



National Aquaculture Sector Overview Australia



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Characteristics, structure and resources of the sector

Summary

Aquaculture is the fastest growing primary industry in Australia. In 2003-04, the gross value of Australian aquaculture production was US\$ 251,3 million (FAO, 2003), contributing 34 percent of the total gross value of fisheries production (ABARE, 2005).

The aquaculture industry is largely based in regional Australia, and makes a significant and positive contribution to regional development. Aquaculture adds diversity to a region's economic base and creates demand for educational and training services, extension services, infrastructure and locally produced goods.

Aquaculture is growing each year, driving the growth has been increasing world demand for fisheries products that the world's commercial fisheries are increasingly unable to meet. The Australian aquaculture industry's vision is to triple its yearly sales to US\$ 1,86 billion by 2010

History and general overview

Aquaculture in Australia dates back thousands of years with evidence of an Aboriginal community systematically farming eels in the Lake Condah and Tyrendarra area in Victoria (DEH, 2005). Indigenous Australians also transported yabbies or freshwater crayfish (*Cheerax destructor*) between waterholes to restock impoverished waterbodies, possibly the first attempt at extensive aquaculture in Australia. It was not until the 1960s that experimental culture of yabbies began with harvesting from farm dams and natural watercourses. Farmers of yabbies are currently moving towards establishing purpose-built dams, supplementary feeding with food grains and management of the water quality (CSIRO, 2002).

One of the earliest commercial aquaculture products was the Sydney Rock Oyster from New South Wales (NSW) in 1872 (ABARE 2003). The Oyster Farmers' Association of NSW Ltd (OFA) was formed in 1928 to deal with the issues relating to the emerging large scale oyster farming industry in NSW and now with approximately 200 member companies, is the leading organisation representing the interests of oyster farmers and processors in NSW (Oyster Farmers' Association of NSW Ltd 2004).

Today, aquaculture is the fastest growing primary industry in Australia, increasing in value by an average of 13 percent per year since 1990 (AFFA, 2002). In 2003, the value of Australian aquaculture production was approximately US\$ 251,3 million (FAO, 2003).

More than 95 percent of Australian aquaculture production is from marine waters.

Domestic demand for seafood is increasing in Australia. In the late 1930s, Australian seafood consumption was 4.9 kilograms per person, by 1998-99, annual per capita consumption had more than doubled to 10.9 kilograms, or about 10 percent of the country's total unprocessed meat intake (ABS, 2000). Unfortunately, Australian caught or farmed fish accounted for less than half of this seafood consumption (3.6 kilograms per capita).

In addition to a rise in the demand for seafood, increasing affluence in countries such as China will see stronger demand for non-edible fisheries and aquaculture products such as pearls, crocodiles and ornamental fish.

Human resources

The most recently available ABS employment data for the Australian aquaculture industry is from August 2001 when the total number of people employed in the Australian sector was recorded as 4 221.

Cultured species

There are more than 40 species produced commercially, however there are only five main species that contribute more than 90 percent of the gross value of aquaculture production. These are pearls, oysters, Atlantic salmon, shrimp and southern bluefin tuna (AFFA 2002; ABARE 2003).

Pearl

Several species of pearl are found and cultured in Australian waters, the main cultured pearl oyster is the gold or silver lipped pearl oyster (*Pinctada maxima*). Pearl farming takes place from Exmouth, in Western Australia, to the east of Darwin in the Northern Territory (AFFA 2002).

Oyster

Historically, the Sydney rock oyster has been the main edible oyster produced in Australia however production fell in 1980s following the introduction of the Pacific cupped oyster (*Crassostrea gigas*). Since then the Pacific oyster production has increased significantly, mainly in Tasmania and South Australia (AFFA 2002). The main species of oyster farmed in Australia are the Sydney rock oyster (*Saccostrea glomerata*), Pacific oyster (*Crassostrea gigas*), the native flat oyster (*Ostrea angasi*), the milky or northern oyster (*Saccostrea amasa*) and the backlip oyster (*Saccostrea echinata*).

Atlantic salmon

In the 1800s the Atlantic salmon (*Salmo salar*) was first introduced into Tasmania by Acclimatization Societies. In the mid 1960s it was introduced from Canada to New South Wales for the Snowy Mountains power scheme lakes, however, the climate was too warm in New South Wales and the salmon did not reproduce naturally.

In the late 1960s all imports of salmonid genetic material were banned by the Commonwealth Government to prevent the introduction of exotic diseases into Australia.

Commercial production began again in Tasmania in the mid 1980s and currently marine farming operations occur in Tasmania and South Australia (ABARE 2003).

