



Australian Government
Productivity Commission

Assessing Environmental Regulatory Arrangements for Aquaculture

Productivity
Commission
Research Paper

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ISBN 1 74037 141 0

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An appropriate citation for this paper is:

Productivity Commission 2004, *Assessing Environmental Regulatory Arrangements for Aquaculture*, Canberra.

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Foreword

Aquaculture is a diverse and rapidly growing industry in Australia, with a significant regional presence. Australian governments see ecologically sustainable aquaculture as an industry of the future.

The Commission's research consultations with government and non-government bodies identified environmental regulatory arrangements for aquaculture as an important issue for examination. Previous Commission research on the Great Barrier Reef catchment also identified issues with environmental regulatory arrangements for aquaculture in Queensland.

The present study reviews existing planning and environmental regulatory arrangements for aquaculture in Australia. It reveals significant differences in the way that aquaculture is regulated and administered across states. The regulations and their jurisdictional differences have implications for both the management of aquaculture and the efficiency of resource allocation.

This study raises questions about how best to improve regulatory arrangements for aquaculture and address various constraints on the industry. It is intended to complement other developments relevant to the Australian aquaculture industry, including the implementation of the national *Aquaculture Industry Action Agenda*, and several state-based reviews of regulatory arrangements for aquaculture.

The Commission is grateful to those who assisted it in preparing this study and welcomes further feedback on it.

Gary Banks
Chairman

February 2004

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Acknowledgments

This paper was prepared with the assistance of Phil Hughes, Andrew Dolling, Michael Schuele and Annette Weier. The development of the paper was guided by Deborah Peterson and overseen by Commissioner Neil Byron. Several other staff members, including Richard Clarke, Jonathan Pincus and Darrell Porter, provided additional input. Vicki Thompson provided administrative and production support.

The paper benefited from helpful comments and suggestions from three external referees, Dr Wendy Craik, ACIL Tasman, Dr Patrick Hone, Fisheries Research & Development Corporation, and Ms Carolyn Tanner, University of Sydney.

In undertaking this research, the Commission was assisted by many organisations and individuals, both in gathering information for the study and commenting on draft reports. The Commission is grateful for their input.

Abbreviations and explanations

Abbreviations

AAIAA	Australian Aquaculture Industry Action Agenda
ABARE	Australian Bureau of Agricultural and Resource Economics
AIDP	Aquaculture industry development plan
ALOP	Appropriate level of protection
AMA	Aquaculture management area
APFA	Australian Prawn Farmers Association Inc
AQIS	Australian Quarantine and Inspection Service
ARRTF	Aquaculture Regulatory Reform Task Force (Victoria)
ATAB	Aquaculture Tenure Allocation Board (South Australia)
BRS	Bureau of Rural Sciences
CCNSW	Coastal Council of New South Wales
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COAG	Council of Australian Governments
COP	Codes of practice
CPCC	Coastal Planning and Coordination Council
DAC	Development Assessment Commission (South Australia)
DAFF	Department of Agriculture, Fisheries and Forestry (Australian Government)

DEC	Department of Environment and Conservation (New South Wales)
DEH	Department for Environment and Heritage (South Australia)
DIPNR	Department of Infrastructure, Planning and Natural Resources (New South Wales)
DNRM	Department of Natural Resources and Mines (Queensland)
DOL	Department of Lands (New South Wales)
DOLA	Department of Land Administration (Western Australia)
DPI	Department of Primary Industries
DPIWE	Department of Primary Industries, Water and Environment (Tasmania)
DSE	Department of Sustainability and Environment (Victoria)
DWLBC	Department of Water, Land and Biodiversity Conservation (South Australia)
EAB	Environmental assurance bond
EC	European Commission
ECC	Environment Conservation Council (Victoria)
EDO	Environmental Defenders Office
EEZ	Exclusive economic zone
EIS	Environmental impact statement
EMS	Environmental management system
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
ERA	Environmentally relevant activities
ESD	Ecologically sustainable development

