

Pearling and Aquaculture

General Overview

The State's commercial aquaculture industry is dominated by South Sea pearl production in the north, mussels and algae production for beta carotene on the west coast, and freshwater crayfish in the southern inland bioregion. Production of species such as non-maxima pearl oysters, edible oysters and abalone continues to increase.

Pearling Activities

The culture of pearl oysters of the species *Pinctada maxima* has been a major success. Centred on Broome, the pearling industry has operated since the 1880s, initially as a source of mother-of-pearl and more recently as Australia's largest and most successful aquaculture sector, producing quality South Sea pearls. The industry has continued to develop with a sound management base, with farms operating from Exmouth Gulf through to the Northern Territory border.

Aquaculture Activities

The level of activity and interest in aquaculture remained high with a diverse range of aquaculture enterprises operating throughout Western Australia. These included the production of algae for beta carotene, mussels, yabbies, marron, freshwater finfish and non-maxima pearl oysters. Development work and commercial production continued for marine finfish, abalone, edible oysters, pearl oysters of the species *Pinctada albina* and *Pinctada margaritifera* and trochus. Prawn farming is considered to have significant potential, with two farm sites already licensed and the assessment of one other proceeding. Better genetic strains, feeds and stock management were developed for yabby farming. The first stage of identifying potential sites for land-based abalone aquaculture has been completed, and the large-scale

mariculture site identification study being undertaken for the Aquaculture Development Council is nearing completion.

Aquaculture Development Initiative

Fisheries WA is responsible for implementation of the Government's aquaculture development initiative, in consultation with the Aquaculture Development Council and the Aquaculture Council of WA.

An aquaculture plan for the Recherche Archipelago was finalised during 2000/2001, and aquaculture plans for Shark Bay and Exmouth Gulf are being prepared. A large number of licence applications for species such as marron and freshwater finfish continued to be assessed for freehold land. Significant resources were directed to the public consultation and assessment process for coastal water applications under Ministerial Policy Guideline no. 8. Work also focused on the preparation of guidelines for the granting of aquaculture leases, drafting of lease documentation and administrative work associated with translocation and shellfish quality assurance.

Aquaculture development in regional areas focused on the provision of extension services and technical advice to existing operators and prospective investors. This work was undertaken predominantly by regionally based Development Officers, with additional specialist technical advice from research staff. Fostering of Aboriginal aquaculture was also a major activity, particularly with the multi-species hatchery under construction in Broome.

The agency maintained strong linkages with peak industry bodies and the relevant management advisory committees. Twelve projects were supported through the Aquaculture Development Fund (ADF) during 2000/2001, utilising funds in excess of \$115,000.

Key Achievements

- A substantial increase in the number of aquaculture licences (438 at 30 June 2001).
- Continued implementation of the Government aquaculture development strategy.
- Completion of an aquaculture plan for the Recherche Archipelago.
- Expansion of the aquaculture research team, closely linked to industry and external research funding.
- Revision and expansion of the 'Aquaculture WA' series and other major advisory publications on key aquaculture species.
- Public release of a report on pearling legislation under National Competition Policy agreements.
- Introduction of the Vessel Monitoring System in Zone 1 to enable more accurate monitoring of wild stock catches in the pearl oyster fishery.
- Upgrading of the aquaculture pages on the Fisheries WA website.
- Development of a statewide aquaculture enquiry database.
- Final stages of development of an internet-based input-output model for sea-cage and pond aquaculture (ADF project).
- Commencement of an implementation plan for an Expression of Interest process through the Department of Land Administration to enable aquaculturists to gain access to identified sites for abalone aquaculture.
- Completion of a risk analysis of larval escape through abalone culture effluent systems.
- Refurbishment and expansion of the South West Freshwater Research and Aquaculture Centre at Pemberton.
- Achievement of export status for three shellfish growing sites in Western Australia.
- Facilitation of the construction of a \$3.2 million multi-species hatchery on a site at the Broome Tropical Aquaculture Park.
- Establishment, with the University of WA, of a major marron genetics and aquaculture research facility at Shenton Park (ADF and FRDC project).
- Participation in the second annual MusselFest at Rockingham.
- Development (with industry) of a broodstock conditioning system for greenlip abalone.



