South Australian Aquaculture: a summary of its diversity, production and innovation
Industry Summary

The South Australian aquaculture industry is one of the largest primary production sectors in South Australia with the production value in 2012-13 amounting to $243 million, contributing to almost 55% of the State’s total value of seafood production.

South Australia’s aquaculture industry produces some of the most sought after seafood in the world including Southern Bluefin Tuna, Pacific Oysters, Yellowfin Kingfish and Greenlip Abalone.

South Australia is home to the most diverse range of aquaculture systems in Australia, including subtidal and intertidal mollusc farming, sea-cage farming of finfish and a range of land-based systems.

Species farmed in South Australia include Southern Bluefin Tuna, Yellowtail Kingfish, Mulloway, Blue Mussels, Greenlip Abalone, Pacific and Native Oysters, Yabbies, Marron, Trout, Barramundi, Murray Cod, Silver and Golden Perch and microalgae.

The majority of South Australia’s aquaculture farming resides in the coastal waters of Eyre Peninsula. Aquaculture has had a positive impact to regional economies and communities with approximately 81% of the state’s regional aquaculture workforce (1,211 full time employees) employed in Eyre Peninsula in 2012-13.

A large proportion of South Australian aquaculture production, particularly Tuna, is exported overseas, primarily to Japan and other Asian countries. A significant amount is also sold locally and around Australia.

As the aquaculture industry continues to grow the opportunity for jobs and benefits to South Australia are also increasing.
Spatial distribution of aquaculture in South Australia

LEGEND
- Barramundi
- Tuna & Finfish
- Abalone
- Mussel
- Oyster
- Yabby/Marron
- Algae
Species farmed in South Australia include Southern Bluefin Tuna, Yellowtail Kingfish, Mulloway, Blue Mussels, Greenlip Abalone, Pacific and Native Oysters, Yabbies, Marron, Trout, Barramundi, Murray Cod, Silver and Golden Perch and microalgae.
Southern Bluefin Tuna

Over the past 20 years, the Southern Bluefin Tuna industry has undergone remarkable growth and change, transforming from a producer of a low value commodity to an innovative industry using sophisticated harvesting, ranching, logistics, marketing and sales techniques to deliver a premium product.

Production is expected to grow as a result of increased wild catch Southern Bluefin Tuna quotas, restrictions on Pacific Bluefin Tuna catch, research into new markets, significant husbandry improvements and the commencement of long term grow out. Japan is the largest world market for Bluefin Tuna (Pacific, Atlantic and Southern) and is an important market for the South Australian product.

Southern Bluefin Tuna generates the highest farm-gates sales (AUD$153.50 million) in South Australia’s aquaculture industry, accounting for more than half of the state’s gross value of aquaculture production in recent years. In 2012-13 the tuna industry produced 7,486 tonnes. All of Australia’s tuna farming activity is located in western Spencer Gulf between 6 and 20 km offshore of Port Lincoln. In 2014, the South Australian tuna industry comprises 15 companies, who operate 20 aquaculture licences over approximately 1,983 hectares.

Approximately 325 people were employed in direct activities associated with the tuna industry in 2012-13.

Southern Bluefin Tuna are caught in the Southern Ocean, transferred to Port Lincoln and placed in sea-cages to grow under controlled feeding techniques. Pontoons and nets are used and designed to hold the tuna. This type of holding facility maximises water flow and minimises marine growth and is regularly monitored by dive teams to maintain the structure’s integrity.
The marine finfish aquaculture industry comprises a number of species including Yellowtail Kingfish, Mulloway and Snapper. Yellowtail Kingfish is the predominant species farmed in South Australia. In 2012-13 Yellowtail Kingfish generated farm-gate sales of AUD$11.26 million for South Australia. The finfish industry produced 889 tonnes and employed approximately 60 people in direct activities associated with the industry in 2012-13.

Production is expected to grow as a result of improved feeding technology, fingerling survival rates and farming strategies.