FAO	Food and Agriculture Organization of the United Nations
FHMC	Fish Health Management Committee
GBRMPA	Great Barrier Reef Marine Park Authority (Australian Government)
HRC	New South Wales Healthy Rivers Commission
IDAS	Integrated Development Assessment System
ILUA	Indigenous Land Use Agreement
IPA 1997	<i>Integrated Planning Act 1997</i> (Queensland)
IRA	Import risk assessment
ISO	International Organization for Standardization
JCPAA	Joint Committee of Public Accounts and Audit
LCC	Land Conservation Council (Victoria)
MCFFA	Ministerial Council on Forestry, Fisheries and Aquaculture
MFPA	<i>Marine Farming Planning Act 1995</i> (Tasmania)
MPA	Marine Parks Authority (New South Wales)
MSC	Marine Stewardship Council
NADC	National Aquaculture Development Committee
NCP	National Competition Policy
NOO	National Oceans Office (Australian Government)
NSW EPA	New South Wales Environment Protection Authority
NTA	<i>Native Title Act 1993</i> (Commonwealth)
OCAD	Office of the Commissioner for Aquaculture Development (Canada)
PIRSA	Department of Primary Industries and Resources South Australia

PMSEIC	Prime Minister's Science, Engineering and Innovation Council
QDPI	Queensland Department of Primary Industries
QEPA	Queensland Environmental Protection Agency
QFS	Queensland Fisheries Service
QPWS	Queensland Parks and Wildlife Service
RCB	Regional Coastal Board
RIS	Regulation Impact Statement
RMA	<i>Resource Management Act 1991</i> (New Zealand)
RPDC	Resource Planning and Development Commission
SAEPA	South Australian Environment Protection Authority
SCA	Southern Cross Aquaculture
SEPP	State environmental planning policy
SRRATC	Senate Rural and Regional Affairs and Transport Committee
TEMP	Tuna environmental monitoring program
VCC	Victorian Coastal Council
VEPA	Victorian Environment Protection Authority
WAEPA	Western Australian Environmental Protection Authority
WAPC	Western Australia Planning Commission
WTO	World Trade Organization

Explanations

Billion The convention used for a billion is a thousand million (10^9).

Glossary

Algal bloom	A sudden growth of algae in an aquatic ecosystem, either natural or induced by nutrient enrichment of waters due to pollution.
Aquaculture	Farming and culturing of aquatic organisms, such as fish, crustaceans, molluscs, and aquatic plants.
Benthic	Associated with the sea bed.
Best management practice	An economically viable management practice that has been determined to be a highly effective and practical means of preventing or reducing pollution.
Biodiversity	Broadly defined as the variety of all life forms, including genetic, species and ecosystem diversity.
Broodstock	Parent stock used in hatcheries.
Carrying capacity	The maximum population of a given organism that a particular ecosystem can accommodate on a sustainable basis.
Code of practice	Industry-developed guidelines for industry participants about ways to undertake environmental management.
Crustaceans	Invertebrate animals (mostly marine), including crabs, lobsters, shrimps, and barnacles.
Cost-effective	Achieves an objective at least cost.
Culture stock	Juveniles collected from ‘the wild’ for on-growing.
Diffuse pollution	Pollution for which it is difficult to identify the precise source, such as that linked to runoff from agricultural land.
Ecosystem	A community of organisms and the physical environment with which they interact.

Endemic	Native only to a particular area.
Environmental management system	A system that is used to manage environmental impacts on a methodical and continuous basis.
Estuary	A semi-enclosed coastal body of water where salt water from the open sea mixes with freshwater draining from the land.
Externality	A ‘spillover’ where the actions of an individual result in costs or benefits to others that the individual creating them does not bear.
Grandfathering	Maintaining initial entitlements.
Macrobenthic	The larger organisms of the benthos (sea floor), exceeding 1 mm in length.
Mariculture	Marine aquaculture. The farming or cultivation of fish, shellfish and other aquatic species using seawater as the growing medium.
Molluscs	Invertebrate, mostly aquatic animals with shells that can be univalve, bivalve or plated — includes oysters, mussels, and abalone.
Non-point source pollution	See diffuse pollution.
Phytoplankton	Small, often microscopic aquatic plants suspended in water that drift freely with the current.
Point source pollution	Pollution that arises directly from an identifiable source, such as a pipe or other conveyance.
Property rights	The bundle of ownership, use and entitlement rights and responsibilities that a user has over a good or resource, such as land.

