment resuspension and shading.

Suitable areas have been designated as POAA in line with the recommendations of the Healthy Rivers Commission in its 'Healthy Oysters, Healthy Rivers report' (HRC, 2003). Identifying POAA recognises the importance of the industry to state and regional economies and the need to implement planning provisions that facilitate the environmental sustainability of the industry.

The assessment criteria for POAA in NSW estuaries (Table 5) ensures that potential environmental impacts and the needs of the community and other legitimate users of the State's estuarine resources are considered in the location and allocation of oyster aquaculture areas.

POAA suitability assessment

The first edition of this strategy restricted the original assessment of areas suitable as POAA to those that were held under an oyster aquaculture lease in 1980 issued under the *Fisheries and Oyster Farms Act, 1935 (FOF Act)* and any lease issued over previously unleased area since that time either under the *FOF Act* or the *FM Act*. Small contiguous areas between adjacent oyster aquaculture leases were also assessed.

In 2005-06 each area was individually inspected and evaluated against a list of locational, environmental and socio-economic suitability criteria. This process classified current and previous oyster aquaculture areas as either suitable or unsuitable. All suitable areas are mapped as POAA on the oyster aquaculture maps. Table 5 lists the key location, environment and socio-economic criteria.

Areas in the National Park estate were assessed for oyster aquaculture suitability, but not mapped as POAA as this is not consistent with the intent of reserving National Park land. Current suitable leases in the National Park estate may continue subject to the relevant park management plan.

Areas not currently or previously leased may still be subject to application for oyster farming, but these applications will be dealt with on a case by case basis and will require development consent (see Chapter 9, Planning and Approvals).

Table 5: Assessment criteria for new priority oyster aquaculture areas in NSW estuaries.

Assessment Issue	Standard for an area to be classified as a priority oyster aquaculture area
Navigation	Not within an identified navigation channel as marked by the TfNSW (except dredge bed leases).
	Not directly offshore from, or 50 m to either side of any public wharf or public boat ramp. Greater distances may be required in high use areas.
	Not directly offshore from, or 50 m to either side of, any public or privately operated marina. Greater distances may be required in high use areas.
	Not within a recognised mooring area.
Conservation areas	Not within 50 m of an area identified by TfNSW as a specific watercraft operation area. Greater distances may be required in high use areas.
	Not within any areas identified as “coastal wetlands” on the Coastal Wetlands and Littoral Rainforests Area Map in State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP 2018) if oyster aquaculture is likely to have significant adverse impacts on the wetland.
	Not in an area mapped as “Posidonia” seagrass bed
	Not in an area where oyster aquaculture is likely to have a significant adverse impact on matters of national environmental significance under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
	Not in an area declared as an Aquatic Reserve under Part 6 of the <i>FM Act</i> if oyster aquaculture is likely to have significant adverse impacts on the conservation values of the Reserve.
	Only within areas within a Marine Park that identify oyster aquaculture as a permitted activity.
	Not within an area if oyster aquaculture is likely to have significant adverse impacts on threatened species or habitats listed under Part 7A of the <i>FM Act</i> or under the <i>Biodiversity Conservation Act 2016</i> .
Heritage	Not within the National Park estate unless it has the planning approval of the relevant authority and the written concurrence of the Minister administering the <i>NPW Act</i> .
	Not immediately adjacent to any area reserved or acquired under the <i>NPW Act</i> if oyster aquaculture is likely to have significant adverse impacts on the conservation values of the area.
	Not within over or adjacent to any area likely to adversely affect items listed on the State Heritage Inventory e.g. shipwrecks.
Aboriginal heritage	Not within, over or adjacent to sites/places of regional or national aboriginal significance without consultation and endorsement by the local Aboriginal community.
Public health safety	Not within any areas classified as a Prohibited (Closed Safety) under the NSW SP.
Commercial fishing	Not within a commercial net hauling ground recognised in a Fisheries Management Strategy made under the <i>FM Act</i> .
Recreational activity	Not directly offshore from, or 50 m to either side of, an area managed for public recreation.
	Not within 50 m of an area identified by the TfNSW as a designated swimming area.
Miscellaneous	Not over any area deemed as commercially non-viable for oyster aquaculture or not in the public interest.

5.2. Oyster aquaculture area available for leasing

Oyster aquaculture lease holdings have contracted since the mid 1970's and at June 2019 were 2920 ha, down from a peak of over 5,550 ha in 1976/77 (not including foreshore leases let on a linear rather than area basis). Chapter 2 discusses the reason for this contraction.

It is anticipated that lease area will continue to consolidate due to the advent of single seed production technology and faster growing selected oyster lines. These culture methods do not require 'catching leases' and may require less grow out area for the same production, as fewer age classes of stock need to be held. It is noted that estuaries affected by contraction due to

disease or by poor water quality may be able to return non-viable areas back into production in the future if disease resistant oyster breeding lines now in development are proven to be commercially successful and water quality issues are addressed.

Demand for lease area in an estuary is driven by the cost of production, demand and price for the product, water quality, production methods, availability of land bases and supporting infrastructure, and confidence in the security of access to the water and land resources required. Supply is controlled by competition from other estuarine user groups, estuarine carrying capacity and the availability of suitable area.

This strategy therefore establishes an orderly process of adjusting the lease area available to industry. The POAA identified on the oyster aquaculture maps may be adjusted to facilitate the objectives of this strategy.

Adding new POAA

The POAA identified on the oyster aquaculture maps may be increased by adding new lease area approved by development consent under Part 4 of the *EP&A Act* detailed in Chapter 9. Maps indicating the location of POAA in NSW estuaries are available online on the DPI Fisheries Spatial Portal available at:

https://webmap.industry.nsw.gov.au/Html5Viewer/index.html?viewer=Fisheries_Data_Portal

Extinguishment of POAA for non-oyster activities

DPI Policy O-072 (Extinguishment of Priority Oyster Aquaculture Area) sets out the circumstances and process under which a POAA will be extinguished to allow for non-oyster aquaculture development.

Under the terms of this policy POAA will only be extinguished for the purpose of non-oyster aquaculture related activity if:

- no other viable option for the proposed non-oyster aquaculture related activity can be identified
- where significant adverse effect on the oyster aquaculture industry is mitigated
- any compensation required by the Act or Regulation is paid.

When considering the adequacy of mitigation measures identified by a proponent/agency, DPI will consider:

- the viability and productivity of the subject lease(s)
- the strategic importance of the lease(s) to local industry (for example, is the lease the only catching lease in the estuary? Is the lease within a NSW SP harvest area?)
- any other matter raised in consultation with the local oyster industry.

The mitigation of any adverse effects on POAA of non-oyster aquaculture development may consist of:

- Replacement with a new reasonable equivalent lease area that will be classified as POAA at the next staged review; or

Note: Reasonable equivalent area will be assessed on the basis of area, productive capacity and culture potential (i.e. spat catching, raft, water depth etc) by DPI in consultation with the local industry and the Local Shellfish Program (LSP). The area must be approved by Deputy Director General DPI Fisheries and Game Licensing.

- Works that mitigate the impact of the development to the local oyster industry to a value agreed to by DPI in consultation with the local oyster industry. Works may take the form of:

- clean up work, e.g. the removal of derelict cultivation material from public water land
- contribution to the LSP
- other work as agreed to by DPI in consultation with the local oyster industry.

Extinguishment of unused POAA

Any POAA identified on the oyster aquaculture maps that remains unleased for more than 10 years may be considered for extinguishment.

5.3. Oyster aquaculture maps

Maps describing the location of oyster aquaculture leases in NSW estuaries are published on the DPI Spatial Data Portal which is available on the DPI website. These maps also indicate lease boundary marking requirements and NSW Shellfish Program harvest area classifications. An overview of historic and current aquaculture lease holdings (ha) is provided in Table 6.

Table 6: Lease area for oyster aquaculture.

Estuary	Greatest area historically leased (ha)	Current leases in the National Parks estate (ha)	Area mapped as POAA (ha)
Column 1	Column 2	Column 3	Column 4
Tweed River	41.0		23.8
Brunswick River	15.0		9.1
Richmond River	29.0		20.9
Clarence River	37.0		13.2
Sandon River	7.0		
Wooli Wooli River	32.0		17.8
Bellinger River	29.0		24.3
Nambucca River	75.0		64.8
Macleay River	118.0		95.5
Hastings River	144.0		126.9
Camden Haven	166.0	17.9	93.9
Manning River	331.0		288.7
Wallis Lake	414.0		373.6
Port Stephens	1705.0		919.1
Hunter River	35.0		
Brisbane Waters	228.0		151.6
Hawkesbury River & Patonga Creek	329.8		292.9
Botany Bay / Georges River	371.0		128.0
Shoalhaven River	21.0		13.2
Crookhaven River	260.0	35.5	149.4
Currumbene Creek	13.0		
Moona Moona Creek	<1		
Conjola River	14.0		8.5
Narrawallee Creek	12.0		

Estuary	Greatest area historically leased (ha)	Current leases in the National Parks estate (ha)	Area mapped as POAA (ha)
Column 1	Column 2	Column 3	Column 4
Burrill Lake	19.0		
Clyde River	236.0		201.2
Tomaga River	11.0		3.4
Moruya River	25.0		12.6
Tuross Lake	145.0		109.4
Wagonga Inlet	112.0		92.1
Wallaga Lake	28.0		5.2
Bermagui River	45.0		33.0
Murrah Lagoon	<1		
Wapengo Lake	94.0		79.3
Nelson Lagoon	48.0		22.5
Bega River	7.0		1.8
Merimbula Lake*	142.5		140.7
Pambula River	116.0		96.3
Towamba River (Kiah)	9.0		
Wonboyn Lake	62.0		53.3

* does not include 16.4 ha sub-let from the lessees of the Merimbula Airport.

Chapter 6 Commitment to environmentally sustainable practices

6.1. Good neighbour policy

The NSW oyster industry is an integral part of many NSW coastal communities. Oyster farming businesses not only generate economic benefits, but also make a positive and constructive contribution to the social fabric of these communities.

Oyster farmers appreciate the wider social responsibilities of their businesses and aim to be recognised in their communities as good corporate citizens and environmentally responsible, professional primary producers. Safeguarding water quality is a primary driver for oyster farmers.

Oyster farmers recognise that the land adjacent to leased areas is either community owned public land or private land. In either case, this land is treated with respect and oyster farming activities are conducted to minimise any existing and potential impact on this land.

Responsible NSW oyster farmers:

- do not abandon infrastructure and equipment as it can cause a hazard to watercraft, land vehicles and the environment
- ascertain ownership of adjacent lands and liaise with these 'neighbours'
- recognise that Crown land or National Park is land owned and managed for the public good, and is not vacant land
- acknowledge the responsibility that goes with the right of access to public waterways and infrastructure
- operate so as not to interfere with the reasonable peace, comfort or privacy of other estuarine and foreshore neighbours
- minimise noise, especially in the vicinity of residences and during the quiet times of the day
- treat neighbours and the community cordially and with respect
- actively participate in community forums
- give preference to purchasing local products and employing local people
- develop and maintain excellent relationships with their communities, building mutual trust and respect
- acknowledge community concerns and co-operate with neighbours to resolve them
- recognise that Aboriginal people may have occupied oyster aquaculture lease areas and/or land adjacent to lease areas
- are committed to assessing and preserving the Aboriginal Heritage values of coastal communities
- encourage, where practical, opportunities to employ and/or train Aboriginal people in the oyster industry.

6.2. Estuarine stewardship policy

Stewardship is the management of a resource on behalf of someone else. In the context of Ecologically Sustainable Development the stewardship of estuarine resources is on behalf of present and future generations. The estuarine stewardship 'team' consists of governments, the local community, local industries that are dependent on the estuary, and other industries and communities whose activities are affecting the estuary.

The NSW oyster industry is dependent on healthy environmental conditions in estuaries for healthy and productive oyster growth. The industry therefore has a vested interest in seeing estuarine ecosystems protected and restored. In turn, farmed oysters now provide much of the filtering of estuarine water previously undertaken by natural oyster reefs. Extensive natural oyster reefs were once dominant structural and ecological features in many NSW estuaries. These reefs all but disappeared from NSW estuaries in the late nineteenth century following historical exploitation to be burnt to produce lime for building and agricultural purposes and significant catchment development which degraded estuary health (Beck et. al., 2019). The introduction of a mudworm into NSW waters in the early 1900's which is often lethal to the Sydney Rock Oyster (Ogburn, 2011) also had a devastated effect on the remaining natural oyster reefs and early attempts at cultivation. Mudworm spread rapidly between east coast estuaries and forced oyster farmers to develop intertidal post and rail cultivation methods that elevated the oyster crops and reduced mudworm mortality rates.

In cooperation with DPI the NSW oyster industry is assisting research by a number of organisations into the habitat and trophic value and interconnections between estuarine habitat mosaics comprising oyster cultivation infrastructure, remnant oyster reef, seagrass beds, mangroves and bare substrate.