All of South Australia’s marine finfish farming activity is located in Spencer Gulf with the majority of farming concentrated in Boston Bay, near Port Lincoln. In 2014, the South Australian finfish industry comprises two companies, who operate 22 aquaculture licences over approximately 1,983 hectares.

Fingerlings are hatched in land-based facilities and transferred to sea-cages to grow under controlled feeding techniques. Pontoons and nets are used and designed to hold the finfish (similar to that of Tuna). This type of holding facility maximizes water flow and minimises marine growth and is regularly monitored by dive teams to maintain the structure’s integrity.
There are seven main oyster growing regions across South Australia extending from Ceduna across to Eyre and York Peninsulas and Kangaroo Island. These regions are growing two species of oysters including Pacific oysters (*Crassostrea gigas*) and the Native flat oyster (*Ostrea angasi*).

In 2012-13 production value for oysters in South Australia was AUD$35 million, representing the second largest aquaculture sector in South Australia. Approximately 687 people were employed in direct activities associated with the oyster industry in 2012-13.

South Australian oysters are grown in intertidal and subtidal waters using several methods including traditional rack and rail systems, the unique South Australian developed BST longline system and hybrid systems that are suited to particular growing areas.

Culturing systems differ from bay-to-bay and are developed to allow oysters the greatest access to food to ensure that the optimum meat to shell ratio is obtained, as well as preventing disease.

In 2014, there are 332 licences in South Australia with a total leased area of 940.107 hectares. The South Australian Oyster Growers Association (SAOGA) has approximately 80 per cent statewide industry membership.
The South Australian mussel aquaculture industry is based on the production of the Blue Mussel (*Mytilus galloprovincialis*). In 2012-13 total commercial production was 1,480 tonnes and worth AUD$2.94 million. Approximately 39 people were employed in direct activities associated with the mussel industry in 2012-13.

In 2014, 38 subtidal (mussel) licences over 573 hectares were located in Boston Bay and Louth Bay in lower Spencer Gulf.

All Australian farmed blue mussels are grown using long-line culture techniques. Long-lining involves a system of horizontal ropes with buoys to provide flotation, to which vertical droppers are attached every 1–4 m, depending on site conditions. Long-lines are used for spat collection as well as for on-growing juvenile mussels to market size.

Mussels are generally harvested after a period of 18 months at ~10–11 cm length.
The primary species of abalone farmed in South Australia is the highly prized greenlip abalone (*Haliotis laevigata*) to cater for a national and international Chinese market.

In 2014, there are 15 land-based aquaculture sites and 15 marine sites licensed to farm abalone in South Australia. These are located on coastal land or in waters off the West Coast, Eyre Peninsula and Kangaroo Island.

Marine and land-based abalone production in 2012-13 was 236 tonnes and valued at AUD$8.6 million. Approximately 44 people were employed in direct activities associated with the abalone industry in 2012-13.

The two types of marine abalone farming systems utilised in 2014 include sea-cage technology and benthic structures.

Marine abalone aquaculture must obtain the spat or juvenile abalone for their farms from land-based hatcheries. These hatcheries operate extensive and intensive grow-out systems, which are most often based around raceway technologies.

Broodstock are sourced from wild and juvenile abalone and grown in land-based hatchery complexes. The stock are then transferred to sea-cages of benthic structures where the abalone are on-grown until harvested for market.
The land-based sector is the most diverse of the South Australian aquaculture industry in terms of farming systems and culture species. Species farmed include freshwater and marine finfish, marron, yabbies, algae and marine molluscs.

In 2014, there are 112 land-based aquaculture licences in South Australia.

Land-based licence holders consist of private businesses, educational and research facilities as well as tourism and hobby farm businesses.

In 2012-13 the land-based aquaculture sector in South Australia produced approximately 3,729 tonnes at a value of $31.4 million; the major species being Algae, Barramundi, freshwater crayfish (Yabby and Marron) and Rainbow Trout. Approximately 79 people were employed in direct activities associated with the land-based aquaculture industry in 2012-13.