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West Coast Bioregion

Regional Management Overview

The principal aquaculture activities in the west coast bioregion are the production of blue mussels (*Mytilus edulis*), and marine algae (*Dunaliella salina*) for beta carotene production. Fisheries WA manages mussel farming in Cockburn Sound in accordance with an agreement between the Minister for Fisheries and the Fremantle Port Authority. Tenure for the existing farming sites at the Kwinana Grain Terminal expired in December 1999 and Fisheries WA secured an alternative farming site at Southern Flats within Cockburn Sound. Production is increasing at this site. The pearling industry utilising blacklip pearl oysters (*Pinctada margaritifera*) has also commenced in the Abrolhos Islands.

The WA Shellfish Quality Assurance Program (WASQAP) monitors and regulates the quality of shellfish harvested in Western Australia for domestic and export markets. The WASQAP is conducted jointly with industry and the WA Health Department. The program involves regular sampling of bivalve shellfish-growing areas for toxic algae and faecal coliform bacteria in order to monitor shellfish quality and the classification of new shellfish growing areas. The two principal areas used for the production of shellfish in Western Australia, Cockburn Sound and Oyster Harbour near Albany, have been classified in accordance with the procedures outlined in the WASQAP and have been given approval by the Australian Quarantine and Inspection Service (AQIS) for export status.

Activities during 2000/2001 included the completion and submission to AQIS of triennial reports on the suitability of the WASQAP for maintaining the quality of harvested shellfish in Western Australia, an annual audit of the WASQAP by AQIS and the classification of a new growing area in Cockburn Sound.

Aquaculture in the Abrolhos Islands is a carefully managed, sustainable and productive new industry. In the past year, aquaculture has expanded in line with the recommendations of the aquaculture plan for the Islands (Fisheries WA 2000b), with licensees primarily engaged in the culture of black pearls. Currently there are over 1,000 ha licensed for the culture of pearl oysters, of which 21% is utilised, carrying over 210,000 shell. Site utilisation in the Abrolhos Islands is set to increase, with average projected growth per licence approximately 45% over the next 12 months.

Trial harvests of pearls from Abrolhos Islands pearl oysters have proven that product of acceptable quality can be produced and is readily sought in the market. The colour of Abrolhos Islands pearls is quite different to that of Pacific black pearls. The distinctive colour is likely to be the result of a combination of genetic differences and site-specific nutritional variation, and may prove to be a useful marketing tool.

As large numbers of young shell are now approaching operable size, the number of seeded shell is likely to increase fourfold in the next two years and to exceed

100,000 shell in three years. This dramatic increase in production will lead to a higher profile for black pearls produced in Western Australia.