For many years oyster farmers have supported community groups to undertake waterway clean-up activities, volunteering their equipment and knowledge for the public good. In 2019 OceanWatch Australia initiated state-wide an annual clean-up program "Tide to Tip". This program puts the oyster industry at the centre of clean-up efforts, helping to demonstrate the value that farmers place on a healthy, productive environment. Tide to Tip clean-ups occur annually in late February and early March to align with Clean Up Australia Day. More information is available at www.nswoysters.com.au

The oyster industry also has an intimate knowledge of estuarine processes and resources, developed over generations of 'working the water'. Estuaries would benefit from having this knowledge incorporated into land and water planning. A focused involvement can also establish a positive feedback loop for the industry that is likely to increase consumer confidence and community acceptance of a sustainable oyster industry remaining in NSW estuaries (Healthy Rivers Commission, Oysters Review, 2003). To facilitate the protection of water quality in oyster growing areas, DPI in cooperation with other key government agencies and the NSW oyster industry, developed the Health Estuaries for Healthy Oysters – Guidelines (2017). The key objective of this document is to assist local councils, state government agencies, private landowners and developers with advice about how to ensure development in close proximity to estuaries is compatible with the requirements of oyster aquaculture.

Responsible NSW oyster farmers:

- do not litter or pollute land or waters
- take all reasonable measures to minimise any existing or potential impacts on adjoining land and remove any oyster farming materials that unintentionally wash ashore, as soon as possible
- operate their business to minimise any existing and potential environmental impact
- support catchment management and land use planning processes that maintain and/or improve estuarine health
- become involved in local resource management planning, estuary management and land use decision making
- ensure that the industry's intimate knowledge of estuaries and the industry's reliance on healthy estuaries is heard and incorporated into land and water management processes

- continue to work with government and the community to manage pests and disease
- support and assist research designed to investigate and/or mitigate the impact of oyster farming activities on the environment
- keep an eye on their patch and report environmental changes and potential water quality problems to the relevant authority
- recognise and promote the public benefit of estuarine water and environmental monitoring and reporting
- ensure that their activities do not degrade conservation and care of unique natural and cultural resources
- act as a good example to others and actively promote responsible habitat management and estuarine stewardship for example participation in annual clean up events.

6.3. Commitment to comply with, and where possible exceed, regulated standards

Government establishes minimum standards of performance in key areas of the operation of the oyster industry on behalf of the people of NSW. These standards attempt to balance potential environmental and social impacts of activities with the operational and viability needs of industry. These aims are not mutually exclusive, and the oyster industry is committed to identifying and implementing improvements to their businesses that meet, and where possible exceed, regulatory standards; improve business profitability; and, improve environmental performance and pest and disease management. Currently eighteen estuaries have prepared environmental management systems (see Chapter 10.4, Environmental Management Systems) to formally address these issues and incorporate them into their business operation.

Responsible NSW oyster farmers:

- make themselves aware of the regulations that apply to their businesses and as a minimum standard comply with those standards
- are proactive in pest and disease management, including staff training on the signs and symptoms of notifiable aquatic pests and diseases and early reporting of suspicions of these to DPI via the Emergency Animal Diseases 24 Hotline, details of which are on the DPI website at: www.dpi.nsw.gov.au/fishing/aquatic-biosecurity/reporting
- seek to identify aspects of their business activities that can improve profitability and environmental performance
- support and participate in training programs to improve skills and knowledge on industry best practice, environmental and community issues
- support research and development initiatives that aim to improve the profitability and environmental performance of the industry
- become involved in the development of appropriate standards for industry regulation.

6.4. Oyster industry Crown land base sites

Land base sites are required by oyster farmers to carry out their day to day land based activities such as the culling, depuration and management of oyster crops, storage of materials, and provide a staging and receiving point for farm watercraft and road based transport requirements. While there are a small number of freehold sites used for this purpose the majority of land base sites are in low-lying areas on the estuary foreshore which are leased or licensed from the Crown.

To ensure a sustainable industry which is in harmony with the surrounding environment, including the need for stewardship and accountability for land management over the areas held under tenure from the Crown it is important that:

- activities are carried out within the lease boundaries and do not encroach onto adjoining Crown land, including the bed of adjoining waterway
- disposal of oyster shell and other by-products does not occur within the lease or on the adjoining Crown land, including the bed of adjoining waterways
- waste is not to be burnt on site
- residing on these sites is not permitted without approval
- submerged land is not reclaimed by filling with oyster shell or other materials without written approval of all relevant authorities
- native vegetation, including riparian vegetation is not interfered with, both within and outside the leased areas
- disused and abandoned equipment is removed from Crown land, including the bed of waterways
- any occupation of Crown land outside of the leased area such as jetties, or ramps must be licensed or otherwise authorised
- any activity on leased areas is consistent with the purpose of the lease
- the Aboriginal heritage values of the site are assessed in consultation with DPIE, the Aboriginal Community and by making reference to the Aboriginal Heritage Information Management System
- 'Land owners consent' is sought from CL prior to the lodgement of any development applications. Also, any such development must be consistent with the zoning and undertaken in accordance with any relevant approvals and consents.

6.4.1. Definitions for Crown land base sites

'Crown land lease' means lease under the *CL Act*

'Oyster aquaculture land base site' means an area of non-submerged land (frequently leased Crown land) used for the purpose of supporting oyster aquaculture

'Premises' – means land and improvements within the leased area

'Oyster industry purposes' – means depuration, spat growing (nursery) and operations directly related to the transfer of oysters to and from cultivation areas.

6.4.2. Delineation of lease boundaries and identification of structures and works

The holder of a Crown land leased for oyster industry purposes is required to undertake a program to identify the surveyed boundaries of the lease and the position of any buildings, works or uses thereon.

Boundary identification and marking

Boundaries and/or corners of leases are to be clearly marked and remain clearly marked for the duration of the lease. CL, as a minimum, the positioning of white painted posts (minimum 100mm diameter) extending no less than one (1) metre above ground level, on all corners and at intervals no greater than 20 metres apart. In some instances, particularly where there is a history of continued encroachment and/or dumping of waste outside the lease boundaries, CL may require the lease holder to fence the landward boundaries of the lease.

Identification of structures and works

The holder of a lease is required to provide the local office of CL a description of all existing works and structures (size, materials, condition, etc.).

Unauthorised developments

All structures, works or uses are to be authorised and holders are required to show proof of any authorisation. Structures, works and uses without the appropriate consents are regarded as 'unauthorised developments' and the holder will need to remove the structures or cease the unauthorised use. Lease holders will need to justify why any structures, works or uses regarded as 'unauthorised developments' should not be removed or ceased. This will apply to those structures, works or uses that do not comply with the lease purpose.

6.4.3. Condition and maintenance of premises

Visual amenity

To minimise potential impacts on the visual amenity of the estuary, oyster industry land base sites should be kept in a reasonably neat and tidy condition at all times and all structures are to be kept in good repair. The visual amenity of the area is to be maintained by painting the structures in colours acceptable to the relevant local council.

Materials and equipment are to be stored in an orderly fashion and storage of chemicals and other hazardous materials to comply with Australian Pesticides and Veterinary Medicines Authority and EPA requirements.

Any redundant material or equipment is to be removed from the premises. Materials and/or equipment are not to be stored temporarily or otherwise on adjoining Crown lands (including waterways).

Disposal of shell, disused sticks and other used oyster waste material

The deposition of oyster shell, solid waste (including tarred sticks), debris and contaminated by-products within the premises, other than on a temporary basis, is prohibited. All such materials are to be removed from the premises to a disposal site authorised to accept such materials.

For further information regarding Crown land base sites see Chapter 9.9.

6.5. Stocking density

Over-stocking is where oyster stocking levels exceed the carrying capacity of an individual growing area or estuary. Overstocking means that stock does not have access to sufficient planktonic food. Poor growth, increased susceptibility to disease and increased susceptibility to heat kills have been linked to stress caused by overstocking in a number of NSW estuaries (Ogburn, 2011).

The number of oysters an estuary, or area within an estuary, can carry and produce is dependent on a wide range of environmental variables and there is currently insufficient data and knowledge to successfully estimate it on an environmental basis (for example using the primary productivity of an estuary). Consequently, no practical scientific tools exist to accurately quantify optimal stocking densities.

Stocking density varies widely between estuaries, method of cultivation and individual farmer preference. Estuary stocking levels are controlled to a large extent by lease stocking density decisions made by individual farmers. White (2002) estimated that, on average, over the period 1968/69 to 2000/01 the annual yield for NSW oyster aquaculture leases for human consumption was 1.3 tonnes/ha. Ogburn (2011) used 2003/04 production data (for human consumption) and estimated that the average yield was closer to 3.125 tonnes/ha given that approximately 50% of the lease area was fallow or uncultivated. Taking into consideration that it takes 3 to 4 years to

grow an oyster, stocking densities tend to vary between less than 6.25 tonnes/ha for some extensively cultivated stick growing areas to over 37.5 tonnes/ha in prime intensively cultivated tray fattening areas.

Experienced oyster farmers can estimate local carrying capacities based on previous production, observed growth rates and environmental conditions. It is acknowledged however, that because oyster farmers rely on a common food resource, a conflict between individual interests and the common good may develop. Where necessary DPI can prepare stock management plans to manage this issue, for estuaries or parts of estuaries, at the request of the local oyster industry. These plans would be prepared in consultation with all affected parties and would be given effect under the *FM Act*.

The following infrastructure stocking densities can be used as a guide for an average lease in a NSW oyster producing estuary:

- the minimum distance between post and rail tray cultivation is 8 metres
- the maximum length of single strand of supported baskets/tumblers or floating cultivation on a lease is 2.5 km per ha of lease
- the maximum area of raft cultivation on a lease is 540 square metres of raft per ha of lease.

6.6. Seagrass protection

All seagrasses provide habitat for fish and other aquatic fauna, help to reduce erosion and improve water quality, and are a source of food for fish and other aquatic fauna. Of the six NSW species of seagrass *Posidonia australis* is particularly susceptible to impacts from human activity because it has a limited distribution and once disturbed is slow to recover.

Existing oyster aquaculture that is over or may potentially shade seagrass should:

- regularly maintain the lease area to keep broken rails and fallen culture infrastructure off the bottom
- ensure outboard motors are trimmed as necessary to avoid the propeller cutting seagrass fronds.
- report significant changes in seagrass coverage to DPI
- use supported baskets/tumblers, floating cultivation, or other methods that minimise shading.

Multiple layer stick cultivation, tray cultivation, shade cloth and any other materials or culture methods that would unduly shade a *Posidonia* bed are not recommended.

New oyster aquaculture leases applications that are not in a POAA:

- will not be approved over *Posidonia sp.* seagrass beds
- will only be considered over *Zostera sp.* seagrass beds where the proposed method of cultivation does not result in significant shading impacts.

6.7. Live oyster reef protection

Live oyster reefs are located in estuarine systems adjacent to and within POAA. Some of the reefs are naturally occurring and some are the result of past oyster cultivation practices. Research has shown the important role these reef areas play in maintaining estuarine processes such as water quality and aquatic species diversity and abundance. Efforts to protect and restore oyster reef and bring back lost ecological functions are growing globally. Under the NSW Marine Estate Management Strategy, DPI with the support of the local community and local oyster farmers, delivered the first large-scale oyster reef restoration effort in NSW waters in

2019/20 at two locations in Port Stephens. This project is paving the way for the development of such projects in other NSW estuaries.

DPI does not support the removal of natural live oyster reef within POAA. Conditions apply to the removal of live oyster reef formed on derelict oyster cultivation within POAA (see Chapters 8.1.7 and 9.1.5).

6.8. Threatened species protection

To meet their ESD and environmental responsibilities oyster farmers should:

- take all possible care to avoid hitting marine fauna with boats or propellers
- not discard any debris into the estuary or adjacent lands
- ensure all ropes and mooring lines are relatively taut and design floating cultivation to prevent entanglement
- immediately record and report any instances of entangled, entrapped or distressed wildlife to NPWS
- participate in the protected, threatened and pest species sighting program to improve knowledge of the distribution and abundance of the species, particularly on oyster aquaculture lease areas
- become familiar in how to identify threatened estuarine species for example, Green Sawfish, Little Tern, Osprey, Pied Oyster Catcher, Sooty Oyster Catcher, Beach Stone Curlew and Turtles
- take care not to disturb potential nest tree sites or nests on or adjacent to oyster aquaculture leases
- take care not to disturb known or potential habitats adjacent to oyster aquaculture areas, for example, Little Tern, Osprey, Beach Stone Curlew, Pied Oyster Catcher and Sooty Oyster Catcher.

6.9. Hours of operation

The hours on which oyster aquaculture leases are worked can be restricted by tides and weather conditions. Therefore, it is important that routine stock handling operations and emergency lease and marking repairs can be conducted at all times.