Ramsar Convention	The Convention on Wetlands formally entitled ‘The Convention on Wetlands of International Importance, especially as Waterfowl Habitat’ was signed at an international conference in Caspian seaside town of Ramsar, Iran, in 1971.
Runoff	Materials carried by water discharged from land that enters a body of water.
Salmonid fish	Salmon and trout.
Seagrass	Flowering plants that grow underwater in coastal and marine environments. They form extensive beds or meadows, provide food and habitats for various species, and contribute to coastal stability.
Stocking density	Quantity of organisms farmed within a given area.
Transaction	Trade of an input, good, service, or asset between two or more individuals or firms.
Transaction costs	The costs associated with trade, such as those associated with collecting information, negotiating prices or contracts, monitoring performance, and enforcing contracts.
Translocation	Any assisted movement of an aquatic organism beyond its accepted distribution.
Water quality	The chemical, physical and biological condition of water.

OVERVIEW

Key points

- The aquaculture industry is diverse and each sector has different potential environmental impacts of varying degrees of significance.
- Aquaculture production is subject to an unnecessarily complex array of legislation and agencies — covering marine and coastal management, environmental management, land use planning, land tenure, and quarantine and translocation.
- State aquaculture and/or fisheries legislation have multiple objectives and these are not always clearly defined. The objectives may overlap or conflict, and there is often a lack of guidance as to the relative weights to be placed on each objective.
- State government departments primarily responsible for aquaculture regulatory arrangements often have potentially conflicting functions of policy development, implementation of regulation, industry promotion and development, and research.
- New South Wales, Queensland and Western Australia have made limited progress with marine aquaculture planning. This may constrain marine aquaculture, or result in ad hoc approvals for individual sites, and conflicts over resource use.
- In most jurisdictions, there are complex approval processes. Obtaining required approvals can take significant time. There would appear to be scope to rationalise the number of approvals, coordinate approval processes, and incorporate statutory timeframes for assessing approvals.
- Increased efficiency and effectiveness of regulatory arrangements for aquaculture could be obtained from greater use of environmental risk assessment based on species, production system, management practices, site location and the condition of the environment.
- There is potential for greater use of innovative policy instruments to complement (or in some cases replace) existing regulatory and administrative controls. For example, auctions could be used to allocate leases of public land or water, and tradeable permits could be used to manage pollution discharges.

Overview

Aquaculture production in Australia has grown rapidly over the last decade. This growth has brought a number of regulatory and environmental management challenges. One challenge is how to satisfy the increasing demand for access to land and water resources for aquaculture, while managing potential conflicts with other resource uses. This raises issues about property rights, resource access and resource allocation. A related challenge is how to manage potential environmental impacts without unnecessarily restricting the development of the aquaculture industry.

The Commission's purpose in this study has been to assess the appropriateness, efficiency, and effectiveness of planning and environmental regulatory arrangements covering marine and land-based aquaculture production in Australia. This study also considers the potential for alternative regulatory and non-regulatory approaches to complement or, in some cases, replace existing arrangements.

The study is intended to complement other developments relevant to the Australian aquaculture industry, including the implementation of the national *Aquaculture Industry Action Agenda*, and various state-based aquaculture reviews, such as those being conducted in Victoria, Queensland and Western Australia.

Aquaculture in Australia

'Aquaculture' is the farming and culturing of aquatic organisms, including finfish (such as salmon), crustaceans (such as prawns), molluscs (such as oysters), and aquatic plants (such as microalgae for betacarotene).

The aquaculture industry in Australia has grown rapidly in recent years, with most production occurring in marine and coastal areas. ABARE report that the value of aquaculture production increased from \$241 million in 1991-92 to \$733 million in 2001-02. This represents an annual real growth rate of around 11 per cent, the highest (although from a relatively small base) of any Australian primary industry. During this time, the aquaculture industry has become an important contributor to regional development and employment. Exports account for more than 60 per cent of the value of Australian aquaculture, with the main exports being pearls and southern bluefin tuna.