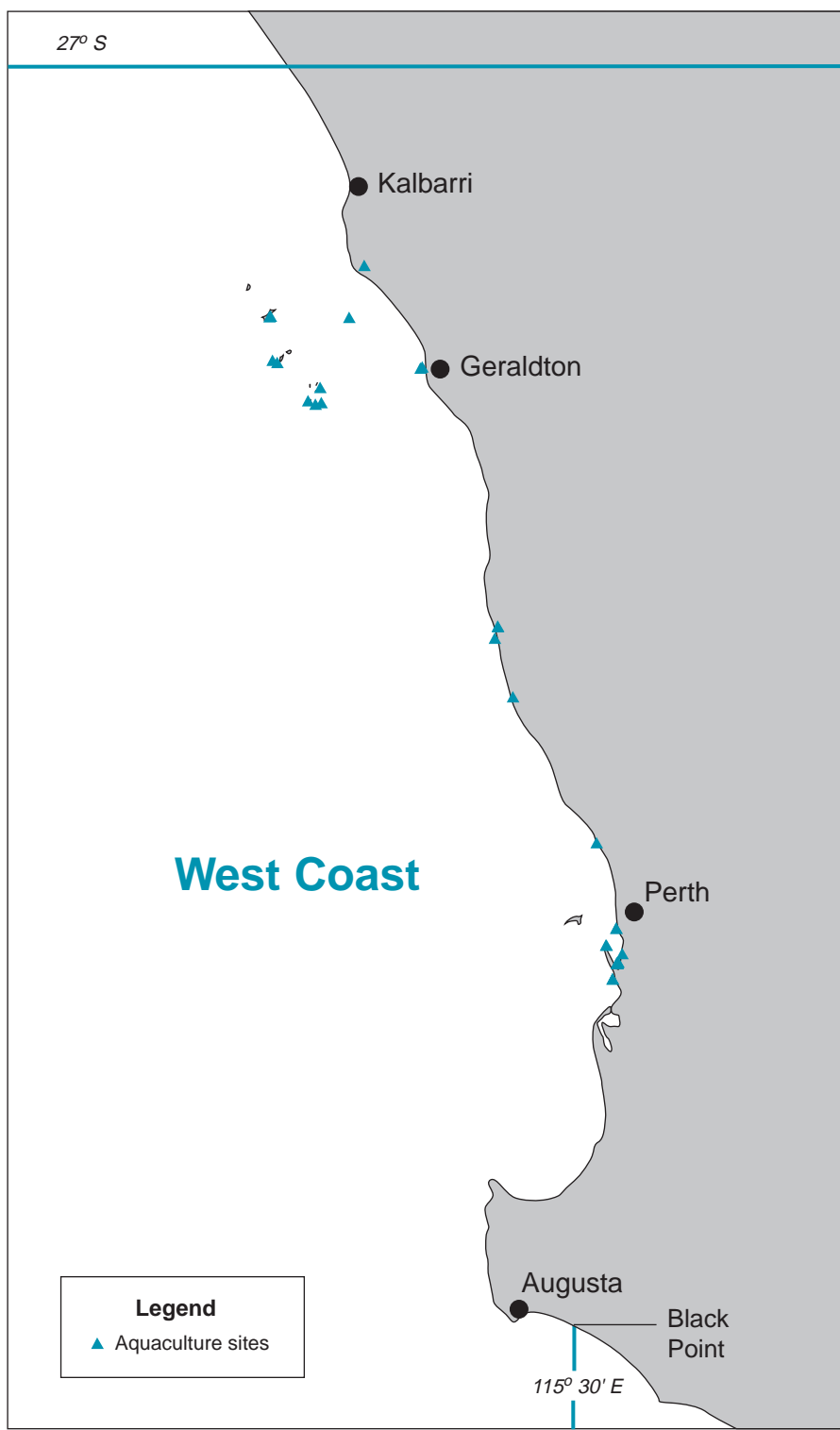
West Coast Aquaculture Figure 1 shows the major licensed aquaculture sites in this bioregion.

Regional Compliance and Extension Overview

Compliance activities were focused on ensuring the successful relocation of mussel farms to Southern Flats and adherence to licence conditions. In particular, resources were directed at ensuring compliance with navigational marking requirements, boundaries of leases and correct procedures for translocation of fish species. Resources also continued to be directed to shellfish quality assurance within Cockburn Sound. Extension activities included public enquiries, participation in a second highly successful mussel festival at Rockingham, technical support – particularly for black pearl farmers in the Abrolhos Islands – and site identification work.

Regional Research Overview

Around Perth, activities include joint research with the WA Maritime Training Centre (WAMTC) on marine finfish and abalone aquaculture. A further collaborative project with WAMTC and Agriculture WA, with funding support from the Grains Research and Development Corporation and Grains Research Council, involves the evaluation of local agricultural products such as lupins and canola in aquaculture feeds. Environmental research on the impact of sea cage farming of snapper and rainbow trout is being conducted with the University of Stirling, Scotland. Joint work with Curtin University (funded by the ADF and FRDC) is aimed at rearing rock lobster larvae and assessing the potential for growout of wild-caught pre-juveniles (puerulus). Joint research with other universities is fostering husbandry, disease and nutritional research for marine aquaculture. Collaborative efforts with industry are aimed at producing a commercial supply of artemia (brine shrimp) cysts, for marine hatcheries, from microalgae production units (established for extracting beta carotene).



WEST COAST AQUACULTURE FIGURE 1

Map showing the major licensed aquaculture sites of the west coast bioregion.