The hours of operation for routine, well managed, stock handling operations, harvest and emergency lease and marking repairs are not restricted. These activities include:

- harvest
- washing
- Grading
- stocking and de-stocking a lease
- marking
- emergency lease and marking repairs.

However, within 200 m of private residences programmed lease construction and unduly noisy operations should only be conducted on oyster aquaculture leases during the period from 7:00 am to 6:00 pm Monday to Friday. Emergency repairs and emergency stock management operations are exempt from this restriction.

6.10. Noise

Oyster farmers operate in an extremely variable noise climate. Background noise varies with wind and wave action and the noise from other boats and shore-based activities. Noise propagation varies depending on the climatic conditions and the distance to the activity. The sensitivity of receivers also varies depending on the time of day and the perceptions and attitudes of individual receivers.

Oyster farming is not known as a noisy activity and has not, historically, been the source of serious noise problems. The main routine noise sources, outboard motors and on-board equipment (winches and pumps) are generally less noisy than recreational powerboats and many other waterway activities. In recent times the industry has switched to modern four-stroke and fuel injected two stroke motors and the noise levels of outboard motors and on-board equipment has dropped significantly. These modern engines also have significantly reduced emissions.

The *POEO Act* and the *Protection of the Environment Operations (Noise Control) Regulation 2017* are the primary legislative means of controlling noise on NSW waterways. TfNSW is the main agency responsible for noise from vessels and may issue regulatory notices and directions under the Act and penalty notices under the Act and Regulation. Police and council officers may also issue directions and penalty notices.

For example, where it is determined ongoing offensive noise is occurring, TfNSW may seek to identify a compromise between being able to conduct legitimate activities that may emit noise and the responsibility to minimise noise. A regulatory notice issued by TfNSW may require, for example, that certain equipment no longer be used, that the equipment be modified or that the equipment only be used at certain times of the day.

There is a general expectation that whoever is creating offensive noise should implement all feasible and reasonable measures to control it. Guidance on determining offensive noise can be found in Part 2 of the EPA's Noise Guide for Local Government available at:

www.epa.nsw.gov.au/your-environment/noise/regulating-noise/noise-guide-local-government

Industry best practice for noise management includes:

- using only four-stroke or fuel injected two stroke outboard motors or other boat motors that enable the vessel to operate without causing offensive noise
- reducing boat speed near sensitive receivers
- keeping all on-board motors in good repair with appropriate mufflers fitted
- aiming to develop amicable relations with residential neighbours and have regular contact so that potential problems can be identified and resolved at an early stage
- acknowledging complaints and aiming to resolve them co-operatively
- complying with any direction of a TfNSW authorised officer
- using courteous language in the vicinity of other waterway users and residential neighbours.

6.11. Washing and temperature control spraying of oyster crops

Washing oysters is undertaken to control parasitic mud worm infection and spraying is used to cool intertidally exposed oysters to prevent heat induced mortality in very hot conditions and to meet food safety standards. The material washed from oysters is fine silt that settles from the water column and small amounts of marine bio-fouling.

Washing is undertaken by pumping water from the estuary through sprays and nozzles and returning this water to the estuary. Stock and infrastructure is either returned to a land base for washing or washed in-situ on an oyster aquaculture lease.

In-situ washing must be:

- undertaken using equipment kept in good repair with mufflers attached to all motors
- undertaken to keep noise to a minimum
- managed and undertaken to minimise any adverse effects on water quality.

6.12. Dredging and reclamation

Reclamation and dredging to maintain adequate water depth by oyster farmers is not a routine oyster aquaculture activity and may only be undertaken with the appropriate development consent under the *EP&A Act*. Other approvals may also be required including a permit under Part 7 of the *FM Act*.

6.13. Platforms and sheds

New work platforms, culling sheds and structures for the storage of un-used culture materials (i.e. depot sticks and trays) will not be approved on oyster aquaculture leases.

A future review of existing platform and shed structures on oyster aquaculture leases will be undertaken in conjunction with CL, to verify approval status, condition and tenure these structures if possible and appropriate. In some cases, these will not be able to be approved and may require removal.

6.14. Pest and disease control

DPI Aquatic Biosecurity unit supports the development of measures to eliminate, prevent or minimise aquatic pests and diseases.

Where there has been a significant level of oyster mortality or there is a suspicion oysters are being affected by a disease/organism DPI must be notified immediately.

There are aquatic pest and disease issues that impact the NSW oyster industry, such as POMS, QX disease, Winter Mortality disease and wild Pacific Oyster overcatch. DPI has developed and implements provisions to reduce the risks of translocation of QX disease, POMS under the *NSW Biosecurity Act 2015* and wild Pacific Oyster translocation via inter-estuarine shipments of oysters and cultivation equipment under the Fisheries Management (Aquaculture) Regulation 2017 (FMAR 2017).

Make 'clean' part of your routine

DPI Primefact No. 1290, (Biosecurity NSW, 2015) outlines how to routinely minimise the chance of spreading aquatic pests and diseases on boats and marine equipment. For more information see the DPI Biosecurity website at www.dpi.nsw.gov.au. The main points from Primefact No. 1290 are:

When arriving at a waterway:

- check your equipment is clean and remove any visible oysters/sediment/biofouling before entering the water

When departing a waterway:

- use fresh, clean water to flush outboard motors, trailers, vehicles and equipment. Commercial car wash facilities provide high pressure sprayers and are a good option
- ensure that all visible debris and biological material is removed – dispose of all waste collected during cleaning in general waste

- pay particular attention to areas where biological material tends to accumulate such as wheel arches, boots and farming equipment
- drain all water from trailer-boats prior to leaving a location - ensure wastewater does not return to any other NSW waterway
- to the best extent possible, all washed items should be allowed to completely air dry before being used at a new location.

QX disease

QX disease is caused by the parasite *Marteilia sydneyi* and is only known to affect the Sydney Rock Oyster. There are no human health issues associated with QX disease. This disease is capable of causing significant impacts and losses of this species and to prevent the spread of QX disease in NSW a risk based approach has been implemented in a biosecurity zone described under Part 3 of the Biosecurity Regulation 2017 (BR 2017) which prohibits the movement of all oysters from high risk QX disease estuaries to lower QX disease risk estuaries. Further, the movement of oyster farming equipment out of high and medium QX disease risk estuaries is only permitted if it has been treated in accordance with the provisions of the specific QX Disease Biosecurity Order.

Pacific Oyster Mortality Syndrome (POMS)

In late November 2010 oyster farmers in the Georges River, Botany Bay, reported to DPI that they had experienced a large mortality event in their Pacific Oyster crop and also noted that wild Pacific Oysters had died too. Subsequently there were reports of wild Pacific Oysters dying in the upper reaches of Sydney Harbour in late February 2011. Investigations confirmed that the mortality had been caused by the virus responsible for POMS. Oyster farmers in the Hawkesbury River reported significant mortality of farmed and wild Pacific Oysters at Mullet Creek in late January 2013 which within 12 months had resulted in the total collapse of the Pacific Oyster sector of the industry in the estuary. Sydney Rock Oysters and Native Oysters are not affected by POMS. There are no human health issues associated with POMS.

To control the spread of POMS, a biosecurity zone has been established under part 3 of the BR 2017 providing for a total ban on the movement of oysters from the Hawkesbury River, Brisbane Waters, Georges River, Botany Bay and Port Jackson to any other unaffected estuary in NSW and movement controls are in place regarding the movement of oyster farming infrastructure and equipment from these estuaries.

DPI is undertaking research into the infectivity mechanisms of this disease and is working closely with other research groups to better understand the mechanisms for the spread and management of this disease and to develop a POMS resistant Pacific Oyster.

Pacific Oyster control

The Pacific Oyster is an introduced species and may only be cultivated in NSW under the authority of an Aquaculture Permit endorsing the cultivation of this species. Pacific Oysters were first introduced into Australian waters in 1947 (Tasmania and Western Australia), 1953 (Victoria) and 1969 (South Australia). Wild Pacific Oysters are now endemic in NSW in all estuaries south of and including the Hastings River.

Part 2, Division 3 of the FMAR 2017 sets out criteria for wild Pacific Oyster over catch management that must be complied with when moving oysters between estuaries in NSW to prevent translocation of this aquatic pest.

Oyster shipment zones

NSW oyster estuaries have been split into estuary groups based on the prevalence of QX disease and the Pacific Oyster. There are restrictions on sending oysters between different

groups because of risk of translocation of disease (QX disease, POMS) and/or Pacific Oysters to other estuaries. Under Part 2, Division 3 Clause 10 of the FMAR 2017, all oyster movement in NSW must be documented in the Oyster Shipment Logbook system. Information regarding the Oyster Shipment Logbook and the inter-estuarine movement of oysters is available on the DPI website www.dpi.nsw.gov.au.

Oyster Shipment Logbook and IVR oyster movement reporting system

All shipments of oysters (except those being moved within the one estuary or those being harvested directly for human consumption) must have shipment details recorded in the permit holders Oyster Shipment Logbook or the interactive voice record system (IVR) prior to shipping.

Fisheries Officers must be given notification of high-risk shipments not less than 48 hours and not more than 2 weeks prior to the movement. For low risk shipments the notification must be given not less than 2 hours and not more than 2 weeks prior to the movement.

The original copy of the Oyster Shipment Logbook sheet or a note of the IVR number must accompany the shipment of oysters to another estuary. This copy must be kept by the receiving permit holder.

The remaining copies of the completed logbook forms must be sent monthly to DPI as described on the logbook form.

Inspections of shipments can be conducted by Fisheries Officers at any time and may include inspection of the logbook. In certain circumstances an inspection may be compulsory.

Where the correct procedures have not been followed Fisheries Officers can detain and/or seize the shipment.

Importation of hatchery spat from interstate

Section 216 of the *FM Act* specifically prohibits the release into any NSW waters of live fish (the definition of which includes oysters and other shellfish) except under the authority of a permit issued by the Minister. It is a condition of every Aquaculture Permit that “for the purposes of Section 216(1) of the *FM Act*, unless specified in a Specific Condition attached to the permit, the permit does not authorise the release into any waters any live fish of any species imported into NSW from interstate or overseas”. A breach of an Aquaculture Permit condition may lead to permit cancellation under Section 160 of the *FM Act*.

Where a permit holder wishes to import hatchery spat from another Australian state they must first make application to DPI to have their Aquaculture Permit varied to permit the importation and possession. This involves the completion of an Aquaculture Permit/Lease Variation Application form which is available online on the DPI website at: www.dpi.nsw.gov.au/fisheries/aquaculture

Currently only shellfish produced at approved interstate shellfish hatcheries may be imported and relayed in NSW waters under specific conditions.

The importation and relaying of shellfish harvested or collected from open waters in other states is not permitted.

An application to import and relay shellfish from an interstate shellfish hatchery will only be considered where the application is accompanied by a Biosecurity Import Risk Assessment (BIRA) completed by the applicant. Only where the BIRA has adequately identified and appropriately mitigated any potential risks will DPI consider the application. Where the application has been approved, DPI will prepare a Shellfish Hatchery Import Protocol (SHIP) specifying conditions under which the importation and relaying may occur. Oyster hatchery spat production and importation must comply with the provisions of the SHIP attached to the importer’s aquaculture permit.

The importation and relaying of shellfish without permit authorisation or in breach of the conditions specified in a SHIP is breach of an aquaculture permit condition and may lead to permit cancellation and/or penalties under the relevant legislation.

For further information regarding the importation of shellfish is available on the DPI website at: www.dpi.nsw.gov.au/fishing/aquatic-biosecurity/legislation-regulations

6.15. Theft of oysters and damage to oyster aquaculture leases

The oyster aquaculture lease/permit holder owns all oysters cultivated on the lease area. It is an offence under the *Crimes Act, 1900* to steal oysters and under the *FM Act* to remove oysters or other cultivated species from an oyster aquaculture lease without authority.

All thefts should be reported to local police for investigation in the first instance, on the NSW Police Assistance line ph. 131 444.

DPI local fisheries compliance should then be informed so that patrols can observe any suspicious activity and liaise with the police and farmers to reduce further theft. Call the Fishers Watch number 1800 043 536.

It is also an offence under the *FM Act* to interfere with aquaculture infrastructure on an oyster aquaculture lease without the consent of the lessee.

Reports of illegal or suspicious activity should be made to your local Police Station or Crime Stoppers (1800 333 000) and your local DPI Fisheries Office.

Chapter 7 Lease Marking

This Chapter is an Aquaculture Industry Development Plan for the purposes of Division 7 of Part 4 of the Fisheries Management (Aquaculture) Regulation 2017 (FMAR 2017) Marking of leased areas, boat channels and access ways.

Lease marking is required for safe navigation, to establish the use of the area for oyster aquaculture and to clearly identify individual oyster aquaculture leases.

Compliance with lease marking requirements is mandatory.

Marking with lease corner and intermediate posts is the default standard unless:

- an exceptional circumstances approval to mark contrary to these standards is granted
- the special marking provisions for foreshore leases apply.

