

PEARLING AND AQUACULTURE



General Overview

The Pearling and Aquaculture Program is responsible for the management of the pearling and aquaculture sectors throughout Western Australia.

The production of South Seas pearls dominates the commercial aquaculture industry in Western Australia.

Pearling Activities

The Pearling Sub-Program is responsible for the development, implementation and review of management of the *Pinctada maxima* pearling industry. Its projects relate to the management of the wild-capture pearl oyster fishery and the hatchery sector; research and monitoring of the wild pearl oyster stocks; disease management; compliance and education; and lease and licence assessment and administration.

The Sub-Program provides executive support to the Pearling Industry Advisory Committee (PIAC), a statutory management advisory committee established under the *Pearling Act 1990*, and its sub-committees. Strong linkages are also maintained with the peak industry representative body, the Pearl Producers Association.

The management of pearling is discussed in detail under the north coast bioregion (pp. 173–174).

Aquaculture Activities

The Aquaculture Sub-Program is responsible for implementation of the Government's aquaculture development initiative. It provides support to the Aquaculture Development Council (ADC), a statutory management advisory committee established under the *Fish Resources Management Act 1994*, and its associated sub-committees.

Excluding *Pinctada maxima* and marine algae, the total increase in value and tonnage of aquaculture product for 2000/01 were 13% and 30% respectively, compared to 1999/2000. Commercial aquaculture enterprises in Western Australia include production of mussels, edible oysters, marron, yabby, trout, algae (for beta carotene), barramundi, abalone, ornamental fish and non-*maxima* pearl oysters.

The first commercial harvest of black pearls from Shark Bay and the Abrolhos Islands was an important step in the development of this new industry for Western Australia. The quality of the pearls has been encouraging.

The first commercial hatchery production of scallop spat and the 'seeding' of an aquaculture site off Geraldton in the Mid West Region is an exciting first step in the process of developing a new industry.

The approval by the Department of Environmental Protection of an increase in barramundi production at Lake Argyle from 100 tonnes to 600 tonnes per year is a very important step in the development of a significant aquaculture industry on the lake.

The establishment of 'new' mussel farms on the Southern Flats site in Cockburn Sound is important for the growth of what is becoming a very important industry.

The successful capture of *Penaeus monodon* prawn broodstock and the production of post-larvae in Broome is an important milestone, underpinning the development of the prawn aquaculture industry in Western Australia.

Prawn farming is also being developed, with three farms licensed but not yet built. Prawn farming is positioned to be a major contributor to regional economic development and employment in the next few years.

Following a process led by the Department of Fisheries, the Department of Land Administration has released an expression of interest for groups interested in working with indigenous communities in the Dampier Peninsula for the development of prawn aquaculture opportunities.

The establishment of a 60 tonne abalone growout farm at Bremer Bay, combined with excellent progress made at the established hatchery at the Albany Aquaculture Park, will provide a basis for the establishment of major industry in years to come. It is anticipated that in the next few years,



another three or four ventures will begin development. There is potential for the abalone aquaculture sector to have a higher value of production than the wild-caught sector in the future.

During 2001/02, 12 new aquaculture licences were issued for sites in coastal waters, 11 for reef reseeding of trochus. Two new larger-scale aquaculture licences were issued, including one for a 650 hectare prawn farm near Derby. Three new marine-based aquaculture licences are being assessed.

The Department assessed 48 new applications, 14 variations and nine transfers for licences on freehold land during the year. Public consultation and assessment of coastal water applications under Ministerial Policy Guideline no. 8 also continued.

The major policy outcomes for the year were:

- completion of land-based site identification process for abalone and finfish;
- development of a policy paper with the WA Police Service concerning the theft of aquaculture stock from farm dams;
- preparation of guidelines for aquaculture leases;
- development of a draft policy position on the issuing of long-term licences for the aquaculture industry in Western Australia; and
- finalisation and implementation of Fisheries Management Paper no. 159 (Thorne 2002) on the translocation of barramundi.

Considerable effort on shellfish quality assurance resulted in continued export approval for three growing sites and the commencement of sampling protocols for an additional mussel farm and a growout site for tropical clams.

