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# NSW Oyster Industry Sustainable Aquaculture Strategy

## Second edition—2014



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Department of Planning and Infrastructure,

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NSW Shellfish Committee

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## Foreword to the second edition

The 2014 second edition of the NSW Oyster Industry Sustainable Aquaculture Strategy (OISAS) retains all the essential elements of the first edition with several updates, amendments, additions and a new format.

The vision of a healthy and sustainable NSW oyster industry remains and despite a decreasing production trend, an aspirational production goal has also been retained. This is in the belief that the recent production losses from floods and disease events will be overtaken by increases in production from new species, new investment and from innovative culture technology.

All production figures are reported in tonnes replacing the previous unit “bags”. One bag is equivalent to 62.5 kg.

Water quality protection and improvement remains the key basis on which the oyster industry can develop sustainably and with confidence. OISAS therefore retains water quality protection measures in Chapter 3 and Chapter 4.

The oyster aquaculture estuary maps have been updated to:

- include areas that have gained development consent since 2006;
- remove terminated phase-out leases; and,
- include the location of Crown land leases used by the industry for land based activities.

A new set of best practice standards for rafts are included in response to the damage caused to rafts in a number of estuaries from floods. Also, a new set of oyster aquaculture lease sign specifications are published in this edition that enable lease holders to make their own signs or to order them from a manufacture of their own choosing. Previously, NSW DPI arranged a common oyster aquaculture lease sign supplier by tender.

The default allocation process for all new oyster aquaculture lease applications is now by competitive public tender in line with revised NSW DPI policy. 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.

A new chapter on risk management, environmental management systems and climate change is added to encourage the industry to prepare risk management strategies well in advance of events occurring.

The Complaint resolution procedure from Edition 1 has been removed because it has now been superseded by the NSW Trade and Investment Complaints Handling Policy and Procedure (<http://www.trade.nsw.gov.au/policy/TI-A-134> and <http://www.trade.nsw.gov.au/policy/procedures/procedure-complaints-handling>).

## Executive Summary

The NSW oyster aquaculture industry is Australia's largest producer of edible oysters, the fourth largest Australian aquaculture industry and accounts for nearly 70% of the value of NSW aquaculture production. It is the state's most valuable fishery.

In recent years annual production has continued to decline from a production peak of 9156 tonnes 1976/77. Production for 2011/12 was 2979 tonnes (Table 2) valued at the farm gate at approximately \$33 million. The decline in recent years is attributed to frequent and wide spread flooding in coastal NSW since early 2009 and the effects of Pacific Oyster mortality syndrome (POMS) disease events in Botany Bay and Hawkesbury River. The effects of these events are likely to be reflected in oyster production until at least 2018.

It is estimated that the sustainable production level for oysters in NSW estuaries is 7500 tonnes and the principal aim of 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 current and potential lease 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 set of best practice standards, 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 estuary as a whole is healthy too. On average, a farmed Sydney Rock Oyster will filter an estimated 250,000 L of estuarine water in its lifetime, removing large quantities of suspended material, chiefly nutrients bound in phytoplankton. This means that oysters are important in maintaining healthy estuaries, 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 lease from NSW DPI.

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



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## Acronyms

Acronym	Definition
<b>AHD</b>	Australian Height Datum
<b>ALAC</b>	Oyster aquaculture lease Area Condition Statement
<b>ANZECC</b>	Australian and New Zealand Environment and Conservation Council
<b>AQIS</b>	Australian Quarantine and Inspection Service
<b>ASQAP</b>	Australian Shellfish Quality Assurance Program
<b>CSIRO</b>	Commonwealth Scientific Industrial Research Organisation
<b>EIS</b>	Environmental Impact Statement
<b>EPA</b>	Environment Protection Authority
<b>ESD</b>	Ecologically Sustainable Development
<b>ha</b>	Hectare
<b>LEP</b>	Local Environment Plan
<b>LLS</b>	Local Land Services
<b>NPWS</b>	National Parks and Wildlife Service
<b>NSW DPI</b>	NSW Department of Primary Industries
<b>OEH</b>	Office of Environment and Heritage
<b>OISAS</b>	NSW Oyster Industry Sustainable Aquaculture Strategy
<b>POAA</b>	Priority Oyster Aquaculture Area
<b>POMS</b>	Pacific Oyster mortality syndrome
<b>RAMSAR</b>	Convention on Wetlands of International Importance



## Definitions

Term	Definition
<b>Aquaculture</b>	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> .
<b>Broodstock</b>	A parent shellfish.
<b>Catchment Area</b>	A drainage area, for example for a reservoir, river or estuary (includes subject water body as well).
<b>Carrying Capacity</b>	The maximum biomass (weight) of shellfish that an area can support and remain commercially viable.
<b>Culling</b>	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.
<b>Catching</b>	The collection of wild juvenile shellfish spat - settled onto 'catching' sticks or plastic slats.
<b>Depoting</b>	The 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.
<b>Cultivation Techniques</b>	
<b>Dredge Bed</b>	An area leased for the harvest of oysters directly from the bed sediments. No oyster farming infrastructure is placed on oyster dredge bed leases.
<b>Floating Cultivation</b>	Sub-tidal cultivation of oysters, on sticks or in baskets suspended from tethered, low buoyancy systems that may include lines and/or polyethylene floats.
<b>Post supported intertidal cultivation</b>	A series of parallel vertical posts that support horizontal rails or lines on which oyster sticks, trays and/or baskets that are placed so the oysters are submerged for varying periods of the tidal cycle.
<b>Raft</b>	Sub-tidal cultivation of oysters in trays or baskets suspended from a permanently anchored, rigid, high buoyancy structure.

<b>Single seed</b>	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.
<b>Stick cultivation</b>	Growing out wild caught oysters on the sticks they are caught on. Suitable method for areas subject to significant wave action. 'Stick oysters' may be removed from sticks and fattened on trays prior to harvest.
<b>Tray cultivation</b>	Growing out single seed oysters on trays. Suitable method for sheltered areas. Often used for the final stage of growth prior to harvest.
<b>Depuration</b>	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.
<b>Development without consent</b>	Has the same meaning as it would under the <i>Environmental Planning and Assessment Act, 1979</i> .
<b>Development with consent</b>	Has the same meaning as it would under the <i>Environmental Planning and Assessment Act, 1979</i> .
<b>Endangered Species</b>	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.
<b>Endemic Species</b>	A species confined in occurrence to a local region.
<b>Environmental Impact</b>	The potential biophysical, social and/or economic effects of an activity on the community or the natural environment.
<b>Environmental Impact Statement</b>	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> .
<b>Estuarine</b>	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.
<b>Fish</b>	As defined in <i>Fisheries Management Act, 1994</i> .
<b>Indigenous Species</b>	A species native to a particular region or country at the time of first British colonisation.
<b>Introduced Species</b>	A species introduced into an area where it does not naturally occur.
<b>Noxious fish</b>	A fish declared to be noxious under the <i>Fisheries Management Act, 1994</i> and the <i>Fisheries Management (General) Regulation, 2002</i> .

<b>Oyster aquaculture lease</b>	An area of submerged Crown land that is leased for the purpose of oyster aquaculture.
<b>Oyster Aquaculture Land Base Site</b>	An area of non-submerged Crown land that is leased for the purpose of supporting oyster aquaculture.
<b>Pathogen</b>	An infectious agent capable of causing disease.
<b>pH</b>	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.
<b>Salinity</b>	The measure of salt concentration of water in ponds, tanks or hatchery expressed in part per thousand or ppt.
<b>Siltation</b>	The deposition of silt or sand in the estuarine environment.
<b>Spat</b>	Small juvenile oysters.
<b>Stocking density</b>	Number of animals per given area.

## Chapter 1 Introduction

### 1.1. Vision statement

The vision of this strategy is to achieve the sustainable production of 7,500 tonnes of premium NSW oyster products for domestic and export markets by 2020.

### 1.2. Scope and objectives

This strategy applies to the NSW edible oyster aquaculture industry. This strategy does not apply to the cultivation of Akoya pearl oysters.

Oyster aquaculture is the commercial cultivation of any species of edible oyster (eg. 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 growout operations.

The NSW Oyster Industry Sustainable Aquaculture Strategy:

- 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 environmental 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; and,
- 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 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 well being. 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 details can be found at <http://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 *Fisheries Management Act, 1994* is to promote ecologically sustainable development and this object is being met in part through the development of statewide 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:

1. 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:
  - a. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
  - b. an assessment of the risk-weighted consequences of various options,
2. 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,
3. conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,
4. improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services, such as:
  - a. polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
  - b. 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,

- c. 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; and,
- 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; and
- 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; and,
- 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, and,
- Improved outcomes for regional NSW with a coordinated approach to providing sustainable oyster aquaculture investment opportunities.

### 1.5. Implementation and legislation

This strategy is as an Aquaculture Industry Development Plan for the purpose of s.143 of the *Fisheries Management Act, 1994*.

*State Environmental Planning Policy 62 – Sustainable Aquaculture* gives effect to planning provisions for oyster aquaculture.



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 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 8 respectively.

The *Fisheries Management Act, 1994*, 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 Section 1.7 will be used to meet these requirements.

### 1.6. Community and stakeholder consultation

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

- Department of Premier and Cabinet - Office of Environment and Heritage including the National Parks and Wildlife Service; and, Division of Local Government,
- Department of Trade and Investment, Regional Infrastructure and Services - Department of Primary Industries (Fisheries NSW; Catchment and Lands; NSW Food Authority; and Marine Estate Management Authority) and Division of Industry Innovation and Investment
- Department of Planning and Infrastructure,
- Environment Protection Authority, and
- NSW Roads and Maritime Services.

The strategy has therefore been prepared using 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 (previously the Peak Oyster Advisory Group), five regional consultation meetings and a written 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

NSW 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 Executive Director Fisheries NSW 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.

NSW 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)
<b>Annual production.</b>	Production trends indicate industry viability and development.	Five year average production drops by 187.5 tonnes or more.
<b>Lease compliance.</b>	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.
<b>Rainfall threshold for harvest closures.</b>	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.
<b>Harvest area classification.</b>	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.
<b>Leases abandoned due to water quality conditions.</b>	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 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 \$105 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 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.

