

## AQUACULTURE (Marine)

November 2007

Marine aquaculture is a diverse industry with a number of different culture systems, depending on the location of the operation (subtidal or intertidal) and the species being grown. As a result, the nature and potential for environmental impact can vary greatly. If the aquaculture farm is sited and operated appropriately, the environmental impact can be minimal.

For the purposes of this environmental assessment guide, aquaculture is defined as the propagation or rearing of molluscs or finfish in marine waters. When a marine aquaculture proposal does not fall into this definition (e.g. aquaculture on land using seawater) it may require a referral to the Environment Protection Authority (EPA) under Schedule 22 (5)(2) of the *Development Regulations* 1993.

The types of production facilities and examples of the fish that are commonly grown in them include:

- sea cages - southern blue-fin tuna, yellowtail kingfish, mullet, snapper, and abalone
- racks - Pacific oysters
- long-lines - Pacific oysters (intertidal), scallops and mussels (subtidal)
- barrels - abalone.

The purpose of this guide is to help planners assess proposals for aquaculture farms from an environmental viewpoint. It focuses on environmental issues and does not deal with the process of assessing proposals against the provisions of the Development Plan.

**The issue of a draft licence by PIRSA does not override or negate the assessment or decision on a development application under the Development Act by the relevant planning authority.**

**Note:**

All aquaculture production facilities in South Australia must be licensed by Primary Industries and Resources South Australia (PIRSA). PIRSA undertakes a complete ecological risk assessment of the activity, and will only issue a licence if the activity meets ecological sustainable development (ESD) criteria. It is recommended that planners read the complete ESD assessment undertaken by PIRSA and any comments made by the EPA as part of the PIRSA licence assessment process. An aquaculture development application should not be processed until a PIRSA licence has been issued.

Before you read further: information about noise in this document may be out of date. This document is being revised. Please refer to the Environment Protection (Noise) Policy 2007, available at [www.legislation.sa.gov.au](http://www.legislation.sa.gov.au).

## Key environmental issues

- water quality
- waste management
- site contamination
- air quality
- noise
- scouring
- shading
- carrying capacity
- other

Some farms undertake small levels of fish processing on the site as the fish are harvested.

## Information requirements

The following environmental information is required to undertake an adequate assessment:

- confirmation that a PIRSA aquaculture licence has been issued or will be issued for the activity (if not, the development application should not be progressed)
- scaled site map including likely position of culture structures and location of nearby land
- accurate GPS coordinates of the site (GDA 94)
- bio-geographical report for the site detailing the species of flora and fauna present on the site, in particular seagrass
- clear description of the culture system being used including the size and number of culture units
- species to be farmed, including both common and scientific names
- operational information including feeding strategies, expected production tonnage, cleaning methods (in particular biofouling)
- details of any proposed on-site fish processing
- strategies to avoid pollution and site contamination (i.e. farm management arrangements)
- depth of water on site and direction and rate of current flow
- expected feeding rates, type of feed used and production tonnages
- disposal methods for all types of wastes to be generated especially mortalities and biofouling
- chemicals that may be used (e.g. for disease treatment, cleaning, stock handling)

***Applications lacking any of this information should not be accepted.***

## **Environmental assessment**

### **Water quality**

Adding nutrients to the water in the form of supplementary feed and faeces from the cultured animals can result in environmental harm. An aquaculture activity (e.g. finfish, abalone) where supplementary feed is required should be in an area of reasonable depth and current flows to ensure that nutrients resulting from uneaten feed and faeces are adequately dispersed.

Chemicals may be used for a number of purposes including treatment of disease, disinfection of equipment and stock handling. If used inappropriately, they may cause environmental harm. The applicant should state whether they intend using chemicals on their farm and for what purposes. The use of chemicals in open water aquaculture farms should generally be opposed.

### **Waste management**

#### **Organic waste**

Organic waste includes fish carcasses, waste products from fish processing and bio-fouling that grows on the culture structures.

In fish farms stock will inevitably die, either randomly or in large numbers as a result of disease or equipment failure. Applicants should specify how they intend to dispose of fish or shellfish mortalities that may occur on site.

Some farms undertake small levels of fish processing on the site as the fish are harvested. Applicants should specify whether fish processing will be conducted on the site and, if so, how they intend to dispose of fish waste including blood, carcasses, shells and offal.

Bio-fouling will need to be removed from culture structures periodically. Applicants should specify how and where they will clean their equipment and how they intend to dispose of bio-fouling removed from the structures.

Organic waste produced at the site should be contained in the service vessel, taken ashore and lawfully disposed of. Methods of disposal may include composting or using a licensed waste depot. Under no circumstances should organic waste be disposed of at sea.

#### **Other waste**

As with any form of land-based business venture, solid waste in the form of personal waste (e.g. food and drink containers) and disused equipment should be taken ashore and disposed of lawfully.

### **Site contamination**

The loss of seagrass, or other aquatic vegetation, resulting from the addition of pollutants (e.g. nutrients or sedimentation) is defined as 'environmental harm' by the *Environment Protection (Water Quality) Policy, 2003*.

It is therefore important that marine aquaculture sites are positioned away from extensive seagrass beds and that they are located in areas of reasonable depth and current flow to ensure that any nutrients and sediments generated as part of the farming process can be adequately dispersed.

The applicant will therefore need to specify whether there is seagrass present on the site, the water depth and current flow. Fallowing is an important strategy to minimise the potential for contamination of the benthic environment. The applicant should specify if and how they intend to fallow the site.