7.1. Marking standards ‘common’ to all leases

7.1.1. Marker post materials

All oyster aquaculture lease marker posts must:

- be constructed of materials that are long lasting, pose no risk of significant environmental harm, be recyclable and made from renewable resources and/or recycled materials
- be white (Pantone 11-0203 TSX or lighter) in colour above the low water mark
- not be constructed of steel or materials that will corrode rapidly.

7.1.2. Marker post maintenance and repair

The following conditions apply to the maintenance and repair of lease marker posts:

- all lease marking (corner posts and intermediate market posts) must be wholly separate from the oyster cultivation infrastructure. That is, lease culture infrastructure must not be connected (in any way) to lease corner or intermediate marker posts
- all oyster aquaculture lease markers must be kept in good condition and be free of un-serviceable or prohibited materials
- all open-ended posts greater than 150mm diameter must be capped.

7.1.3. Lease corner marker posts

An oyster aquaculture lease corner marker post is required at each point on the lease where there is a change in the compass heading of the boundary of more than 20 degrees or the boundary point is shared with one or more adjacent oyster aquaculture leases. An oyster aquaculture lease corner post must:

- have an approved DPI oyster aquaculture lease sign attached at least 1 metre above the high-water mark
- have a minimum diameter or diagonal width of,
 - 90 millimetres where the post is constructed wholly of white plastic with internal timber reinforcing (minimum diagonal width of 80mm)
 - 150 millimetres where the post is constructed wholly of timber
- be firmly placed
- be equal in height to adjacent intermediate posts
- appear to be square to the water surface to the casual observer

- be white (Pantone 11-0203 TSX or lighter) in colour above the low water mark
- have between 1.25 metres and 1.5 metres showing above high-water mark (spring tides)
- must not be used as a point of attachment for oyster culture infrastructure

7.1.4. Intermediate lease marker posts

An intermediate oyster aquaculture lease marker post marks the boundary of a lease between two lease corner posts. Intermediate oyster aquaculture lease marker posts must:

- have a minimum diameter or diagonal width of
 - 75 millimetres, where the post is constructed wholly of white plastic with internal timber reinforcing (minimum diagonal width of 70 millimetres)
 - 100 millimetres, where the post is constructed wholly of timber;
- be firmly placed
- be equal in height to adjacent intermediate posts and evenly spaced
- appear to be square to the water surface to the casual observer
- be white (Pantone 11-0203 TSX or lighter) in colour above the low water mark
- have between 1.25 metres and 1.5 metres showing above high-water mark (spring tides)
- must not be used as a point of attachment for oyster culture infrastructure.

7.1.5. Intermediate lease marker post spacing

The oyster aquaculture maps categorise the water adjacent to each oyster aquaculture lease boundary using Categories 1, 2, 3 and 4. The requirements for intermediate lease marker post spacing are given in Table 7.

Table 7: Intermediate lease marker post spacing.

Marking Category	Description	Minimum intermediate post spacing
1	High level of boating activity – i.e. adjacent to main navigation channels, ways of access, and recreational areas.	10 metres
2	Medium level boating activity.	25 metres
3	Low use areas and foreshore boundaries with public access.	50 metres
4	Minimal use areas with boundaries adjoining other oyster aquaculture leases and minimal use/limited access foreshores such as bushland.	100 metres
SPECIAL	Where exceptional circumstances apply.	As directed

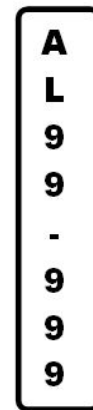
7.1.6. Oyster aquaculture lease signs

An oyster aquaculture lease sign must be attached to each lease corner post. The oyster aquaculture lease sign must be a sign provided by a DPI approved supplier or a sign that meets the specifications prescribed in Table 8.

Table 8: Oyster aquaculture lease sign specifications.

		Diamond Square	Vertical Rectangle
Sign specifications	Size	300mm x 300mm	100mm x 550mm
	Material	Marine Grade UV Stable	Marine Grade UV Stable
	Finish	Rounded corners	Rounded corners
	Colour	White (see Chapter 8.1.1)	White (see Chapter 8.1.1)
Lettering	Minimum Character size	60mm high x 25mm wide	60mm high x 25mm wide
	Colour	Black (UV Stable)	Black (UV Stable)
	Wording	Oyster Farm	
	Numbering	Lease number	Lease number

Format



7.1.7. Navigation aids

Navigation aids (e.g. directional arrows, port and starboard colours and/or visual marks) must not be placed on any oyster aquaculture lease or oyster aquaculture lease boundary without prior consultation and written approval of the local TfNSW Boating Safety Officer.

TfNSW may require the installation or removal of navigation aids in some circumstances and will advise leaseholders in writing of any such requirements.

7.2. Special marking standards

7.2.1. Foreshore oyster aquaculture leases

The following additional marking requirements apply to all foreshore oyster aquaculture leases:

- foreshore leases, being natural rock or break-walls where no cultivation infrastructure has been placed on the lease area are to be marked on the shore, directly adjacent to the lease boundary and the mark must be clearly visible from the water and land
- the shoreline mark must have an approved DPI oyster aquaculture lease sign attached at least 1m above the high-water mark
- no sign may be installed on a National Park or Nature Reserve without approval from the NPWS.

7.3. Approval to mark contrary to these standards

Division 7 of the FMAR 2017 provides for the Minister or a Fisheries Officer to direct a lessee to mark an oyster aquaculture lease contrary to the standards given in this Chapter if these standards are impractical. These directions must be given in writing.

7.3.1. Fisheries Officer approval for reduced marking

DPI Fisheries Officers may approve in writing:

- for a lease to be not marked at all if the lease is completely free of all cultivation material
- marking only a used section of a lease where only a small portion of a very large lease is cultivated, for example on long narrow leases close the shore.

7.3.2. Approval to use raft infrastructure as a boundary markers

DPI Aquaculture Administration may approve in writing for lease markers to be placed on or incorporated into raft cultivation where the raft is located on the boundary of a lease or where it is unreasonable for the lessee to install marker posts due to water depth or substrate conditions.

Applications must be made using a Lease/Permit variation form.

The following additional marking requirements apply to all oyster aquaculture leases approved for raft markers to be incorporated into raft design in shallow waters:

- on the side of the raft that adjoins a navigational channel only, all vertical mooring post that pass vertically through the raft and secure the raft on the lease area must,
 - be white (see Chapter 8.1.1)
 - have a minimum diameter of 200mm
 - have between 1.25 metres and 1.5 metres showing above high-water mark (spring tides)
 - have reflectors fitted if required by TfNSW
- at the vertical mooring post at the end of a raft located closest to each corner of the oyster aquaculture lease, a lease sign must be fixed (between 1.25 metres and 1.5 metres showing above high-water mark)
- on the end, or any side of the raft that adjoins a navigational channel the raft must incorporate a substantially white stripe of a minimum width of 90mm.

The following additional marking requirements apply to all oyster aquaculture leases approved for raft markers to be incorporated into raft design where it is unreasonable for the lessee to install marker posts due to water depth and/or substrate conditions as well as to minimise visual impact:

- at each corner of a raft that adjoins a navigational channel, a vertical post must be fitted that,
 - is of a minimum height of 0.7 metres above the waterline
 - has attached near the top, two flat white panels (attached at 90 degrees to one another) each of a dimension of 300 mm x 300 mm when sighted from any horizontal position
 - has post and fixture painted white (see Chapter 8.1.1)
 - has reflectors fitted if required by TfNSW

- at the end of a raft located closest to each corner of the oyster aquaculture lease, a lease sign must be fixed (between 1.25 metres and 1.5 metres showing above high-water mark),
 - such signs may form part of the corner marks of the raft
 - may substitute for a 'common' oyster aquaculture lease corner post and sign.
- on the end, or any side of the raft that adjoins a navigational channel the raft must incorporate a substantially white stripe of a minimum width of 90mm.

Note: Only the raft that adjoins a navigational channel must be marked as described above. Any other raft on the lease must meet the Chapter 8 Lease Tidiness standards and be substantially black, dark grey or dark grey/green in colour (the use of blue flotation drums on rafts is permitted contrary to Chapter 8.1.1).

7.3.3. Aquaculture Administration approval to use floating markers

DPI Aquaculture Administration may approve in writing for a lease, or for sections of a lease, to be marked with floating markers where it is unreasonable for the lessee to install marker posts due to water depth and/or substrate conditions. Approval may also be granted for floating markers to minimise visual impact.

Applications must be made using a Lease/Permit Variation form available online at: www.dpi.nsw.gov.au/fishing/aquaculture/forms/lease-based.


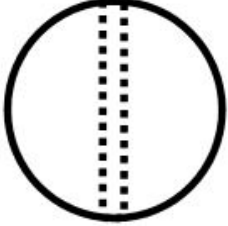
7.3.4. Standards for floating marks

The specifications for floating lease marks are prescribed in Table 9.

Floating marks must be securely attached to an anchor appropriate to the prevailing conditions with nylon rope with a minimum diameter of 10mm. To minimise the entanglement risk to marine mammals the minimum possible amount of rope must be used, and the float rope must be counterweighted near the bottom to ensure that the rope remains vertically taught throughout the tidal cycle.

Table 9: Floating lease boundary marks.

		Corner Mark	Intermediate Mark
Float specifications	Size	Minimum 200mm Maximum 400mm	Minimum 90mm Maximum 200mm
	Material	Polystyrene or Plastic	Polystyrene or Plastic
	Finish	Round	Round
	Colour	White (see Chapter 8.1.1)	White (see Chapter 8.1.1)
Lettering	Minimum Character size	60mm high x 25mm wide	
	Colour	Black (UV Stable)	
	Numbering	Lease number	

	Corner Mark	Intermediate Mark
Format		

7.4. Lease marking compliance

If an oyster aquaculture lease does not comply with the relevant lease marking standards specified in this strategy the lessee will be issued a Notice to Comply to ensure that the markings comply in accordance with Clause 58(1) of the FMAR 2017.

A Clause 58(1) Notice will give not less than 7 days from the date of issue to bring the oyster aquaculture lease marking into compliance with the standards specified in the strategy.

Clause 58(2) provides for a Fisheries Officer to complete the work if the lessee fails to comply with a Clause 58(1) Notice. The cost of this work can be recovered from the lessee under Clause 58(3).

A monetary Penalty Infringement Notice (PIN) may be issued for failure to maintain lease markings.

Chapter 8 Lease Tidiness

Aquaculture Lease Tidiness standards aim to:

- reduce the likelihood of the lease maintenance burden becoming overwhelming
- reduce lease abandonment and potential expenditure of lease security trust funds
- reduce adverse visual, amenity and safety impacts consistent with the oyster industry's estuarine stewardship responsibilities (see Chapter 5).

For the purpose of s.162 of the *FM Act*, "tidy" is defined as being in accordance with these tidy standards. Nothing in these standards stifles any innovation that achieves an even higher standard of performance.

8.1. Tidy standards 'common' to all leases

The following aquaculture lease tidiness standards apply to all aquaculture lease areas.

8.1.1. Colour

To create visual harmony and compatibility, aquaculture lease infrastructure must be:

- substantially black, dark grey (Pantone 4128 C or darker) or dark grey/green (Pantone 196026 TCX or darker) in colour on installation
- consistent in colour
- lease corner and intermediate markers must be white (Pantone 11-0203 TSX or lighter).

Note: *white culture infrastructure is prohibited in order to reduce visual amenity impacts and to prevent confusion with white lease boundary marker posts while navigating in oyster aquaculture areas. However, light coloured posts are permissible if the cultivation (baskets, tumblers, trays) substantially hides or obscures the posts. Blue recycled drums are also permitted as raft floatation devices)*

8.1.2. Shape and design

To create visual harmony and compatibility, aquaculture lease infrastructure must be:

- consistent in shape and design
- consistent and low in height and appear square to the water surface to the casual observer
- consistent in line and direction to the casual observer
- consistent with the scale of the surroundings.

Note: *If possible, leases that are within the same visual catchment should use the same types of cultivation equipment, same spacing and alignment as this creates uniformity.*

8.1.3. Materials and Construction

The following conditions apply to materials and construction method use on oyster aquaculture areas:

- unless approved under Section 7.3.2 all aquaculture lease culture infrastructure must be kept separate from white lease markers and intermediate markers posts
- all aquaculture lease infrastructure must be installed so that it is kept wholly within the surveyed lease boundary at all times, including floating infrastructure, rafts, moorings, anchors and ropes

- all oyster aquaculture lease infrastructure must be constructed of materials that are long lasting, pose no risk of significant environmental harm, be recyclable and made from renewable resources and/or recycled materials
- all oyster aquaculture leases must be kept free of the following prohibited materials:
 - conveyor belting – no new installation is permissible, existing unserviceable conveyor belting must be removed from the lease area and cannot be replaced
 - vertically hung netting
 - steel, steel star pickets and corrugated iron
 - tyres (*Contrary to this section the use of small car tyres as sliding mooring collars or raft module shock absorbers is permissible*).