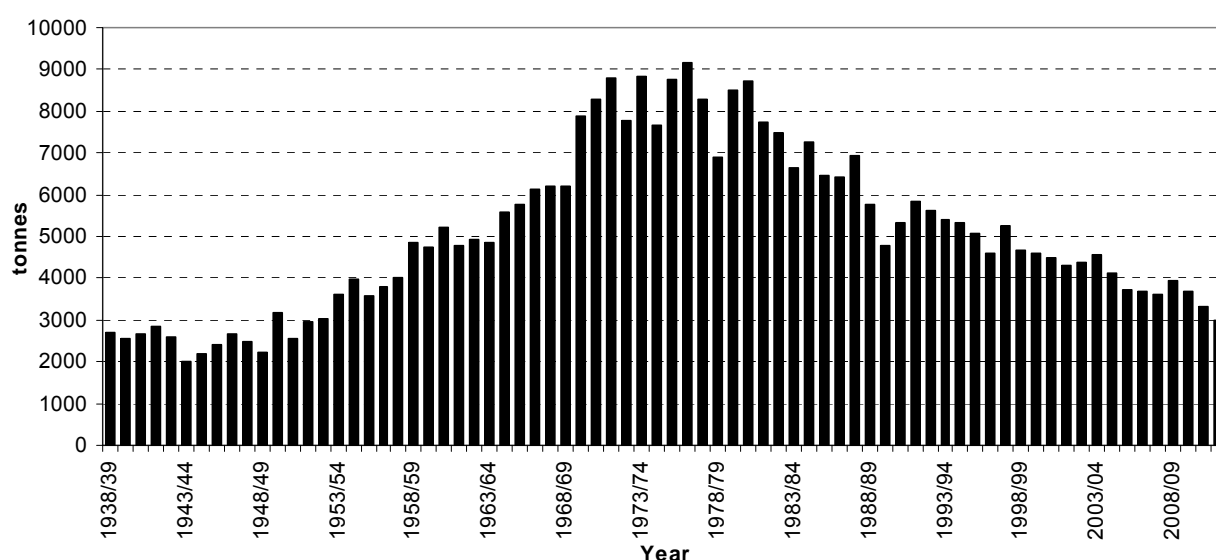


Figure 1: Annual NSW oyster production (tonnes) 1938/39 to 2011/12

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 Section 7.1.4) 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 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 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 of spat movements from Port Stephens, over 70% of all oysters sold for human consumption in NSW originated from Port Stephens stock. Also note that peak production has occurred only recently in a number NSW estuaries particularly on the NSW south coast driven by 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 and Pacific Oyster. This equates to approximately 2.6 tonnes per hectare grown on the currently leased area in NSW (June 2012).

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 data records.

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

Estuary	20011/12		Historic Peak		Historic maximum 10 year moving average
	(tonnes)	dozens	(tonnes)	(year)	(tonnes)
<b>Tweed River</b>	*	*	246.5	1980/81	152.1
<b>Brunswick River</b>	*	*	60.3	1981/82	24.8
<b>Richmond River</b>	*	*	48.2	1940/41	31.9
<b>Clarence River</b>	*	*	131.6	1974/75	97.5
<b>Wooli River</b>	*	*	54.3	1966/67	39.6
<b>Bellinger River</b>	*	*	54.1	2001/02	30.3
<b>Nambucca River</b>	50.0	92,358	191.6	1985/86	115.1
<b>Macleay River</b>	11.8	22,577	367.6	1974/75	248.9
<b>Hastings River</b>	108.3	204,175	433.9	1987/88	320.3
<b>Camden Haven</b>	71.7	128,600	229.5	1977/78	167.1
<b>Manning River</b>	77.9	145,975	428.4	1960/61	303.4
<b>Wallis Lake</b>	718.3	1,330,703	1802.6	1987/88	1448.8
<b>Port Stephens</b>	553.1	664,974	2695.6	1976/77	2123.3
<b>Hunter River</b>	*	*	42.9	1993/94	25.9
<b>Brisbane Waters</b>	106.2	201,470	842.1	1982/83	557.7
<b>Hawkesbury River / Patonga</b>	285.6	1,672	1328.3	1969/70	1049.9
<b>Georges River/ Botany Bay</b>	*	*	2566.8	1971/72	2057.7
<b>Shoalhaven*/ Crookhaven</b>	110.3	145,831	208.7	1990/91	143.4
<b>Conjola/Burril Lake &amp;</b>	*	*	354.9	1980/81	59.1

	20011/12		Historic Peak		Historic maximum 10 year moving average
Narrawallee Creek					
Clyde River	313.8	590,521	494.8	2003/04	381.5
Moruya & Tomaga	*	*	74.7	1981/82	31.8
Tuross Lake	21.4	36,657	137.8	1994/95	87.0
Wagonga River	120.1	225,194	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	37.4	68,218	113.3	1988/89	69.6
Merrimbula Lake	140.8	258,046	180.5	1999/00	134.8
Pambula River	127.9	234,602	99.3	1986/87	59.8
Wonboyn	30.4	52,940	141.9	1990/91	66.6
Miscellaneous Estuaries	93.8	154,360			
State Production	2978.6	4,558,873	9166.6	1976/77	

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

## 2.2. Current 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 327 oyster aquaculture permit holders that hold between them 2,371 oyster aquaculture leases occupying 2,926 hectares of submerged Crown lands (June 2012).

While the NSW oyster industry is based almost entirely on the cultivation of the Sydney Rock Oyster (*Saccostrea glomerata*) a species native to the NSW and southern Queensland coast, it is increasingly being supplemented by the expansion of production of the Pacific Oyster (*Crassostrea gigas*) in NSW. The Pacific Oyster is an introduced species and is declared as a 'noxious fish' in all NSW waters other than in the waters of Port Stephens. Due to the overwhelming numbers of wild Pacific Oysters present at Port Stephens, permission was granted for the cultivation of Pacific Oysters in the estuary in 1990. However, in response to devastating outbreaks of QX disease in the Georges River and Hawkesbury River which rendered the cultivation of Sydney Rock Oyster derived from wild oyster settlement impossible, approval was granted for the cultivation of functionally sterile triploid Pacific Oysters in these estuaries in 2004 and 2005 respectively. Triploid Pacific Oysters are not susceptible to Sydney Rock Oyster diseases (QX disease and winter mortality) and provide an opportunity for oyster cultivation to continue in estuaries devastated by recurrent disease outbreaks. Due to their inability to produce viable offspring triploid Pacific Oysters pose very little threat to the environment and are currently being trialled in a small number of other NSW estuaries as a supplementary oyster crop. Small numbers of the Native (flat) Oyster (*Ostrea angasi*) are also being produced in southern NSW estuaries. To further assist the oyster industry a QX disease resistant, faster growing Sydney Rock Oyster has also been developed by NSW DPI.

In recent years annual production has continued to steadily decline. Production for 2011/12 was 2979 tonnes (Table 2) valued at the farm gate at approximately \$33 million. The decline in recent years is attributed to frequent wide spread flooding in NSW since early 2009 and the effects of POMS disease events in Botany Bay and Hawkesbury River. The effects of these events are likely to be reflected in oyster production until at least 2018.

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. The industry is the sixth 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 \$8,000/ha across the state and as high as \$35,000/ha in some estuaries (White, 2001).

Approximately 1600 people are currently directly employed within the industry (White 2001). The total capital investment in the industry is estimated at \$268 million (White 2001).

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 number of oyster exported overseas. Classification of harvest areas under the NSW Shellfish Program which is recognized internationally can open further opportunities for export with AQIS approval. NSW currently has seven export approved harvest areas. These are:

- Hawkesbury River (export listed in 2009) Porto Bay, Kimerikong, Coba Bay and Marramarra
- Clyde River (export listed in 2012) Waterfall and Rocky Point
- Merimbula Lake (export listed in 2004) Entrance
- Pambula River (export listed in 2004) Pambula Lake

Corrie Island (Port Stephens) and Cape Hawke (Wallis Lake) were export listed in 2001 and 2004 respectively. Due to a lack of export activity from these areas they were both de-listed in 2008.

The AQIS export approval provides access to most markets including Japan, but excluding the EU and USA. NSW shellfish have been exported to a number of countries including Dubai, Japan, Singapore and Fiji. Recently there has been increased interest in accessing the EU market, and the NSW Food Authority is currently working with interested growers on meeting the requirements for entry to the EU.



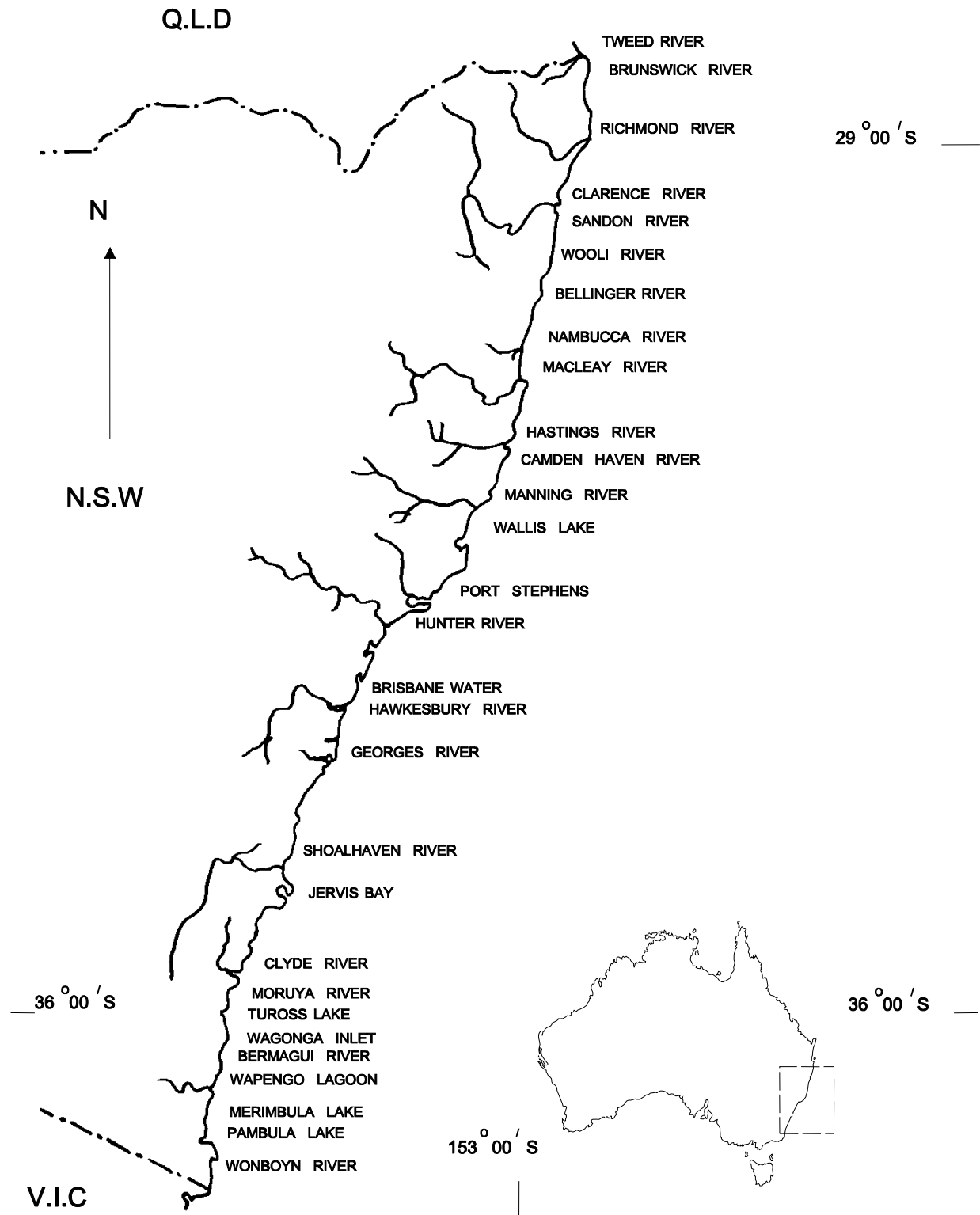


Figure 2: The location of major oyster producing estuaries in NSW.

