



**Government of South Australia**  
Primary Industries and Resources SA

**REPORT  
SUPPORTING THE  
REPLACEMENT OF THE  
  
ARNO BAY AQUACULTURE MANAGEMENT PLAN,  
STREAKY BAY AQUACULTURE MANAGEMENT PLAN  
AND THE  
LACEPEDE BAY AQUACULTURE MANAGEMENT  
PLAN**

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# 1 INTRODUCTION

Of South Australia's total seafood production, 56% originates from aquaculture product (EconSearch, 2009). This trend is reflected worldwide with expectations that, by 2020, aquaculture will produce 60% of the global seafood demand (FAO, 2009). South Australia's aquaculture industry body, the SA Aquaculture Council, has published industry targets; estimating that by 2013, aquaculture production in South Australia will generate a farm gate value of \$650 million.

The Minister for Agriculture, Food and Fisheries (the Minister) may make aquaculture policies for any purpose directed towards furthering the following objects of *Aquaculture Act 2001*:

- (a) *to promote ecologically sustainable development of marine and inland aquaculture;*
- (b) *to maximise benefits to the community from the State's aquaculture resources; and*
- (c) *otherwise to ensure the efficient and effective regulation of the aquaculture industry.*

Aquaculture zone policies recognise the aquaculture industry as a legitimate user of the State's marine resources, providing guidance and clarity regarding the aquaculture industry's access to these resources. The policies are created to consolidate aquaculture activities in specific areas and to ensure the ecological sustainability of the existing and future industry.

In accordance with the *Aquaculture Act 2001*, the Minister must prepare a report in relation to a draft policy containing:

- An explanation of the purpose and effect of the draft policy;
- A summary of any background and issues relevant to the draft policy and of the analysis and reasoning applied in formulating the policy; and
- An assessment of the consistency of the draft policy with the Planning Strategy and any relevant Development Plan under the *Development Act 1993*; any relevant environment protection policy under the *Environment Protection Act 1993*; and any other relevant plans or policies. The objectives of these Acts and policies and how aquaculture policies are consistent with, and reflective of them, are described at Appendix D1.

Zone policies are developed to ensure that they are relevant to both community and industry needs. Where possible and appropriate, it is expected that issues raised are dealt with during the planning phase rather than during the individual aquaculture licence application process. Consequently, this Report supporting the Policy has been developed to inform and involve all stakeholders in the decision making process for the zoning of marine resources for aquaculture purposes. It has been referred to prescribed bodies and relevant public authorities as well as regional stakeholders, local indigenous communities, Native Title claimant groups, local government and industry, and was made available to the general public for a period of two months for comment.

The Minister has consulted with and considered the advice of the Aquaculture Advisory Committee (AAC) on all matters raised during the consultation period. As prescribed by the *Aquaculture Act 2001*, following approval of the draft policy by the

Minister, the draft policy will be referred to the Environment, Resources and Development Committee (ERDC) of Parliament. The ERDC may approve the policy; seek amendments to the policy or object to the policy. In the event the ERDC objects to the draft policy, the policy will be presented to both Houses of Parliament where either House may disallow it.

As a result of consultation and gazettal of the Policy it is proposed that amendments will be made to the Land Not within a Council Area (Coastal Waters) Development Plan in accordance with provisions under the Development Regulations 2008.

The draft Streaky Bay, Arno Bay and Lacepede Bay Policy Report (the Report) supports the draft *Aquaculture (Zones – Streaky Bay) Policy 2010*, the draft *Aquaculture (Zones – Arno Bay) Policy 2010* and the draft *Aquaculture (Zones – Lacepede Bay) Policy 2010* (the Policies).

## **2 REPLACEMENT OF THE CURRENT MANAGEMENT POLICIES**

Prior to 2005 a number of aquaculture zone and administrative policies were drafted by the Aquaculture Division of Primary Industries and Resources SA (PIRSA Aquaculture). Following a review of the nature and effect of the statutory policies provided for under the *Aquaculture Act 2001* (the Act), it was considered more appropriate that the Office of Parliamentary Counsel (OPC) undertake the drafting of all aquaculture policies. Subsequently OPC commenced drafting all aquaculture policies from January 2005.

In 2009, PIRSA Aquaculture undertook a review of all policies prepared by the division prior to 2005. Along with the Policies, a range of administrative policies were identified that were also developed in 2003/2004 and have now been superseded by other management controls or are more appropriately considered as internal guidelines. The outcome of the review formed the basis for the *Aquaculture Revocation Policy 2010*, which was gazetted in July 2010, and affected the revocation of nine administrative policies and the *Aquaculture (Cost Recovery Revocation) Policy 2010* which is presently undergoing its two month public consultation. As a result the Streaky Bay Aquaculture Management Policy, the Arno Bay Aquaculture Management Policy and the Lacepede Bay Aquaculture Management Policy remain the only operational policies drafted prior to OPC's commencement in 2005.

OPC have recommended that the Policies should be transitioned into the current format before the commencement of amendments to the Act and *Aquaculture Regulations 2005* (the Regulations) which are expected in the first half of 2011. This will allow for consistency and completeness across aquaculture governance and allow for stakeholders and industry to raise any contemporary issues. To affect this transition PIRSA Aquaculture will revoke and replace these zone policies in the simplest and most expeditious manner possible.

The essence of the replacement of the Policies will be to make, as far as possible and practicable, a literal replacement of the existing policies into the current format and language. PIRSA Aquaculture intends the revocation and replacement of the Policies to occur simultaneously. As a result only one policy report has been prepared which covers all amendments. Additionally, there will be one two-month period of formal consultation (as required by section 12 of the Act).

Because the intent and effect of the replacement is to simply re-format and replace the existing policies, PIRSA Aquaculture considers that the environmental, social and any community issues normally included into a standard policy report will not need to be included in the policy report as these matters would have been addressed in full at the time the original zone policy was developed. These matters will be considered upon review of the relevant policy. The re-drafting of these policies is not contemplated to form a review of the policy and as such a formal review will be carried out in due course. Accordingly, the policy report will only focus on the justification of any changes required due to omissions, errors, lack of clarity or changes in terminology used, which affect the drafting of the replacement zone policy into a more statutory form.

## **2007 MODIFICATION TO POLICIES**

In 2007, PIRSA made a number of modifications to the way aquaculture policies were drafted; in particular the terminology used to describe a class of aquaculture, prescribed criteria and the introduction of 'sectors' and biomass limits. The modified format was developed to better align policies to the objects of the Act and more clearly represent the key resource management objectives being considered.

As part of the replacement and re-drafting of the current Streaky Bay, Arno Bay and Lacepede Bay Management Policies, the 2007 modifications will be built into the Policies to ensure consistency with other aquaculture policies, as well as providing a more robust approach of achieving ecologically sustainable development.

### Aquaculture zones and sectors

The 2007 modifications introduced the separation of aquaculture zones into geographic sectors (ie sub-zones). As a consequence prescribed criteria can be then used to facilitate or prohibit stock/lease movement from one sector to another sector within a zone, as well as control types of aquaculture and biomass limits within a particular sector. This provides the basis for more sophisticated resource management when necessary – such an approach would not be possible under the more homogeneous zone-based controls used prior to this modification. In keeping with this approach, the zones in Arno Bay and Lacepede Bay have, where appropriate, been made into sectors within a zone, rather than individual zones.

### Classes of aquaculture

Prior to 2007 'classes of aquaculture' referred to groups of species for example bivalve molluscs or finfish. Under the modified format, classes of aquaculture refer to permitted types of aquaculture. These types of aquaculture are categorised into 4 groups:

1. prescribed wild caught tuna;
2. aquatic animals (other than prescribed wild caught tuna) in a manner that involves regular feeding (ie finfish and abalone);
3. bivalve molluscs; and
4. algae.

### Prescribed criteria

The criteria that must be taken into account in the determination of applications for licences or in the making of other decisions under the Act are listed as “prescribed criteria.” The criteria essentially represent what is permitted or not permitted within a zone or sector.

The prescribed criteria detail the maximum area that can be allocated to each class of aquaculture as well as detailing for each zone or sector, the requirements aimed at resource management from a biological perspective, including the maximum biomass of a particular class of aquaculture allowed in that zone or sector. More specific constraints on classes of aquaculture, for example the restricting of bivalve farming to oysters (i.e. excluding mussels) are also detailed under this heading.

### Biomass limits

Control of the amount of nutrients released into or extracted from the environment is achieved at the zone policy level by setting upper biomass limits for each zone, i.e. the maximum biomass of organisms farmed under a particular class of aquaculture at any one time. Environmental impacts are also managed by monitoring impacts on an on-going basis, through the environmental monitoring and reporting requirements stipulated in the Regulations.

The Policies set biomass limits for the farming of supplementary fed aquatic animals in terms of a tonnage of finfish biomass equivalents. The net amount of nutrient released by various types of supplementally fed organisms differs, with finfish aquaculture generating the highest amount of discharge compared for example, with abalone. Because there is still insufficient scientific information to accurately predict the amounts of nutrients that would be released by non-fish species, the Policies take a generally cautious approach in setting biomass limits by assuming that amounts of nutrients released by all farmed organisms that are supplementally fed would be similar to that of finfish.

The Policies allow for the Minister to alter the maximum biomass limits of all classes of aquaculture through notice in the South Australian Government Gazette. This provides a mechanism to enable flexibility in setting biomass limits for zones/sectors and enables future research and environmental monitoring results to be taken into consideration as they become available over time.

## **3 CURRENT AQUACULTURE**

### **3.1 Streaky Bay**

The Streaky Bay Aquaculture Management Policy came into operation on 13 January 2005, and has been endorsed by the ERDC in accordance with the provisions of the Act. The Management Policy develops the objectives for the development of aquaculture and its use and management in the coastal waters of Streaky Bay within a framework of ecologically sustainable development. The Management Policy has been developed to manage aquaculture in Streaky Bay, specifically the subtidal shellfish (abalone and scallops) and intertidal shellfish (oysters) developments.

The management policy creates six (6) aquaculture zones: Blanche Port Zone, Streaky Bay Zone, Perlubie (South Bank) Zone, Haslam (North Bank) Zone, Point Gibson Zone and the Streaky Bay Exclusion Zone (Appendix C, Figure 1).

There is no intention to make any changes to the number or placement of zones currently created by the Streaky Bay Management Plan as a consequence of the revocation and replacement of the current policy (Appendix C, Figure 2).

### 3.1.1 Proposed amendments

The following amendments are proposed for the Streaky Bay Policy:

- PIRSA Aquaculture recently became aware of some minor issues surrounding the co-ordinates and description of the exclusion zone within the current management policy. Essentially, the description failed to adequately identify the areas which should have been excluded. As a result the aquaculture zones located in Streaky Bay have not yet been incorporated into the Land Not Within a Council Area (Coastal Waters) Development Plan. Accordingly, the current co-ordinates and descriptions will be amended and clarified to enable the exclusion zone to be clearly identified. The exclusion zone around Perlubie Beach will be slightly increased so that it reflects the true intent of the original policy.
- The current policy provides for the farming of oysters, subtidal shellfish or intertidal shellfish. These terms are no longer used as a way of prescribing the class of aquaculture (as detailed under heading 2 above). Consequently, the class of permitted aquaculture in the replacement policy will be *'the farming of bivalve molluscs (other than mussels) and the farming of abalone.'* The use of this 'class' will make the policy consistent with current drafting principles, but will not derogate from the intent of the current management plan.
- To provide for the farming of abalone in the Streaky Bay aquaculture zone, the policy has been drafted with 'abalone' defined by reference to its genus under the 'Interpretation' heading. This enables the policy to be drafted to allow for abalone but not for 'aquatic animals (other than prescribed wild caught tuna) in a manner that involves regular feeding' which would generally allow the farming of finfish and other species which may not be desirable in this policy area and are currently excluded by the management policy. Abalone is managed by reference to biomass limits; a limit based upon the full number of hectares at five (5) tonnes per hectare has been used. This tonnage rate is consistent with current farming practices and licensing conditions applied by PIRSA Aquaculture on all abalone licences, as well as being supported by carrying capacity calculations using a predictive model developed by the South Australian Research and Development Institute (SARDI) (Tanner et al., 2007) which provided substantially higher carrying capacity levels.
- With respect to the Perlubie (South bank) Zone, the Haslam (North Bank) Zone and the Point Gibson Zone, the Management Policy provides for the following:

*'no further development will be approved until seventy percent (70%) of the current approved area is under production.'*

This requirement has not been included in the replacement policy, however will be followed as a general internal policy within the Aquaculture division.