About 75 per cent of production in 2001-02 was accounted for by three species in three jurisdictions — tuna in South Australia (\$261 million), pearl oysters in Western Australia (\$175 million), and salmon in Tasmania (\$111 million). Other high value species were prawns in Queensland and New South Wales (\$65 million), and edible oysters in New South Wales, South Australia and Tasmania (\$57 million). Trout, barramundi, yellowtail kingfish, microalgae, mussels, freshwater crustaceans, and other species accounted for the remainder.

Potential environmental impacts

Environmental impacts from aquaculture vary according to the type of species farmed, type of production system, management practices used, location and number of farms, environmental carrying capacity, and condition and/or value of the environment. Potential environmental impacts can be classified as having either site location and construction impacts, or farm operation impacts (local and off-site), as illustrated in the following table.

Selected potential environmental impacts of aquaculture

<i>Production system/species</i>	<i>Potential site impacts</i>	<i>Potential operation – local impacts</i>	<i>Potential operation – off-site impacts</i>
Cage culture (eg tuna, salmon, yellowtail kingfish)	Habitat modification or loss; effects on amenity values	Marine floor degradation; lower water quality; disease; fish escape impact on wild stocks; loss of native wildlife	Disease; fish escapes and impact on wild stocks; cumulative impacts on environment; amenity values
Rack, tray and stick (eg oysters, mussels)	Habitat modification or loss; effects on amenity values	Marine floor degradation; removal of food for other filter feeders; spread of introduced marine organisms; improved water quality in some areas	Impacts on human health; cumulative impacts on environment; amenity values
Pond culturing (eg prawns)	Habitat modification or loss; effects on amenity values	Lower water quality; disease; competition with wild stocks; loss of native wildlife	Cumulative impacts on environment; amenity values

Each sector and production system has different potential environmental impacts and levels of impact. For example, oysters and mussels typically have few operation impacts (as they require few inputs, such as feed), but may create some site location impacts, such as on visual amenity. The intensive cage culture of finfish, with introduced feed and chemical inputs, may create operation impacts through the discharging of nutrients (from fish and food waste) and chemicals into waters in which cages are located. Cage culturing may also have other significant local and off-site operating impacts through fish escapes, interaction with wild stocks, and associated effects on fishing (both commercial and recreational).

Recognising the variation in potential environmental impacts from different types of aquaculture operations is a necessary step in developing and implementing an efficient and effective environmental management regime. In addition, aquaculture may be only one of a number of activities contributing to environmental impacts in a particular area. An understanding is required of both the cumulative impacts from different activities, and the impacts from aquaculture relative to other activities.

The regulatory framework for aquaculture

The regulatory framework for aquaculture covers marine and coastal management, environmental management, land use planning, land tenure, native title, and quarantine and translocation. In part, the framework reflects that aquaculture comprises a range of diverse activities, and involves the use of public and private resources, with potential for environmental impacts of varying degrees of significance. However, aquaculture production is subject to an unnecessarily complex array of legislation and agencies.

State and territory governments have primary responsibility for the regulation of aquaculture production. Generally, state and territory departments of primary industries (or fisheries), planning, environment and land administration, as well as environment protection authorities, administer the regulatory framework, and associated approvals. Local government is usually responsible for development approval for aquaculture activities on land.

The Australian Government has some regulatory involvement through the *Environment Protection and Biodiversity Conservation Act 1999*, the *Native Title Act 1993*, and the *Quarantine Act 1908*. The Australian Government's Great Barrier Reef Marine Park Authority also has responsibility for regulation of aquaculture in or adjacent to the marine park, although regulation of land-based aquaculture that may discharge to waterways leading to the marine park is currently under review.

State and territory governments often take a tiered approach to environmental regulatory arrangements for aquaculture involving:

- resource assessment, planning and zoning of selected areas for marine and land-based aquaculture;
- allocation of leases of public land and waters that provide secure tenure to a specific site; and
- administration of various development and operating approvals.

An aquaculture producer may require a number of different approvals from various government departments and local government depending on the location, species,

type of production system, and size of operation. For example, approvals that may be required for large-scale marine aquaculture ventures (with associated land-based storage facilities in the coastal area) include:

- a marine aquaculture lease — to provide long-term tenure and the right to occupy and use a marine site in public waters;
- an aquaculture licence to undertake aquaculture production — containing operating conditions for specific species and environmental controls;
- a works approval to control impacts from construction and/or an environmental licence to control waste discharges (in some states, environmental conditions may be part of an aquaculture licence);
- a permit to take brood or culture stock;
- a licence for development in the tidal or coastal zone;
- permits to clear marine and/or terrestrial vegetation; and
- a development or planning approval (from local government).