Shrimp

Shrimp farming began in 1984 and has expanded rapidly ever since. The giant tiger prawn (*Penaeus monodon*) is the major species farmed in Australia and is produced in Queensland, New South Wales and the Northern Territory. Other species farmed in Australia are the banana prawn (*P. merguensis*), brown tiger prawn (*P. esculentus*)

) and kuruma prawn (*P. japonicus*) (ABARE 2003).

Southern bluefin tuna

The first commercial production of southern bluefin tuna (*Thunnus maccoyii*) began in the mid 1990s when quota restrictions were put in place for the wild tuna fishery (AFFA 2002, ABARE 2003). There are currently fifteen tuna farms on eighteen sites, ranging in size from 20 to 30 hectares.

Although there are Australian aquaculture products, Atlantic salmon, Kuruma prawns, Pacific oysters, rainbow and brown trout and exotic ornamental fish are all introduced into Australia (ABARE 2003). The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), administered by the Department of the Environment and Heritage, and the Quarantine Act 1908, administered by the Australian Quarantine and Inspection Service, control the import of live animals into Australia. These laws apply to all importers of live exotic animals.

Practices/systems of culture

Raceways

A system that provides a flow through of water to enable the rearing of high density populations of fish is referred to as a flow through system. These systems include raceways, tanks (excluding recirculation systems), purpose built bottom draining ponds and other manufactured containers that allow the flow of water from inflow points to outflow points. The production in raceways is more intensive than in ponds as the water is well oxygenated due to the high water turnover ensuring wastes are removed.

Cages

In Australia cages are used for the farming of finfish such as southern bluefin tuna, Atlantic salmon and snapper. It is an important farming system as it can allow the production of freshwater crops in ponds that are not otherwise particularly suited to aquaculture.

Ponds

Dams or levees are created using earthmoving equipment to hold the water and can vary in size from 0.05 hectares to 20 hectares or more with depth ranging from 1 to 2.5 metres. The most successful ponds are those that are built to specifically farm fish with a specific size and shape and which maintain and monitor water levels and water quality. Prawns, silver perch (*Bidyanus bidyanus*), red claw (*Cherax quadricarinatus*), marron (*Cherax tenuimanus*), yabbies (*Cherax destructor*) and barramundi (*Lates calcarifer*) are the species most commonly produced in ponds.

Tanks

Tanks used for aquaculture can be used as flow through systems or in static systems. They are more typically used in closed systems that involve water being recirculated through filters and pumped back into the tank. Tanks are constructed from food grade plastic or fibreglass as well as from concrete or glass and are used for the production of ornamental fish or in hatcheries where large quantities of fish can be grown in a relatively small area of tanks. Tanks may make efficient use of water however they are expensive to set up and operate.

Ropes

Ropes are used to culture mussels on a longline or raft system. Longlines are horizontal ropes anchored at both ends and connected to large floats and consist of one or two headlines and are more commonly used as they are less obtrusive and can be sunk so the area can be shared with boats. In raft systems ropes are suspended from a raft and rely on the natural settlement of spat.

Racks/rafts (stick and tray)

Racks and rafts are also known as stick and tray culture. This system is traditionally the most common method of rock oyster farming. Oyster spat is allowed to settle naturally on sticks placed on intertidal rocks. When young oysters are firmly established, bundles of sticks are moved further up river to allow these oysters to grow without further settlement of spat. The sticks remain there for two to four years until they are large enough to harvest. The larger oysters are removed and sold and the remainder are placed on trays and left on intertidal

racks for between 3 and 15 months to allow them to grow up to the larger grades.

Sector performance

Production

The graph below shows total aquaculture production in Australia according to FAO statistics:

Market and trade

Some aquaculture products are produced almost exclusively for the export market while other products are sold on the domestic market. The main exported aquaculture species based on value for 2003-04 were rock lobster, tuna, abalone and prawns. The main export markets for edible fisheries product are Japan, Hong Kong, United States, Thailand and New Zealand. South Australia and Queensland are the main exporters of finfish while South Australia and Western Australia are the main exporters of crustaceans.

In 2003-04 Australia's exports of fisheries products was valued at US\$ 1,19 billion. Approximately 80 percent of the total exports were edible fisheries products while the remaining 20 percent were non-edible fisheries products with pearls the dominant product by value (ABARE 2005).

Trout, silver perch, barramundi, prawns, redclaw, edible oysters and mussels produced in Australia are sold mostly on the domestic market. Australia imports more than 60 percent of the seafood sold in the domestic market.

The supply chain for fresh and frozen Australian seafood mostly follows the same pathway, going from producer through several market intermediates then to the consumers, however, the frozen seafood supply chain includes at least one refrigerated transport company and one or more cold storage companies. These supply chains can be very short going straight from the producer to the consumer or very long as some producers use multiple, sometimes competing supply chains (Ruello and Associates 2004).