Notwithstanding this undertaking, it is considered that by including this clause into the policy it will make the policy inflexible and could potentially impede the development of areas by successful farmers simply through the inaction of other lease holders which affects the overall development level within a zone.

ZONE	LEASED AREA		CLASS	BIOMASS			
	Maximum total lease area allowed in the draft Policy	Lease area already allocated  (9 July 2010)		Supplementally fed		Non-supplementally fed	
				(a) Farming of prescribed wild-caught tuna	(b) Farming of aquatic animals in a manner that involves regular feeding	(c) Farming of bivalve molluscs	(d) Farming of algae
<b>Blanche Port aquaculture zone</b>	77.5 ha	50.5 ha	c (no mussels)	Nil	Nil	Limited by licence condition	Nil
<b>Haslam (North Bank) aquaculture zone</b>	50 ha	36.7 ha	c (no mussels)	Nil	Nil	Limited by licence condition	Nil
<b>Perlubie (South Bank) aquaculture zone</b>	40 ha	30 ha	c (no mussels)	Nil	Nil	Limited by licence condition	Nil
<b>Point Gibson aquaculture zone</b>	70 ha	60 ha	c (no mussels)	Nil	Nil	Limited by licence condition	Nil

<b>Streaky Bay aquaculture zone</b>	40 ha	0 ha	c & b (no mussels or finfish)	Nil	200	Limited by licence condition	Nil
<b>Streaky Bay aquaculture exclusion zone</b>	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Table 1 – Summary of zoning framework established under the Aquaculture (Zones – Streaky Bay) Policy 2010.

## 3.2 Arno Bay

The Arno Bay Aquaculture Management Policy came into operation on 19 May 2005, and has been endorsed by the ERDC in accordance with the provisions of the Act. The policy is designed to allow aquaculture to develop in the area to its full potential in an environmentally sustainable manner, consolidating existing finfish farming with the development of two finfish zones that will provide sufficient area to address environmental concerns and accommodate good fish health practices.

The current zone management policy creates two (2) aquaculture zones; the Inner Arno Aquaculture Zone and the Outer Arno Aquaculture Zone (Appendix C, Figure 3). The management policy allows for the farming of finfish and refers to the consolidation of existing finfish farming in the area. At the time this management policy was created, finfish referred to, amongst other species, yellowtail kingfish, mullock and tuna.

The decision to include tuna in the management policy would have been influenced by the holding of wild caught tuna broodstock within the zoned areas for the propagation of tuna and consequential farming of propagated tuna. As such, the replacement policy will differentiate between wild caught tuna for the purposes of propagation, with the farming of propagated tuna falling under the auspices of finfish.

### 3.2.1 Proposed amendments

The following amendments are proposed for the Arno Bay Policy:

- The creation of one (1) zone; the Arno Bay aquaculture zone, which will consist of two (2) sectors: the Arno Bay (Inner) sector and the Arno Bay (outer) sector (Appendix C, Figure 4). This will make the zone more manageable and provide the option for lessees to move their lease site between sectors (which is not permitted between zones in policies created post 2005).
- The current policy limits the ability to apply for ownership of a new lease and licence sites to current holders of licences within the Inner Arno Aquaculture zone or Outer Arno Aquaculture Zone. This is clearly an anti-competitive condition and as such it is proposed to remove this condition in the replacement policy.
- Currently the zone provides for finfish. As detailed under heading 2 above this 'class' will be replaced with '*the farming of aquatic animals (other than prescribed wild caught tuna) in a manner that involves regular feeding*' and '*the farming of prescribed wild caught tuna broodstock.*' The use of these classes will make the policy consistent with current drafting principles and the intent of the management policy.
- The area available for the farming of tuna broodstock will be limited by hectares and biomass. This will be a more accurate reflection of the current policy and also provide scope for the growth of the propagated tuna farming process into the future.

ZONE	LEASED AREA		CLASS	BIOMASS			
	Maximum total lease area allowed in the draft Policy	Lease area already allocated  (9 July 2010)		Supplementally fed		Non-supplementally fed	
				(a) Farming of prescribed wild-caught tuna	(b) Farming of aquatic animals in a manner that involves regular feeding	(c) Farming of bivalve molluscs	(d) Farming of algae
<b>Arno Bay aquaculture zone</b>	280 ha	280ha	a & b	100	4,100		
<b>Arno Bay (inner) sector</b>	200 ha	200 ha	a & b	Nil  (100 tonnes will be available for prescribed wild caught tuna broodstock)	2,900	Nil	Nil
<b>Arno Bay (outer) sector</b>	80 ha	80 ha (under application)	b	Nil	1,200	Nil	Nil

Table 2 – Summary of zoning framework established under the Aquaculture (Zones – Arno Bay) Policy 2010.

### 3.3 Lacepede Bay aquaculture zone

The Lacepede Bay Aquaculture Management Policy came into operation on 8 July 2004, and has been endorsed by the ERDC in accordance with the provisions of the Act. The zones created by this Aquaculture Management Policy were established to address: the growth and expansion of the aquaculture industry in the Lacepede Bay area; the need to ensure that aquaculture development is progressed in an ecologically sustainable manner; and the need to provide certainty to the industry and the community in the approval process of license/lease applications.

The current management policy creates five (5) zones; the Inner Kingston Zone, the Intermediate Kingston Zone, the Outer Kingston Zone, the Historical Cape Jaffa Zone and the Kingston Exclusion Zone. There will be no change to the Kingston Exclusion Zone or the Cape Jaffa Zone (Appendix C, Figure 5)

The management policy purports to create aquaculture zones in Commonwealth Waters. Section 11(2) of the Act precludes areas not in State waters from being part of an aquaculture zone. As such, the zone will need to be reduced by way of removal of the area situated in the Commonwealth Waters. This will create little actual effect on the operation of the zone as PIRSA Aquaculture has not granted any lease sites in the Commonwealth area. The effect will be the decrease in the size of the aquaculture zone overall.

The management policy currently asserts that 'licences will not be issued for shellfish culture.' Shellfish has been read to include all bivalve molluscs and abalone. The replacement policy will not include, as a permitted class of aquaculture, '*bivalve molluscs*'. However, abalone, due to their feeding requirements, are included in the class of permitted aquaculture under the class described as '*the farming of aquatic animals (other than prescribed wild caught tuna) that involves regular feeding*'. As such it is considered prudent to define abalone and to specifically exclude it as an allowable genus within the class permitted.

#### 3.3.1 Proposed amendments

The following amendments are proposed for the Lacepede Bay Policy:

- Due to the reduction of the zone areas, by way of removal of the Commonwealth waters, the Inner Kingston zone, Intermediate Kingston zone and Outer Kingston zone will be reduced and combined into one (1) zone to be named the Kingston aquaculture zone. This new zone will comprise three (3) sectors; the Kingston (inner) sector, the Kingston (outer) sector and the Kingston (holding) sector (Appendix C, Figure 6).
- The Kingston Intermediate Zone currently has 200 hectares of leasable area and a total area of 12,897 hectares, with the Kingston Outer Zone having 400 hectares of leaseable area and a total area of 15,469 hectares. The proposed Kingston (outer) sector will be 14,899 hectares in total, an increase of 2000 hectares above that of the Kingston Intermediate Zone and will have a total of 200 hectares available for aquaculture activities.
- Finfish will be replaced with '*the farming of aquatic animals (other than abalone and prescribed wild caught tuna) in a manner that involves regular*

*feeding.* The use of this 'class' of aquaculture will make the policy consistent with current drafting principles.

- The exclusion of abalone from the class makes the policy consistent with the current policy, as well as considering the environmental and bio-security issues for State waters located in the south-east of South Australia.

ZONE	LEASED AREA		CLASS	BIOMASS			
	Maximum total lease area allowed in the draft Policy	Lease area already allocated  (9 July 2010)		Supplementally fed		Non-supplementally fed	
				(a) Farming of prescribed wild-caught tuna	(b) Farming of aquatic animals in a manner that involves regular feeding	(c) Farming of bivalve molluscs	(d) Farming of algae
<b>Cape Jaffa aquaculture zone</b>	40 ha	40 ha		Nil	600	Nil	Nil
<b>Kingston aquaculture zone</b>							
<b>Kingston (inner) sector</b>	80 ha	0 ha (80 ha under application)	b (no abalone)	Nil	400	Nil	Nil
<b>Kingston (outer) sector</b>	200 Ha	0 ha	b (no abalone)	Nil	1,000	Nil	Nil
<b>Kingston (holding) sector</b>	5 ha	0 ha	b (no abalone)	Nil	N/A	Nil	Nil
<b>Kingston aquaculture exclusion zone</b>	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Table 3 – Summary of zoning framework established under the Aquaculture (Zones – Lacedpede Bay) Policy 2010.

## 4 SUBSEQUENT DEVELOPMENT PLAN AMENDMENTS

The Policies are consistent with the provisions contained in the Land Not Within A Council Area (Coastal Waters) Development Plan (LNWCA(CW) Development Plan) as it seeks to ensure the ecologically sustainable development of the aquaculture industry, whilst recognising and respecting other users of the marine resource.

The area comprised in the Policies falls within the land and waters covered by the LNWCA(CW) Development Plan<sup>1</sup>. The LNWCA(CW) Development Plan contains Objectives and Principles of Development Control<sup>2</sup> which serve to guide and shape aquaculture development. To provide more certainty in regard to appropriate locations for proposed aquaculture development, specific aquaculture zones are proposed to be identified within the LNWCA(CW) Development Plan.

Section 29 (1)(b) of the *Development Act 1993* allows the Minister for Urban Development and Planning to amend a Development Plan to include a plan, policy, standard, document or code, which is prepared under another Act and falls within a class prescribed by regulation 14 of the *Development Regulations 2008*. A policy under the *Aquaculture Act 2001* is prescribed under this regulation.

Subject to the approval of the Minister for Urban Development and Planning, zone map amendments will be made to the LNWCA(CW) Development Plan to delineate the extent of the new aquaculture zones as outlined in the *Aquaculture (Zones – Streaky Bay) Policy 2010* (Appendix C, Figure 1), the *Aquaculture (Zones – Arno Bay) Policy 2010* Appendix C, Figure 3) and the *Aquaculture (Zones – Lacepede Bay) Policy 2010* Appendix C, Figure 5). Amendments to the *Development Act 1993* mean that aquaculture is not “development” under that Act if it is located within an aquaculture zone and within the LNWCA (Coastal Waters) Development Plan. Thus, the outcomes of this report will lead to the designation of areas within which aquaculture will not be subject to development assessment under the *Development Act 1993*. Aquaculture proposed outside of these zones will be subject to full development assessment under the Development Act.

## 5 CONSULTATION UNDERTAKEN IN RELATION TO REGIONAL ISSUES

Following preparation of the draft policy and report, section 12(4)(a) of the *Aquaculture Act 2001* requires the Minister to refer both documents to prescribed bodies and to any public authority whose area of responsibility is, in the opinion of the Minister, likely to be affected by the policy.