## 2.3. Industry management initiatives

### 2.3.1. Department of Primary Industries

#### 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 contribution of \$40 per hectare.

#### Leasing and re-leasing

NSW DPI has a competitive tender process for letting vacant lease areas so that the commercial value of these areas can be realised. Leases may also be let by application, auction or ballot if it is considered to be in the state and/or public interest. 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.

#### Aquaculture compliance strategy

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

This involves:

- **Regular permit and lease condition inspections conducted by NSW DPI** – The standard inspection period is every three years but may be varied where required.

Permit holders are required to complete an annual condition report detailing the condition of lease areas showing how well they meet permit and lease conditions. This is usually part of the annual production reporting form. It is compulsory for the report to be completed and returned to NSW DPI.

**Oyster aquaculture lease Area Condition Statement (ALAC)** – The purpose of an ALAC is for all parties involved in a lease transaction (transfer/renewal/sublet) to identify and agree on the condition of a lease area, mainly in relation to neat and tidy, and marking provisions.

If work is required, an approved workplan must be submitted with the transaction application.

- **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 other leases.
- **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 Section 8.6.
- **Workplans** – Oyster aquaculture permit holders and lessees may submit a workplan for approval to extend the time given in a notice to tidy and repair oyster aquaculture lease areas where there is a large quantity of work, extenuating circumstances or high seasonal workloads.

Workplans are prepared by the permit holder/lessee and approved by the relevant District Fisheries Officer.

Lease marking and signs must be attended to in the time given on all Oyster aquaculture lease Inspection Reports and this work cannot be included in a workplan due to navigation safety issues.

- **Complying with lease marking notices** – If an oyster aquaculture lease does not comply with the relevant lease marking standards specified in this strategy the holder of the oyster aquaculture lease will be ordered to take the following action:

In the case of an oyster aquaculture lease corner marker post,

Within 14 days from notification, bring the oyster aquaculture lease corner marker post into compliance with the standards specified in the strategy. A penalty notice may be issued at any time for a missing corner post; and,

In the case of an oyster aquaculture intermediate lease marker post,

Within 14 days from notification, bring the oyster aquaculture intermediate lease marker post into compliance with the standards specified in the strategy. A penalty notice may be issued at any time for a missing intermediate lease marker post.

- **Complying with neat and tidy notices** – If an oyster aquaculture lease does not comply with the provisions of this strategy (unless otherwise authorised under an approved NSW DPI workplan or exemption) the holder of the oyster aquaculture lease will be ordered to take the following action:  
Within 30 days from notification, bring the lease into compliance with the standards specified in the strategy.
- **Removal of infrastructure** – 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** – Time allowed to bring leases into compliance with marking, neat and tidy standards and removal of infrastructure from terminated leases may be issued for periods shorter than those specified if the issue requires more immediate attention to reduce risks to navigation, environmental damage or serious public nuisance.

### Historic derelict oyster aquaculture leases and oyster aquaculture lease cleanup program

The majority of derelict oyster aquaculture leases are the result of catastrophic disasters like the QX disease outbreaks in the Georges and Hawkesbury Rivers, and the incursion of the pest Pacific Oyster in Port Stephens.

Responsibility for the clean up of oyster cultivation material passes to the State (as land owner) when clean up costs cannot be recovered from the lessee. In some cases, lessees have their responsibilities waived under bankruptcy or insolvency legislation.

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 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 exempted from the competitive lease tender process. However, the majority of leases have been cleaned up as a result of legal and administrative action undertaken by NSW DPI.

The number of leases becoming derelict and adding to the list of State legacy leases has also 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 cleanup responsibilities; and administrative policies which prevent individuals with outstanding clean up responsibilities from completing lease transactions.

### 2.3.2. Crown Lands Division

The Crown Lands Division has implemented a new strategy for oyster industry land base sites located on Crown land.

By working in partnership with the grower the division will promote environmentally sensitive and well managed Crown land associated with the oyster farming industry.

The strategy includes:

- A commitment to 25 year lease for each land base site;
- Five year Work Plans developed in consultation with the grower;
- A series of key principles in the Work Plan, assembled into three categories:
  - Commitment to environmentally sustainable practices and social responsibilities;
  - Site management and presentation;
  - Roles and initiatives provided by the division.
- Work Plans also contain a walk-through agreement, developed in consultation with the grower;
- The walk-through agreement will detail initiatives proposed by the farmer and the department to improve site efficiencies, presentation and environmental practices;
- The 25 year lease and associated Work Plan contains no initial requirement for a security bond system. The aim here, is to work in partnership with the grower to maintain an environmentally sensitive and professionally well managed land base;
- The Work Plan will provide for the calling in of a security deposit should the grower fail to meet obligations and commitments contained in the walk- through agreement; and
- Should the grower fail to adhere to work plan and subsequent walk- through agreement the department maintains the option to terminate the lease on a breach of conditions.

Work Plans will be required when:

- A new lease is being granted;
- The lease is being transferred; and
- Work Plans are to be updated, if and when required. This option is determined in consultation with the grower and can be called for by either the grower or the department.

### 2.3.3 The NSW Shellfish Program

The NSW Shellfish Program is a compulsory, industry funded program that assists in ensuring the public health safety of oysters and other shellfish grown and harvested from NSW waters. The Shellfish Program is administered by the NSW Food Authority under the *Food Act, 2003*. A brief description of the program is given here for information only. This strategy does not affect the operation of the program. Full details of the program including water quality monitoring details can be obtained from the NSW Food Authority ([www.foodauthority.nsw.gov.au/industry/industry-sector-requirements/shellfish](http://www.foodauthority.nsw.gov.au/industry/industry-sector-requirements/shellfish)).

The objective of the NSW Shellfish Program is to protect the health of shellfish consumers through the administration and application of procedures described in the NSW Shellfish Program Operations Manual 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; and,

- protect shellfish from contamination after harvesting.

In addition the Operations Manual describes administrative procedures for the operation of Local Shellfish Programs as specified under the *Food Regulation, 2010*. The NSW Shellfish Program adheres to the principles and objectives of the Australian Shellfish Quality Assurance Program (ASQAP).

### Classification of oyster harvest areas

Harvest area risk assessment (also known as a comprehensive sanitary survey) is the cornerstone of the NSW Shellfish Program. 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 2009 and the NSW Shellfish Industry Manual (NSW Food Authority, 2013).

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

- A 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	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 AQIS export criteria for shellfish.

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

1. **Approved.** Direct harvest for human consumption under prescribed conditions;
2. **Restricted Harvest.** Product requires depuration in an approved deputation plant under prescribed conditions or relay to an Approved area prior to sale for human consumption;
3. **Prohibited (Nursery).** The harvest of shellfish for sale for human consumption is not permitted; or,
4. **Prohibited (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 minimum period of 14 days or translocating juvenile (nursery) shellfish for on-growing for a minimum period of 60 days.

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 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.

### 2.4. 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

This department manages issues and projects of significance to NSW, such as the development of this strategy. Premiers Department has provided direction and leadership to the Hunter Aquaculture Taskforce to ensure a whole of government approach to policy development.



### **NSW Department of Trade & Investment, Regional Infrastructure & Services**

This department works with the NSW oyster industry to assist in business development. The department has sponsored many industry initiatives in the areas of marketing, business planning and trialling new species and farming methods.

### **NSW Department of Primary Industries (a division of NSW Department of Trade & Investment, Regional Infrastructure & Services)**

NSW DPI is the key regulatory agency for the NSW oyster industry. The department administers leases and permits, collates production data, develops policy and also has an industry development role. The department is also the key NSW aquatic habitat protection and compliance agency and develops policies and guidelines for the industry that are consistent with habitat protection objectives.

### **NSW Department of Planning and Infrastructure**

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

### **NSW Food Authority (a division of NSW Department of Primary Industries)**

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

### **Office of Environment & Heritage (a division of NSW Department of Premier & Cabinet)**

The Office of Environment and Heritage (OEH) 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 OEH'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. OEH (via the National Parks and Wildlife Service) has care and control of national parks and nature reserves throughout NSW, and these are often located in estuarine areas. Although oyster aquaculture leases are granted under the *Fisheries Management Act, 1994*, any new lease on the National Parks Estate requires the written concurrence of the Minister for the Environment.

The OEH 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. OEH leads the implementation of the Diffuse Water Pollution Management Strategy which provides a framework for natural resource and environment agencies, including local government and LLS to better manage pollution from non-licensed activities.

OEH works with local councils and communities to maintain or improve the health of our estuaries. OEH supports local government through the Coastal Zone Management Program which provides guidance and support for both coastal and estuary management planning and actions. OEH works with the oyster industry to provide estuary process information when available to help resolve issues such as dredging.

### **Environmental Protection Authority (a division of NSW Department of Premier & Cabinet)**

The Environment Protection Authority (EPA) is tasked with making those subject to environmental regulation aware of Government and community expectations about the

protection of our environment and the health of local communities, by raising general awareness of regulatory requirements and delivering strong compliance and enforcement programs.

The EPA shares responsibility for regulating pollution of waters in NSW with local government and the Roads and Maritime Services. The EPA is responsible for regulating state and local government agencies and those premises holding an environment protection license. Roads and Maritime Services regulate water pollution from vessels and local government regulates most other sources.

### **Trade and Investment – Crown Lands**

The Crown Lands Division is the primary administrator for Crown land tenures and unallocated Crown lands across NSW. The division leases land to the oyster industry for land based activities and also gives owners consent to lodgement of development applications for new oyster aquaculture lease areas where development consent is required.

Future management of land based sites located on Crown land will be driven by the need for both the grower and the Crown Lands Division to maintain an environmentally sensitive and professionally well managed land base. This will be achieved through the process of a long term lease agreement and an associated Work Plan that is developed in partnership with the grower to achieve sound environmental and social outcomes.

### **NSW Maritime (a division of Roads & Maritime Services)**

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

### **Marine Estate Management Authority NSW**

Marine Estate Management Authority manages the NSW Marine Parks estate. These parks are large marine and estuarine protected areas that are designed to conserve all forms of marine plant and animal species (biodiversity). The Marine Estate Management Authority is responsible for the declaration, management, selection and zoning of marine parks and the regulation of ecologically sustainable use of these areas.

### **Division of Local Government (a division of NSW Department of Premier & Cabinet)**

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

### **Local Land Services (a division of NSW Department of Primary Industries)**

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.

## 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 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 L 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). They have therefore an important role in the ecology of estuaries.

Because oysters filter such large volumes of water they are particularly sensitive to changes in water chemistry. For this reason they are sometimes referred to as 'grey canaries', as they are excellent biological indicators of estuary health. Their feeding habits and life-style 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; and,
- Discharges from industrial premises or agriculture.

### 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 seston 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. In general, oysters feed more efficiently in relatively clear waters (White, 2001). Increased turbidity may also reduce primary production and seston 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 et al, 1999).
- **Toxic elements and substances.** Detailed knowledge of all substances that may affect oyster growth is not available, but Dove et al (1999) observed that elevated 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 gill structures (Dove et al., 1999).

### 3.3. Tidal range, water flow and salinity

Oyster aquaculture ideally requires a stable mean water level that varies with each tide cycle. This allows oysters to be 'set' at a height where predictable periods of inundation and drying can be achieved.