Research was undertaken in a range of areas, including freshwater crustaceans, finfish, abalone, rock lobster and nutrition. Major project funding was received for research projects including:

- marron genetic improvement and husbandry;
- improved fees for larval finfish;
- using lupins and canola in aquaculture feeds;
- training farm managers and constructing ponds for freshwater aquaculture;

- identifying potential for aquaculture by indigenous communities;
- identification of large-scale potential sites for land-based aquaculture; and
- developing tools for detecting fish and prawn viruses and modelling nutrient release from aquaculture facilities.

Major advisory and extension publications on key species were revised and the number of aquaculture publications held by the Department's library was increased. Fish health diagnosis and management is another important function of the Aquaculture Sub-Program, which also collected and collated aquaculture production returns from all industry sectors.

Aquaculture development in regional areas focused on the provision of extension services and technical advice to existing operators and prospective investors. These services were provided by regionally based Aquaculture Development Officers who work closely with individual proponents and existing licensees.

The Kimberley Aquaculture Aboriginal Corporation \$3.2 million multi-species hatchery has been completed at the Broome Tropical Aquaculture Park. A hatchery for the production of trochus was established with an Aboriginal community in the Kimberley in 2000. A project to work with Aboriginal communities to identify land-based sites for prawn aquaculture has been commenced, with a view to promoting aquaculture development.

The growth in the granting of aquaculture licences is extremely encouraging. As of 30 June 2002, the Department of Fisheries had issued 462 aquaculture licences – a 6% increase on the previous year (438).

Licence growth of 387.5% since 1994 gives a clear indication of the level of interest and human activity in the aquaculture sector in Western Australia. This figure understates the level of involvement in aquaculture, given that yabby farmers generally do not require an aquaculture licence and anecdotal evidence suggests that interest and activity have increased substantially in this area. In addition, around 200 agricultural farmers have participated in growout trials of rainbow trout in farm dams, in a project known as 'Outback Ocean'.

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, and the emerging black pearl industry based on the production of *Pinctada margaritifera* at the Abrolhos Islands and Shark Bay.

The Department of Fisheries manages mussel farming in Cockburn Sound in liaison with the Fremantle Port Authority and is currently negotiating with farmers a process for reallocation of farm sites. The tenure for farmers operating at the Kwinana Grain Terminal has been uncertain for some time. Consequently the Department of Fisheries secured an alternative farming site at Southern Flats within Cockburn Sound two years ago. The Department is currently discussing an additional 12 ha of water at this site, following the loss of a farm site within the waters controlled by the Royal Australian Navy. Mussel production in Cockburn Sound reached 964 tonnes in 2000/01, an increase of 30% on the previous year's production.

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 Department of Health. The program involves regular sampling of bivalve shellfish-growing areas for toxic algae and contaminating bacteria in order to monitor shellfish quality and permit the classification of 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 are approved for export status by the Australian Quarantine and Inspection Service (AQIS).

Activities during 2001/02 included the completion and submission to AQIS of update reports on the farm sites at the Kwinana Grain Terminal and Oyster Harbour. AQIS conducted its annual audit of the WASQAP in March 2002. Following the submission of a sanitary survey report, AQIS also gave unconditional approval for the export of product from the new growing area of Southern Flats.

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 2000), with seven licensees engaged in the culture of black pearls. Currently there are over 1,300 ha licensed for the culture of pearl oysters in the Abrolhos Islands, with site utilisation set to increase. It is estimated that the average projected growth in site utilisation per licence will be approximately 45% over the next 12 months, based on the projected increase in the number of longlines.

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.

Over the last 12 months, development of saucer scallop (*Amusium balloti*) aquaculture through reseedling of hatchery-produced spat on to the seabed has taken an exciting step forward. The successful deployment of approximately one million saucer scallops on a site in the Geelvink Channel off Geraldton in January 2002 was a first for Australian saucer scallop enhancement.

Experience and innovation in identification of good quality broodstock, spawning induction techniques, and rearing/handling of saucer scallop larvae and spat, is providing increased security for the scaling up of production. Spawns from early January 2002 provided sufficient spat to conduct the first saucer scallop reseedling trials undertaken in Australia. The rapid growth in the larval phase led to settlement at around 9–11 days and a further 10–15 days in culture prior to reaching the 1 mm shell size suitable for handling and seeding. After settlement and prior to seeding, spat were examined by the Department's Fish Health Section and certified disease-free.