The following bodies (or their respective replacement body) are prescribed for this purpose in Regulation 4 of the Regulations:-

- Aboriginal Legal Rights Movement Incorporated;
- Conservation Council SA;

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<sup>1</sup> The LNWCA(CW) Development Plan applies to land bounded by the State borders in Western Australia and Victoria, the high water mark along the whole of the South Australian coast and the line three nautical miles seaward of the low water mark, and includes both the Spencer Gulf and the Gulf of St Vincent, the offshore islands and the three nautical miles seaward of the low water mark around the off-shore islands. It does not include any land in that area which is covered by a council area Development Plan or the Land Not Within A Council Area (Metropolitan) Development Plan.

<sup>2</sup> Objective 35 and Principles of Development Control 13, 17-19, 25, 26, 38 and 41.

- Local Government Association of South Australia;
- Wildcatch SA;
- South Australian Aquaculture Council;
- South Australian Recreational Fishing Advisory Council;
- Any registered representatives of native title holders or claimants to native title in land comprising or forming part of a zone or area to which the policy applies;
- Any person holding an aquaculture licence or aquaculture lease over an area comprising or forming part of a zone or area to which the policy applies; and
- Any regional NRM Board (within the meaning of the Natural Resources Management Act 2004) responsible for a region comprising or forming part of a zone or area to which the policy applies.

The Policy and the Report describing the zoning proposal is distributed to key stakeholders as the basis for consultation. In addition these documents are available on the PIRSA Aquaculture website for a period of two months. Public notices were also placed in *The Advertiser*, the *Port Lincoln Times*, the *Coastal Leader* and the *Koori Mail* seeking comment from members of the public. Furthermore all existing lease and licence holders in the zone area will be advised during the two month consultation period of the policy proposal by letter.

The basis for the aquaculture zone and associated planning policies has included information obtained through consultation with key community, industry and government stakeholders which was undertaken at the time the zone policies were initially established. The Act requires that the draft policy be presented to the public for comment and that the submissions are taken into account in preparing the final policy. In developing the management policies and management zones a number of issues have been taken into account including (but not limited to) the following:

- Principles of Ecologically Sustainable Development;
- Ensuring an equitable and rational allocation of coastal resources to different uses;
- Heritage issues and proximity to proclaimed shipwrecks and sites of indigenous heritage and/or archaeological significance;
- Proximity to marine reserves, National Parks, sensitive habitats;
- other protected areas;
- Proximity to navigational channels, safe anchorages, marinas, public jetties and other public facilities;
- Impacts of the industry on non-industry activities (eg. commercial/recreational fishing, boating, tourism, public beaches, etc) and vice versa including sewerage outlets, drainage patterns, land use patterns, and on-shore facilities;
- Impacts on the management of the coastal zone; and
- An analysis of current management practices of the industry.

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## 6 APPENDIX A – GLOSSARY OF TERMS

<b>Adaptive Management</b>	Management involving active response to new information of the deliberate manipulation of fishing intensity or other aspects in order to learn something of their effects. Within a stock, several sub-stocks can be regarded as experimental units in which alternative strategies are applied.
<b>Assimilative capacity</b>	The capacity of a natural body of water to receive wastewaters without deleterious effects to aquatic life.
<b>Benthic</b>	Of or relating to or happening on the bottom under the ocean/lake.
<b>Biodiversity</b>	The variability among living organisms from all sources (including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part) and includes: (a) diversity within species; and (b) diversity of ecosystems.
<b>Biomass</b>	The total live weight of a group (or stock) of living organisms (e.g. fish, plankton) or of some defined fraction of it (e.g. spawners), in an area, at a particular time. Any quantitative estimate of the total mass of organisms comprising all or part of a population or any other specified unit, or within a given area at a given time; measured as volume, mass (live, dead, dry or ash-free weight) or energy (joules, calories).
<b>Bivalve mollusc</b>	Any mollusc belonging to the taxonomic class Bivalvia, being characterised by a shell consisting of two hinged sections. Includes clams, cockles, mussels, oysters, pipis and scallops.
<b>Broodstock</b>	Aquatic organisms from which subsequent generations are intended to be produced for the purpose of aquaculture.
<b>Carrying capacity</b>	The maximum population of a given organism that a particular environment can sustain.
<b>Ecologically sustainable development (ESD)</b>	ESD is described in the <i>Aquaculture Act 2001</i> as: <i>'Development is <b>ecologically sustainable</b> if it is managed to ensure that communities provide for their economic, social and physical well-being while—</i> <ul style="list-style-type: none"> <li>(a) <i>natural and physical resources are maintained to meet the reasonably foreseeable needs of future generations; and</i></li> <li>(b) <i>biological diversity and ecological processes and systems are protected; and</i></li> <li>(c) <i>adverse effects on the environment are avoided, remedied or mitigated.</i></li> </ul> <i>In making decisions as to whether development is ecologically sustainable or to ensure that development is ecologically sustainable—</i> <ul style="list-style-type: none"> <li>(a) <i>long-term and short-term economic, environmental, social and equity considerations should be effectively integrated; and</i></li> <li>(b) <i>if there are threats of serious or irreversible environmental harm, lack of full scientific certainty should not be taken to justify the postponement of decisions or measures to prevent the environmental harm'.</i></li> </ul>
<b>Ecosystem</b>	A dynamic complex of plant, animal, fungal, and microorganism communities and the associated non-living environment interacting as an ecological unit.
<b>Habitat</b>	The place or type of site in which an organism naturally occurs.
<b>Infauna</b>	Aquatic organisms (animals only) that live within particulate media such as sediments or soil.
<b>Marine protected area</b>	An area of land and/or sea especially dedicated to the protection and

<b><i>(MPA)</i></b>	maintenance of biological diversity and of natural resources, and managed through legal or other effective means.
<b><i>Population</i></b>	A group of individuals of the same species, forming a breeding unit and sharing a habitat.
<b><i>Spatial</i></b>	Of or relating to space.
<b><i>Stakeholder</i></b>	An individual or a group with an interest in the conservation, management and use of a resource.
<b><i>Stock</i></b>	A group of individuals of a species occupying a well defined spatial range independent of other groups of the same species, which can be regarded as an entity for management or assessment purposes.
<b><i>Supplementary fed</i></b>	Supplementary feeding is the giving of feed to aquatic organisms to supplement any naturally available food.

## 7 APPENDIX B – LIST OF ACRONYMS

AAC	Aquaculture Advisory Council
CRC	Cooperative Research Centre
DAAR	Department for Aboriginal Affairs and Reconciliation
DAC	Development Assessment Commission
DENR	South Australian Department of Environment and Natural Resources
DTEI	Department for Transport, Energy and Infrastructure
EMP	Environmental Monitoring Program
EPA	Environment Protection Authority
EPBC Act	The Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERDC	Environment, Resources and Development Committee
ESD	Ecological Sustainable Development
FTE	Full Time Equivalent
ILUA	Indigenous Land Use Agreement
LGA	Local Government Association
MHWS	Mean High Water Springs
MPA	Marine Protected Area
NPW Act	<i>National Parks and Wildlife Act 1972</i>
NRM	Natural Resource Management
PIRSA	Department of Primary Industries and Resources South Australia
SARDI	South Australian Research and Development Institute
SATC	South Australian Tourism Commission
SIDSC	Seafood Industry Development Steering Committee
The Minister	Minister for Agriculture, Food and Fisheries

## 8 APPENDIX C – MAPS AND COORDINATES

A written description of the aquaculture zones and the aquaculture exclusion zones are provided in the draft Policies.

Figure 1 Map of the existing Streaky Bay Management Policy aquaculture zones

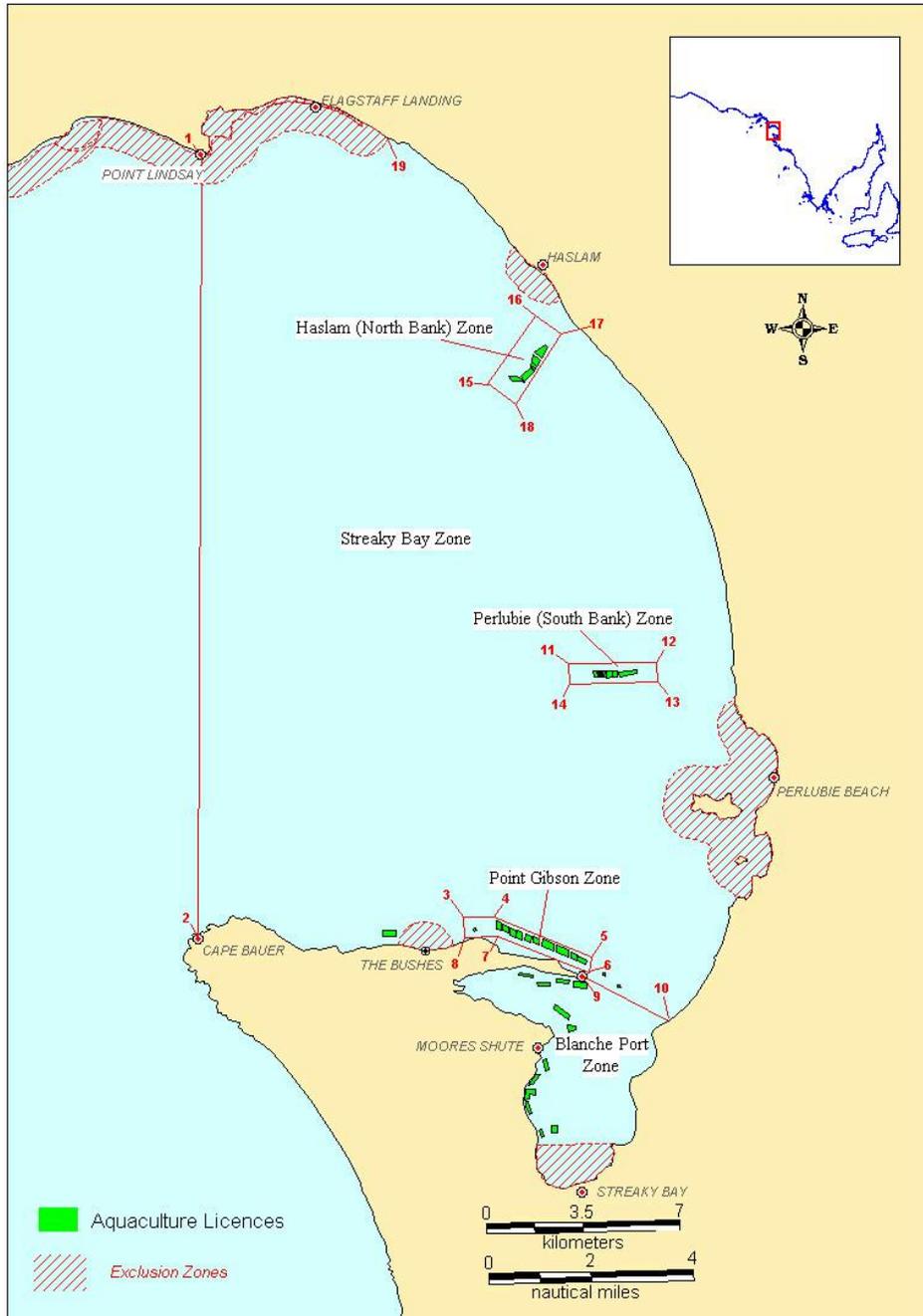


Figure 2 Map of the proposed zones within the Aquaculture (Zones - Streaky Bay) Policy including the Streaky Bay aquaculture exclusion zone.