Regulations shape incentives, influence how people behave and interact, and can help societies deal with otherwise intractable problems. Given the potential for significant environmental impacts from some aquaculture operations, some environmental regulation is clearly required. However, environmental regulatory arrangements that are unwarranted, or poorly developed and implemented, can impose unnecessary costs on aquaculture producers, consumers and the community, and adversely affect competitiveness and the environment.

The efficiency and effectiveness of aquaculture regulation could be improved by greater use of environmental risk assessment based on species, production system, management practices, site location and the condition of the environment (such as the quality of receiving waters). Any refinement of regulation along these lines, however, would need to consider the costs (including regulatory and administrative) and benefits.

Point source water pollution from land-based aquaculture, such as prawn or trout farms, is often more heavily regulated than diffuse sources of pollution from other land uses, such as pastoral or horticultural farming. This has implications for the efficient and effective management of environmental impacts, and the development of the aquaculture industry. There is a need for further research across industries to assess if the level of regulation and control is consistent with the level of environmental risk posed by each industry.

An important mechanism for providing greater discipline on regulation-making in Australia, as well as an increasing number of other countries, has been the

requirement to prepare a Regulation Impact Statement (RIS). The RIS process requires policy makers to consult with those affected, and to work through a sequential process of articulating the problem potentially requiring regulation, assessing a range of options (including non-regulatory ones), recommending the best option and explaining why other options are not as effective. The RIS process can also promote accountability and transparency. This is especially important in dynamic regulatory areas, such as environmental regulatory arrangements for aquaculture.

Since 1997, Australian Government departments and agencies have been required under a Cabinet directive to prepare RISs for all regulation that has a significant effect on business. All state and territory governments have RIS processes in place. However, RISs are required only for subordinate legislation in New South Wales, Victoria and Queensland, whereas in Western Australia, South Australia, Tasmania, ACT and Northern Territory, RIS requirements also apply to primary legislation.

Legislative objectives and agency functions

Clear legislative objectives promote consistency and certainty in setting the parameters of legal power under the legislation, and in guiding interpretation and application of the legislation. Clarity of objectives can be improved through identification of a single primary objective, supported by subsidiary objectives.

State aquaculture and/or fisheries legislation have multiple objectives and these are not always clearly defined. The objectives may overlap or conflict, and there is often a lack of guidance as to the relative weights to be placed on each objective. For example:

- New South Wales, Victoria, Queensland and Western Australia have legislation containing broad (and similar) objectives for conservation and development of each state's fisheries resources, but the objectives are not clearly defined and appear difficult to implement without further guidance;
- New South Wales, Victoria, Western Australia and Tasmania have legislation containing multiple, and sometimes conflicting, objectives — there is explicit recognition that there are alternative uses of fisheries resources (for example, commercial fishing, aquaculture, recreational fishing and conservation). However, there is little guidance as to the appropriate weights to be assigned to competing uses or how conflicts between uses are to be resolved; and
- New South Wales, Victoria, Western Australia and South Australia have legislation requiring the maximisation and/or provision of benefits to the broader

community and/or to ‘present and future generations’, but there is again little guidance as to the weighting of benefits and costs between resource users.

State government departments primarily responsible for aquaculture regulatory arrangements often have potentially conflicting functions of policy development, implementation of regulation, industry promotion and development, and research. In New South Wales and Western Australia, for example, the fisheries departments are responsible for most aspects of aquaculture regulation, in addition to fostering industry development through the provision of business support, advice and financial assistance. There may be some size and efficiency advantages from the grouping of certain functions, but the conflict between regulatory and industry development roles may lead to public and industry mistrust over resource planning and allocation, regulatory approvals, monitoring and enforcement.