Tidal variation also drives currents that exchange water through lease areas, delivering 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 optimal oyster production. Salinity is also an important parameter in the operation of the NSW Shellfish Program.

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 (in the order of 1 closure per century).

Estuaries are 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 there are increased periods of low salinity, higher water temperatures 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.

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 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 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 Estuary Management Plans, entrance opening strategies and estuary dredging strategies that may affect salinity, tidal range and flows in an oyster growing estuary. However, oyster aquaculture needs alone may not be sufficient to justify the artificial opening of an estuary.

### 3.4. Water quality and flow objectives for oyster aquaculture areas

#### Objectives

The water quality objective and flow objective for areas identified as priority oyster aquaculture areas 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.

These water quality objectives aim to provide policy direction for local government, state government agencies and Local Land Services 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). (<http://www.epa.nsw.gov.au/ieo>).

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 Shellfish Program. 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 2002 and the NSW Shellfish Program Operations Manual 2001.

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 areas may see an improvement in water quality that results in a future upgrading.

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	Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).
Suspended solids	<75 mg/l	
Aluminium	<10µg/L	
Iron	<10µg/L	
Other parameters	For other parameters please refer to Section 4.4 and Section 9.4 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)	

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.

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 priority oyster aquaculture areas the relevant agency is required to:

- Consider the potential impact of the activity or plan on oyster aquaculture areas, and,
- 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* 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 8.

### 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. 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 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 (eg livestock, golf link, turf farm);
- Elevated monitoring and awareness of septic safe programs in areas adjacent to harvest zones;
- Marinas and vessel pump out facilities carefully regulated;
- Educational and advisory signs for recreational boating warning of the need to protect sanitary water quality;
- Avoid artificially attracting large numbers of birds into a harvest zone.

- Investigate the need for exclusion of recreational/private boating in specific oyster harvest area to protect sanitary water quality if required; and,
- 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 can not 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;
- 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; and,
- At source control of stormwater for new developments to reduce stormwater impacts.

### Community Responsibilities

Members of the community have a general 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.

### 4.3. 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 Shellfish Program, 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 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.

In setting regional water quality objectives, LLS refer to the Statewide 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 to set specific objectives relevant to the protection of estuaries and their catchments, including oyster growing areas.

The relevant LLS, Estuary Management Committee 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, Estuary Management Committee and local council for prioritisation.

### 4.4. 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 open the South Arm or to trigger a mechanical opening. A severe oyster mortality event occurred. The entrance management plan for the South Arm allowed for mechanical opening of the estuary only when Taree was threatened by flood.

What the local oyster industry did:

- Got active to find a solution.
- Engaged the Council, community and other key stakeholders.
- Got involved in the preparation of a revised entrance management plan.
- Helped to raise money to support the work being done.

#### The outcome:

Water quality triggers were built into the Farquhar Inlet Entrance Management Plan to ensure that prolonged periods of fresh water would be avoided.

The community purchased a dredge to implement estuary dredging works.

The Farquhar Inlet Management Group was formed and in partnership with the Greater Taree City Council has commenced dredging to improve flushing, recreational boating access and navigation in the South arm. Dredge spoil is being used to construct Little Tern nesting habitat in consultation with the National Parks and Wildlife Service.

For more information see the Greater Taree City Council website [www.gtcc.nsw.gov.au](http://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 oyster industry recognises that a range of environmental and socio-economic factors must also be considered in determining suitable oyster farming areas.

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 taken into account in the location and allocation of oyster aquaculture areas.

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

#### 2006 POAA 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* and any lease issued over previously unleased area since that time either under the *Fisheries and Oyster Farms Act, 1935* or the *Fisheries Management Act, 1994*. 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 8 Planning).

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

Assessment Issue	Standard for an area to be classified as a priority oyster aquaculture area
<b>Navigation</b>	Not within an identified navigation channel as marked by the NSW Maritime (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.
	Not within 50 m of an area identified by NSW Maritime as a specific watercraft operation area. Greater distances may be required in high use areas.
<b>Conservation areas</b>	Not within any areas mapped under <i>State Environmental Planning Policy 14 – Coastal Wetlands</i> if oyster aquaculture is likely to have significant adverse impacts on the wetland.
	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>Fisheries Management Act, 1994</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>Fisheries Management Act, 1994</i> OR under the <i>Threatened Species Conservation Act, 1995</i> .
	Not in the National Park estate without the written concurrence of the Minister for the Environment.
	Not immediately adjacent to a National Park or Nature Reserve if oyster aquaculture is likely to have significant adverse impacts on the conservation values of the area.
<b>Heritage</b>	Not within over or adjacent to any area likely to adversely affect items listed on the State Heritage Inventory eg shipwrecks.
<b>Aboriginal heritage</b>	Not within, over or adjacent to sites/places of regional or national aboriginal significance without consultation and endorsement by the local Aboriginal community.
<b>Public health safety</b>	Not within any areas classified as a Prohibited (Closed Safety) under the NSW Shellfish Program.
<b>Commercial fishing</b>	Not within a commercial net hauling ground recognised in a Fisheries Management Strategy made under the <i>Fisheries Management Act, 1994</i> .
<b>Recreational activity</b>	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 NSW Maritime as a designated swimming area.
<b>Miscellaneous</b>	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

The first edition of this strategy did not seek to achieve a windfall increase in area available to the NSW oyster industry NOR did it seek to force a sudden decrease in area that would adversely affect business viability.

Oyster aquaculture lease holdings have contracted since the mid 1970's and at June 2012 were 2926 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 1 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. However, some QX disease and POMS affected estuaries and estuaries affected by poor water quality may be able to bring non-viable areas back into production in future if QX disease and POMS resistant oyster lines are proven 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.

Areas identified for Phase-out in the first edition of this strategy will not be renewed.

### 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 *Environmental Planning and Assessment Act, 1979*.

### Extinguishment of POAA for non-oyster activities

NSW 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:

1. no other viable option for the proposed non-oyster aquaculture related activity can be identified;
2. any adverse effect on the oyster aquaculture industry is mitigated; and,
3. any compensation required by the Act or Regulation is paid.

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

1. the viability and productivity of the subject lease(s);
2. 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 Shellfish Program harvest area?); and,
3. 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:

1. 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 NSW DPI in consultation with the local industry and the local Shellfish Program. The area must be approved by NSW DPI Director, Aquaculture, Conservation & Marine Parks.

2. Works that mitigate the impact of the development to the local oyster industry to a value agreed to by NSW DPI in consultation with the local oyster industry. Works may take the form of:
  - a. Clean up work, e.g. the removal of derelict cultivation material from public water land;
  - b. Contribution to the Local Shellfish Program;
  - c. Other work as agreed to by NSW 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.

### Terminating current lease area

OISAS Edition 1 identified 98.1 hectares of current lease area for phase-out that were not suitable for on-going oyster aquaculture. Some incentives were offered to the holders of these leases to surrender them before December 2012. 11.4 hectares of this lease remains current at 30 June 2013 and the option for preferential rights to apply for vacant POAA no longer exists for these lease holders. On expiry these leases will not be renewed.

### 5.3. Oyster aquaculture maps

Table 6 gives the areas of each of the mapped categories of oyster aquaculture lease area, which are:

<b>Priority oyster aquaculture areas</b>	<b>green</b>	
<b>Terminating current lease area</b>	<b>yellow</b>	
<b>Current leases on the National Parks estate</b>	<b>blue</b>	
<b>Oyster aquaculture areas located on the Marine Parks estate.</b>	<b>hatched</b>	
<b>Land-based oyster facilities - Crown land lease: actual lease area</b>	<b>brown</b>	
<b>Land-based oyster facilities - Crown land lease: indicative location</b>	<b>orange triangle</b>	

The oyster aquaculture estuary maps are published on the NSW DPI website at:

[www.dpi.nsw.gov.au](http://www.dpi.nsw.gov.au)



Table 6: Lease area for oyster aquaculture.

Estuary	Greatest area historically leased (ha)	Current leases in the National Parks estate (ha)	Area mapped as priority oyster aquaculture area (ha)
Column 1	Column 2	Column 3	Column 4
Tweed River	41.0		27.5
Brunswick River	15.0		9.3
Richmond River	29.0		22.2
Clarence River	37.0		13.5
Sandon River	7.0		4.5
Wooli Wooli River	32.0		18.2
Bellinger River	29.0		24.5
Nambucca River	75.0		65.4
Macleay River	118.0		100.3
Hastings River	144.0		121.3
Camden Haven	166.0	18.0	80.5
Manning River	331.0		275.7
Wallis Lake	414.0		359.1
Port Stephens	1705.0		863.2
Hunter River	35.0	13.9	0.9
Brisbane Waters	228.0		151.4
Patonga Creek	27.0		23.6
Hawkesbury River	447.0		292.6
Botany Bay	297.0		109.7
Georges River	74.0		1.8
Shoalhaven River	21.0		13.2
Crookhaven River	260.0	36.0	108.4
Currambene Creek	13.0		
Moona Moona Creek	<1		
Conjola River	14.0		8.5
Narrawallee Creek	12.0		
Burrill Lake	19.0		1.1
Clyde River	236.0		192.1
Tomaga River	11.0		3.5
Moruya River	25.0		12.6
Tuross Lake	145.0		109.7
Wagonga Inlet	112.0		86.7
Wallaga Lake	28.0		5.2
Bermagui River	45.0		35.7
Murrah Lagoon	<1		
Wapengo Lake	94.0		76.4
Nelson Lagoon	48.0		22.3

Estuary	Greatest area historically leased (ha)	Current leases in the National Parks estate (ha)	Area mapped as priority oyster aquaculture area (ha)
Column 1	Column 2	Column 3	Column 4
Bega River	7.0		1.8
Merimbula Lake*	142.5		126.3
Pambula River	116.0		98.0
Towamba River (Kiah)	9.0		
Wonboyn River	62.0		52.8

\* 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 so as 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 water craft, 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; and
- 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 dependant 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 the filtering of estuarine water previously undertaken by natural oyster reefs. These reefs all but disappeared from NSW estuaries in the late nineteenth century following the appearance of a parasitic mudworm that is lethal to the Sydney Rock Oyster. The mudworm spread between east coast estuaries and forced oyster farmers to develop intertidal cultivation practices.

The oyster industry 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 may 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).

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;
- Get 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 pest, disease and noxious species;
- 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; and,
- Act as a good example to others and actively promote responsible habitat management and estuarine stewardship.

### **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 achieve a threefold effect: meet, and where possible exceed, regulatory standards; improve business profitability; and, improve environmental performance. Sixteen estuaries have prepared environmental management systems (see Section 9.2) 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;
- 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; and,
- Get involved in the development of appropriate standards for industry regulation.

#### 6.4. Oyster industry Crown land base sites

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 leased areas 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 waterways;
- 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 DEC, the Aboriginal Community and by making reference to the Aboriginal Heritage Information Management System; and,
- Land owners consent is sought from Trade and Investment – Crown Lands 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 *Crown Lands Act, 1989*;

‘Oyster Aquaculture Land Base Site’ – 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; and,

‘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 lease 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. The Crown Lands Division will accept, 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, the Crown Lands Division 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 the Crown Lands Division 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 Environment Protection Authority 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 tarred sticks and other 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.

### 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 food. Poor growth, increased susceptibility to disease and increased susceptibility to heat kills have been linked to overstocking in various NSW estuaries (Ogburn, 2011).