On the day of transport, spat were harvested from the settlement tanks, counted, placed in the transport container and transferred to the licensed site for deployment on the bottom. Once anchored, the spat were pumped to the seabed through a hose where it is hoped they will grow out to a harvestable size within 12–18 months. Further surveys are planned in 2002 to determine the survival rate of scallops from this deployment.

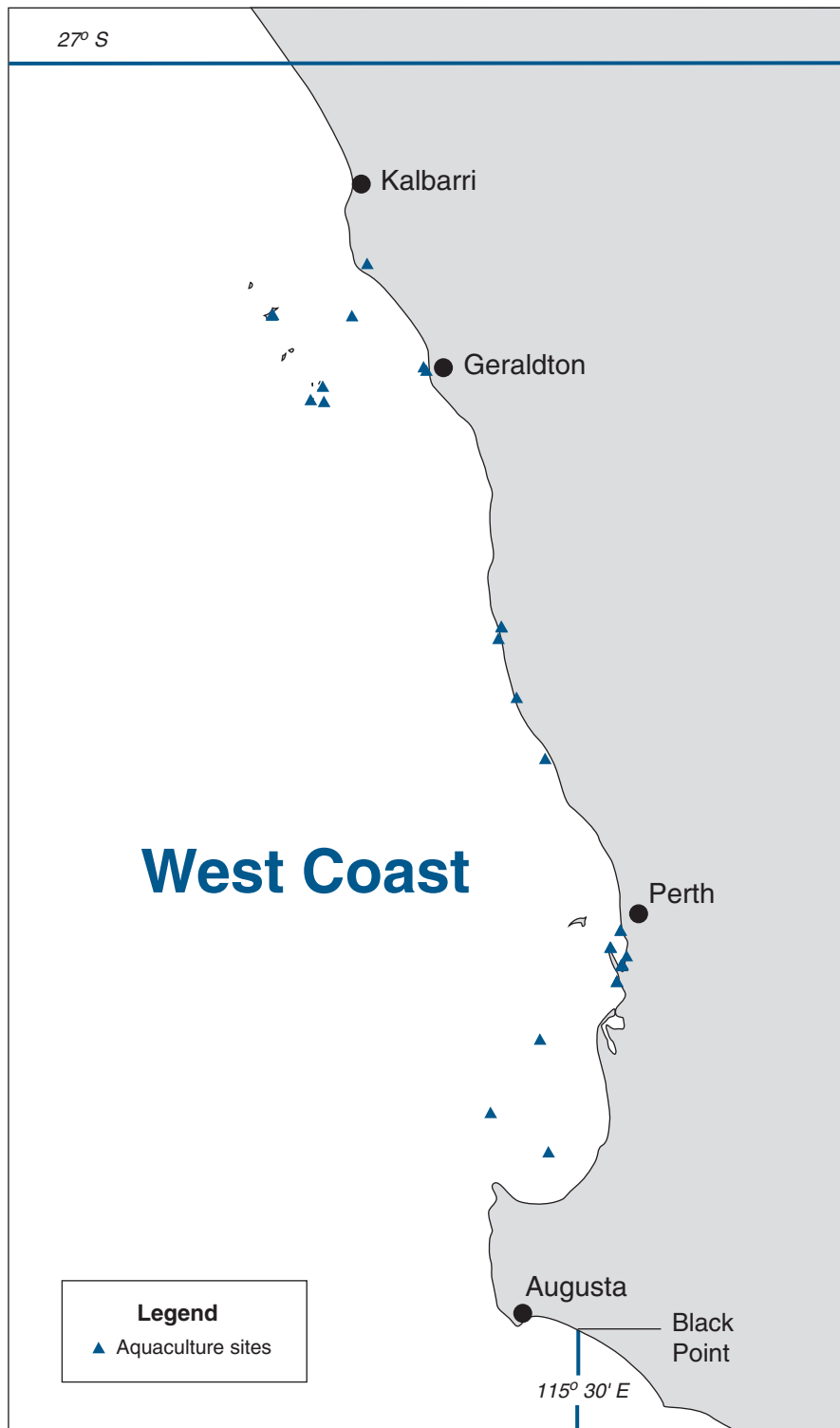
West Coast Aquaculture Figure 1 shows the major licensed aquaculture sites in this bioregion.