8.1.4. Maintenance and Repair

The following conditions apply to the maintenance and repair of oyster lease infrastructure:

- all oyster aquaculture leases must be kept in good condition and be free of un-serviceable or prohibited materials
- any fallen, damaged or unserviceable materials or infrastructure must be repaired or removed as soon as tides, weather and normal work schedules permit, or in accordance with a Section 162(1) Notice issued by a Fisheries Officer
- all oyster aquaculture leases must be kept free of waste and must not be used to store un-used cultivation materials
- overcatch and other marine biofouling must be removed if it threatens to the structural integrity of the lease infrastructure and markers.

8.1.5. Mooring of oyster industry vessels

The following conditions apply to the mooring of vessels on oyster aquaculture leases:

- punts and boats must not be permanently moored on an oyster aquaculture lease
- punts and boats not removed from the water daily must be moored at work sheds, private jetties or on TfNSW registered moorings
- floating shuttle devices used for the purpose of turning or harvesting floating basket longline cultivation may be temporarily secured in a lease area (including overnight).
- a shuttle must:
 - remain wholly within the boundaries of the lease during all wind and tidal conditions
 - have a fully enclosed hull
 - be less than 5m long by 3m wide
 - be securely attached to the longline
 - be designed to host infrastructure to service longline basket cultivation.

8.1.6. Waste management

The following conditions apply to the management of oyster industry waste:

- reduce, re-use and recycle waste materials where possible

- all lease infrastructure removed from a lease must be returned to shore for processing or disposal
- all wastes from culling activities conducted on leases must be returned to shore for processing or disposal
- where possible bio-fouling removed from lease infrastructure (markers, rail etc) should be collected and returned to shore for processing or disposal.

8.1.7. Removal of derelict cultivation that has formed live oyster reef in POAA

The following conditions apply to the removal of live oyster reef from oyster aquaculture leases:

- where an oyster farmer wishes to remove from a lease area derelict oyster cultivation that has collapsed into the substrate and is fully encrusted with hard living oyster biofouling with little or no cultivation exposed, DPI will only consider its removal where:
 - an environmental impact assessment has been prepared by the applicant
 - any necessary approvals have been obtained under the *EP&A Act*.
- DPI will only consider the removal of traditional rock cultivation where it can be demonstrated that it poses a serious navigation, or safety risk, and can be removed without causing significant net environmental harm and where:
 - an environmental impact assessment has been prepared by the applicant
 - any necessary approvals have been obtained under the *EP&A Act*.
- DPI will not support the removal oyster encrusted natural reef or natural rock.

8.1.8. Fallow leases

The following conditions apply to oyster leases that are left fallow (unused):

- leases may be left fallow for up to five years. Longer fallow periods are permitted if identified in an approved Commercial Farm Development Plan (CFDP) submitted by the leaseholder or with the prior written approval of DPI
- only sound posts and rail may remain on fallow leases - all rafts trays, sticks, supported baskets/tumblers and floatation longlines must be removed
- lease marking must be maintained during the fallow period
- rails and posts must be maintained in serviceable order during the fallow period.

8.2. Special tidy standards

8.2.1. Catching slats

- White plastic catching slats are permitted (contrary to Section 8.1.1).

8.2.2. Raft cultivation

The following conditions apply to raft cultivation:

- rafts must be constructed of materials that are long lasting in the marine environment and pose no risk of significant environmental harm
- rafts must be constructed with marine grade fastening systems
- rafts must not be used to store waste, infrastructure or materials

- plastic drums and floats must be adequately secured to the raft at all times and replaced if broken or leaking.
- rafts must be low in height and must be designed and constructed to float horizontally to the water surface
- the use of steel or concrete flotation devices is prohibited
- rafts must be constructed of either good quality structural grade hardwood or aluminium, or equivalent
- only plastic drums sourced from a licensed drum recycling company may be used for oyster raft flotation
- black coloured flotation is preferred but blue flotation drums are permitted (contrary to Chapter 8.1.1).
- small sized securely fixed tyres may be used for raft buffers or post sleeve collars (contrary to Section 8.1.3)
- broken or damaged rafts must be removed from the lease area or repaired as soon as possible
- broken or damaged rafts must not be stored on any oyster lease or any public water land

For further information regarding best practice for raft cultivation see Best Practice Guidelines for Raft available on the DPI website at: www.dpi.nsw.gov.au/fisheries/aquaculture

8.2.3. Floating cultivation

The following conditions apply to not-raft floating cultivation:

- any spherical surface float used to support floating cultivation must not be greater than 400mm in diameter
- horizontal white flotation (for example white pipe) is only permitted in Wallis Lake and the Manning River as an historical stick cultivation method but is not approved for floating basket cultivation in any other estuary
- horizontal white floats must be secured appropriately so that they do not drift outside of the lease boundaries
- horizontal white floats (for example white pipe) must not be bundled for storage on a lease area or any public water land when not being used
- small sized, securely fixed tyres may be used for floating cultivation post collars (contrary to Section 8.1.3).

For further information regarding best practice for floating cultivation see Best Practice Guidelines for Floating Cultivation available on the DPI website at: www.dpi.nsw.gov.au/fisheries/aquaculture

8.2.4. Wave barrier fencing

The following conditions apply to wave or boat wash barrier fencing:

- wave barrier fences can only be constructed on leases approved and endorsed by DPI for these structures
- must not unreasonably restrict ways of access to other leases, or to other public waters
- must not obstruct access to an intertidal shoreline
- may incorporate lease corner marks and intermediate markers

- floating fences must not extend more than 50cm above or below the water surface and must be fixed such that they do not drift or extend beyond the boundaries of the lease
- unless approved by DPI, fixed (not floating) fences must not extend above Mean High Water Mark and where possible, fences should not extend more than 50 cm above the highest level of cultivation materials and must not extend more than 20cm below the lowest level of cultivation.

8.2.5. Spray Irrigation

The following conditions apply to spray irrigation used to cool intertidal rack and rail cultivation:

- spray irrigation can only be constructed on leases approved and endorsed by DPI for these structures
- all reasonable care must be taken to ensure that irrigation pumps do not pollute the marine environment.

8.3. Maintenance Schedule

As a guide, the following lease maintenance schedule is recommended. However in the event of significant environmental event oyster farmers should check their lease infrastructure to ensure that it does not significantly impact on visual amenity or pose a risk to the safe navigation of oyster lease areas.

MATERIAL	MAINTENANCE
Lease superstructure – markers, cultivation posts and rails.	Routine once every 12 months Repair at any time if it has collapsed, is in danger of imminent collapse or if a marker post or sign is missing
Catching material or depot blocks	Routine once every 12 months Repair at any time if it has collapsed or is in danger of imminent collapse Must not remain continuously on a lease for more than two years before being stripped or nailed out
Stick Cultivation	Routine once every 12 months Repair at any time if it has collapsed or is in danger of imminent collapse Must not remain continuously on a lease for more than three years after being nailed out
Trays, Baskets and Cylinders	Routine once every 12 months Repair at any time if it has collapsed or is in danger of imminent collapse
Rafts	Routine once every 12 months Repair at any time if it has failed or in danger of imminent failure: <ul style="list-style-type: none"> • raft timbers and metal fixings, moorings, ropes, attachments and anchors

MATERIAL**MAINTENANCE**

- location within the lease boundary
- floatation devices and attachments
- signs, markers and navigation aids.

8.4. Lease tidy compliance

If an oyster aquaculture lease does not comply with the relevant lease tidy standards specified in this strategy the relevant permit holder will be issued a Notice to Comply to achieve compliance in accordance with Section 162 of the *FM Act*.

A Section 162 Notice will normally specify a timeframe of between 30 and 120 days from the date of issue to bring the oyster aquaculture lease into compliance with the tidy standards specified in the strategy.

The time allowed to bring leases into compliance with tidy standards may be shorter if the issue requires more immediate attention to reduce risks to navigation, environmental damage or serious public nuisance. The frequency of lease inspections may also increase to address compliance concerns.

In accordance with Section 162(3) failure to comply with such a notice is taken as a contravention of a condition of the aquaculture permit.

Oyster farmers may negotiate with the local District Fisheries Office to extend timeframes up to a maximum of 3 years. The local Fisheries Officers will exercise their discretion to extend timeframes on a case by case basis, in consultation with DPI Aquaculture Management. Where agreement has been reached a new Notice to Comply will be issued under Section 162 specifying the new time frame.

Sections 162 (4)-(7) provides for the Minister to complete the work if the permit holder fails to comply with a Section 162(3) notice and to recover costs.

A PIN may be issued for contravention of an aquaculture permit condition in relation to maintaining a lease in a tidy condition.

8.5. Decommissioning oyster aquaculture leases

Leases that are expired, cancelled or surrendered must be completely cleared of all cultivation materials, stock, equipment, wave barrier fences and marker posts before the lessee is discharged from legal responsibility for the area (*Section 171 FM Act*).

The removal of rock cultivation will only be ordered if it poses serious navigation, amenity or safety risk and can be removed without causing significant net environmental harm. Rock cultivation may only be removed with the approval of DPI.

A Section 171(3) notice will specify a timeframe of between 30 and 180 days from the date of issue to completely clear the oyster aquaculture lease.

The time allowed to clear the lease may be shorter if the issue requires more immediate attention to reduce risks to navigation, environmental damage or serious public nuisance.

Sections 171 (4)-(5) provides for the Minister to complete the work if the former lessee fails to comply with a Section 171(3) notice and to recover costs from the former lessee. This entails advertising for a contractor to undertake works, clearing the area and creating a debt. Where a former lessee does not pay off the debt, debt collectors are engaged. Where the debt is deemed irrecoverable, the debt will be covered by the Lease Security Trust.

A Penalty Infringement Notice may be issued for failure to comply with a Section 171(3) notice.

Chapter 9 Planning and Approvals

9.1. Approval of new oyster aquaculture leases

A person may only apply for oyster aquaculture lease where:

- they are the holder of a current Class A Aquaculture Permit
- have a Class A Aquaculture Permit approved in principal awaiting the addition of leases to the permit
- where they have an agreement to sublet the oyster aquaculture lease to an existing Class A Aquaculture permit holder should it be approved.

DPI Aquaculture Administration should be contacted for current advice and information before any formal application is made to lease any area for oyster farming.

New applicants should consult the publicly available Fisheries Spatial Data Portal to identify current and vacant POAA, lease boundary marking requirements, oyster harvest zones established under the NSW SP, wetlands declared under the Coastal Management SEPP 2018 and the location of National Park and Marine Park boundaries. Different assessment and approval processes apply to each of these areas. The Fisheries Spatial Data Portal is available online at:

https://webmap.industry.nsw.gov.au/Html5Viewer/index.html?viewer=Fisheries_Data_Portal

9.1.1. New lease in a POAA.

- an application for a new lease in a POAA must be submitted on the prescribed DPI form
- DPI will make an assessment in accordance with Section 5.5 of the *EP&A Act* to determine if the area is suitable and appropriate for leasing and provide planning approval for the activity.
- if available, the lease will be offered by competitive tender in accordance with the DPI Policy O-071 (*Oyster Aquaculture Lease Allocation*)
- the new lease will be gazetted by DPI if approval is granted.

9.1.2. New lease in a POAA in a Marine Park

- an application for a new lease in a POAA in a Marine Park must be submitted on the prescribed DPI form
- DPI will consult with the relevant Marine Park Manager
- DPI will make an assessment in accordance with Section 5.5 of the *EP&A Act* and the Marine Parks Act, 1997 (*MP Act*) to determine if the area is available for leasing
- if available, the lease will be offered by competitive process in accordance with the DPI Policy O-071 (*Oyster Aquaculture Lease Allocation*)
- the new lease will be gazetted by DPI if approval is granted.

9.1.3. New lease NOT in POAA

An application for a new lease area that is not in POAA must be accompanied by:

- a suitability assessment using the assessment criteria in Table 5 (see Chapter 5.1)
- DPI will liaise with TfNSW and the Marine Estate Management Authority (MEMA) and NPWS if required and make a preliminary assessment of the application and determine if the area appears to be available for leasing

- if available, the applicant should prepare a SEE that addresses the potential environmental impacts of the proposed new lease
- if deemed available, the lease will be offered by competitive tender in accordance with DPI Policy O-071 (*Oyster Aquaculture Lease Allocation*)
- the preferred applicant will prepare a development application (DA) to the relevant local council for assessment under Part 4 of the *EP&A Act*. The DA will need to be supported by a SEE, or for designated development an EIS. A Species Impact Statement is required if a threatened species is likely to be significantly affected
- prior to submitting a DA to council an application must be submitted to CL as land owner for consideration. CL must assess an application to determine whether it will provide Landowner's Consent and if so, provide endorsement prior to the DA being lodged with council for consideration under the *EP&A Act*. Applications for Land Owners Consent are available on the website listed below and enquiries should be directed to:

Crown Lands
PO Box 2215
Dangar 2309

Telephone: 1300 886 235 (Australia wide)
Email: cl.enquiries@crownland.nsw.gov.au
Website: www.industry.nsw.gov.au/lands

- any application for Landowners Consent must include:
 - the original DA form
 - any applicable fees
 - the SEE submitted to DPI with the lease application
 - a copy of a letter from DPI supporting the application
 - detailed plans showing the location and dimensions of proposed development with respect to tenure boundaries
- if the proposed lease area is in a Marine Park and the consent authority intends to grant consent to the lease, the concurrence of the relevant Ministers will be sought
- the new lease will be gazetted by DPI if consent (and concurrence if required) is granted.