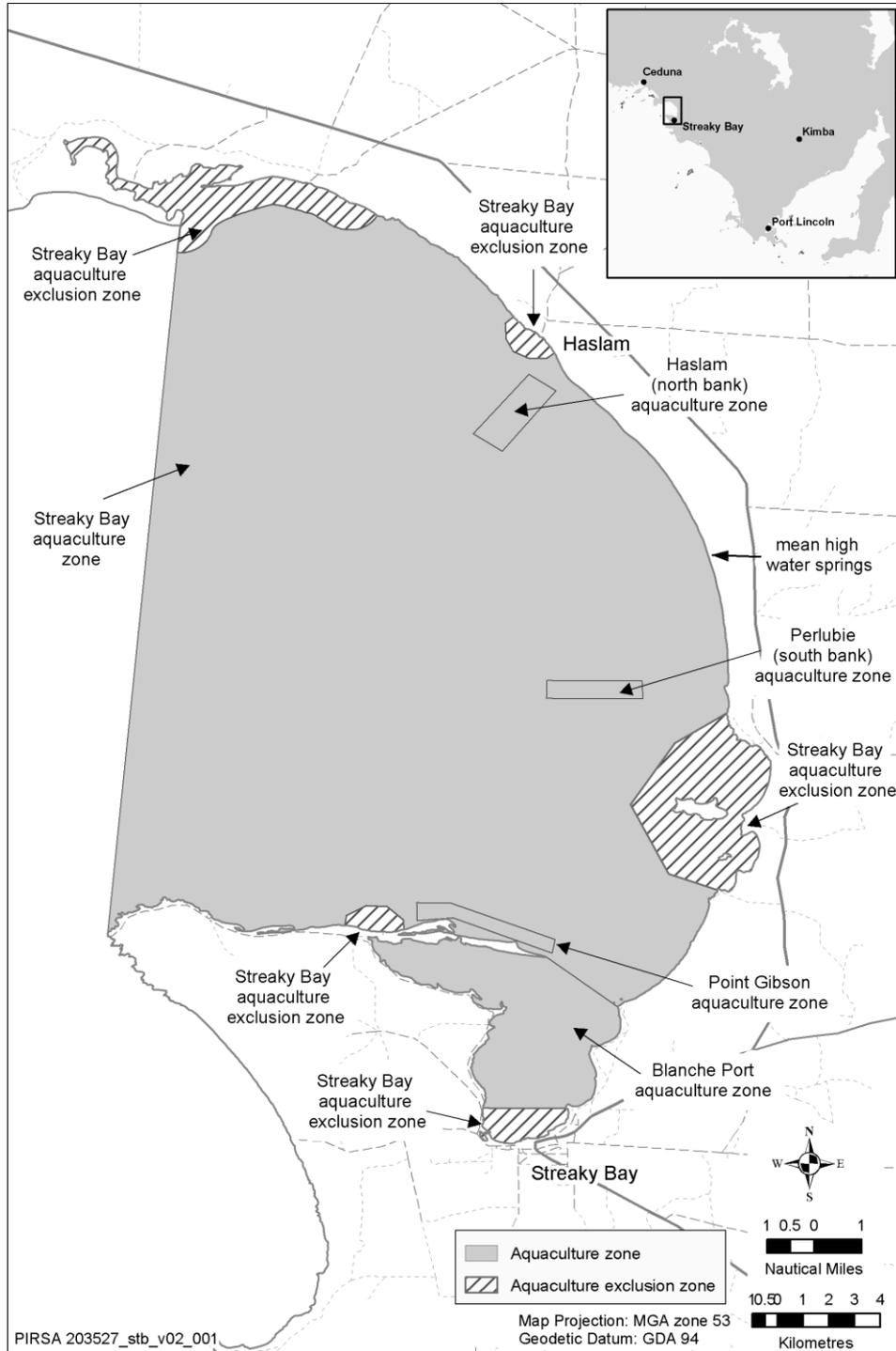


Figure 3 Map of the existing Arno Bay Management Policy aquaculture zones

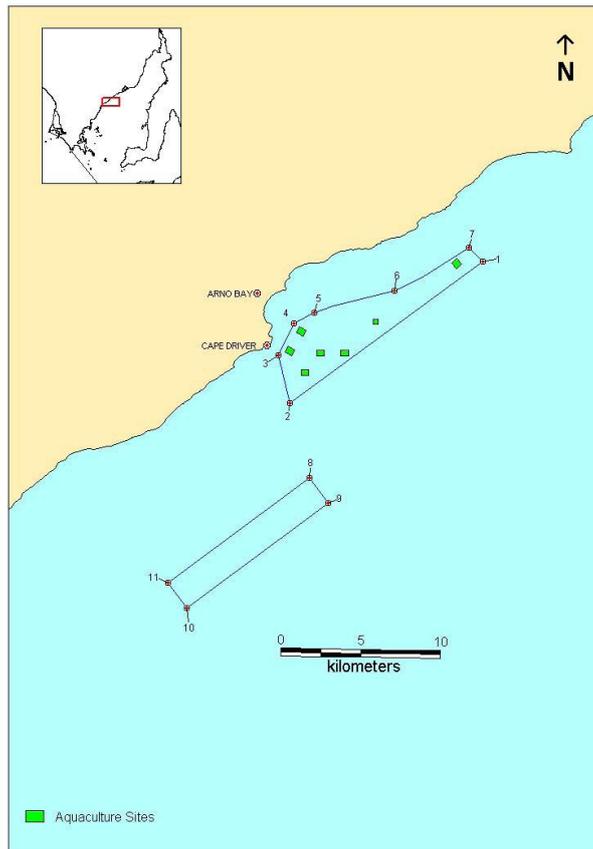


Figure 4 Map of the proposed zones within the Aquaculture (Zones - Arno Bay) Policy.

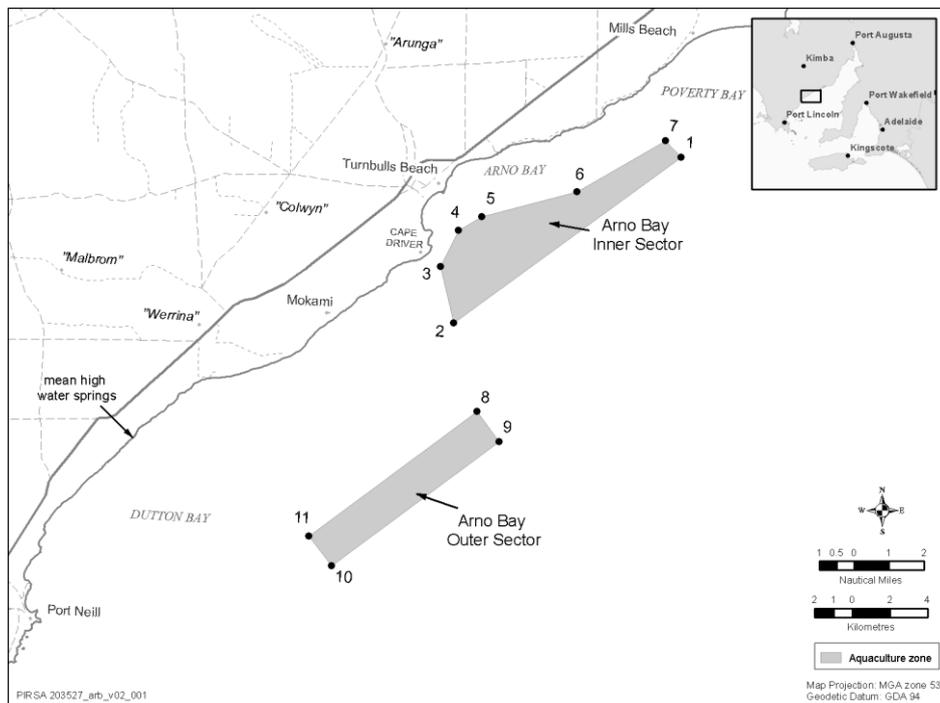


Figure 5 Map of the existing Lacepede Bay Management Policy aquaculture zones

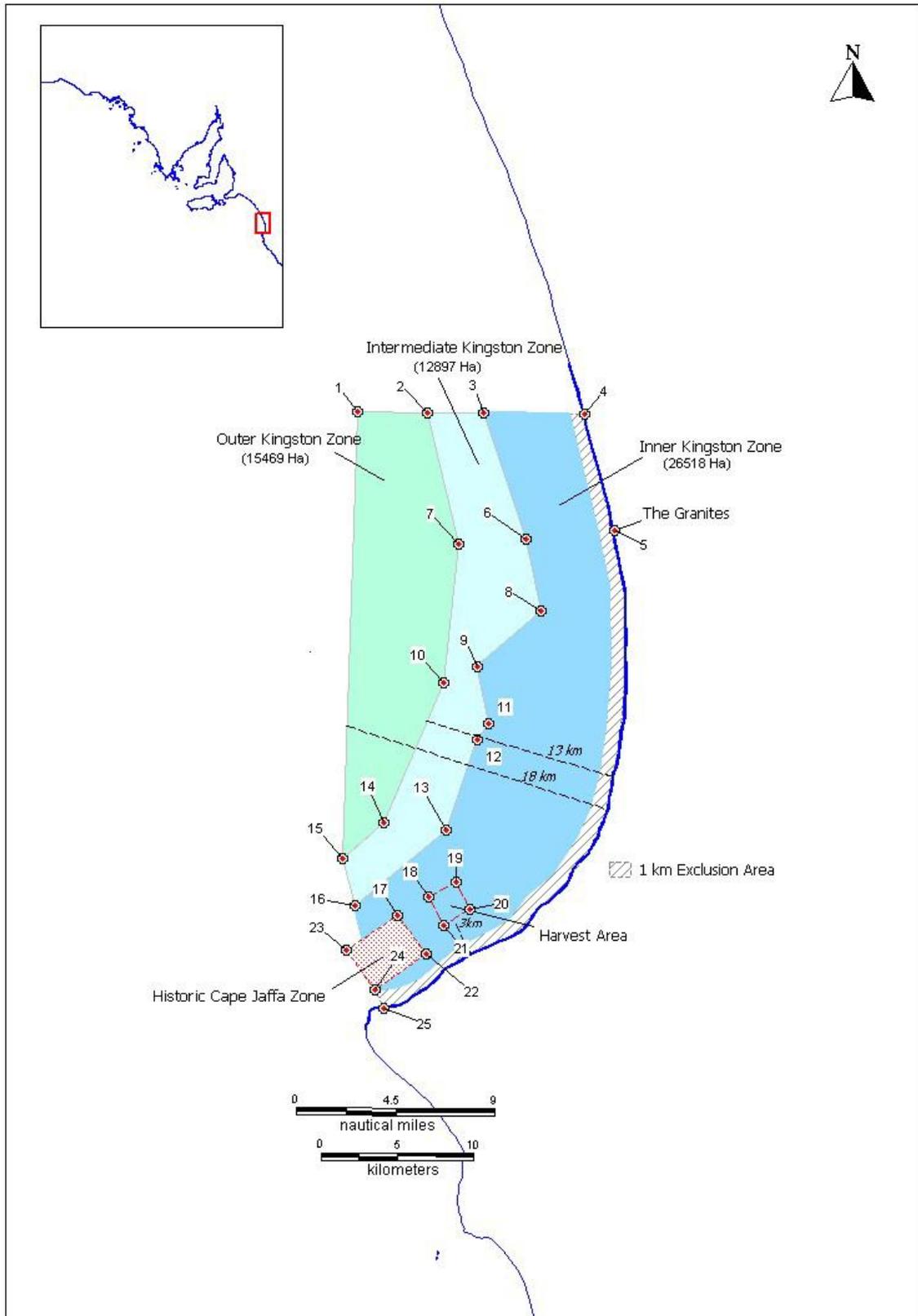
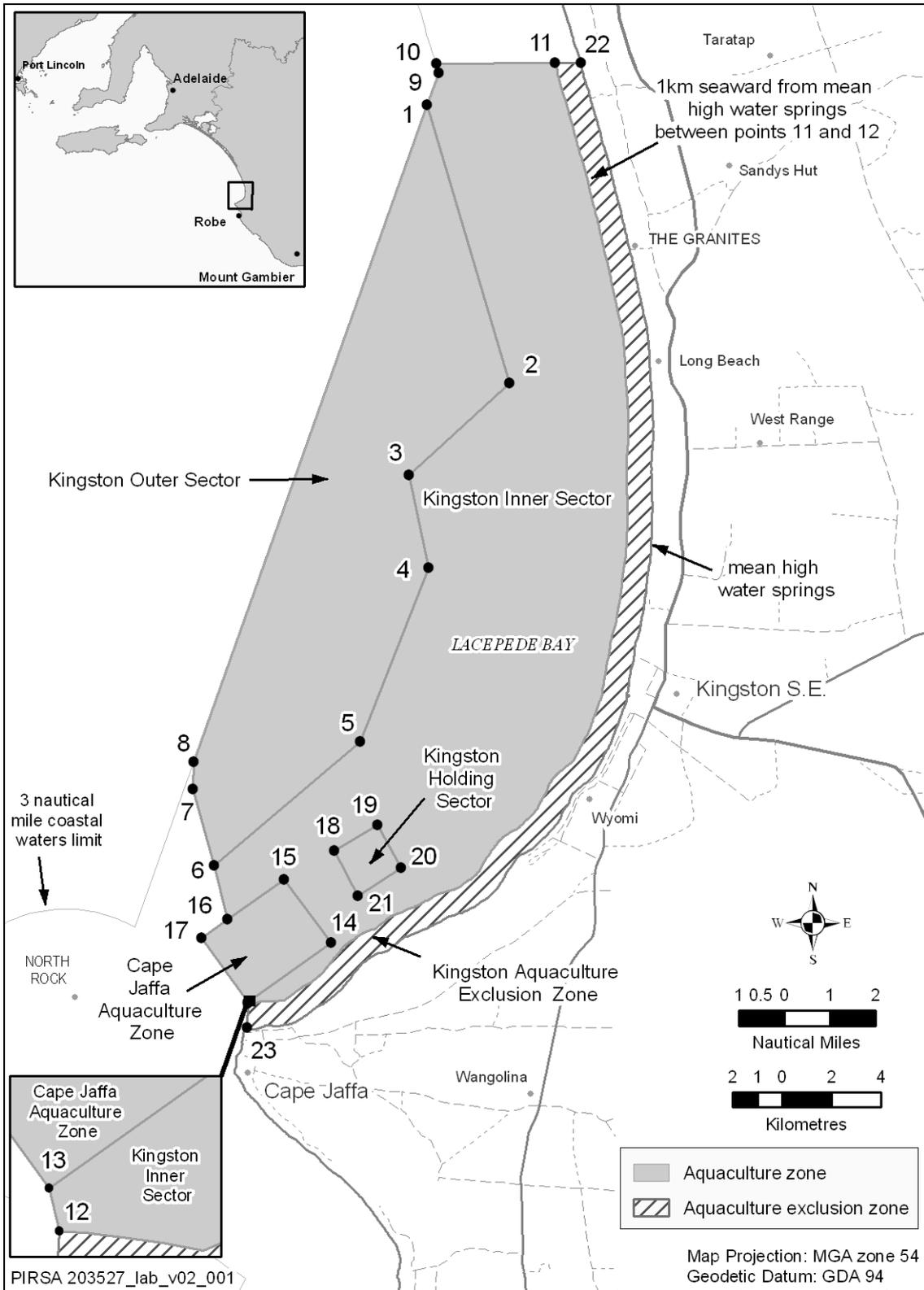