Land-based aquaculture licences are located all over South Australia including the Eyre Peninsula, Yorke Peninsula, Kangaroo Island, Adelaide Hills, Murraylands and South East.

A number of production systems are utilised by the land-based aquaculture sector. The most popular systems are pond culture, recirculating aquaculture systems and flow-through systems.
Propagated Southern Bluefin Tuna
Clean Seas Tuna have been conducting research into closing the life cycle of the Southern Bluefin Tuna with the aim to enhance the availability of this valuable stock for aquaculture in South Australia and increase the value of the industry. Early successes were recognised by *Time* magazine as the second most innovative invention in 2009.

Benthic abalone aquaculture
South Australian aquaculture licence holders are trialing benthic structures for abalone production, which more similarly replicate the natural habitat that abalone is grown on. Although these structures have not yet been used in South Australia, successful trials of this method of farming have taken place in Western Australia.

Offshore aquaculture development
In the late 1980’s in response to the ongoing decline in the traditional pole and line wild fishery, the Tuna Boat Owners Association of SA, Japanese Overseas Fisheries Cooperative Foundation and the State Government undertook a collaborative research and development project to assess the feasibility of establishing a Southern Bluefin Tuna farming industry in South Australia. This led to the establishment of commercial tuna ranching off the coast of Port Lincoln.

Since then the Southern Bluefin Tuna sector has continued to look for both expansion and diversification opportunities within the Lower Eyre Peninsula. In 2010, offshore pilot leases were trialed in Spencer Gulf with a means to improve growth and reduce the impacts of aquatic animal disease. In 2013 the Lower Eyre Peninsula Aquaculture Zone policy was amended to include offshore areas to enable industry expansion.

Adaption to the offshore environment involved modification of infrastructure and logistics for growers. Although there is significant cost and risk to this form of aquaculture with growers experiencing significant increase in the stocks’ ability to put on weight throughout the ranching process, along with a significant reduced mortality rate of stock associated with disease.

Integrated multi trophic aquaculture
Integrated Multi-Trophic Aquaculture (IMTA) refers to the farming of different aquaculture species together in a way that allows one species’ wastes to be recycled as feed for another. Typically IMTA systems combine an aquaculture species that requires external feeding, such as salmon and other finfish, with species capable of deriving nutrients from the wastes of the ‘fed’ species. By recycling nutrients that would otherwise be wasted, IMTA systems offer farmers the potential of increased economic gains. IMTA systems could also lead to “greener” aquaculture practices through the reduction in waste products in the marine environment.
Industry Innovation

**Value adding initiatives**
Industry is continuously coming up with value adding initiatives to improve/diversify their products. Some examples of this include packaging of live mussels and developing a premium range of spawnless oysters that are available all year round, varying in size, colour and taste, with appeal to different consumer tastes and markets.

**BST Adjustable Longline Oyster Farm System**
The BST Adjustable Longline Oyster Farming System was developed in South Australia, produced and commercialised by three local growers to suit the rough and weedy conditions in Franklin Harbour. The system is now recognised world-wide as an example of best practice oyster farming and has added to the positive growth of Cowell in the Eyre Peninsula region along with the overall development of the State’s aquaculture industry.
Future Trends

Trends in production and value are expected to grow as the industry works to develop and implement new technologies and species.

Looking ahead, the South Australian Government is committed to working with industry to ensure the state remains at the forefront of Australian aquaculture planning, management and development and that future industry growth continues in a productive, competitive innovative and ecologically sustainable way.

This cooperative approach to research, planning, management and environmental monitoring processes is assisting the industry to make significant inroads in international and domestic markets.

With continued growth in seafood demand expected both globally and domestically, markets that value premium sustainable seafood are providing increasing opportunities for South Australian producers and investors alike. There is potential for growth and value-adding to be realised in the production of Southern Bluefin Tuna, Oysters, Mussels, Kingfish, Algae and Abalone, as well as the opportunity to culture and develop new species.

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