9.1.4. New lease in or adjacent to the National Park estate

- an application for a new lease in or adjacent to the National Park estate must be accompanied by:
 - a suitability assessment using the assessment criteria given in Table 5
- DPI will liaise with TfNSW, CL and NPWS and will make a preliminary assessment of the application and determine if the area appears to be suitable and appropriate for leasing. This assessment will also consider other tenures, including potential impacts on native title rights, and the requirements of any Indigenous Land Use Agreement
- if apparently suitable and appropriate (and if available), the lease will be offered by competitive tender in accordance with the DPI Policy O-071 (*Oyster Aquaculture Lease Allocation*)
 - the successful tenderer will be required to submit a REF that addresses the potential environmental impacts of the proposed new lease, including an assessment of impacts on the natural, cultural and social values of the National

Park area and its management. An EIS will be required if the proposed new lease is likely to significantly affect the environment.

- DPI will exhibit the proposed lease and its REF for public and agency comment
- DPI will consider any feedback on the proposal in collaboration with NPWS and assess the application in accordance with Section 5.5 of the *EP&A Act* to determine if the area remains suitable and appropriate for leasing and provide planning approval for the activity
- the written concurrence of the Minister administering the *NPW Act* will be sought if DPI approves the lease – this request will be accompanied by the REF and its determination notice
- the new lease will be granted where the written concurrence of the relevant Minister(s) has been granted.

9.1.5. New lease in areas containing live oyster reef

- DPI will not consider a new application over existing POAA in a Marine Park sanctuary zone that contains significant areas of oyster reef unless:
 - the applicant identifies how they intend to farm around the presence of the existing oyster reef, or
 - agrees to provide a new lease survey removing the oyster reef from the POAA area
- an application for new lease over existing POAA (other than above) that contains oyster reef will only be considered where the applicant:
 - identifies how they will farm around the presence of the existing oyster reef
 - agrees to provide a new lease survey removing the oyster reef from the lease area, or
 - provides an environmental impact assessment adequately addressing the environmental issues associated with the removal of the oyster reef (see Chapter 8.1.7 above)
- any vacant POAA that is identified on oyster aquaculture maps that contain significant areas of oyster reef may be considered for full, or partial extinguishment in consultation with Shellfish Committee.

9.2. Competitive allocation of new lease areas

Under DPI Policy O-071 (*Oyster Aquaculture Lease Allocation*) the default allocation process for all new oyster aquaculture lease applications is by competitive public tender. This policy ensures transparent equal opportunity and maximizes the return to the state from the allocation of this public resource to a private/commercial use. The new lease assessment and allocation process is outlined in Figure 3.

Non-competitive relocation of a portion of a lease that has become unsuitable for oyster aquaculture

DPI will only consider an application to relate a portion of a lease by non-competitive process where:

- it is to correct an administrative error in the existing survey plan

- to shift the boundary of the lease in order to replace a section of the lease that is unsuitable for aquaculture with a new suitable area and the applicant is the current lessee. This exception only applies if:
 - the resurveyed lease incorporates at least 50% of the current lease
 - the total area of the proposed lease does not exceed the total surveyed area of the current lease
 - the applicant has a good history of managing their aquaculture lease areas and agrees to surrender the area that is being excluded from the proposed new lease and remove all improvements from that area (including cultivation material, lease markings and structures).

Note: Oyster aquaculture on public water land that is partly within and partly outside a priority aquaculture area is permissible without development consent, but only if the land outside the area is no more than 0.1 hectares in area as per clause 5.19(6) of the Standard Instrument – Principal Local Environmental Plan and Schedule 4 of the PPRD SEPP where a non-standard LEP still applies.

9.3. Making Local Environmental Plans that may affect oyster aquaculture

To address this issue Council must have regard for Local Planning Direction 1.4 – Oyster aquaculture when preparing any Local Environmental Plans.

9.4. Determining development applications that may affect oyster aquaculture

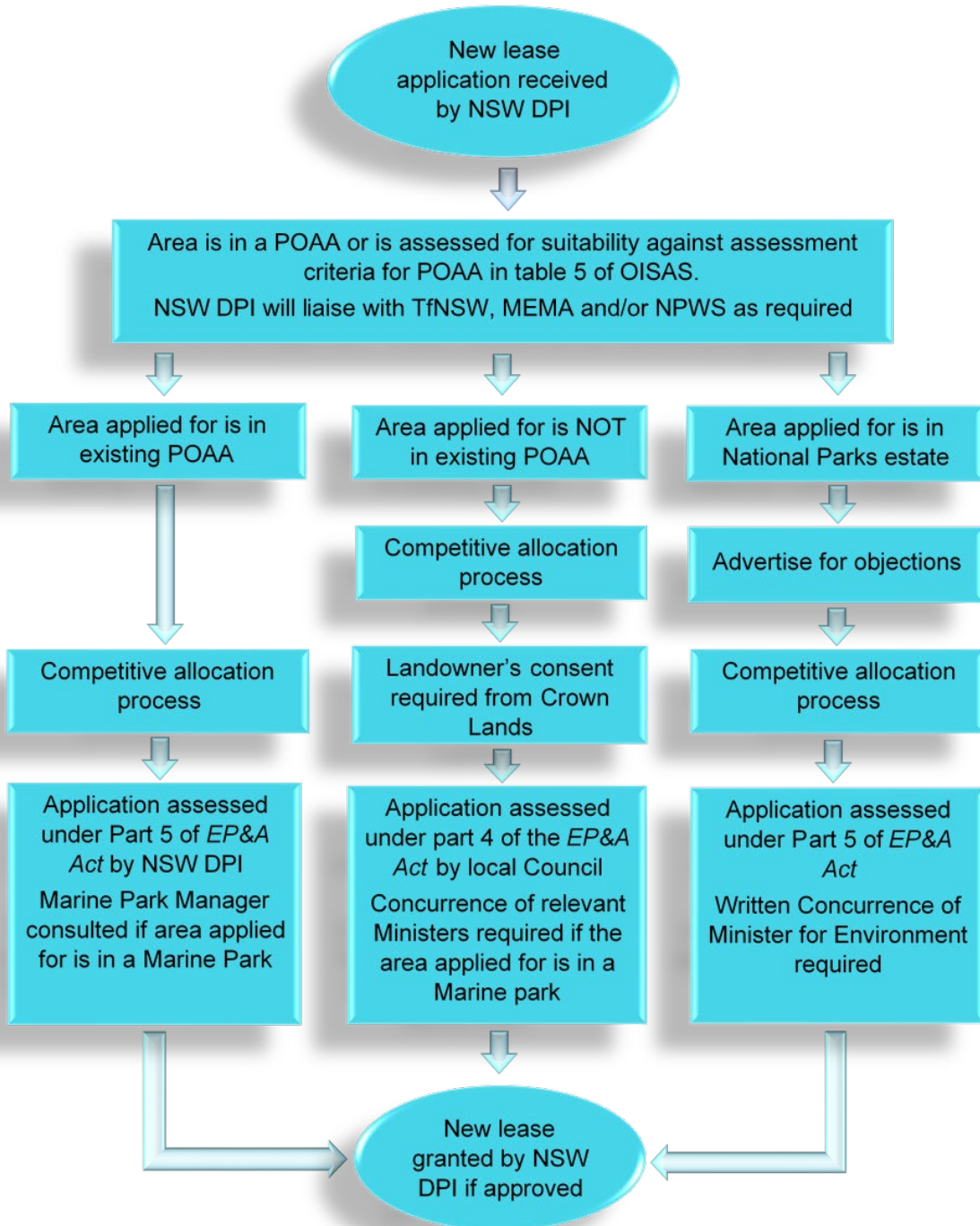
Division 4 of Part 5 of the PPRD requires consent authorities to consider the effects of the proposed development on oyster aquaculture and to take OISAS into consideration.

When considering an application for development that, because of its proposed location, may affect a priority oyster aquaculture area or oyster aquaculture outside such an area, the consent authority must:

- give the Secretary of the Department of Industry written notice of the development application and take into consideration any written submissions made in response to the notice within 21 days after notice was given
- take into consideration the provisions of OISAS
- consider any issues that are likely to make the development incompatible with oyster aquaculture and evaluate any measures that the applicant has proposed to address those issues. Examples of potential land use incompatibility issues include access to oyster aquaculture leases being limited by the development or the risk of adverse impacts of the development on water quality and, consequently, on the health of oysters and on the health of consumers of those oysters.

The consent authority may refuse to grant consent to development if, in the opinion of the consent authority, the development is likely to have an unreasonable impact on a priority oyster aquaculture area or on oyster aquaculture outside such an area.

Figure 3: New lease assessment and allocation process.



9.5. Aquaculture permits

Aquaculture permits are not transferable and remain in force until cancelled at the request of the permit holder or by DPI.

The permit holders listed on a permit cannot be changed. If there are changes to a business partnership, business name or group of farmers working under the one permit, then a new permit must be applied for and assessed by DPI.

The permit, as well as the lease, will specify the species allowed to be cultivated on a lease area.

Applying for a permit

DPI Aquaculture Administration should be contacted for advice. Information regarding aquaculture permits is also provided on the DPI website. Applications for oyster aquaculture permits will be assessed by DPI against the Best Practice Standards in OISAS.

A new entrant to the industry will normally be required to demonstrate access to an approved land base site (work area) and have an aquaculture permit or preliminary approval, prior to obtaining any leases.

Commercial Farm Development Plan

All new class 'A' Aquaculture Permits (includes oysters) must submit a CFDP that is assessed by DPI. A CFDP must include a Lease Maintenance and Development Plan (LM&DP) and a Biosecurity Risk Management Plan (BRMP). Further information regarding the preparation of a LM&DP and a BRMP can be found in Chapter 10, or on the DPI website at:

www.nsw.gov.au/fishing/aquaculture/

A CFDP may be reviewed by DPI where farm management and/or compliance issues arise.

A new CFDP will also be required, or an existing CFDP will need to be updated, where there is a change in ownership or a significant increase in lease area operated under an aquaculture permit.

Suspension and cancellation of permits

Aquaculture permits can be suspended and/or cancelled under s.159 and s.160 of the *FM Act*. Some reasons for suspension or cancellation given under these sections of the Act are:

- the permit holder dies or requests the permit be suspended or cancelled
- the permit application contained false or misleading information
- permit conditions, including Compliance Notices, are not complied with
- the permit holder has been convicted of stealing fish (includes oysters) or marine vegetation
- aquaculture is not being carried out in line with the CFDP
- Other circumstances consistent with the *FM Act* or the FMAR 2017.

In cases other than when the permit holder dies or asks for the permit to be cancelled, the permit holder is given an opportunity to explain why the suspension or cancellation should not go ahead before this action is taken.

The permit holder can request an internal review of a permit suspension or cancellation. If still not satisfied, application can then be made to the NSW Civil and Administrative Tribunal to review the case.

Permit suspension and cancellation may also lead to the cancellation of leases held under the permit.

9.6. Administration of oyster aquaculture leases

An oyster aquaculture lease gives the leaseholder the exclusive right to farm the species listed on the lease within the lease area.

Other community members still have rights of access to the area for fishing and boating, however, it is an offence for a person to interfere with or damage lease structures or stock on the leased area. There are severe penalties for theft and/or damage to stock or infrastructure on oyster aquaculture leases.

Administrative Sanctions and civil action for non-compliance

Where the permit holder/lessee has a poor record of management such as non-completion of required work specified in a Compliance Notice or a former lease areas not being cleaned up, an application for a new lease or lease transfer, consolidation, sub-division, renewal or sublet will normally be refused.

In addition, DPI will take civil action against current and former lease and permit holders under DPI Policy O-041 (Undertaking works on oyster aquaculture lease areas and permit areas and recovering costs) if clean-up, marking or other work is required on a lease to make it comply with this strategy, the Act or the Regulations. This action consists of a final warning, engaging contractors to do the work then recovering the debt from the responsible person(s).

Transfer, subdivision, consolidation and sublet

On application, leases can be transferred, subdivided, consolidated or sublet. Certain conditions have to be met for each of these transactions and DPI Aquaculture Administration should be consulted.