Figure 6 Map of the proposed zones within the Aquaculture (Zones - Lacepede Bay) Policy including the Kingston aquaculture exclusion zone.



## 9 APPENDIX D1 – BACKGROUND INFORMATION

Legislation / Policy	Objectives	Consistency
South Australia's Strategic Plan	<p>South Australia's Strategic Plan is a commitment to making the state the best it can be – prosperous, environmentally rich, culturally stimulating, offering its citizens every opportunity to live well and succeed. The Plan is built on the following objectives:</p> <ul style="list-style-type: none"> <li>• Growing Prosperity</li> <li>• Improving Wellbeing</li> <li>• Attaining Suitability</li> <li>• Fostering Creativity &amp; Innovation</li> <li>• Building Commitments</li> <li>• Expanding Opportunities</li> </ul> <p>The Plan contains 98 targets across the six objectives to measure progress towards achieving these goals.</p>	<p>Aquaculture policies under the <i>Aquaculture Act 2001</i> provide the necessary policy framework to facilitate aquaculture development in South Australia. The new and developing aquaculture industry is greatly assisting economic development and will help meet these Strategic Plan targets:</p> <ul style="list-style-type: none"> <li>• Target 1.1 – Economic Growth</li> <li>• Target 1.5 – Business Investment</li> <li>• Target 1.10 – Jobs</li> <li>• Target 1.14 – Total Exports</li> </ul>
<p>Planning Strategy for Regional South Australia (January 2003 – amended Dec 2007)</p> <p>(DPLG document)</p>	<p>The Planning Strategy for Regional South Australia (January 2003, as amended December 2007) contains a number of strategies to support future growth in regional South Australia.</p> <ul style="list-style-type: none"> <li>• Building and/or supporting sustainable communities;</li> <li>• Being more efficient and sustainable;</li> <li>• Diversifying primary production into new areas to replace or complement existing activities;</li> <li>• Adding value by greater processing of produce within South Australia instead of exporting produce in its raw state;</li> <li>• Facilitating sustainable tourism development to achieve economic, social and environmental benefits for the state; and</li> <li>• Integrated and sustainable management of natural resources in a manner that maintains ecological processes.</li> </ul>	<p>The Policies are consistent with the strategies relating to the diversifying primary production into new areas to replace or complement existing activities and the integrated and sustainable management of natural resources in a manner that maintains ecological processes.</p>
<i>Development Act 1993</i>	<p>The <i>Development Act 1993</i> and <i>Development Regulations 2008</i> detail the processes for making and assessing development applications.</p>	<p>The Policies are consistent with these provisions in that it seeks to ensure the ecologically</p>

<p><i>Development Regulations 2008</i></p> <p>Land Not Within A Council Area (Coastal Waters) Development Plan</p>	<p>'Development' is defined in the Development Act to include:</p> <ul style="list-style-type: none"> <li>• A change in the use of land or buildings</li> <li>• The creation of new allotments through land division (including Strata and Community Title division)</li> <li>• Building work (including construction, demolition, alteration and associated excavation/fill)</li> <li>• Cutting, damaging or felling of significant trees</li> <li>• Specific work in relation to State and Local Heritage Places</li> <li>• Prescribed mining operations</li> <li>• Other acts or activities in relation to land as declared by the Development Regulations.</li> </ul> <p>The Development Act requires there be a Development Plan for each part of the state. Development Plans guide development and inform assessment of development applications.</p> <p>Development Plans contain the zones, maps and written rules ('policies') which guide applicants as to what can and cannot be done in the future on any piece of land in the area covered by the Development Plan. These zones, maps and policies provide the detailed criteria against which development applications will be assessed.</p> <p>The policies and zoning in Development Plans need to be changed and updated over time. The <i>Development Act 1993</i> provides the legislative framework for undertaking amendments to a Development Plan. Amendments can be instigated by either the relevant Council or the Minister for Urban Development and Planning. The document used to propose changes to a Development Plan is called a Development Plan Amendment (DPA).</p> <p>The <i>Development Regulations 2008</i> recognise aquaculture zones identified in an aquaculture policy prepared under the <i>Aquaculture Act 2001</i>, classing them as a Category 1 development. The Act and Regulations also enable the Minister for Urban Development and Planning to amend a development plan in accordance with an approved aquaculture policy under the <i>Aquaculture Act 2001</i>.</p> <p>Recent amendments to the <i>Development Act 1993</i> mean that aquaculture is not "development" under that Act if it is located within an aquaculture zone and within the LNWCA(Coastal Waters) Development Plan. Aquaculture within the</p>	<p>sustainable development of the marine-based aquaculture industry and recognises and respects other users of the marine resource.</p>
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	<p>designated aquaculture zone will not be subject to development assessment. However, aquaculture proposed outside of this zone will remain subject to full development assessment.</p> <p>More information on the Land Not Within a Council Area (Coastal Waters) Development Plan can be sourced by contacting the Department of Planning and Local Government on 08 8303 0600.</p>	
<i>Aboriginal Heritage Act 1988</i>	<p>The <i>Aboriginal Heritage Act 1998</i> provides for the protection and preservation of Aboriginal sites, objects and remains, whether registered or not, without an authorisation from the Minister for Aboriginal Affairs and Reconciliation pursuant to section 23. Section 20 of this Act requires that any Aboriginal sites, objects or remains discovered on land, be reported to the Minister for Aboriginal Affairs and Reconciliation.</p>	<p>The Aboriginal Affairs and Reconciliation Division of the Department of Premier and Cabinet are consulted during the development of aquaculture policies to identify any registered sites, objects or remains in the area. In addition, the native title claimants for the area are also consulted for information on any sites that may exist but have not been formally registered.</p> <p>All aquaculture operators are reminded of their responsibilities in regards to reporting any Aboriginal site, objects or remains that they discover.</p>
<i>Native Title Act 1993 (Cth)</i>	<p>The <i>Native Title Act 1993 (Cth)</i> provides for the recognition by Australian law that some Indigenous people have rights and interests that come from their traditional laws and customs (National Native Title Tribunal (NNTT) 2009).</p> <p>In particular, the <i>Native Title Act 1993</i> may validate past acts; provide for future acts; extinguish native title either in full or part; provide a process to determine native title; provides three approaches to negotiating native title, including Indigenous Land Use Agreements (ILUA); and, provides for a range of other matters including the establishment of a land trust and the National Native Title Tribunal.</p> <p>Resolution of native title claims by either consent determination or by recognition of an ILUA is a key focus in South Australia and is a key target in South Australia's Strategic Plan. Specifically, target 3.15 of the Strategic Plan aims to resolve 75% of native title claims in South Australia by 2014.</p>	<p>The Native Title Unit of the Attorney General's Department are consulted during the development of aquaculture policies to establish if there are any registered ILUA's in the area or if there are any in negotiation that need to be considered. Additionally, advice is sought from the Native Title Unit to determine who are the appropriate Native Title Groups to consult during the development of the policy.</p> <p>As part of the individual lease application process (within and outside of aquaculture zones) details of the application are referred to the Aboriginal Legal Rights Movement and the appropriate Claimant groups pursuant to section 24HA of the <i>Native Title Act 1993 (Cth)</i>.</p>

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Australia's Ocean Policy (Cth)	<p>Australia's Oceans Policy sets in place a framework for integrated and ecosystem-based planning and management for Australia's marine jurisdictions. It promotes ecologically sustainable development of the ocean resources and encourages internationally competitive marine industries, whilst ensuring the protection of marine biological diversity. The key tool is Regional Marine Planning i.e., planning based on large areas that are ecologically similar, and seeks to integrate the use, management and conservation of marine resources at the ecosystem level.</p> <p>Marine Plans establish an overarching strategic planning framework to guide State and local government planners and natural resource managers in the development and use of the marine environment. Fundamental to these Marine Plans is an ecologically based zoning model. Each of these zones is supported by goals and objectives.</p>	<p>These policies are consistent with the Australia's Ocean Policy as it seeks to avoid aquaculture development over unique and sensitive ecosystems, and provides for orderly, sustainable and internationally competitive marine industries.</p>
<i>Marine Parks Act 2007</i>	<p>The <i>Marine Parks Act 2007</i> provides the legislative framework for the dedication, zoning and management of South Australia's marine parks.</p> <p>South Australia's marine parks will be zoned for multiple-use to protect coastal, estuarine and marine ecosystems, while also providing for continued ecologically sustainable use of suitable areas. This means that most activities, including aquaculture operations, will still be allowed within a marine park. However, some activities will not be permitted in particular zones. Areas with high conservation values will be designated as either Restricted Access Zones or Sanctuary Zones to provide the necessary level of protection for habitats, species, ecological and geological features. Both of these zones preclude commercial fishing, recreational fishing and aquaculture operations.</p>	<p>The <i>Marine Parks Act 2007</i> recognises that Aquaculture is an important and growing industry in this State that provides significant benefits to South Australia. The needs of the industry have been considered with commitments to accommodate, as far as possible, existing aquaculture operations. This has resulted in an agreement between the Minister for Environment and Conservation and the Minister for Agriculture, Food and Fisheries on the relationship and likely interactions between proposed marine parks and aquaculture developments in South Australian waters. This will enable the Department of Environment and Natural Resources (DENR) and the Department for Primary Industries and Resources SA (PIRSA) to work together to address key priorities from South Australia's Strategic Plan, specifically to treble exports by 2014 (T1.14) and to create 19 marine parks by 2010 (T3.4), such that each is given optimal effect without detriment to the other.</p> <p>The agreement identifies the general areas of the</p>