The number of oysters an estuary, or area within an estuary, can 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 quantify optimal stocking densities.

Research is being undertaken in a number of NSW estuaries (Pambula, Merimbula, Wapengo, Clyde and Shoalhaven) to establish baseline information regarding oyster crop performance. This research is measuring oyster growth and mortality rates occurring under varying environmental conditions and cultivation methods employed in the oyster industry. It will assist in the determination of sustainable oyster carrying capacity levels in oyster cultivation areas.

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 taking into consideration that approximately 50% of 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 stick growing areas to over 37.5 tonnes/ha in prime fattening areas.

Experienced oyster farmers can estimate local carrying capacities based on previous production 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. NSW 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 *Fisheries Management Act, 1994*.

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

- The minimum distance between tray or single layer non-cement coated stick cultivation is 8 metres;
- The minimum distance between multiple layer or cement coated stick cultivation is 16 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; and,
- The maximum area of raft cultivation on a lease is 540 square metres of raft per ha of lease.



## Chapter 7 Best practice standards

These best practice standards contain both voluntary (should) and mandatory (must) provisions. It is envisaged that oyster businesses will adopt voluntary practices as finances and maintenance schedules allow, consistent with their commitment to environmentally sustainable practices. Nothing in these standards stifles any innovation that achieves an even higher standard of performance.

Existing approved activities continue to be permissible provided they are not inconsistent with the mandatory provisions, permit conditions, lease conditions or the provisions of the *Fisheries Management Act, 1994*.

### 7.1. Lease marking

To ensure the safe navigation of oyster aquaculture areas, individual oyster aquaculture leases must be marked in a consistent and appropriate manner. In this regard all marking must be highly visible and provide navigational guidance, and in doing so, marking itself should not provide a threat to safe navigation of oyster aquaculture areas. Appropriate marking also clearly establishes the use of the area for oyster aquaculture and clearly identifies individual oyster aquaculture leases.

Compliance with marking requirements is mandatory.

Clause 48(3) of the *Fisheries Management (Aquaculture) Regulation 2012* 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 Section if these standards are impractical. These directions must be given in writing. Examples of where a deviation from the Standards may be considered are:

- where only a small portion of a very large lease is cultivated, it may be more practical to mark only the used portion, particularly for long narrow leases close the shore,
- where the water is too deep to install a marker post and a floating mark is more practical.

Note that culture infrastructure must not be white so that it can not be confused with boundary and corner markers.

#### 7.1.1. Marking standards ‘common’ to all leases

The following lease marking standards apply to all oyster aquaculture lease areas identified under this strategy, except that leases that are completely free of all cultivation material do not need to be marked.

##### 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 in colour above the low water mark;
- Not be constructed of steel or materials that will corrode rapidly.

##### 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 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 NSW 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), or
  - 150 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 in colour above the low water mark; and,
- Have between 1.25 metres and 1.5 metres showing above high-water mark (spring tides).

### 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), or
  - 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 in colour above the low water mark; and
- Have between 1.25 metres and 1.5 metres showing above high-water mark (spring tides).

### 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.**

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

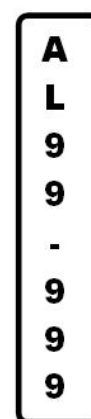
## Oyster aquaculture lease signs

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 NSW 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 500mm
	Material	Marine Grade UV Stable	Marine Grade UV Stable
	Finish	Rounded corners	Rounded corners
	Colour	White	White
Lettering	Minimum Character size	60mm high x 25mm wide	50mm high x 25mm wide
	Colour	Black (UV Stable)	Black (UV Stable)
	Wording	Oyster Farm	
	Numbering	Lease number	Lease number

Format



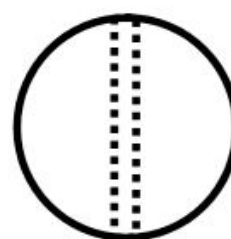
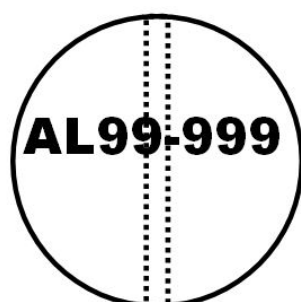
## Floating marks

Where the depth of water or the nature of the bottom substrate type (i.e. hard substrate) prevents the installation of a lease marker post, the lease holder may seek permission from the local Fisheries Officer to install an alternative floating lease corner mark or a floating intermediate mark on the lease area. 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**

		<b>Corner Mark</b>	<b>Intermediate Mark</b>
<b>Float specifications</b>	Size	200mm	90mm
	Material	Polystyrene	Polystyrene
	Finish	Round	Round
	Colour	White	White
<b>Lettering</b>	Minimum Character size	60mm high x 25mm wide	
	Colour	Black (UV Stable)	
	Numbering	Lease number	

**Format**

## 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 Maritime boating services officer.

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

### 7.1.2. Special marking standards

#### Dredge bed oyster aquaculture leases

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

- Where oyster dredge beds are entirely below the Mean Low Water Mark and the depth of water precludes the placement of posts, NSW DPI may consider a written request for exemption from normal marking requirements;
- The oyster dredge lease must be marked on the shore, directly adjacent to the lease boundary and the mark must be clearly visible from the water and land; and,
- The shoreline mark must have an approved NSW DPI oyster aquaculture lease sign attached at least 1metre above the high-water mark.

#### Raft oyster aquaculture leases

The following additional marking requirements apply to all oyster aquaculture leases approved for raft cultivation:

- At each corner of a raft that adjoins a navigational channel, a vertical posts 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,
- has reflectors fitted if required by the NSW Maritime; and,
- 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, and
  - may substitute for a 'common' oyster aquaculture lease corner post and sign.

### 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 NSW DPI oyster aquaculture lease sign attached at least 1m above the high-water mark; and,
- No sign may be installed on a National Park or Nature Reserve without approval from the National Parks and Wildlife Service.

## 7.2. Keeping leases neat and tidy

The perception of 'neat and tidy' is affected by the design and construction of the lease infrastructure, choice of materials and colour and how well it is maintained. Neat and tidy leases are important to minimise potential effects on estuarine amenity, to ensure lease materials are safe and secure and to provide optimal conditions for oyster cultivation.

To minimise potential impacts on estuarine amenity it is desirable that lease infrastructure be designed to fit into its surroundings as much as possible. A unified appearance helps to reduce the potential impact. Contrasting elements that vary in height, angle, material finish, colour or reflectivity, draw the attention of viewers and may lead to unacceptable visual impacts.

Materials should ideally be long lasting, pose no risk of environmental harm, be recyclable and made from renewable resources and/or recycled products. The use of new tar treated timber infrastructure will be phased out as soon as practical as identified by the Timber Alternatives in the NSW oyster industry project.

The Timber Alternatives in the NSW oyster industry project is a joint industry and government program established to identify alternative infrastructure materials to traditional tarred timber. Alternatives have been identified that are durable, recyclable, economical and practical. Adoption of alternative infrastructure materials will minimise risk of leases becoming derelict because the materials (eg HDPE plastics) are more durable (up to four-fold time period) and have a salvage value. Consequently leases will have much longer depreciation cycles and will maintain higher resale values over a long time frame with minimal refurbishing and clean-up requirements. The industry has recognised the economic and environmental benefits of this program and is rapidly adopting this new technology. The program won the 2003 Sydney Fish Market Seafood Award for Excellence in Environmental Practice.

The general immobilisation approval for the disposal of tar treated oyster industry waste (Approval Number 2007/16) applies to waste consisting of used tar-treated timber arising from oyster farms (active or inactive) located in NSW waters and provides for this material to be

disposed of at appropriately licensed solid waste landfills or industrial waste landfills which have currently operating leachate-management systems

### 7.2.1. Neat and tidy standards 'common' to all leases

The following oyster aquaculture lease tidiness standards apply to all oyster aquaculture lease areas identified under this strategy.

#### Visual amenity

To create visual harmony and compatibility oyster aquaculture lease infrastructure should be:

- Black, dark grey or dark grey/green in colour (white is prohibited to prevent confusion with marker posts);
- Consistent in colour;
- Consistent in shape and design;
- Consistent with the natural environmental line and form;
- Consistent and low in height;
- Consistent in line and direction;
- Matched to the scale of the surroundings; and,
- Matt finish texture.

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.

#### Lease maintenance and materials

All oyster aquaculture leases must be:

- Kept in good repair and all fallen or damaged cultivation materials must be rectified within the timeframes specified in this strategy (Section 2.3.1) or under the terms of an agreed NSW DPI workplan;
- Not used to store waste or un-used cultivation materials;
- Free of old or unserviceable timbers, stumps and other infrastructure;
- Free of these prohibited materials:
  - continuous lengths of conveyor belting exceeding 10 metres
  - glass,
  - steel, steel star pickets and corrugated iron,
  - tiles and bricks, and
  - tyres.

All oyster aquaculture leases should:

- 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; and
- Have the use of new tar treated timber infrastructure phased out as viable alternatives become available.



### 7.2.2. Special neat and tidy standards

#### Post supported intertidal cultivation

- All sticks, trays and other cultivation materials fallen from supporting rails and/or lines must be re-secured as soon as tides, weather and normal work schedules permit;
- Racks and lines must be constructed to appear straight and level to the casual observer; and,
- Posts must be secure and appear square to the water surface to the casual observer.

#### Catching sticks, depot sticks and trays

- Catching sticks, depot sticks and trays must not remain continuously on a lease for more than two years; and,
- Any fallen catching sticks, depot sticks or trays must be retrieved as soon as tides, weather and normal work schedules permit.

#### Rafts

- Rafts may only be placed on a lease subject to NSW DPI approval and endorsement of that lease;
- Rafts must be securely moored within the lease and must remain entirely within the lease boundaries at all times;
- Rafts must be low in height and must not be used to store infrastructure and materials;
- Plastic drums and floats must be adequately secured at all times and replaced if broken or leaking;
- The use of steel or concrete pontoons is prohibited;
- The raft must be designed and constructed to float horizontally to the water surface; and,
- Rafts must not be used to store waste or cultivation materials.

#### Floating cultivation

- All floating cultivation must be securely fixed, taut and must remain entirely within the lease boundaries at all times; and,
- Any fallen baskets, trays or sticks must be retrieved as soon as tides, weather and normal work schedules permit.

## Fallow leases

- Leases may be left fallow for up to five years. Longer fallow periods are permitted if identified in an approved commercial farm development plan or with the prior written approval of NSW DPI;
- Only sound posts and rail may remain on fallow leases. All raft trays, sticks, supported baskets/tumblers and floatation must be removed;
- Lease marking must be maintained during the fallow period; and,
- Rails and posts must be maintained in good order during the fallow period.

## 7.3. Raft construction and maintenance

Oyster rafts need to be designed to withstand structural stresses caused by a wide range of environmental conditions, including strong winds, tidal and flood currents, and wind and boat generated waves. They also need to be designed to withstand these stresses while the stock is either, submerged and growing, or being air dried on top of the raft to control biofouling. Rafts also need to provide a safe and stable work platform for the loading and unloading and management of oyster stock. Further information regarding best practice guidelines for oyster raft construction can be found on the NSW DPI website.