REGIONAL DEVELOPMENT AND COMPLIANCE OVERVIEW

Development activities during 2001/02 included public enquiries, technical support – particularly for black pearl farmers in the Abrolhos Islands – and site identification work. Small-scale 'on farm' experimentation and environmental monitoring has identified preferred methods of pearl oyster nursery culture at the Southern Group of the Abrolhos Islands. Subsequent trials under way are comparing a range of husbandry techniques used by the growers in the region and these results will be provided to growers through presentations at future industry meetings.

Further technical extension was provided to the Geraldton scallop hatchery through assistance in the development of more efficient larval rearing practices. Several experiments were conducted leading to the identification of optimal incubation gamete density and husbandry techniques for scallop larvae that would increase yield by more than 20%.

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.



WEST COAST AQUACULTURE FIGURE 1

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

REGIONAL RESEARCH OVERVIEW

Around Perth activities included joint research with the WA Maritime Training Centre (WAMTC) on marine finfish and abalone aquaculture, which has produced encouraging results especially with hatchery and nursery phases for yellowtail kingfish (*Seriola lalandi*) culture. Snapper (*Pagrus auratus*) and kingfish larvae have been reared in an excellent new larval rearing system designed by research staff for joint research with WAMTC and James Cook University (part-funded by FRDC). Finfish and fish health staff have provided very useful support for successful, pilot-scale farming trials with mahi mahi (*Coryphaena hippurus*). Further collaborative effort with WAMTC and the Department of Agriculture, with funding support from the Grains Research and Development Corporation and Grains Research Council, involved completion of projects on evaluation of local agricultural products such as lupins and canola in aquaculture feeds. This information is being communicated to feed companies and nutritionists worldwide through website-based reviews, international trade presentations, joint trials in France and numerous scientific and popular publications.

Field research on the environmental impact of sea-cage farming of snapper and rainbow trout (*Oncorhynchus mykiss*) in experimental cages in Fremantle Harbour has been completed with the University of Stirling, Scotland, and showed that fish and benthic animals can utilise much of the waste nutrients from sea cages. Laboratory trials have been completed with the University of WA aimed at customising feed design for snapper to meet environmental challenges posed by different farming systems. An internet-based input-output model was developed for predicting growth and waste output, for a range of species, diets and water temperatures. This was a joint project with Israeli and University of WA collaborators. It incorporates results from the above snapper and rainbow trout research and was funded by the Aquaculture Development Fund (ADF).

Joint laboratory and field trials with Curtin University (part-funded by the ADF and FRDC), aimed at rearing western rock lobster (*Panulirus cygnus*) larvae and assessing the potential for growout of wild-caught pre-juveniles (puerulus), have been completed. Joint research with other universities is fostering husbandry, disease and nutritional research for marine aquaculture. Several of these joint projects with universities are now being written up as PhD theses.

MUSSEL FARMING

MUSSEL FARMING STATUS REPORT

Prepared by G. Maguire

INDUSTRY DESCRIPTION

Production areas

Mussel (*Mytilus edulis*) 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. Production has

commenced in the Southern Flats area of Cockburn Sound where mussel farmers now have more secure access to productive growing areas.

Production method

Vertical rope and bag culture on longlines.

AQUACULTURE PRODUCTION

Production current season (2000/01): 964 tonnes

Number of producers for year 2000/01: 14

Production projection next year (2001/02):
800–1,000 tonnes

ECOSYSTEM EFFECTS

Mussel farms present a low risk to the environment because there is no addition of feeds. Secondly, faecal wastes from the farms are far less likely to cause high organic loadings on the sea bed in Western Australia than in other mussel industries, as local mussel lines are more widely separated in response to low food (plankton) levels. Monitoring of impact on seagrass beds below mussel lines at Albany indicated negligible impact. In Cockburn Sound, large pink snapper which aggregate in the area to spawn are attracted to the mussel farms and are thought to consume significant amounts of mussels. This is a major cause of concern to farmers, who are investigating methods to deter the fish.

SOCIAL EFFECTS

The industry provides direct employment to 40–50 personnel and adds valuable diversity to the Western Australian seafood industry.

ECONOMIC EFFECTS

Estimated annual value (to producers) for year 2000/01:
\$2.27 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.