Potential lessees are warned not to exchange a payment or enter into an agreement to take over a lease from a current lessee until they have consulted DPI Aquaculture Administration to obtain current information about the lease and lease transfers. NOTE: The transfer of a lease is not automatic and is not complete until the deeds have been issued to the transferor.

The assessment of the application will consider financial and compliance records, use of existing leases by an applicant, the condition of the lease area and ensuring that the area remains or is brought into a tidy condition.

Lease transactions will not be approved unless the lease(s) is in a compliant condition or the person taking over the lease agrees to undertake the work necessary to bring the lease area into compliance. (e.g. marking, clean-up).

Surrenders, cancellations, renewals and expired leases.

Leases surplus to oyster farmer's requirements may be surrendered on application. A lease will not be accepted for surrender unless the lease is in a compliant condition and completely free of cultivation materials.

The *FM Act* makes provisions for oyster aquaculture leases to be cancelled in certain cases. Should a lease be cancelled, the previous lessee remains legally responsible for removing any cultivation materials, infrastructure or stock on the lease.

Oyster aquaculture leases are issued for a maximum 15 year term with the leaseholder being entitled to the first renewal for a further maximum 15 year term. Leases are renewable subject to the area remaining available for aquaculture and taking into consideration the lessee's compliance record. The *FM Act* gives preferential rights to the current lessee, on renewal.

Leases that are not otherwise tenanted prior to their expiry date revert to public water land. However, the previous lessee remains legally responsible for removing all cultivation materials from the lease area.

Changes to activity on a lease

The permit holder/leaseholder must obtain written approval from DPI before commencing any activity that is not consistent with the permit and lease conditions. This may include the introduction of novel cultivation methods, new materials, a new species or other significant change in activity. Changes in activity that are not consistent with this document may require development consent.

In particular, written approval from DPI must be obtained before constructing on an oyster aquaculture lease:

- floating markers, raft markers or reduced marking
- fences
- spray irrigation,
- platforms
- pump-stands.

Annual production reports

All permit holders must complete an annual production report.

Public liability insurance and indemnity

Aquaculture permit holders must have public liability insurance cover over all leased areas. Public liability insurance cover must be to a minimum of \$10 million dollars for property owner's and occupier's liability.

Aquaculture permit holders must also indemnify the NSW Government and their officers and agents in respect to any activities carried out on the oyster aquaculture lease area for the purpose of aquaculture. This includes all action, suits, claims and demands, in respect of accident or injury to any person or property arising from the use of the public water land.

The permit holder's public liability insurance and indemnity must remain current at all times and apply to all leases listed on the permit and include terminated/surrendered leases where improvements remain on the lease.

Sub-lessees must list lease details on their permit and must provide public liability insurance and indemnity cover for the area.

9.7. Maintenance dredging of oyster aquaculture leases

Dredging to maintain adequate water depth on an oyster aquaculture lease situated on Crown submerged land will require a licence issued under the *CLM Act*. The provisions of the relevant local environmental plan and/or the *EP&A Act* may require development consent to be obtained. Development applications will require Land Owners Consent from CL prior to lodgement.

CL will give written notice to the Minister for Primary Industries and consider any matters raised by the Minister concerning the proposed work within 28 days of giving the notice. CL and the relevant consent authority should be consulted for further advice. A permit may also be required from DPI under Section 201 of the *FMA Act*.

The NSW Government has no statutory responsibility to maintain any particular depth of water beneath an area leased for oyster aquaculture or within channels leading to the lease. If an oyster aquaculture lease or permit holder wishes to undertake maintenance dredging then they will have to take full responsibility for gaining all consents and approvals and for funding the work.

DPI will only consider maintenance dredging of oyster aquaculture areas where:

- the material to be dredged is clean marine sand
- no potential or actual acid sulphate materials will be disturbed
- maximum dredging depth is 2.5 m below AHD
- no seagrass is destroyed without a permit from DPI

- the dredging activity will have no significant adverse impact on any threatened species or habitats
- no current oyster reef is destroyed or removed without a permit from DPI
- an approved spoil disposal site or other option is available
- the activity will not result in any significant water pollution.

DPI, CL and the consent authority should be consulted for further advice.

9.8. Aquaculture species

Species to be cultivated on a Class 1 lease

There are three main species cultivated on oyster aquaculture leases in NSW, the Sydney Rock Oyster, the Native Oyster and the introduced Pacific Oyster. Both the Sydney Rock Oyster and the Pacific Oyster belong to a group of oysters known as ‘cupped oysters’, while the Native Oyster belongs to the ‘flat oyster’ group. Worldwide, the vast majority of oysters harvested for human consumption are ‘cupped oysters’. In general, ‘cupped oysters’ may be farmed using similar techniques and have a well-studied effect on the environment. In the past, Native Oyster cultivation has been a major industry in Europe and wild Native Oyster fisheries have been important in the past in southern Australia. However, due to disease and overfishing this oyster is now only grown in relatively small quantities. Native Oysters can be grown with only minor modifications to the systems used for ‘cupped oysters’ and their cultivation using these techniques have not been reported to have a significant impact on the environment.

The NSW oyster industry is mostly based on the production of the Sydney Rock Oyster. While the geographic range of this species extends from Wangan Inlet in eastern Victoria north along the eastern Australian coast, across northern Australia to the West Australia coast, wild populations of the oyster are most prolific in southern Queensland and NSW estuaries. In these estuaries the Sydney Rock Oyster is the dominant intertidal species.

A cultivation of the Native Oyster is largely confined to marine dominated estuaries in southern NSW, however individual Native Oysters have been found as far north as Moreton Bay in southern Queensland.

The Pacific Oyster was introduced into southern Australian states in the late 1940’s and early 1950’s by the CSIRO in an attempt to establish a cupped oyster industry in these states in lieu of a suitable indigenous cupped oyster species. At that time the importation of Pacific Oysters into NSW was prohibited by the NSW Government. However, by the 1970’s the wild Pacific Oyster had found its way into a number of NSW estuaries and since then wild Pacific Oyster populations are now found in most NSW estuaries south of Port Macquarie.

Oyster farmers in eight estuary systems are currently approved to cultivate the functionally sterile triploid Pacific Oyster hatchery produced variety; Port Stephens (both diploid and triploid), Tweed River, Georges River, Hawkesbury River/Patonga Creek, Brisbane Water, Shoalhaven/Crookhaven Rivers, Clyde River, Lake Conjola and Wapengo Lagoon).

The species selected for cultivation will affect the design of cultivation infrastructure as well as the viability of the aquaculture business. An aquaculture business may cultivate more than one species. In designing the facility, flexibility of design and layout allows switching of species to meet opportunities created by changing markets, supply or production technologies. Where a proposed farming technology deviates significantly from the farming technology or its impact on the environment is unclear or unknown a REF or in some instances an EIS may be required to be prepared by the applicant (see below).

Factors in the selection of species include:

- constraints on translocation of species (see below)

- genetic factors
- availability of seed stock (reliability, quality, quantity, seasonality)
- documented performance of the species in the aquaculture system proposed
- site specific attributes e.g. scale required, flood liability, temperature and water quality requirements
- cost of production and business viability
- market demand and price
- potential disease
- other management factors, such as DPI translocation protocols.

In some situations, 'polyculture' (i.e. two or more species farmed simultaneously in the one area) may increase returns to industry, improve business resilience and provide a more productive use of an aquaculture lease area. A potential example of this is Sydney Rock Oyster and Native Oyster farming on the one lease. Table 10 lists the edible oyster species currently approved for commercial cultivation on NSW oyster aquaculture leases by estuary.

Table 10: Species of oyster currently approved for commercial cultivation on oyster aquaculture leases in NSW.

Estuary	Sydney Rock Oyster	Native Oyster	Pacific Oyster	Other
Tweed River	yes	no	Yes - Triploid Only	
Brunswick River	yes	no	no	
Richmond River	yes	no	no	
Clarence River	yes	no	no	
Sandon River	yes	no	no	
Wooli River	yes	no	no	
Bellinger/Kalang Rivers	yes	no	no	
Nambucca River	yes	no	no	
Macleay River	yes	yes	no	
Hastings River	yes	no	no	
Camden Haven River	yes	yes	no	Akoya sp.
Manning River	yes	no	no	
Wallis Lake	yes	yes	no	
Port Stephens	yes	yes	Yes - Diploid and Triploid	Akoya sp.
Hunter River	yes	no	no	
Brisbane Water	yes	Yes	Yes - Triploid only	Akoya sp.
Hawkesbury River	yes	yes	Yes - Triploid only	Akoya sp.
Georges River/Botany Bay	yes	no	Yes - Triploid only	
Crookhaven Shoalhaven	yes	no	Yes - Triploid only	
Clyde River	yes	yes	Yes - Triploid only	
Lake Conjola	yes	no	Yes - Triploid only	
Moruya River	yes	yes	no	
Tuross Lake	yes	yes	no	
Wagonga Inlet	yes	yes	no	Akoya sp.

Estuary	Sydney Rock Oyster	Native Oyster	Pacific Oyster	Other
Wallaga Lake	yes	yes	no	
Bermagui River	yes	yes	no	
Wapengo Lagoon	yes	yes	Yes - Triploid only	
Nelson Lagoon	yes	yes	no	
Bega River	yes	no	no	
Merimbula Lake	yes	yes	no	
Pambula Lake	yes	yes	no	
Wonboyn Lake	yes	yes	no	

Protocol for assessing a new species for commercial aquaculture

One of the potential risks of aquaculture is the inadvertent introduction of live species into natural waters beyond their natural range or to areas within their natural range that have genetic stocks or populations that are distinct from the aquaculture stock by translocation Ministerial Council on Forestry, Fisheries and Aquaculture (1999) (MCFFA). Translocation of non-indigenous species is sanctioned in some catchments. In other circumstances, it may occur accidentally or deliberately. Translocation of live aquatic organisms has a number of inherent risks for the receiving aquatic habitats as well as for endemic organisms.

The MCFFA developed a national translocation policy to meet the needs of Australia's aquaculture and aquarium industries for the translocation of live aquatic species within jurisdictions and across jurisdictional boundaries. The policy sets out a risk assessment process for considering translocation issues and identifies potential risks under the headings of escape/release, survival and establishment.

An example of such a translocation occurred in Port Stephens where the Pacific Oyster was illegally introduced in 1984. Wild Pacific Oyster populations are now established in the majority of the estuary, and wild Pacific Oyster settlement on growing Sydney Rock Oyster crops can significantly increase farming costs due to the need to manage fast growing wild Pacific Oyster over catch on Sydney Rock Oyster and Pacific Oyster crops.

On application, DPI may consider approving new species for culture on aquaculture leases. When proposing new species for cultivation on an aquaculture lease, the proponent needs to submit to DPI an assessment of potential environmental effects on:

- any critical habitats, threatened species, ecological communities and their populations
- any community of aquatic plant or animal
- existing commercial oyster cultivation
- the visual, scientific, cultural or recreational amenity
- any cumulative effects with other existing or likely future activities
- any necessary modification to the applicant's CFDP.

DPI may impose special conditions on the approval of new species and may require a trial period of farming to monitor and assess potential environmental impacts. If critical habitats, threatened species, populations ecological communities and their populations are likely to be affected a Species Impact Statement may be required and if the proposal is likely to significantly affect the environment an EIS may be required.

9.9. Approval of Crown Land land base leases and licences

Current oyster aquaculture activities that are lawfully approved may continue despite the provisions of this strategy. You can find more information on leases and licences on the department's website at: industry.nsw.gov.au/lands/use/ and on the Leases and licences for oyster farming on Crown land Fact Sheet

https://www.industry.nsw.gov.au/__data/assets/pdf_file/0019/272422/leases-and-licences-oyster-farming-fact-sheet.pdf

Leases

A lease is a registrable dealing, which means that it can be recorded on the title for the land. Generally, to be registered, the leased area must be identified as one or more lots in a registered plan of the land. If a site has not been surveyed and is not identifiable in a registered deposited plan, CL are unable to lease the site. Environmental planning restrictions to the subdivision of land may also prevent the creation of a title for the land by registered plan, and therefore restrict CL's ability to lease the Crown land.

Where an oyster farmer is proposing a substantial development on the Crown land that involves significant capital investment, a lease may be more appropriate than a licence, providing there are no constraints that preclude CL from granting a lease. The consent of the Minister is usually required prior to the transfer of a lease, and you can't transfer a lease if there is any debt to the Crown outstanding on the lease.

Licences

Generally, a Crown land licence does not provide for exclusive use and possession of Crown land. It provides an authority to occupy and use Crown land for a specified purpose and term. Usually licences can be terminated at will by the Minister administering the *Crown Land Management Act 2016* (CLM Act) Unlike leases, licence areas do not need to be identified by surveyed lot boundaries and may be defined by diagram. Licences may accompany a lease site to authorise jetties or infrastructure connected with oyster farming operations that extend outside of the leased area, such as below the mean high-water mark.