		<p>State's waters where:</p> <ul style="list-style-type: none"> <li>• there will be little or no interaction between future marine parks and aquaculture development;</li> <li>• there may be some interaction but where mutually acceptable outcomes can be reached through pragmatic planning processes; and</li> <li>• further discussion will be required to resolve potential conflicts.</li> </ul> <p>The Policies have been prepared having regard to Marine Park objects and boundaries and in accordance with the agreement between DENR and PIRSA.</p>
<p><i>Natural Resources Management Act 2004</i></p> <p>Eyre Peninsula Catchment Water Management Plan</p>	<p>The intent of the <i>Natural Resources Management Act 2004</i> is to establish an integrated system of natural resource management that will assist in achieving sustainable natural resource management in South Australia. Regional Natural Resources Management Plans are underpinned by ecologically sustainable development principles and are required to recognise best practice by an industry sector.</p>	<p>The <i>Aquaculture Act 2001</i> and its supporting policies are also underpinned by ecologically sustainable development principles.</p>
<p><i>Environment Protection Act 1993</i></p> <p><i>Environment</i></p>	<p>The Objects of the <i>Environment Protection Act 1993</i> (EP Act) include the promotion of the principles of ecologically sustainable development, and in particular, to prevent, reduce, minimise and, where practicable, eliminate harm to the environment. The EP Act provides that communities must be able to provide for their economic, social and physical well being.</p> <p>The principle object of the <i>Environment Protection (Water Quality) Policy 2003</i><sup>3</sup> (Water Quality Policy) established under the EP Act is to achieve the sustainable</p>	<p>The Policies are consistent with the provisions of the EP Act 1993 and the Water Quality Policy as it seeks to minimise or prevent harm to the environment associated with aquaculture.</p>

<sup>3</sup> Note: the Water Quality Policy is currently under review and it is anticipated the amendments will be implemented by the end of 2009.

<p><i>Protection (Water Quality) Policy 2003</i></p>	<p>management of waters by protecting or enhancing water quality while allowing economic and social development. In particular, the Policy requires all reasonable and practicable measures to be taken to avoid the discharge or deposit of waste into any waters or onto a place from which it is reasonably likely that waste will enter any waters. The Policy prescribes water quality criteria that must not be contravened and prohibits the discharge or deposition of pollutants into any waters that results in:</p> <ul style="list-style-type: none"> <li>• Loss of sea grass or other native aquatic vegetation; or</li> <li>• Reduction in numbers of any native species of aquatic animal or insect; or</li> <li>• Increase in numbers of any non-native species of aquatic animals or insect; or</li> <li>• Reduction in numbers of aquatic organisms necessary to a healthy aquatic ecosystem; or</li> <li>• Increase in algal or aquatic plant growth; or</li> <li>• Water becoming toxic to vegetation on land; or</li> <li>• Water becoming harmful or offensive to humans, livestock or native animals; or</li> <li>• Increased turbidity or sediment levels.</li> </ul>	
<p><i>Harbors and Navigation Act 1993</i></p>	<p>The <i>Harbors and Navigation Act 1993</i> sets out the following objectives:</p> <ul style="list-style-type: none"> <li>• To provide for the efficient and effective administration and management of South Australian harbors and harbor facilities for the purpose of maximising their use and promoting trade;</li> <li>• To ensure that efficient and reliable cargo transfer facilities are established and maintained;</li> <li>• To promote the safe, orderly and efficient movement of shipping within harbors;</li> <li>• To promote the economic use and the proper commercial exploitation of harbors and harbor facilities;</li> <li>• To provide for the safe navigation of vessels in South Australian waters;</li> <li>• To provide for the safe use of South Australian waters for recreational and other aquatic activities; and</li> </ul>	<p>Under the <i>Aquaculture Act 2001</i>, aquaculture policies can be prescribed in State waters. These policies define areas of state waters that are considered appropriate for aquaculture, and have regard to other resource users; including operators of recreational and commercial vessels.</p> <p>Section 20 of the <i>Aquaculture Act 2001</i> provides that the grant of aquaculture leases is subject to the concurrence of the Minister responsible for administration of the <i>Harbors and Navigation Act 1993</i>.</p>

	<ul style="list-style-type: none"> <li>• Insofar as this Act applies to the Adelaide Dolphin Sanctuary, to further the objects and objectives of the <i>Adelaide Dolphin Sanctuary Act 2005</i>.</li> </ul>	
<i>Coast Protection Act 1972</i>	<p>The <i>Coast Protection Act 1972</i> establishes the Coast Protection Board. The functions of the Board are:</p> <ul style="list-style-type: none"> <li>• To protect the coast from erosion, damage, deterioration, pollution and misuse;</li> <li>• To restore any part of the coast that has been subjected to erosion, damage, deterioration, pollution or misuse;</li> <li>• To develop any part of the coast for the purpose of aesthetic improvement, or for the purpose of rendering that part of the coast more appropriate for the use or enjoyment of those who may resort thereto;</li> <li>• To manage, maintain and, where appropriate, develop and improve coast facilities that are vested in, or are under the care, control and management of the Board;</li> <li>• To report to the Minister upon any matters that the Minister may refer to the Board for advice;</li> <li>• To carry out research, to cause research to be carried out, or to contribute towards research, into matters relating to the protection, restoration or development of the coast; and</li> <li>• To perform such other functions assigned to the Board by or under this or any other Act.</li> </ul>	<p>The Policies are consistent with the provisions of the <i>Coast Protection Act 1972</i> as it seeks to protect the coast by minimising any risk of erosion, damage, deterioration, pollution and misuse of the resource, through appropriate siting of aquaculture zones and aquaculture exclusion zones, the specification of appropriate types and levels of aquaculture development.</p>
<i>Native Vegetation Act 1991</i>	<p>The objects of the <i>Native Vegetation Act 1991</i> are:</p> <ul style="list-style-type: none"> <li>• The conservation, protection and enhancement of the native vegetation of the State and, in particular, remnant native vegetation, in order to prevent further— <ul style="list-style-type: none"> <li>○ Reduction of biological diversity and degradation of the land and its soil; and</li> <li>○ Loss of quantity and quality of native vegetation in the State; and</li> <li>○ Loss of critical habitat; and</li> </ul> </li> <li>• The provision of incentives and assistance to landowners to encourage the</li> </ul>	<p>The Policies are consistent with these objectives as it seeks to minimise impacts on native vegetation through appropriate siting of aquaculture zones and the establishment of aquaculture exclusion zones around sensitive habitats.</p>

	<p>commonly held desire of landowners to preserve, enhance and properly manage the native vegetation on their land; and</p> <ul style="list-style-type: none"> <li>• The limitation of the clearance of native vegetation to clearance in particular circumstances including circumstances in which the clearance will facilitate the management of other native vegetation or will facilitate the sustainable use of land for primary production; and</li> <li>• The encouragement of research into the preservation, enhancement and management of native vegetation; and</li> <li>• The encouragement of the re-establishment of native vegetation in those parts of the State where native vegetation has been cleared or degraded.</li> </ul>	
<p><i>Historic Shipwrecks Act 1976 (Cth)</i></p> <p><i>Historic Shipwrecks Act 1981 (SA)</i></p>	<p>Any shipwreck or relic that is older than 75 years is protected under the <i>Historic Shipwrecks Act 1976 (Cth)</i>, which covers water off the South Australian coast from the low water mark or the agreed baselines but does not include State internal waters – ie the River Murray, Gulf St. Vincent, Spencer Gulf, Encounter Bay, Lacedpede Bay, Rivoli Bay and Anxious Bay – which are covered under the <i>Historic Shipwrecks Act 1981 (SA)</i>.</p> <p>If there are declared historic shipwrecks in the vicinity of aquaculture development, the developer is advised that a 550 metre radius buffer zone applies around the historic shipwreck, and that no aquaculture development should take place within this area.</p> <p>It should also be noted that while a shipwreck may not currently be protected, the 75 year rolling protections date means that it will be at some future time.</p>	<p>The Policies are consistent with the requirements and provides for a greater distance from historic shipwrecks of 550 metres which is requirement of the Land Not Within A Council Area (Coastal Waters) Development Plan under the <i>Development Act 1993</i>.</p>

## **D2 –AQUACULTURE ZONING FRAMEWORK**

The Policy defines the broad framework for aquaculture management within the defined zones, including the prescribed criteria that apply to each zone/sector. More detailed considerations such as the size of each lease, the farming structures permitted on each licence and the stocking densities for different species is assessed and managed at the individual lease and licence level. Such management tools do not form part of the zoning policy.

Approval of leases and licenses in aquaculture zones will be subject to the provisions of the *Aquaculture Act 2001* and the *Aquaculture Regulations 2005*, and relevant lease and licence conditions. An assessment of individual site suitability (including an Environmental Sustainability Development Assessment) and criteria outlined in the Aquaculture Tenure Allocation Policy are considered during the assessment. Ongoing environmental monitoring provides information that is an important input to the adaptive management of aquaculture. Further information about licensing is provided in part D4 and D5 of this Appendix.

### ***Carrying Capacity and Assimilative Capacity***

The concepts of 'carrying capacity' and 'assimilative capacity' are important and interrelated tools for natural resource management. Carrying capacity equates to the biomass (tonnage) of culture product that can be added to the environment at a rate that can be assimilated by the environment without significant environmental changes. Assimilative capacity refers to the extent to which the environment can cope with a particular activity without unacceptable change (O'Bryen and Lee, 2003).

Estimating carrying and assimilative capacities for finfish aquaculture is a relatively simpler task than for shellfish or algae. This is largely due to the additive versus extractive nature of finfish production compared to shellfish or algae production. For finfish aquaculture, it is possible to determine, using mass balance equations of the type described by Beveridge (1987), the changes in concentration of nitrate and ammonia in the water column. The level of confidence in these estimations reflects the empirical understanding of sources and sinks for these waste products and their interaction.

Due to physical and chemical differences in site characteristics among coastal areas where aquaculture occurs, such as water depth and nutrient concentrations, it is necessary to determine carrying and assimilative capacities for each different area (Tanner et al. 2007). Furthermore, it is necessary to have an understanding of the species' metabolism, used for calculations of aquaculture system oxygen requirements, fish energy requirements, environmental impact assessment, and species-specific physiological thresholds (Fitzgibbon 2007). This data exists for Yellowtail Kingfish and mullock cultured in SA (Clark and Seymour 2007, Fitzgibbon et al. 2007), but the necessary research has not been carried out for other cultured species. Where new research is published, PIRSA Aquaculture will incorporate this new knowledge into their assessment and calculations.