New South Wales, Victorian and Western Australian governments have prepared aquaculture development strategies or plans designed to promote investment and employment in the industry. State governments have also funded and supported industry development to improve business planning, species and site selection, farm management and marketing. At times, this focus on industry development has occurred despite the compelling prior need to establish or refine environmental regulatory arrangements for aquaculture. Without appropriate regulatory arrangements, the aquaculture industry is unlikely to realise its potential, and any government funding of industry development will be less effective than otherwise.

Marine resource planning and aquaculture

All jurisdictions have either prepared or are in the process of preparing or updating a number of statutory and non-statutory marine and coastal planning strategies. These strategies are in some cases not well integrated with each other, do not consider adjoining land uses, are outdated, and lack implementation plans. These problems can affect both aquaculture development proposals, and existing aquaculture operations through poor marine and coastal water management, with further implications for environmental sustainability.

Aquaculture planning for marine and coastal waters, in conjunction with the use of aquaculture zones and leases, may facilitate further development of the marine aquaculture industry. It may also contribute to the management of marine and coastal waters, and potential environmental impacts from aquaculture, especially if integrated with broader marine plans.

Jurisdictions have used different statutory planning processes to assess and allocate marine resources for aquaculture purposes, and provide for management of the marine environment. For example:

- Tasmania (since 1995) and South Australia (since 2001) have statutory marine aquaculture planning arrangements with marine aquaculture plans and zones used in conjunction with marine aquaculture leases;
- Victoria and Queensland have statutory marine aquaculture planning arrangements — Victoria has recently declared nine marine aquaculture zones as fisheries reserves and is preparing reserve management plans, and Queensland has started to develop a marine aquaculture plan;
- Western Australia has statutory planning arrangements for marine parks that may allow some commercial activity (such as aquaculture) where it is consistent with conservation; and
- New South Wales has statutory aquaculture planning arrangements but has yet to develop aquaculture plans for marine areas.

Apart from South Australia and Tasmania, there has been slow progress with marine aquaculture planning. The limited use of statutory marine aquaculture plans in New South Wales, Queensland and Western Australia may either constrain marine aquaculture, or result in ad hoc approvals for individual sites, and resource use conflicts.

Land use planning and aquaculture

The lack of recognition and provision for aquaculture in state-based land use planning arrangements (particularly regional and local planning schemes) can adversely affect the granting of development or planning approvals for aquaculture. Victoria, Western Australia and South Australia, for example, do not provide planning guidance to local councils on how to address land-based aquaculture in planning schemes, or how aquaculture applications should be assessed for development approval.

State land use planning strategies and/or state-wide ‘model planning schemes’, if not unduly prescriptive, may assist the integration of planning policy and development control, improve coordination of planning at different levels, and reduce the resources required by state and local governments in the preparation and administration of schemes. State-wide aquaculture planning guidance may help local councils to provide appropriately for land-based aquaculture in planning schemes, and inform the assessment of applications for development approval.

Lease of public waters and/or land for aquaculture

Following resource assessment and resource use planning, governments may use different types of lease to provide the right to occupy and use public water and land resources for aquaculture purposes for a defined period. Tenure may be either short- or long-term, and occupation and use of the lease area may or may not be exclusive. Conflicts may arise where lease systems do not have:

- sufficient flexibility, with different lease categories and potential uses;
- efficient and transparent methods for lease allocation and transfer; and
- adequate specification of property rights, term and renewal arrangements.

Where applicable, the lease of public land or waters for aquaculture purposes will need to address and be consistent with native title. Other than seeking court determinations over native title rights, lessees, governments and traditional owners may seek to negotiate agreements for aquaculture purposes.

Marine aquaculture leases

Marine aquaculture leases can be used to allow aquaculture operators to access, occupy and use publicly-held marine (both waters and seabed) resources. However, the use of marine aquaculture leases varies significantly across jurisdictions:

- New South Wales, South Australia and Tasmania have dedicated marine aquaculture lease arrangements, and have made considerable use of them, both in terms of the number of leases granted and the area leased;
- Western Australia has dedicated marine aquaculture lease arrangements but has not granted any marine leases — annual aquaculture licences are used; and
- Victoria and Queensland have no specific marine aquaculture lease arrangements and have not granted any marine aquaculture leases — these jurisdictions rely on aquaculture licences for the use of marine areas for aquaculture purposes, although the use of leases is under review.