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Mussel Farming

Mussel Farming Status Report

Prepared by G. Maguire

INDUSTRY DESCRIPTION

Production areas

Mussel farms are found in Cockburn Sound and Warnbro Sound (as well as in the Albany harbours and King George Sound in the south coast bioregion). Resource-sharing issues are a major constraint to securing additional sites in protected and productive areas. Additional area has been negotiated in the Southern Flats area of Cockburn Sound to give the Cockburn Sound mussel farmers more secure access to productive growing areas.

Production method

Vertical rope and bag culture on longlines.

AQUACULTURE PRODUCTION

Production current season (1999/2000): 683 tonnes

Number of producers for year 1999/2000: 11

**Production projection next year (2000/2001):
800–1,000 tonnes**

ECOSYSTEM EFFECTS

Low risk because there is no addition of feeds. Faecal wastes are far less likely to cause high organic loadings on the sea bed in Western Australia than in other mussel industries, as mussel lines are more widely separated in response to low food levels.

SOCIAL EFFECTS

Small industry as a direct employer. Few social effects other than to attract recreational fishers for finfish.

ECONOMIC EFFECTS

**Estimated annual value (to producers) for year
1999/2000: \$1.69 million**

INDUSTRY GOVERNANCE

Licence approvals are required and regular site inspections are carried out to ensure farmers are operating within their site coordinates and that their site is clearly marked for marine safety compliance.

The mussel industry must also meet the requirements of the WA Shellfish Quality Assurance Program.

EXTERNAL FACTORS

Production levels for this species are related to dissolved nutrient levels which provide the basis for phytoplankton, the main food of mussels. Productive areas are therefore generally protected waters where nutrients from terrestrial sources raise the food levels above those in coastal waters dominated by the low-nutrient, tropical Leeuwin Current.

Gascoyne Coast Bioregion

Regional Management Overview

The Gascoyne coast bioregion includes the areas of inner Shark Bay (Denham), outer Shark Bay (Carnarvon), and Exmouth Gulf. Whilst the production of pearls and pearl oysters remains the primary coastal aquaculture activity, there has been recent development in the production of a range of aquaculture species.

Culture of marine invertebrates including prawns and sea cucumbers has progressed significantly with the successful production of prawn post-larvae in the Exmouth area. Sea cucumber culture has advanced with the installation of hatchery facilities and the collection of biological data on broodstock.

Research and development of techniques for the aquaculture production of Serranid finfish (e.g. estuary cod) continues in the Gascoyne, with improvements to broodstock handling increasing the yield of gravid females; however, significant impediments to increased production of this species include synchronous production of ripe males and efficient control of environmental parameters such as salinity. The production of ornamental aquarium fish is an important parallel to food fish culture in the Gascoyne.

Hatchery production of *Pinctada maxima* pearl oysters is of critical importance in this region, where recruitment of oysters in the wild is irregular. Two hatcheries, one in Carnarvon and one in Exmouth, are producing significant quantities of spat to supply pearl farms in Exmouth Gulf and the Montebello Islands.

Black pearl production through culture of *P. margaritifera*, *P. albina* and *P. penguin* species has expanded, with farms increasing carrying capacity and also holding greater numbers of 'seedable' shell. Areas that suffered heavy stock and equipment losses during cyclones in recent years have rebuilt farms and stock numbers. Increased levels of technical skill and commercial experience among pearl farmers throughout the Gascoyne are being translated into improved growth rates and lower production costs. The volume and quality of black pearls from trial harvests have improved every six months as the number of suitably sized oysters at these farms accumulates and husbandry skills are gained. Market response to the Western Australian product has been very promising, with premium prices paid for locally mounted value-added product.

Management activities during 2000/2001 included the facilitation of meetings and the development of grower groups in regions with a concentration of aquaculture licensees, and fine tuning and implementation of policy relating to the collection of non-*maxima* pearl oyster spat. Aquaculture licensing advice, and assessment of applications for licences or variations to licences, remained important responsibilities of management in the Gascoyne region. Liaison with growers and the provision to them of information, advice and assistance continued through field visits and remote communication.

Gascoyne Coast Aquaculture Figure 1 shows the major licensed aquaculture sites in this bioregion.