For shellfish or algae aquaculture, estimating carrying capacity is more complicated as potential production must be estimated from available nutrient and light resources. At present there are difficulties in confidently predicting potential production. Firstly, there is limited data to ascertain the availability of nutrient and light for shellfish or

algae; and, secondly, processes such as shellfish filtration, excretion and respiration rates, algae nutrient uptake and photosynthetic rates and assimilation efficiencies need to be investigated within South Australian coastal conditions and compared to seasonally varying food concentrations and temperature (Parsons Brinkerhoff and SARDI Aquatic Sciences, 2003; Mount et al., 2007). Nevertheless, algae aquaculture has been recommended as a means by which the negative effects of effluent and reduce the environmental impact of other aquaculture activities may be minimised (Chopin et al., 2001; Buschmann et al., 2007).

### **Class of aquaculture**

Classes of aquaculture under previous zone policies referred to groups of species e.g. bivalve molluscs; finfish; tuna etc. Under a modified format, classes of aquaculture now relate to the feeding requirements of aquatic organisms, i.e. whether the organisms are supplementary fed or not supplementary fed. Grouping the classes of aquaculture around the feed inputs better focuses the policy on the key determinant of environmental impact, namely, the amount of nutrient that is released into the environment. The modified format also provides greater flexibility to adaptively manage aquaculture activity through the conditions place on individual licences.

The classes of aquaculture that may be permitted under policies are—

- the farming of prescribed wild-caught tuna;
- the farming of aquatic animals (other than prescribed wild-caught tuna) in a manner that involves regular feeding (e.g. finfish and abalone);
- the farming of bivalve molluscs (e.g. oysters, scallops, mussels, razorfish); and
- the farming of algae.

The first two of these involve the supplemental feeding of the farmed animals, whereas no supplemental feeding is associated with the latter two classes.

### **Biomass limits**

Control of the amount of nutrients released into or extracted from the environment is achieved at the zone policy level by setting upper biomass limits for each zone, i.e. the maximum biomass of organisms farmed under a particular class of aquaculture at any one time. Environmental impacts are also managed by monitoring impacts on an on-going basis, through the environmental monitoring and reporting requirements stipulated in the *Aquaculture Regulations 2005*.

The Policy sets biomass limits for the farming of supplementary fed aquatic animals in terms of a tonnage of finfish biomass equivalents. The net amount of nutrient released by various types of supplementally fed organisms differs, with finfish aquaculture generating the highest amount of discharge compared for example, with abalone. Because there is still insufficient scientific information to accurately predict the amounts of nutrients that would be released by non-fish species, this policy takes a generally cautious approach in setting biomass limits by assuming that amounts of nutrients released by all farmed organisms that are supplementally fed would be similar to that of finfish. However, in order to accommodate future use of information on nutrient release by non-fish species, the proposed policy adopts the concept of finfish biomass equivalents, where upper biomass limits are expressed

and benchmarked in terms of an amount of biomass that would have an environmental impact equivalent to a stated biomass of finfish.

The impacts of overstocking systems with aquatic organisms that do not involve supplemental feeding are likely to be felt by industry (through decreased production) well before any potential environmental harm. For example, in the case of filter feeders like oysters, production is self-limiting since industry performance overall will be determined by the amount of suitable food available in the water. As a result, the focus of PIRSA Aquaculture's regulatory activity for aquatic organisms (that do not involve supplemental feeding) is to meet the Government's undertaking "to maximise benefits to the community from the State's aquaculture resources", i.e. to ensure that a zone is not overstocked to the detriment of the aquaculturalists operating in the area.

The Policy allows for the Minister to alter the maximum biomass limits of all classes of aquaculture through notice in the South Australian Government Gazette. This provides a mechanism to enable flexibility in setting biomass limits for zones/sectors and enables future research and environmental monitoring results to be taken into consideration as they become available over time.

In the case of bivalve molluscs, the Minister cannot increase the maximum biomass limit unless satisfied, after consultation with relevant aquaculture industry groups, that such an increase would not compromise the overall productivity of existing bivalve mollusc farming operations in the area.

### **D3 – PROTECTED SPECIES FRAMEWORK**

The *National Parks and Wildlife Act 1972* (NPW Act) provides the legislative framework dealing with native fauna and flora in this State. Most native mammals, reptiles and birds are protected in South Australia. Under the provisions of the Act, it is an offence to kill, hunt, catch, restrain, injure, molest or harass a protected animal. Rare, vulnerable and endangered species are listed in Schedules 7, 8 and 9 of the NPW Act.

The *Fisheries Management Act 2007* (FM Act) provides offence provisions for the taking, injuring or harming of an aquatic mammal or aquatic resource of a protected species. Under the provisions of section 71(1)(a) of the FM Act, a person must not kill, injure or molest, or cause or permit the killing, injuring or molestation of, a marine mammal. Furthermore, it is an offence to take protected species, which include white shark (*Carcharodon carcharias*), (more commonly known as the great white shark). A statutory defence exists in cases where the defendant proves that the alleged offence was not committed intentionally and did not result from any failure on the part of the defendant to take reasonable care to avoid the commission of the offence.

All marine mammals and sharks have the potential to become entangled in nets or mooring lines and seabirds may be adversely affected by activity around any feeding, roosting or nesting sites in the area. To minimise adverse interactions with seabirds and large marine vertebrates section 19 of the *Aquaculture Regulations 2005* requires a licensee to have a written interaction strategy approved by the Minister. In addition, risks posed by the aquaculture activity are assessed at the time of licence application through the ESD Assessment process consistent with the National ESD Framework (Fletcher et.al., 2004).

Syngnathid fish are protected under the provisions of section 71 of the FM Act. Syngnathid fish are likely to be present, especially in the seagrass, algal and reef assemblages. It is known that at least some seahorses are abundant around finfish cages, using them as an alternative habitat to seagrass beds and algal assemblages. It should however be noted cages will not be placed over dense seagrass beds and algal assemblages.

#### ***Framework specific to finfish aquaculture***

In November 2002 Cabinet approved the establishment of a Marine Mammal-Marine Protected Areas Working Group (MM-MPAWG) to develop management arrangements to address the proximity of aquaculture developments to core areas of proposed marine protected areas and significant marine wildlife habitats such as seal colonies and whale breeding areas.

The MM-MPAWG concluded that the only aquaculture activity to pose a risk to seal/sea-lion colonies is finfish aquaculture, and the only seal/-lion colonies at risk from finfish aquaculture are breeding colonies of Australian sea-lions.

Although New Zealand fur seals also interact with aquaculture operations, they were not considered to be at risk from finfish aquaculture, due to their increasing population and expansion in distribution around the coastline. As such it was proposed that no further management restrictions would apply in relation to the New Zealand fur seals.

Cabinet considered the MM-MPAWG report and, in 2005, noted the following recommendations in order to reduce the potential risk to Australian sea-lion breeding colonies from finfish aquaculture—

- Finfish aquaculture located within 5 km of any Australian sea-lion breeding sites will not be approved;
- Finfish aquaculture will not be approved within 15 km of the eight major Australian sea-lion breeding colonies (namely The Pages, Dangerous Reef, Seal Bay, West Waldegrave Island, Olive Island, Franklin Islands, Purdie Island and Nicolas Baudin Island);
- Finfish aquaculture to be located between 5-15 km of minor Australian sea-lion breeding colonies will have a risk assessment applied to during the licence assessment process specifically related to seals; and
- There will be no additional restrictions in relation to finfish aquaculture and sea-lions for finfish aquaculture located 15 km or more from a sea-lion breeding colony.

## **D4 – LESSEE AND LICENSEE OBLIGATIONS**

The *Aquaculture Act 2001* (the Act) is the main piece of legislation governing the management, control and development of the aquaculture sector. The Act includes provisions giving the Minister for Agriculture, Food and Fisheries the powers to grant aquaculture leases (with the concurrence of the Minister for Transport) and licences and the power to make decisions on licence conditions, with the EPA's approval, as well as conditions and terms of leases.

The *Aquaculture Regulations 2005* establishes an environmental assessment, monitoring and management framework for all sectors of aquaculture.

The Act provides for an integrated licensing and tenure system and provides a flexible approach to the granting of rights to occupy State waters. Under the Act, a licence may not be granted for aquaculture in State waters unless the area is subject to a lease granted by the Minister. The Act allows for four types of lease, namely pilot, development, production and emergency leases.

Applications for leases within an aquaculture zone must be allocated through a process approved by the Aquaculture Tenure Allocation Board (ATAB). A public call is made inviting applicants to submit their proposal on the required application form. These applications are assessed by the ATAB who then make a recommendation to the Minister on which applications should proceed. Once the tenure has been provisionally granted, a licence assessment will be undertaken.

The competitive allocation process ensures a fair and efficient means of allocating the State's marine aquaculture resources.

Applications for pilot leases outside an aquaculture zone are not subject to a competitive allocation process, however the ATAB is notified of all pilot lease applications.

Management obligations are those requirements an aquaculture operator must undertake according to the *Aquaculture Act 2001* and other relevant legislation. Penalties for a failure to comply with the requirements include expiation fines and suspension or cancellation of the lease and/or licence.

### ***Ecologically Sustainable Development***

PIRSA Aquaculture's Ecologically Sustainable Development (ESD) risk assessment guidelines for aquaculture licenses is based on the National ESD Framework: The 'how to' Guide for Aquaculture (Fletcher et al., 2004), underpinned by the Australian and New Zealand Standard (AS/NZ) ISO 31000:2009 (Standards Australia and Standards New Zealand (2009) for risk management. The assessment process considers risks to aquatic habitats associated from individual aquaculture facilities (both marine and land-based) through to accumulative risks of the industry at the regional scale. Using these guidelines, aquaculture licence applications are assessed to determine the likely environmental, social and economic risks the proposed licence may have if approved.

The environmental risk assessment component considers the nature of the specific activity relative to the environment in which it will be undertaken at different spatial

scales, namely; at the level of the individual site and at the regional level. Risks are calculated semi-quantitatively through a likelihood x consequence methodology. PIRSA Aquaculture's management of ESD risks can result in the amendment of site location or application of licence conditions, including (but not limited to) stocking rates, farming systems, legislative and environmental monitoring requirements. It should be noted that, in accordance with Section 52 of the Act, the Minister may vary licence conditions at any time to prevent or mitigate significant environmental harm or the risk of significant environmental harm.

This licence assessment is then formally referred to the EPA for their consideration.

### ***Environmental Monitoring and Management***

Environmental risks are managed both at the licence assessment stage (as previously described above) and through PIRSA Aquaculture's ongoing Environmental Monitoring Program (EMP). EMP requirements are stipulated in the *Aquaculture Regulations 2005* for each sector. Once a licence is approved, an EMP is tailored to each class of aquaculture to allow for the ongoing monitoring by licence holders of a variety of physical and biological factors considered relevant to measuring the environmental effects of the aquaculture venture.

#### ***Marine-based Aquaculture:***

The annual Environmental Monitoring Program includes ongoing monitoring of:

- benthic assessment (colour videotape of the sea floor and written record);
- amount and type of supplemental feed (if applicable to the species farmed);
- biomass maintained on the site;
- aquaculture waste (securing, treating, recovering);
- use of chemicals (amount, frequency and purpose);
- requirement to mark-off area and maintain structures or equipment used to mark-off area;
- farming structures (marking, mooring, maintaining, locating, and recovering);
- interaction with seabirds and large marine vertebrates.

In addition Regulations provide for:

- notification and reporting of entanglement of certain animals;
- notification and reporting of escape of stock or damage that may lead to escape of stock;
- notification and reporting of unusually high mortality rate and duty to isolate unaffected organisms.

### ***Land-based Aquaculture:***

The annual Environmental Monitoring Program includes (depending on the licence class of A, B or C) the ongoing monitoring of:

- water quality testing (category B & C only);
- intake water source, method of extraction, water type (i.e. fresh, brackish etc.) and volume used per month;
- where, how discharged, if treated and volume each month of water discharged;
- amount and type of supplemental feed (if applicable to the species farmed);
- use of chemicals (amount, frequency and purpose).