Promotion and management of the sector

The institutional framework

The Department of Agriculture, Fisheries and Forestry (DAFF) is the Federal Government department with executive responsibility for aquaculture in Australia. Other agencies reporting into DAFF with involvement in aquaculture include: The Primary Industries Ministerial Council (PIMC), this is comprised of State and Territory Primary Industries Ministers and elected officials. The PIMC considers agricultural issues of national importance to better integrate Australia's conservation and sustainable production objectives. The Council is the highest government forum for consultation, coordination and, where appropriate, integration of action by governments on primary industries issues.

The Primary Industries Standing Committee (PISC) is the standing committee to the PIMC. It comprises State and Territory CEOs (Chief Executive Officers) of agriculture departments and agencies and includes representatives from New Zealand and the CSIRO.

The Natural Resource Management Ministerial Council (NRMMC) consists of the Australian/State/Territory and New Zealand government ministers responsible for primary industries, natural resources, environment and water policy. The Council is the highest government forum for consultation, coordination and, where appropriate, integration of action by governments on natural resource management issues.

The Natural Resource Management Standing Committee's (NRMSC) main objectives are to support the

NRMMC in the achievement of its objectives and to develop cooperative and coordinated approaches to matters of concern to the NRMMC. All Department Heads/CEOs of Australian/State/Territory and New Zealand government agencies responsible for natural resource policy issues are members of NRMSC.

The governing regulations

Under the Australian Constitution, state and territory governments have primary responsibility for management of land and waters within a state or territory, and management of inland and coastal waters out to the three nautical mile limit. The Australian Government has the responsibility for management of marine waters between the three and two hundred nautical mile limits.

All states or territories have fisheries or aquaculture legislation that regulates aquaculture production. In New South Wales, Victoria, Queensland and Western Australia, aquaculture is regulated under general fisheries legislation covering commercial and recreational fishing, and aquaculture. Tasmania has two pieces of legislation relating to marine and inland fisheries respectively. Separate legislation provides for marine aquaculture leases in Victoria (Land Act 1958), Tasmania (Marine Farming Planning Act 1995), and potentially in Queensland (Land Act 1994). In contrast, South Australia has a single dedicated **Aquaculture Act (2001** , as amended in 2003 and 2005), while Western Australia has dedicated legislation for pearling (Pearling Act 1990).

Aquaculture production may also be subject to Commonwealth legislation, such as the **Environment Protection and Biodiversity Conservation Act (1999)** and the **Great Barrier Reef Marine Park Act (1975)** (the latter affects Queensland only). Other Commonwealth legislation that may be relevant includes the Native Title Act (1993) that may affect the use of public land and waters. Commonwealth quarantine legislation can affect aquaculture operators' access to new species, broodstock and feed.

South Australia is the largest producer of aquaculture products in Australia, accounting for 38 percent of the gross value of production. In the following, only the legislation of this state will be dealt with. Commonwealth legislation will be mentioned when it is relevant.

For more information on aquaculture legislation in Australia please click on the following link:
[National Aquaculture Legislation Overview - Australia](#)

Applied research, education and training

The major government research institutions are the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Fisheries Research & Development Corporation (FRDC).

Minor research institutions include the Seafood Services Australia, Bureau of Rural Sciences (BRS), Australian Bureau of Agricultural and Resource Economics (ABARE) and Australian Institute of Marine Science (AIMS).

Research projects being conducted through CSIRO cover the following areas:

- Environmental management.
- Healthy production and safe products.
- Improved breeding.
- Nutrition.
- New marine products (CSIRO 2004).

The FRDC plans, invests in and manages fisheries research and development throughout Australia. FRDC invests in three research and development programs, natural resource sustainability, industry development and people development.

For natural resource sustainability the challenge is to 'improve the sustainability of natural resources supporting

wild-catch and aquaculture'. There are three challenges in the industry development program: 'meet long-term demand for fish and fish products, increase the value and social and economic return of fish and fish products and increase the efficiency of businesses and other entities in the fishing industry'.

The two challenges in the people development program are to 'meet long-term demand for people who will help the fishing industry to meet its future needs' and 'increase community support for the fishing industry and the natural resources on which the industry depends'.

The world's first research and development project associated with farming of southern bluefin tuna began in 1991 with the establishment of partnerships with the FRDC, Tuna Boat Owners Association of Australia, the South Australian Government and the Japanese Government (FRDC 2000). The FRDC also conducts on-farm participatory research for Atlantic salmon.

There is a broad range of aquaculture related courses available across Australia to varying levels in Universities, colleges and technical schools. Along with these courses there are the Seafood Industry Training Package (SITP) competency-based training programs for the aquaculture industry that have been developed by Seafood Training Australia (AFFA 2002).