### Raft construction

The use of steel or concrete pontoons is prohibited;

- All raft timbers must be a good quality structural grade hardwood or equivalent;
- All timber cross members must have a minimum cross-sectional dimension of 150 x 50mm, be a single continuous length of timber;
- All structural horizontal and longitudinal raft timbers must be fixed using good quality galvanised bolts having a minimum diameter of 12 mm;
- Only plastic drums sourced from a licensed drum recycling company may be used for oyster raft flotation; and
- Rafts must not be stocked at a rate that exceeds the floatation capacity of the raft while all the stock on the raft is being air dried, or lifted during flood conditions.

### Raft mooring

- Rafts must be securely moored to ensure that they remain entirely within the lease boundaries at all times;
- Raft mooring devices may only be placed within the lease boundary;
- All raft mooring ropes must be resistant to ultraviolet light, have a minimum diameter of 24 mm and have a rated breaking strain of at least 7000 kg;
- Mooring ropes should be attached to major longitudinal raft timbers behind one or more major horizontal raft timbers and should not be attached solely to a leading horizontal raft timber; and
- Each corner of a raft must be attached by a mooring rope to a mooring device adequate to maintain the raft in position during adverse conditions.

### Annual check list

- Check the structural integrity of all raft timbers and metal fixings;
- Check all mooring block and flood safety anchors at their points of attachment for wear or corrosion; and

- Check all mooring ropes from their points of attachment at mooring blocks or flood safety anchors to the point of attachment to the raft for damage or fouling by submerged objects.

### Frequent check list

The following visual checks should be carried out whenever a raft is attended or at a minimum of every three months:

- Check the location of the raft within the lease boundary, with reference to a known shore position or shore feature;
- Check for missing, flooded or deformed floatation devices;
- Check floatation devices for abrasion, cracks, general damage or leaks;
- Check mooring rope attachments to rafts for UV damage, abrasion or cuts;
- Check the structural integrity of timbers and timber fixings at the point of attachment of all mooring ropes;
- Check that all navigation aides and signs are in place; and
- Three months after initial construction, check timbers for shrinkage and adjust bolts and other fixings where necessary.

### 7.4. 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.

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 NSW DPI.

### 7.5. 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 the Crown Lands Division, to verify approval status, condition and tenure.

### 7.6. 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.

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 NSW DPI
- use supported baskets/tumblers, floating cultivation, single layer stick 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 that are not in a POAA will not be approved over *Posidonia sp* or *Zostera spp* seagrass beds.

### 7.7. Threatened species protection

- Take all possible care to avoid hitting turtles with boats or propellers.
- Do not discard any debris into the estuary or adjacent lands.
- Ensure all ropes and mooring lines are taut and design floating cultivation to prevent entanglement.
- Participate in the protected, threatened and pest species sighting program to improve knowledge of the distribution and abundance of the species.
- Become familiar in how to identify threatened estuarine species for example, Green Sawfish, Little Tern, Osprey, Pied Oyster Catcher, Sooty Oyster Catcher and Turtles.
- Take care not to disturb potential nest tree sites or nests on oyster aquaculture leases.
- Take care not to disturb known or potential habitats adjacent to oyster aquaculture areas, for example, Little Tern, Osprey, Pied Oyster Catcher and Sooty Oyster Catcher.

### 7.8. Wave barrier fencing

Wind and boat generated waves may cause significant damage to oyster aquaculture infrastructure and crops. To mitigate these impacts, wave barrier fences are necessary in some oyster aquaculture lease areas.

Under the *Fisheries Management Act, 1994*, the permission of the Minister for Primary Industries is required to construct a wave barrier fence on an oyster aquaculture lease. Wave barrier fences must meet the standards defined in this strategy and can only be constructed on leases approved and endorsed by NSW DPI for these structures.

All wave barrier fences must comply with the following standards.

Wave barrier fences must:

- Be wholly within the oyster aquaculture lease area;
- Not unreasonably restrict ways of access to other leases, or to other public waters;
- Not obstruct access to an intertidal shoreline;
- Must meet the requirements for lease marking in this strategy if parts of the fence constitute lease markers (e.g. corner and intermediate boundary marking); and
- Be free of these prohibited materials:
  - continuous lengths of conveyor belting exceeding 10 metres
  - glass,
  - steel, steel star pickets and corrugated iron,
  - tiles and bricks, and
  - tyres.

Wave barrier fences should:

- For floating fences, 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;

- For fixed (not floating) fences, 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;
- Be consistent in materials, construction, design and colour;
- Be compatible in colour and materials with adjacent cultivation infrastructure; and
- A wave barrier fence should have matt finishes in black, dark grey or grey/green.

### 7.9. Hours of operation

The hours on which oyster aquaculture leases can be worked are 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, and
- 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.

### 7.10. 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 power-boats and many other waterway activities. As the industry switches to modern four stroke and fuel injected two stroke motors, the noise levels of outboard motors and on-board equipment has dropped significantly. These modern engines also have reduced exhaust gas emissions.

The *Protection of the Environment Operations Act 1997* and the *Protection of the Environment Operations (Noise Control) Regulation 2008* are the primary legislative means of controlling noise on NSW waterways. Roads and Maritime Services (RMS) 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.

Where it is determined ongoing offensive noise is occurring, RMS will help to find a compromise between being able to conduct legitimate activities that may emit noise and the responsibility to minimise noise. A regulatory notice issued by RMS 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: <http://www.epa.nsw.gov.au/noise/nglg.htm>

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 RMS authorised officer; and
- Using courteous language in the vicinity of other waterway users and residential neighbours.

### 7.11. Washing oysters

Washing oysters is undertaken to control parasitic mud worm infection, to cool oysters 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 marine bio-fouling organisms.

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.

### 7.12. Spray Irrigation

Where high summer temperatures coincide with low tide periods occurring during the middle of the day, oyster aquaculture lease temperatures in sheltered areas may exceed 50°C. These conditions may result in significant oyster mortality (up to 100%). To mitigate these events in vulnerable and valuable tray finishing areas, oyster farmers have historically installed spray irrigation to cool their oyster crops. Sprays are fed by portable pumps placed on small permanent pump stands to which the irrigation system is attached. Farmers may also use portable oyster washing equipment mounted on an oyster punt to cool oysters.

In most instances heat prone lease areas are located in remote bays and inlets surrounded by steep hills that inhibit local wind cooling effects and are not usually in close proximity to residential development. Where spray irrigation is installed it may only be required to be activated for short periods (2-3 hours) on a few days per year.

Best Practice for spray irrigation includes:

- Approval must be obtained from NSW DPI for the establishment of irrigation infrastructure on previously non-irrigated lease areas;



- An irrigation pump stand may form part of a fence but must be constructed wholly within the lease area;
- All reasonable care must be taken to ensure that irrigation pumps do not pollute the marine environment; and
- Noise provisions described in Section 7.9 apply equally to irrigation pumps and sprinkler systems.

### 7.13. 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 development consent. Other approvals may also be required including a permit under Part 7 of the *Fisheries Management Act, 1994*.

### 7.14. Pest and disease control

NSW DPI Aquatic Biosecurity unit prepares and implements control measures for aquatic pest and disease management.

Where there has been a significant level of oyster mortality or there is suspicion oysters are potentially being affected by a disease/organism the local District Fisheries Office must be notified immediately.

Four aquatic pest and disease issues are of particular relevance to the NSW oyster industry, namely Caulerpa, POMS, QX disease and Pacific Oysters. NSW DPI has developed a NSW Control Plan for Caulerpa and implements restrictions to reduce the risks of translocation of QX disease, POMS and the noxious Pacific Oyster through inter-estuarine shipments of oysters.

#### Make 'clean' part of your routine

NSW DPI Primefact No. 1290, (Biosecurity NSW, 2013) outlines how to routinely minimise the chance of spreading aquatic pests and diseases on boats and marine equipment. More stringent measures are also in place for the oyster industry for moving oysters and infrastructure from POMS, QX disease and Pacific Oyster affected estuaries. For more information see <http://www.dpi.nsw.gov.au/fisheries/pests-diseases/animal-health>. 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
- Avoid boating, swimming and diving near known populations of introduced pests (such as *Caulerpa taxifolia*)

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 fishing tackle.
- Drain all water from trailer-boats prior to leaving a location - ensure waste water 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.

## Caulerpa

*Caulerpa taxifolia* (Caulerpa) is a fast growing marine alga naturally distributed throughout tropical regions of the Indo-Pacific. Listed as a Class 1 noxious species in NSW, Caulerpa is capable of spreading quickly and outcompeting native aquatic flora, and can impact fish and other aquatic fauna. The 'NSW Control plan for the noxious marine alga *Caulerpa taxifolia*' exists to manage the risks and impacts of Caulerpa. Best practice for Caulerpa control includes:

- Abide by any special permit or lease conditions relating to Caulerpa in NSW waters.
- Avoid boating near known populations of Caulerpa. Propellers cut the plant into many fragments that can drift into areas and easily establish into new outbreaks.
- Inspect and clean propellers, anchors, ropes and chains before leaving an affected area.
- Inspect and clean trays and other infrastructure prior to movement out of a Caulerpa affected area. Fisheries Offices may inspect movements according permit conditions.
- Collect fragments of Caulerpa and seal the pieces in a plastic bag and dispose of them in a bin where they can not re-enter a waterway.
- Report new sightings of Caulerpa to Aquatic Biosecurity on the 24hr Pest and Disease Reporting Hotline on (02) 4916 3877 or email [aquatic.pests@dpi.nsw.gov.au](mailto:aquatic.pests@dpi.nsw.gov.au).

## QX disease

QX disease (caused by *Marteilia sydneyi*) is a declared disease under Schedule 6B of the *Fisheries Management Act, 1994*. QX disease is known to affect the Sydney Rock Oyster (*Saccostrea glomerata*) and is capable of causing significant impacts and losses of this species. To prevent the spread of QX throughout NSW the movement of oysters from high risk estuaries to lower risk estuaries is prohibited in NSW by the provisions of the Section 8 Fishing Closure QX Disease.

## Pacific Oyster Mortality Syndrome

Oyster farmers in the Hawkesbury River reported significant mortality of Pacific Oysters at Mullet Creek in late January 2013. Previously, in late November 2010 oyster farmers in the Georges River, Botany Bay, reported to NSW DPI that they had experienced a large mortality event in their Pacific Oyster crop and also noted that wild Pacific Oysters had died too. There were reports of wild Pacific Oysters dying in the upper reaches of Port Jackson in late February 2011. Investigations have confirmed that the mortality has been caused by the virus responsible for Pacific Oyster Mortality Syndrome (POMS). Sydney Rock Oysters are not affected by this virus.

There is 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.

Educational material is being developed to help boat owners better understand the risks of boating movement, and translocation of fouling organisms and bilge water from Hawkesbury River, Botany Bay and Port Jackson to other waterways.

NSW 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.

## Pacific Oyster control

The Pacific Oyster (*Crassostrea gigas*) is declared a Class 2 Noxious Fish under the *Fisheries Management Act, 1994* in all NSW waters except Port Stephens.