Licences are generally not transferable. An application must be lodged with CL and be determined before a new licence can be considered for offer to a new holder (see the *Revocation of existing tenure and issue of a new licence* form on the department's website).

Considerations for leasing and licensing Crown land

Native title

Native title is the recognition by Australian law that some Indigenous people have rights and interests to their land that come from their traditional laws and customs. The Commonwealth *Native Title Act 1993* (NT Act) sets out how native title rights are recognised and protected in Australia.

When assessing Crown land tenure applications, CL consider whether there is evidence that native title is extinguished or the proposed use is permissible under the *NT Act*. CL assess whether there are also any procedural requirements relating to native title groups or representative bodies, such as notification requirements or a right to comment.

Native title can be a key reason CL cannot issue a lease over Crown land. In such cases, it may be possible to issue a licence to authorise occupation of a site required for oyster farming/aquaculture activities. Refer to the fact sheet "How native title rights affect oyster farming tenures on Crown land" (go to industry.nsw.gov.au/lands and search for the title) for more information about native title and how this relates to oyster farming/aquaculture activities on Crown land.

Aboriginal land claims

The NSW *Aboriginal Land Rights Act 1983* recognises the rights of Aboriginal people in NSW.

The legislation allows Aboriginal Land Councils (ALC) to lodge land claims over Crown land, which are determined by the relevant Minister.

CL generally will not authorise any dealing, such as a lease or licence, in land that is subject to an Aboriginal land claim that will:

- prevent the land being transferred to a claimant ALC in the event it is found to be claimable
- impact on the physical condition of the land.

For sites already developed for oyster farming/aquaculture activities, CL generally only consider a Crown land application if the applicant has obtained a letter of consent from the claimant ALC. The claimant ALC is under no obligation to grant such a request and may prefer to have the claim fully investigated and determined.

Tenure agreement

A tenure holder has responsibilities under the terms and conditions of their tenure agreement. This includes using the site in accordance with the permitted use, paying rent, complying with environmental obligations and other relevant laws, and holding current insurances.

A holder of a Crown tenure for oyster farming/aquaculture activities must be a bona fide oyster farmer and hold a current:

- aquaculture permit issued under the *FM Act*
- Food Authority Licence issued under the FR 2015 to cultivate and/or harvest oysters (including spat).

Subletting or sale

Should an oyster farmer wish to sublet or sell leased or licenced Crown land land-based site they are encouraged to have early discussions with CL. Sublicensing is not permitted on sites licenced for oyster farming/aquaculture activities. In many cases, tenures are not directly transferrable.

Environmental planning approvals

As a tenure holder, the oyster farmer is responsible for obtaining all necessary environmental planning, development, building, and operating approvals relating to structures and activities on tenured Crown land. Any proposed construction or demolition of buildings, retaining walls, jetties, tar pits, onsite sewerage management system, etc. may require development consent or other approvals from local councils. Applications will generally require landowner's consent from CL before they are lodged. The *Landowner's consent application form* outlines the requirements and is available from industry.nsw.gov.au/lands/what-we-do/fees-and-forms/forms

Agency approvals

Oyster farmers may also require approvals from other authorities such as TfNSW or DPI to carry out activities associated with oyster farming/aquaculture. As the tenure holder, it the oyster farmers responsibility to ensure that they are aware of these requirements and hold all required approvals.

Work plan compliance

The tenure holder is responsible for ensuring that they meet obligations outlined in their work plan agreements issued by CL. CL may initiate compliance actions if an oyster farmer does not

comply with work plan requirements or tenure conditions, or if they do not pay rent. Actions may include lease forfeiture or licence revocation.

More information

You can find general information about leases and licences on the department's website at industry.nsw.gov.au/lands.

9.10. Transitional provisions

Current oyster aquaculture activities that are lawfully approved may continue despite the provisions of this strategy.

Chapter 10 Risk management and business resilience

10.1. Risk Management

The size, severity, timing, location and impacts of natural disasters and disease events are difficult to predict, and our changing climate increases the uncertainty about future risks. In the past, standard emergency management planning emphasised the documentation of roles, responsibilities and response procedures. Traditionally, primary producers looked towards government for financial support to get through the aftermath of an adverse event (e.g. drought assistance).

Increasingly, emergency management is moving its focus towards arrangements for prevention, mitigation, preparedness and recovery. Also, natural disaster relief and recovery programs are now structured to provide immediate short-term assistance only. The majority of the cost of rebuilding and restocking after a major disaster event must be borne by industry. Therefore, industry needs to plan well ahead to make sure they are prepared. Natural disaster relief does not cover disease related events and at this time cost-sharing arrangements between the aquaculture industry and government to cover these events are still being considered.

Other risks to the business include changes in the financial climate that impact on profitability. The impact of changes to interest rates, market prices and the costs of business inputs need to be considered well before they occur. Succession is a longer-term risk and, in most cases, will affect retirement planning. This risk needs to be factored into the business plan many years before retirement age.

At the business level, financial resilience is also important so that the business can survive a period of little to no income and rebuilding following an event. In some cases, businesses have taken the decision to build infrastructure that is resistant to flood and storm damage and to diversify the species cultivated to manage the risk of pest and disease incursion and the risk of market uncertainty. Training, education and planning are essential risk management tools that help to build resilience into the business.

Some areas of risk to an oyster business and to the industry as a whole include:

- disease
- environmental extremes - floods, heat kill, drought and storms
- climate change
- water quality - harvest area contamination, toxic algae blooms
- personal injury
- social interruptions, such as bushfires
- public liability
- the economy and oyster markets

Assistance and support with risk management planning is provided by:

- Rural Support Workers
www.dpi.nsw.gov.au/aboutus/services/community/support-workers
- Rural Financial Counsellors
www.daff.gov.au/agriculture-food/drought/rfcs/counsellors/nsw
- Rural Assistance Authority - www.raa.nsw.gov.au/
- DPI – see www.dpi.nsw.gov.au/agriculture/emergency

10.2. Biosecurity Risk Management Plan

The best defence against diseases and pests is the implementation of sound biosecurity practices on farm. The development of a farm-based Biosecurity Risk Management Plan (BRMP) facilitates the identification and prioritisation of biosecurity practices to protect the farm against diseases and pests. The development of a BRMP will enable permit holders to identify biosecurity weaknesses and strengths associated with farming practices and implement actions and procedures to protect their farm from potential disease and pest risks. The development of a BRMP will also provide greater disease and pest protection for the wider industry.

DPI requires that all Class A Aquaculture Permit applications include a BRMP. As a minimum the BRMP should address the following:

- the identification and assessment of potential biosecurity risks
- mitigation measures to manage potential biosecurity risks associated with all movements of stock, vehicles, vessels and equipment on-farm, inter-farm and inter-estuary, including compliance with permit conditions relating to:
 - the movement of oysters and material between estuaries (Part 2, Division 3 of the FMAR 2017)
 - QX disease biosecurity zone (Part 3, Division 2 of BR 2017)
 - Pacific Oyster Mortality Syndrome biosecurity zone (Part 3, Division 3 of BR 2017)
 - Biosecurity Order (Permitted Activities) 2019
 - Biosecurity (Pacific Oyster Mortality Syndrome) Control Order (NO. 2) 2018.
- staff biosecurity training to ensure that staff have a clear understanding of their responsibilities to maintain farm biosecurity. Staff must be able to recognise signs of stock ill health, be informed about the major disease transmission routes onto, within and from the farm, as well as be familiar with work practices and standard operating procedures that support farm biosecurity. Staff must also have a clear understanding of how to implement response protocols and emergency procedures
- record keeping procedures to document the movements of all stock onto the farm, between zones of different biosecurity status within the farm and from the farm. Records must also be kept for the health of all the different stock populations within the farm, including details such as disease testing, sickness, treatments, mortality and relevant information on environmental factors
- records keeping procedures for staff biosecurity training, stock receipts, inspections, disinfection cleaning and audits
- movement reporting procedures and records for oysters and equipment – Oyster Shipment Logbook and IVR system
- cleaning procedures and general hygiene for vessels and equipment
- an Emergency Disease Action Plan
- signage and secure areas where entry by authorised personnel only is permitted
- a timeline for the review and audit of the BRMP.

10.3. Lease Maintenance and Development Plan

All applicants for a Class A aquaculture permit are required to submit with their permit application a CFDP which includes a LM&DP. In completing their LM&DP, the permit applicant must describe how all leases that will be authorised by the permit will comply with the lease

marking and cultivation standards prescribed in the OISAS and how the condition of the lease(s) would be improved or maintained should the permit be granted. The completion of a LM&DP is also a valuable check for new industry entrants to understand the potential costs and liability of taking on leases with on-going statutory maintenance obligations. The best defence against diseases and pests is the implementation of sound biosecurity practices on farm.

Specifically, the LM&DP must address the following:

- the type and condition of all lease marking present on the lease area, including any missing or sub-standard marking
- the construction type (e.g. timber post and rail; post supported long-line basket; floating basket; raft, etc.), quantity and condition of all infrastructure currently present on the lease area
- where a lease listed on the permit is undeveloped or partially developed, the permit holder must provide a development strategy for the lease area over the next five years
- to assist with the maintenance of the lease marking and tidiness standards, permit applicants must develop a lease maintenance and development schedule. The lease maintenance and development schedule should specify the order of priority for all works (e.g. navigational markers and lease signs are higher order priorities). A recommended lease maintenance schedule is provided in Chapter 8.3)

10.4. Environmental Management Systems

A good first step towards developing disaster preparedness at the estuary level is to include risk management in the estuary environmental management system. Many NSW oyster farming estuaries have already prepared these plans and have commenced implementing key actions to build resilience. Estuary level issues include harvest area water quality and risks to harvest area classification, floods, disease and pests.

An environmental management system is a process through which oyster farmers can determine which risks pose the biggest threat to the industry. The process systematically identifies, assesses and prioritises all risks then constructs a plan to mitigate these risks.

These risks can result from internal oyster farming practices (for example the continued use of treated timber, running inefficient outboards), but may also arise from external catchment based activities (e.g. livestock effluent in creeks, faulty sewerage pumping stations). Addressing these risks will require working closely with other stakeholders, which will include the LLS, DPI, Local Council, your neighbours and NPWS.

Documenting the risk assessment process, and clearly outlining an action plan to reduce industry exposure, gives oyster farmers a clear vision for the future. It also helps farmers achieve better outcomes when negotiating with catchment managers, opens the door for funding opportunities, and allows partnerships that improve environmental conditions for the oyster industry to develop. For an insight into how EMS has been effectively used by south coast oyster farmers, South Coast Oyster Growers and Australia's Oyster Coast short documentary videos at vimeo.com/76913593 and vimeo.com/69287281 are available on line.

OceanWatch Australia and the coastal LLS are actively involved with the industry and there are now 18 estuary-wide EMS documents in varying stages of development that outline local industry priorities for the future. The estuaries that have committed to an environmental management system, and the documents themselves can be viewed at:

www.oceanwatch.org.au/our-work/ems-nsw-oysters/ems-database/. More information can also be obtained from OceanWatch Australia at www.oceanwatch.org.au/.

Once prepared, attention needs to be given to EMS implementation. South Coast oyster grower groups with the assistance of the LLS employed Oyster EMS Implementation officers. These officers enabled the smooth implementation of the estuary-wide EMS's and assisted the oyster

industry make full use of their EMS's in building the partnerships necessary to ensure the long-term sustainability of the local oyster industry.

10.5. Climate Change

Climate change is a change in the average pattern of weather over a long period of time. Weather patterns are naturally highly variable and the changes in weather averages due to climate change are difficult to identify within natural variability over the shorter-term time scales. The NSW Government is working to identify the long-term effects of climate change for NSW and to identify approaches to adapting to the effects of climate change.

Potential long-term impacts of climate change on NSW oyster industry

The potential impacts of climate change on the NSW oyster industry have been identified and analysed by University of Tasmania researcher Peat Leith (Leith and Haward, 2010). The main areas where change may occur in the longer term that could impact on oyster growing include:

- air and water temperature
- acidification
- sea level rise
- wind speed
- rainfall
- changes in salinity
- frequency of extreme events
- changes in the geographic distribution of pests and diseases.

Addressing climate change – adaptive capacity

There is uncertainty about the timing and impacts of climate change on the oyster industry. It will affect different estuaries in different ways and to different degrees. The best way to deal with this uncertainty is to maximise the industry's ability to adapt to changes when they occur. Assessment of new aquaculture lease sites needs to factor in the potential impacts of climate change including sea level rise and changes to rainfall and runoff as well as local hydrodynamic processes.

What the NSW oyster industry can do to adapt to climate change:

- develop knowledge-action networks that include local industry bodies, scientists, and natural resource management agencies
- develop monitoring programs in order to understand baseline conditions, local variability, sensitivities, and to detect changes (for example see Nash et al, 2013)
- work together at an estuary or regional level rather than working as individuals
- support research to develop resilient oyster breeding lines.

Chapter 11 References

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