There are no fish farms owned by scientific and research institutions. Some experiments dealing with fish nutrition and selection and production of endemic species have been carried out, but this is not sufficient.

Trends, issues and development

The industry set itself a vision at a National Aquaculture Workshop held in Canberra in August 1999, which stated that by 2010 a vibrant and rapidly growing Australian aquaculture industry will achieve US\$ 1,86 billion in annual sales by being the world's most efficient aquaculture producer.

Major issues expected to influence growth were identified and discussed at the workshop. Issues identified as highest priority were:

- Industry coordination and organisation.
- Promoting the industry and ensuring it had access to resources.
- Environmental issues.
- Markets and marketing.
- Research and development.

At the workshop the industry also identified the need for some form of national framework or action plan to develop recommendations and implement activities to enhance the sectors growth.

The Commonwealth Government responded to this need by announcing an Aquaculture Action Agenda initiative to increase the growth prospects of the industry. Under the Action Agenda, industry and governments have worked together from 2002 to identify and undertake key activities that will enhance the industries sustainable competitive advantages.

The Commonwealth Government, in partnership with State and Territory Governments and the Australian aquaculture industry, has established a National Aquaculture Development Committee to develop and implement the Aquaculture Action Agenda and to act as a high level advisory body to the aquaculture industry and governments.

The Implementation Committee has made significant progress towards implementing the 10 strategic initiatives identified, these being:

Strategic initiative 1

Making a National Aquaculture Policy Statement- The launch of a National Aquaculture Policy Statement that commits the Australian and State and Territory government to work in partnership with the aquaculture industry to achieve sustainable growth.

Strategic initiative 2

Promoting a regulatory and business environment that supports aquaculture

Strategic initiative 3

Implementing an industry driven Action Agenda

Formation of a peak industry body, the National Aquaculture Council (NAC).

Launch of the Australian Aquaculture web portal to centralise the growing body of information, research and business opportunities in the Australian aquaculture industry.

Strategic initiative 4

Growing aquaculture within an ecologically sustainable framework

The report "Assessment and Reporting of the Ecologically Sustainable Development of Australian Aquaculture - an Industry Perspective" has been published. The report can be viewed at the following link:

www.australian-aquacultureportal.com/action_agenda/pdf/esdreport.pdf

Strategic initiative 5

Protecting the aquaculture industry from aquatic diseases and pests

Agreement has been reached between governments and aquaculture industries on the funding for the implementation of AQUAPLAN 2005-2010.

The Aquatic Animal Welfare Guidelines - "Guidelines on welfare of fish and crustacea held in live holding systems for human consumption" has been published. It can be viewed at the following link:

http://www.australian-aquacultureportal.com/action_agenda/pdf/aawelfare.pdf

Strategic initiative 6

Investing for growth

A booklet has been produced (in cooperation with Invest Australia) that outlines the strengths of the Australian aquaculture industry to international investors.

Strategic initiative 7

Promoting aquaculture products in Australia and globally

The first stage of a marketing and promotions strategy for the aquaculture industry has been completed.

DAFF has provided over US\$ 0,75 million to the second stage of this initiative to fund a Marketing and Branding Aquaculture Industry Action Agenda project

Strategic initiative 8

Tackling the research and innovation challenges

A project has been completed that looks at research and development issues relating to the Australian aquaculture industry. The Australian Aquaculture Research and Innovation strategy report presents an innovation policy framework for the Australian aquaculture industry. The framework identifies and recommends four innovation pathways for sustainable development of the industry.

The report can be viewed at the following link:

www.australian-aquacultureportal.com/action_agenda/pdf/rdreport.pdf

Strategic initiative 9

Making the most of education, training and workplace opportunities

A report 'Making the most of Education, Training and Workplace Opportunities for the Australian Aquaculture Industry' has been published and presents an assessment of current and projected needs to support growth in the Australian aquaculture industry. This report can be viewed at the following link:

www.australian-aquacultureportal.com/action_agenda/pdf/etreport.pdf

Strategic initiative 10

Creating an aquaculture industry for all Australians

The Indigenous Aquaculture Unit was established within DAFF in mid 2003, and includes an officer from the Aboriginal and Torres Strait Islander Services. The IAU looks at funding projects that will encourage and provide training and/or jobs to get Indigenous people and communities involved in the aquaculture industry.

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Related links

[FAO FishStatJ – Universal software for fishery statistical time series](#)

[FRDC \(Fisheries Research & Development Corporation\)](#)

[National Fishing Industry Education Centre](#)

[Oyster Farmers' Association of NSW Ltd](#)