The relevant Pacific Oyster management requirements must be complied with when moving oysters between estuaries in NSW to prevent translocation of this aquatic pest. Cultivation practices must include every effort to eradicate Pacific Oyster overcatch in all estuaries other than Port Stephens. Where Pacific Oysters are not controlled by the permit holder the control work may be done by NSW DPI and costs recovered from the permit holder.

NOTE: At the time of print the S.8 Fishing Closure – Pacific Oyster control was being reviewed by NSW DPI, in consultation with the NSW Shellfish Committee and the broader industry. The scheduled timeframe for completion of this project, including implementation of a new less complex risk-based Pacific Oyster management option is December 2013.

### **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, POMS) and/or Pacific Oysters to other estuaries. All movements of oysters between estuaries must be recorded in an Oyster Shipment Log Book. No oysters may be removed from a lease subject to a noxious fish order, and placed on any other lease, unless the oysters are first inspected by a fisheries officer and comply with the Pacific Oyster management requirements.

### **Oyster shipment log book**

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 prior to shipping.

48 hours PRIOR to moving oysters, notice must be given to the local District Fisheries Office of intention to move oysters to another estuary (this notice may be left on the Fisheries Office voicemail). The notice to the local District Fisheries Office must include the Oyster Shipment Logbook permit number and details of the shipment.

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

Copies of all completed logbook forms must be sent monthly to NSW DPI Aquaculture Management.

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.

## **7.15. Punt and boat mooring**

Punts and boats should not be permanently moored on oyster aquaculture leases if alternative arrangements are available. The preferred alternative is for punts and boats to be moored at work sheds, private jetties or on NSW Maritime registered moorings. Punt and boat moorings fronting Crown Land bases should also be appropriately authorised.

## **7.16. Waste management**

Wastes generated from activities on oyster aquaculture leases include culture infrastructure that is no longer serviceable and bio-fouling. Best practice is:

- Reduce, re-use and recycle waste materials where possible;
- No waste (including shell) is to be deposited on lease areas;

- All lease infrastructure removed from a lease must be returned to shore for processing or disposal;
- All wastes from culling activities conducted on leases should be returned to shore for processing or disposal;
- Bio-fouling on the lease superstructure (post, rail etc) should be collected and returned to shore for processing or disposal if possible; and,
- Residual materials that cannot be re-used or recycled must be disposed of to an approved waste management facility.

### 7.17. Theft of oysters and damage to oyster aquaculture leases

All thefts should be reported to local police for investigation in the first instance.

NSW DPI local fisheries officers should then be informed so that patrols can observe any suspicious activity and liaise with the police and farmers to reduce further theft.

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 *Fisheries Management Act, 1994* to remove oysters or other cultivated species.

It is also an offence under the *Fisheries Management Act, 1994* 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 NSW DPI Fisheries Office.

#### Oyster theft will not be tolerated

In January 2011, a 44 year old Forster man was arrested after stealing six dozen oysters from oyster racks in Wallis Lake. The man was brought before Forster court in front of magistrate Shaughan McCosker who said in sentencing, “a clear message needed to be conveyed to the community that oyster theft will not be tolerated”. He told the court that oyster farmers were sick of oyster theft and the cost to their businesses. The thief was sentenced to ten months gaol with an eight month non-parole period. He was also fined \$2,000 and \$96 court costs.

In February 2011, a 38 year old Taree man was arrested after stealing twenty dozen oysters from leases in the Manning River. The thief was fined \$900 and given an 18 month good behaviour bond in Taree local court. This financial year Fisheries and Police Officers have jointly conducted 17 “Operation Trident” operations mainly during peak holiday periods over Christmas and Easter to detect oyster theft along the NSW coast.

## Chapter 8 Planning and Approvals

### 8.1. Approval of new oyster aquaculture leases

NSW 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 Oyster Aquaculture maps and determine if the area they wish to apply for is in a POAA, a National Park or a Marine Park. Different assessment and approval processes apply to each of these areas as detailed below.

#### 8.1.1. New lease in a POAA.

1. An application for a new lease in a POAA must be submitted on the prescribed NSW DPI form.
2. NSW DPI will make an assessment in accordance with s.111 of the *Environmental Planning and Assessment Act, 1979* to determine if the area is available for leasing.
3. If available, the lease will be offered by competitive process or by application in accordance with the Oyster aquaculture lease Allocation Policy O-071.
4. The new lease will be gazetted by NSW DPI if approval is granted.

#### 8.1.2. New lease in a POAA in a Marine Park

1. An application for a new lease in a POAA in a Marine Park must be submitted on the prescribed NSW DPI form.
2. NSW DPI will consult with the relevant Marine Park Manager.
3. NSW DPI will make an assessment in accordance with s.111 of the *Environmental Planning and Assessment Act, 1979* and the *Marine Parks Act, 1997* to determine if the area is available for leasing.
4. If available, the lease will be offered by competitive process or by application in accordance with the Oyster aquaculture lease Allocation Policy O-071.
5. The new lease will be gazetted by NSW DPI if approval is granted.

#### 8.1.3. New lease NOT in a POAA

1. An application for a new lease outside a POAA must be accompanied by:
2. a suitability assessment using the assessment criteria given in Table 5, AND
3. a Review of Environmental Factors that addresses the potential environmental impacts of the proposed new lease.
4. NSW DPI will liaise with NSW Maritime and the Marine Estate Management Authority if required and make a preliminary assessment of the application and determine if the area appears to be available for leasing.
5. If available, the lease will be offered by competitive process or by application in accordance with the Oyster aquaculture lease Allocation Policy O-071.
6. The preferred applicant will prepare and submit a development application to the relevant local council for assessment under Part 4 of the *Environmental Planning and Assessment Act, 1979*. The development application will need to be supported by a Statement of Environmental Effects, or for designated development an Environmental Impact Statement. A Species Impact Statement is required if a threatened species is likely to be significantly affected.

7. The Development Application must be signed by the Crown Lands Division as land owner before it can be submitted to Council. Owners consent can be given at a local Crown Lands Division office or by posting a request to:

Crown Lands Division

PO Box 2215

Dangar 2309

T: 1300 886 235 (Australia wide)

E: [enquiries@lands.nsw.gov.au](mailto:enquiries@lands.nsw.gov.au)

W: [www.crownland.nsw.gov.au](http://www.crownland.nsw.gov.au)

For Crown Lands Division to provide owners consent it needs:

- the original Development Application form,
  - the fee,
  - the Statement of environmental effects submitted to NSW DPI with the lease application, and
  - a copy of the letter from NSW DPI supporting the application.
8. 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.
  9. The new lease will be gazetted by NSW DPI if consent, and concurrence if required, are granted.

#### **8.1.4. New lease in the National Park estate**

1. An application for a new lease in the National Park estate must be accompanied by
  - a. a suitability assessment using the assessment criteria given in Table 5, and
  - b. a Review of Environmental Factors that addresses the potential environmental impacts of the proposed new lease, the consistency of the activity with any management plan for the area and an assessment of the impact the activity may have on the National Park area. An Environmental Impact Statement is required if the proposed new lease is likely to significantly affect the environment.
2. NSW DPI will liaise with NSW Maritime and the National Parks and Wildlife Service and will make a preliminary assessment of the application and determine if the area appears to be available for leasing.
3. NSW DPI will advertise for objections if the area is potentially available.
4. NSW DPI will consider any objections and assess the application in accordance with s.111 of the *Environmental Planning and Assessment Act, 1979* to determine if the area is available for leasing.
5. If available, the lease will be offered by competitive process or by application in accordance with the Oyster aquaculture lease Allocation Policy O-071.
6. The written concurrence of the Minister for Environment will be sought if NSW DPI approves the lease.
7. The new lease will be gazetted by NSW DPI if approved and the written concurrence of the Minister for Environment has been granted.



## 8.2. Competitive allocation of new lease areas

Under Oyster aquaculture lease Allocation Policy O-071 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.

There are four general exemptions from the mandatory tender policy. These are: to protect intellectual property; to allow current lessees to make minor boundary modifications; to provide an incentive to applicants to clean-up historical derelict lease area where there is a significant State liability; and, if it is in the public interest. These exemptions are detailed in Oyster aquaculture lease Allocation Policy O-071.

The new lease assessment and allocation process is outlined in Figure 3.

## 8.3. Making Local Environmental Plans that may affect oyster aquaculture

As a result of the impacts of development of estuarine catchments (e.g. stormwater, septic seepage, sewerage outfalls), there has been a deterioration in the environmental conditions required for oyster cultivation in some estuaries.

To address this issue Council must have regard for the s.117(2) Direction 1.4 Oyster Aquaculture as detailed in Planning Circular PS 07–013.

## 8.4. Determining development applications that may affect oyster aquaculture

Part 3A of *State Environmental Planning Policy 62 - Sustainable Aquaculture* requires consent authorities to consider the effects of the proposed development on oyster aquaculture and to take OISAS into consideration.

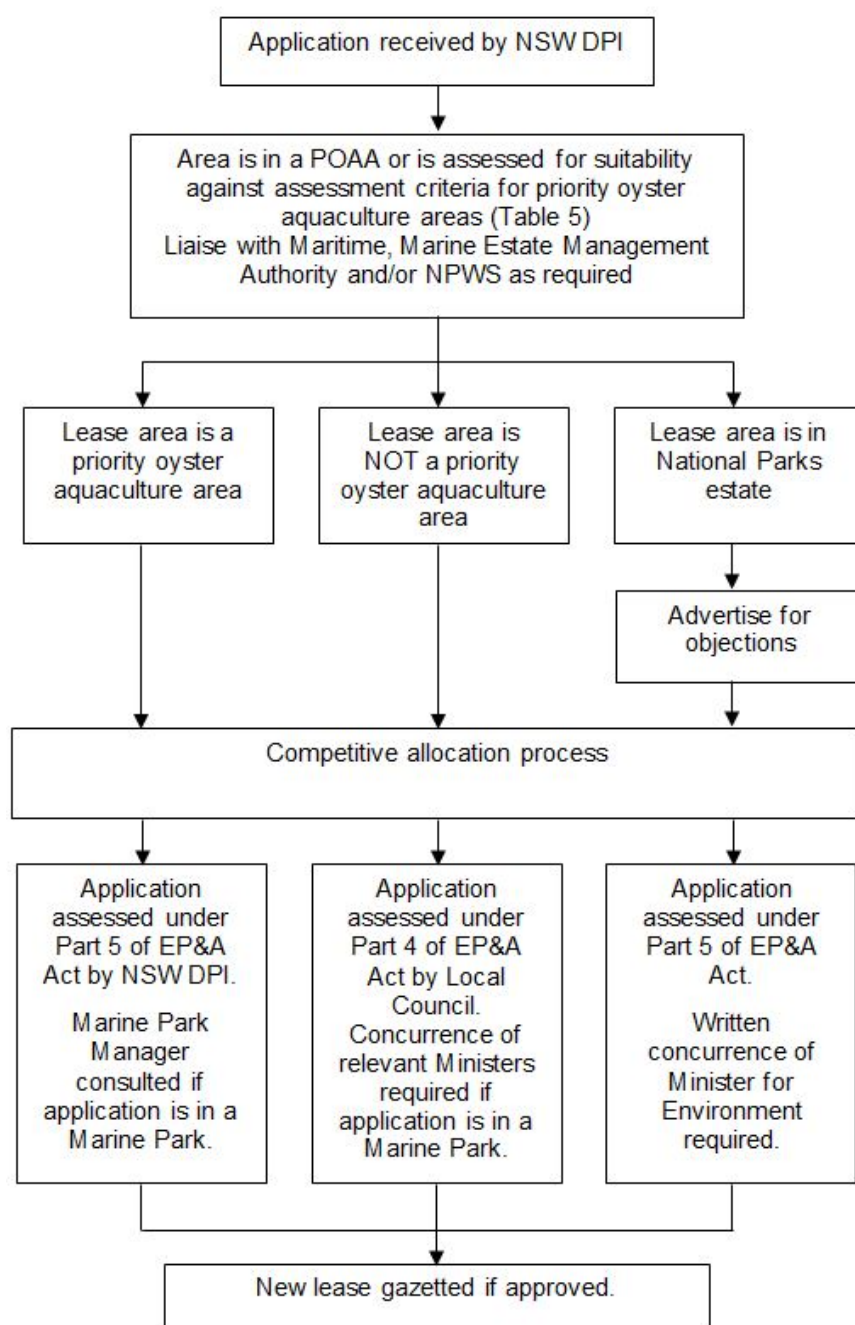
When considering an application for development that, because of its proposed location, may affect a priority oyster aquaculture area or oyster aquaculture outside such an area, the consent authority must:

1. Give the Director-General of the NSW DPI 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, and
2. Take into consideration the provisions of OISAS.
3. 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.