Additional requirements to be monitored can be determined from the licence assessment process on a case by case basis, or based on the results of Environmental Monitoring Program reporting.

### ***Marine and Other Animal Interactions***

The requirement to report interactions (such as entrapments or entanglements of seabirds and large marine vertebrates) form part of licence conditions and Regulations under the Act. If interactions occur then modifications to farming practices may be required.

A licensee must have a written strategy approved by the Minister for minimising adverse interactions with seabirds and large marine vertebrates resulting from aquaculture carried on under the licence (see the *Aquaculture Regulations 2005*, Regulation 19). The strategy must detail operational requirements under the following categories:

- Mammal interactions and
- Great white shark interaction
- Protected species interactions
- Maintenance of infrastructure
- Site surveillance

The strategy must explain what procedures the licensee will implement to minimise these risks to a level considered acceptable by the minister. Operators may be audited against the operating practices detailed in their strategy at any time. Failure to comply with the strategy may result in an expiation fee or fine.

### ***Aquatic Animal Health Controls***

A range of controls are included in the management of licensed aquaculture activities to prevent or mitigate against diseases or parasites. All applications for new aquaculture licences are assessed for aquatic animal health risks as part of the ESD assessment (culture technique, technology and specific environment of the

application). Regulations under the *Aquaculture Act 2001* require that operators report to PIRSA any significant increases in background mortality and must not move any animals showing signs of clinical disease without Ministerial approval. Requirements designed to manage other on-farm activities are included in a variety of legislation and policy.

Diseases of particular concern and those that are regarded as posing particular threats to environmental, economic or social processes are listed as notifiable under the *Livestock Act 1997*. It is an offence under this Act to fail to report the occurrence, or suspected occurrence, of a notifiable condition.

Translocation of organisms is managed through a process of Import Risk Analysis. The outcomes of these analyses, which include factors to reduce risk of disease or pest introduction and consideration of genetic integrity, are included in Orders under the *Livestock Act*, including the *Livestock (Restrictions on Entry of Aquaculture Organisms) Notice 2008*.

Use of any therapeutants or treatments can be conducted only under a Ministerial approval (for off-label use as defined by the *Veterinary Practice Act 2003*), or under conditions specified by the Australian Pesticides and Veterinary Medicines Authority, either on the label of registered products or included in Minor Use Permits.

### ***Exotic Species***

There are potential risks associated with the introduction of organisms not from the local environment. For the protection of the aquaculture industry, and of the natural environment, controls must be maintained on the introduction and movement of aquatic organisms, bearing in mind the potential risks involved with the introduction of disease and potential for genetic manipulation.

The primary concerns associated with the introduction of non-native organisms are that they may form feral populations, which may compete for habitat and reduce the availability of nutrients to local organisms.

Potential issues associated with exotic species are addressed as part of the ESD risk assessment and licence application process.

### ***Stock Escapes***

The potential for escape of aquaculture stock from a site is considered during the ESD risk assessment of the application. This assessment considers the level of risk presented by the species under consideration and the technology used. Regulations under the *Act* require operators to have an approved strategy to minimise and mitigate against the risk of escapes and outline the requirements that must be followed in the event of an escape.

A study carried out by SARDI on Kingfish showed that, when escapes occur, it is very probable that females are not reproductively mature. Also, given the gut contents of male escaped fish, it is unlikely that they would feed well enough to

support gonad development. Moreover, the farmed fish carry the same genetic makeup as the wild fish, so cross breeding would have no effect on the wild population gene pool (Fowler et al., 2003).

Licensees are also required to submit a strategy relating to the escape of stock from the constraints of the licensed infrastructure and the lease area (see the *Aquaculture Regulations 2005*, Regulation 19). This strategy is required by the Minister to prevent and control the risk of escaped stock to the wild. This strategy must include methods under the following categories:

- Health monitoring.
- Escape monitoring
- Dealing with escapes
- Maintenance of infrastructure
- Site surveillance
- Reporting requirements

The strategy must explain what procedures the licensee will implement to minimise these risks to a level considered acceptable by the Minister. Operators may be audited against the operating practices detailed in their strategy at any time. Failure to comply with the strategy may result in an expiation fee or fine.

### ***Site Decommissioning***

There will be times when an aquaculture site in the zone is no longer being used. In this case the lease contract requires that the site be rehabilitated by the lessee at the expiry of the lease. The lease also requires the operator to be party to an approved indemnity scheme or bank guarantee which the Minister may draw upon if the lessee fails to clear the site.

## D5 - Doing It Better – Research and Adaptive Management

Evidence based policies require robust research to inform the decision making process. As such, PIRSA Aquaculture has initiated several projects with the Fisheries Research and Development Corporation (FRDC) to improve our knowledge and inform our policies, in particular, the PIRSA / FRDC Innovative Solutions for Aquaculture Planning and Management Program. This suite of projects aims to develop tools to ensure a sustainable and competitive aquaculture industry for South Australia. These tools will:

- identify more effective ways to manage aquaculture;
- minimise the regulatory burden on industry; and
- ensure that environmental considerations for South Australian aquaculture remain a clear priority.

The following research projects have been completed:

a) *Environmental audits of marine aquaculture* – The project examined the impacts of Yellowtail Kingfish aquaculture in Fitzgerald Bay, and of land-based abalone aquaculture around South Australia, on a range of environmental variables. The results indicated that the environmental impacts of both sectors are minimal using current production techniques. Additionally, the project included a pilot study on light availability to seagrass beds off Cape Jaffa in the south-east of the state. The results indicated that any aquaculture undertaken in this region would have to be conducted in a manner which minimises light reduction to seagrasses. Finally, research was conducted into shading effects of intertidal shellfish long-line farming infrastructure at South Spit, Stansbury. While the relative area and degree of shading effects on seagrass meadows is low, a number of recommendations were made to reduce any potential lethal and sub lethal impacts. Overall, this project provides the basis for the enhancement of current environmental monitoring programs.

b) *Addressing seal interactions* – The project has provided comprehensive appraisal of the status of the Australian sea lion population in southern Spencer Gulf and the Nuyts Archipelago, including identification of several new breeding populations. Based on satellite tracking studies of the Australian sea lion in southern Spencer Gulf, there was limited spatial overlap in the major areas used by seals and the tuna farming zone. A questionnaire survey of tuna farmers confirmed that operational interactions with seals are a continuing problem, although there were opposing views on whether they are increasing or decreasing. Australian sea lions were considered to be responsible for most attacks on tuna. New Zealand fur seals were not considered a threat to farmed tuna, as they are too small to attack the tuna successfully. Extensive tracking in the Nuyts Archipelago from six different colonies showed that there were marked inter-colony differences in foraging behaviour, and evidence of two broadly different foraging patterns - inshore (shallow) and offshore (deep) foragers. With respect to farm interactions, procedures for minimising finfish mortality attributable to seals include incorporation of seal fences on the pens, regular and frequent net maintenance and, removal of tuna carcasses. Also, efforts should be made to improve procedures for recording causes of death of farmed finfish to monitor the consequences from seal interactions;

c) *Spatial impacts and carrying capacity of aquaculture stock* – The project studied the nutrients released from Yellowtail Kingfish aquaculture in Fitzgerald Bay, and based on this data two models were produced that assist environmental management decisions. At the site scale, a seafloor deposition model was developed that predicts that areas of high sedimentation are localised around individual pens. At a more regional level, a carrying capacity model has been developed that can be used to predict the level of increased nutrient loadings in the water column associated with increases in Yellowtail Kingfish production. The physiology of Yellowtail Kingfish and mulloway was studied, with the focus on determining their oxygen consumption under a variety of environmental conditions. This information is important for the modeling, as it allows for an estimate of how much of the feed is metabolized by the fish. The outcomes of this work will **allow PIRSA Aquaculture to make more informed decisions on total allowable biomass** within the Fitzgerald Bay zone, as well as **optimal stocking densities** for individual leases. These models can also be adapted to environmental conditions for other zones. As well as PIRSA Aquaculture, farm managers will be able to utilize the seafloor deposition model to investigate patterns of sedimentation within a lease, allowing for decisions on how best to arrange pens so as to minimise localised seafloor sedimentation and where to place pens for fallowing ;

d) *Parasite interactions between wild and farmed Yellowtail Kingfish* – The project studied the potential for parasite interactions between wild and farmed kingfish, methods of distinguishing wild from farmed kingfish and assessing migratory behaviour of wild kingfish. Wild fish migrate past kingfish sea-cages in Fitzgerald Bay in summer. This knowledge creates the potential to better manage parasite infestation during periods of increased interaction between farmed and wild kingfish. Given that parasite eggs hatch more quickly in warmer sea temperatures, surveillance and management effort for infections by monogenean parasites should be concentrated on this period. Although few reliable methods are available to distinguish natural fish from farmed fish, marking otoliths has emerged as a potential tool that could be used to discriminate any farm escapees from wild fish. The key outcomes of this project included the development of standard sampling methods for ongoing assessment of parasite prevalence and intensity in wild and farmed kingfish. These sampling techniques are expected to be incorporated into an ongoing sampling program for effective parasite management. Farm management practices to reduce the impact of parasites include regular net changes and strategically timed treatments across entire farm leases.

e) *Assessment of novel monitoring and modelling techniques to measure gill and skin fluke infestation* - A reliable and consistent means of measuring the level of gill and skin fluke infestation of farmed kingfish has been developed based on a computer driven scanning system. This novel technology is faster and more cost-effective than current methods, and will greatly enhance industry's ability to monitor and therefore control fluke infestations, through a more precise timing of applying control measures.

f) *Development of rapid environmental assessment and monitoring techniques* - The project was an extension of previous work undertaken to improve the tuna environmental monitoring program. The project aimed to determine similarities and differences in the DNA of benthic infaunal communities associated with finfish farming at Fitzgerald Bay, Arno Bay and Boston Bay. The number of individuals and the types of species of benthic infauna that live in the seafloor sediments were used

to monitor the biological health of the environment around finfish farms. The outcomes of this project will decrease the time taken for an assessment of the condition of the environment and improve the accuracy of the assessment. Information from this project will be used to standardise the finfish environmental monitoring program in line with the tuna environmental monitoring program.

A second suite of projects (Innovative Solutions 2 (IS-2)) is underway. The proposed projects are categorised into four areas: (1) environmental standards, (2) biosecurity, (3) new technologies and (4) climate change. The IS-2 suite of projects has been designed to provide information aimed at further supporting PIRSA's on-going efforts to improve its ecosystems-based approach to aquaculture resource management. The first project to commence under IS-2 is entitled Carrying Capacity of Spencer Gulf: Hydrodynamic and Biogeochemical Measurement Modelling and Performance Monitoring. The ability to obtain accurate estimates spatial and temporal variability in the cycling of carbon and other macro-nutrients through the ecosystems in Spencer Gulf will provide important information about potential risks and impacts of increased aquaculture activities in the Gulf. This need will be met through the development of calibrated hydrodynamic and bio-geochemical models for Spencer Gulf that will also determine more accurate carrying capacity estimates for aquaculture areas, including the concurrent use of both supplementary and non-supplementary fed organisms within each area.

In addition, PIRSA Aquaculture supports studies commissioned by the Aquafin Cooperative Research Centre (CRC) and the Australian Seafood CRC involving six research programs for the Port Lincoln-based southern Bluefin tuna (*Thunnus maccoyii*) aquaculture industry including; production, value-adding, environment, technology transfer and commercialisation, and education and training. Similar Aquafin CRC projects are operating for the Atlantic salmon (*Salmo salar*) aquaculture industry in Tasmania along with research of striped trumpeter (*Latris lineata*) and Australian snapper (*Chrysophrys auratus*) production in Tasmania and New South Wales respectively.