The addition of nutrients into the water column via supplementary feeding and animal faeces can lead to suspended material settling on the sea floor and contaminating the benthic environment. If contamination continues over time, it may also give rise to the formation of anoxic sediments. This may have an impact on seagrass or other aquatic vegetation under or near the culture structures.

### **Air quality**

The majority of marine-based aquaculture farms are located offshore in remote locations and sited among other aquaculture facilities. Generally marine-based aquaculture farms are unlikely to generate significant air quality issues.

### **Noise**

The majority of marine-based aquaculture farms are located offshore in remote locations and sited among other aquaculture facilities. Some farms may use bird scarers and auto feeders that may generate noise. The applicants should specify if any potentially noisy equipment will be used but it is unlikely that noise will be a significant issue.

### **Scouring**

Anchors and anchor ropes securing the cages and longlines need to be kept taut and there should be a sufficient distance maintained between the bottom of the cages and longlines (3 metres minimum) so that they don't connect with the sea floor. Otherwise, culture structures may move with the tide or currents and scour the sea floor resulting in potential damage to the benthic environment including any residing flora and fauna. Potential impacts are likely to be minimised by positioning farms away from seagrass beds and in appropriate water depths. Any aquaculture proposal over seagrass should be opposed unless the applicant provides adequate information on how they intend to minimise the potential impact on seagrass.

### **Shading**

Cages, racks and longlines will shade the sea floor. Shading may be detrimental to the growth of seagrass and other plant and algae species. Applicants must demonstrate how they intend to minimise any potential impacts from shading.

Strategies may include fallowing, in which the culture structures are moved to different locations on the site over certain periods of time, and positioning culture structures away from seagrass beds located on the site or in adequate water depths.

## Carrying capacity

Bivalve shellfish, such as Pacific oysters and mussels, are filter feeders on the plankton naturally occurring in marine waters. Cultured shellfish will therefore compete for food with other filter feeders occurring both naturally and in nearby farms. Overstocking may result in reduced growth and survival rates by other filter feeders (including cultured shellfish) in the region. The development application should therefore include an assessment by PIRSA to determine if the carrying capacity of the region is likely to be affected by the addition of a new shellfish farm.

## Other

Advice on the potential for marine animal interactions should be obtained from the Department of Environment and Heritage (DEH).

Structures in the water column may also cause a change in hydrodynamics, potentially leading to the deposition of fine particulate matter. This can lead to a change in the composition and numbers of organisms and aquatic vegetation found naturally in an area.

## Checklist of environmental issues

- Species to be farmed
- Type of culture system to be used including size and number of culture units
- Depth of water on site and direction and rate of current flow
- Biogeographical report for the site including presence and densities of flora and fauna, in particular seagrass
- Expected feeding rates, types of feed used and production tonnages
- Chemicals to be used (for cleaning, disease treatment etc)
- Disposal of mortalities and other organic waste such as biofouling
- Details of any fish processing to be undertaken on site

## Draft standard conditions

*To use and adapt as may be applicable to a specific proposal*

**Note:** Application of these conditions will depend on the nature of the culture system proposed by the applicant.

1. Anchoring systems and holding structures must be designed, constructed and maintained in a manner that does not result in scouring of the sea floor.
2. Culture equipment must be placed in a manner that will not cause long-term damage to, or loss of, aquatic vegetation.
3. Implementation of an effective feeding management strategy that minimises the use of excess food deposited into the marine environment.
4. All waste generated on site must be taken ashore and disposed of lawfully.

5. Only the longline method of shellfish culture is permitted on the site.  
(*Note:* This condition usually applies to intertidal shellfish culture over seagrass).

The following note provides important information for the applicant and should be attached to the approval notice.

*The applicant is reminded of their general environmental duty, as required by Section 25 of the Environment Protection Act, to take all reasonable and practical measures to ensure that the activities on the whole site, including during construction, do not pollute the environment in a way which causes or may cause environmental harm.*

## References

EPA Information Sheet, *Aquaculture Management and the Environment Protection (Water Quality) Policy*, May 2003), can be found at:  
[www.epa.sa.gov.au/pdfs/aquaculture\\_mgmt.pdf](http://www.epa.sa.gov.au/pdfs/aquaculture_mgmt.pdf)

The *Environment Protection (Water Quality) Policy*, 2003 and the *Environment Protection Act 1993* can be accessed through: [www.legislation.sa.gov.au](http://www.legislation.sa.gov.au)

---

## FURTHER INFORMATION

### *Legislation*

Legislation may be viewed on the internet at: [www.legislation.sa.gov.au](http://www.legislation.sa.gov.au)

Copies of legislation are available for purchase from:

Service SA Government Legislation Outlet	Telephone:	13 23 24
101 Grenfell Street	Facsimile:	(08) 8204 1909
Adelaide SA 5000	Internet:	<a href="http://shop.service.sa.gov.au">shop.service.sa.gov.au</a>

---

*For general information please contact:*

Environment Protection Authority	Telephone:	(08) 8204 2004
GPO Box 2607	Facsimile:	(08) 8124 4670
Adelaide SA 5001	Freecall (country):	1800 623 445
	Internet:	<a href="http://www.epa.sa.gov.au">www.epa.sa.gov.au</a>
	E-mail:	<a href="mailto:epainfo@epa.sa.gov.au">epainfo@epa.sa.gov.au</a>

---