Clause 15B of *State Environmental Planning Policy 62- Sustainable Aquaculture* requires the consent authority to consult with the Director General of NSW DPI if the development may have an adverse effect on oyster aquaculture development or a priority oyster aquaculture area.



**Figure 3: New lease assessment and allocation process.**

### 8.5. Aquaculture permits

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

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

## Applying for a permit

NSW DPI Aquaculture Administration should be contacted for current advice. Information regarding aquaculture permits is also provided on the NSW DPI website. Applications for oyster aquaculture permits will be assessed by the Department of Primary Industries 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 Commercial Farm Development Plan that is assessed by NSW DPI.

A Commercial Farm Development Plan may be reviewed by NSW DPI where farm management and/or compliance issues arise.

## Suspension and cancellation of permits

Aquaculture permits can be suspended and/or cancelled under s.159 and s.160 of the *Fisheries Management Act, 1994*. 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 and workplans, 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 Commercial Farm Development Plan; or
- Other circumstances consistent with the *Fisheries Management Act, 1994* or the *Fisheries Management (Aquaculture) Regulation, 2012*.

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/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 Administrative Decisions Tribunal to review the case.

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

## 8.6. 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 from a compliance notice, untidy lease area, former lease areas not being cleaned up, or workplans not being followed an application for a new lease or lease transfer, consolidation, sub-division, renewal or sublet will normally be refused.

In addition, NSW DPI will take civil action against current and former lease and permit holders under NSW 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 NSW 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 NSW DPI Aquaculture Administration to obtain current information about the lease and lease transfers. NOTE: The transfer of a lease is NOT automatic.

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 an approved workplan that addresses compliance concerns (eg 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 *Fisheries Management Act, 1994* 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 *Fisheries Management Act, 1994* 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.

Areas identified for Phase-out in the first edition of this strategy will not be renewed.

## Changes to activity on a lease

The permit holder/leaseholder must obtain written approval from NSW DPI BEFORE commencing any activity that is not consistent with the permit and lease conditions. This may include the introduction of different cultivation methods, new materials, a new species or other significant change in activity. Changes in activity that are not consistent with Chapter 7 Best Practice Standards may require development consent.

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

- Raft cultivation,
- Fences,
- Irrigation,
- Platforms, or
- Pumpstands.

### Annual production reports

All permit holders must complete an annual production report and return it on a form approved by NSW DPI.

### 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. As this figure is updated periodically you should contact NSW DPI Aquaculture Administration section for the current figure.

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.

## 8.7. 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 *Crown Lands Act, 1989*. The provisions of the relevant local environmental plan and/or the *Environmental Planning and Assessment Act, 1979* may require development consent to be obtained. Development applications will require land owner's consent from the Department of Lands prior to lodgement.

The Crown Lands Division 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. The Crown Lands Division and the relevant consent authority should be consulted for further advice. A permit may also be required from NSW DPI under Section 201 of the *Fisheries Management Act, 1994*.

The NSW Government has no statutory responsibility to maintain any particular depth of water beneath an area leased for oyster aquaculture. 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.

The protocol for Wallis Lake Oyster aquaculture lease Maintenance Dredging (NSW Government Gazette No 156 p.8121) guides best practice for maintenance dredging of oyster aquaculture leases. In summary:

- 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 metres AHD;
- No seagrass destroyed without a permit from NSW DPI;
- The dredging activity will have no significant adverse impact on any threatened species or habitats;
- An approved spoil disposal site is available;
- The activity will not result in any significant water pollution.

NSW DPI, the Crown Lands Division and the consent authority should be consulted for further advice.

## 8.8. Oyster aquaculture species

### Species currently approved

There are three main species of edible oysters in NSW, the Sydney Rock Oyster (*Saccostrea glomerata*), the Native (flat) Oyster (*Ostrea angasi*) and the introduced Pacific Oyster (*Crassostrea gigas*). Both the Sydney Rock Oyster and the Pacific Oyster belong to a group of oysters known as 'cupped oysters', while the Native (flat) Oyster belongs to the 'flat oyster' group. World wide, the vast majority of oysters harvested for human consumption are 'cupped oysters'. This is a recent trend and has been driven largely by the translocation and cultivation of the fast growing Pacific Oyster. 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. It is believed that a disease (bonamia) that wiped out the European industry during the late 19th and early 20th century was also responsible for a significant decline in wild Native Oyster populations in Australia in the 19th century. The impact of over fishing of Native Oyster populations may have also contributed significantly to this decline.

The NSW oyster industry is mostly based on the production of the Sydney Rock Oyster. While the geographic range of this species extends from Wingan 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 often the dominant intertidal species.

A small industry with considerable potential for expansion is developing around the cultivation of the Native Oyster in southern NSW. This species is endemic to southern Australia and is the major oyster species found in aboriginal middens in these areas. This species is primarily a sub-tidal oyster commonly found in the marine dominated areas of estuaries and has a low tolerance to fresh water runoff. While self-sustaining wild populations of this species are usually only found south of the Clarence River, individuals have been found as far north as Moreton Bay in southern Queensland.

The Pacific Oyster was introduced in to 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 Pacific Oyster had found its way into a number of NSW estuaries. The Pacific Oyster is now found in most NSW estuaries south of Port Macquarie.

Farmers in five estuaries are approved to cultivate the functionally sterile triploid Pacific Oyster (Port Stephens, Georges River, Hawkesbury River, Shoalhaven/Crookhaven Rivers and Clyde River). Other estuaries are undertaking or considering trials of these oysters.

The species of oyster 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.

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 eg scale required, flood liability, temperature and water quality requirements;
- Cost of production and business viability;
- Market demand and price;
- Potential disease; and,
- Other management factors.

In some situations, 'polyculture' (ie 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 oyster 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 approved for cultivation on NSW oyster aquaculture leases by estuary at 30 June 2013.

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

Estuary	Sydney Rock Oyster	Native (flat) oyster	Pacific Oyster
Tweed River	yes	no	no
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
Nambucca River	yes	no	no
Macleay River	yes	no	no
Hastings River	yes	no	no
Camden Haven River	yes	yes	no
Manning River	yes	no	no
Wallis Lake	yes	no	yes Triploid trial
Port Stephens	yes	yes	yes Diploid and Triploid
Hunter River	yes	no	no
Brisbane Water	yes	no	no
Hawkesbury River	yes	no	yes Triploid only
Georges River	yes	no	yes Triploid only
Crookhaven Shoalhaven	yes	yes	yes Triploid only
Clyde River	yes	yes	yes Triploid only
Moruya River	yes	yes	no
Tuross Lake	yes	yes	no



Estuary	Sydney Rock Oyster	Native (flat) oyster	Pacific Oyster
Wagonga Inlet	yes	yes	no
Bermagui River	yes	yes	no
Wapengo Lagoon	yes	yes	yes Triploid trial
Nelson Lagoon	yes	yes	no
Merimbula Lake	yes	yes	no
Pambula Lake	yes	yes	no
Wonboyn Lake	yes	yes	no

yes = Approved

no = Not currently approved

### Protocol for assessing a new species for commercial oyster 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 (MCFFA, 1999). 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 Ministerial Council on Forestry, Fisheries and Aquaculture (1999) 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 illegal translocation occurred in Port Stephens when the Pacific Oyster was introduced in 1984. The Pacific Oyster has now established in the majority of the estuary, and significantly reduced the harvest of Sydney Rock Oysters.

Movement of Sydney Rock Oysters from one estuary to another is practiced widely in NSW to take advantage of changes in temperature and growing conditions that promotes oyster growth and condition.

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

- Any critical habitats, threatened species, populations 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; and,
- Any necessary modification to the commercial farm development plan.

NSW 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 Environmental Impact Statement may be required.

### **8.9. Transitional provisions**

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

## Chapter 9 Risk management and business resilience

### 9.1. 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 (eg 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 ready. Natural disaster relief does not cover disease related events and at this time there are no cost-sharing arrangements in place between the aquaculture industry and government to cover these events.

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
- public liability
- the economy and oyster markets

Assistance and support with risk management planning is provided by:

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

## Case Study – Industry training initiatives on the South Coast

South East LLS and Bega Coast Oysters are developing an oyster industry 'holistic farm planning training package' to be delivered by an accredited training provider, which includes financial and business risk planning and decision making. The aim of this project is to design and offer a course that is accessible to all NSW growers.

Fostering 'tomorrow's oyster farmers and industry leaders' is an important strategy for succession planning within the industry and a pilot school-based training program has been established by the Clyde River growers and partners, in conjunction with South Coast Workplace Learning Inc. The purpose of the program is to link high school students and teachers with vocational training, industry experience and mentors, to enhance youth skills, experience and career pathways in the progressive Far South Coast oyster industry.

South East LLS is working towards extending this concept to develop a school-based oyster industry apprenticeship program that includes face-to-face training and encourages school leavers to appreciate and enter the industry.

## 9.2. 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 tar, running inefficient 2-stroke 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 Local Land Services, NSW DPI, Local Council, your neighbours and National Parks & Wildlife Service.

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 growers, watch the South Coast Oyster Growers and Australia's Oyster Coast short documentary videos at [vimeo.com/76913593](http://vimeo.com/76913593) and [vimeo.com/69287281](http://vimeo.com/69287281).

OceanWatch Australia and the coastal LLS are actively involved with the industry and there are now 16 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:

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

Once prepared, attention needs to be given to EMS implementation. South Coast oyster grower groups with the assistance of the Southeast 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.

### 9.3. Climate Change

#### What is 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 that are most relevant to this strategy. 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). Potential impacts on the oyster industry will occur gradually over long periods of time and are not likely to become apparent over the term of this strategy. 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
- The biogeography 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.

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

- Develop knowledge-action networks that include local growers, industry bodies, scientists, natural resource management agencies, for example the Oyster Information Portal (<http://www.oysterinformationportal.net.au>);
- 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

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