The limited use of marine aquaculture leases in Victoria, Queensland and Western Australia has implications for industry development and the growth of marine aquaculture, particularly given the significance of marine aquaculture in Australia. Inadequate security of tenure may affect aquaculture development financing.

Multiple selection criteria and specialist tenure allocation boards are used to assess and allocate marine leases in South Australia and Tasmania, rather than a competitive auction based on price and subject to specified conditions. The lack of open competitive bidding processes for marine aquaculture leases based on price

has potential to lead to distortions in resource use and affect economic efficiency. The use of multiple selection criteria processes may also raise concerns about the transparency and accountability of lease allocation processes.

Some businesses may be concerned about the impacts of open competitive bidding processes on intellectual capital and innovation when applying for an unallocated lease site. For example, if a business has invested considerable resources in assessing a new site or developing a new product, then it would be reluctant to reveal the intellectual capital until it has possession of the site. Government agencies would need to weigh up the potential to stifle innovation in the assessment of how best to pursue broader efficiency goals.

Lease of public land for land-based aquaculture

A land-based aquaculture operation may require access to, or tenure over, public land, such as coastal foreshore, a coastal reserve or a pastoral lease. This may be for land-based aquaculture itself, or for placing a pipe under or across the coastal foreshore to take and discharge sea water from a coastal land-based site.

In some jurisdictions, it can be difficult to gain access to coastal foreshore and reserves for aquaculture (and other) purposes due to a lack of defined processes for lease assessment and approval. This highlights the importance of clear assessment criteria for lease applications, and well-functioning administration and approval processes.

On pastoral leases, until recently, the main approach to accommodating non-pastoral land uses, including aquaculture, was by discretionary changes to lease conditions and rental rates by the relevant managing authority. This approach, lacks transparency and may involve inconsistencies, thereby heightening uncertainty for investors.

Approvals, monitoring and reporting

Various aquaculture licences, permits and development approvals may be required for aquaculture production, depending on the location, species and production system. Approval requirements for aquaculture can create barriers to entry into the industry or expansion of existing operations. There is potential for further research on the compliance costs of aquaculture approval processes in each jurisdiction.

Agencies and approval processes

In most jurisdictions, around five state government departments and agencies, as well as local government, are involved with processing and providing approvals for aquaculture, especially for larger projects. However, important environmental considerations may still fall between agencies. In South Australia, for example, the Department of Environment and Heritage and Department of Water, Land and Biodiversity Conservation, are not included in mandatory consultations as part of the assessment process for marine aquaculture leases or licences.

Prospective aquaculture operators can experience significant costs and uncertainties through dealing with multiple agencies with different regulatory responsibilities for aquaculture management. Prospective operators can also experience difficulties identifying which approvals they need, which agencies they need to apply to, and whether there is a hierarchy of approvals they are required to comply with. More complex aquaculture proposals, for example, may take more than four years to be approved where extensive consultation and many different approvals are required.

There would seem to be scope to simplify approval systems by reducing the number of individual approvals required — for example, by introducing one approval that covers interrelated aspects of aquaculture production, including fish health and environmental management, rather than having individual aquaculture and environmental approvals. Improved agency coordination and statutory timeframes for approval processing would provide greater certainty for applicants and incentives for prompt and efficient processing of applications by agencies. Provision of guidance to approval agencies or local government on the processing of approvals may also assist the efficiency of approval processes.

All jurisdictions charge fees for various aquaculture approvals. There are potentially different efficiency and equity implications resulting from different cost recovery arrangements for aquaculture regulation. Cost recovery measures need to be carefully developed, and should be implemented for efficiency reasons, not merely to raise revenue. Some charges could potentially be reduced to operators who provide services to governments, such as water quality monitoring.

Monitoring and reporting

Environmental and compliance monitoring is important for the sustainable management of aquaculture. There are, however, concerns that some arrangements can be too prescriptive. Enforcement is also critical for regulatory effectiveness, but in some jurisdictions, enforcement appears not to be adequately resourced.

At present, there appears to be limited reporting by, and auditing of, the main state agencies responsible for environmental regulatory arrangements for aquaculture. Aspects of regulatory and approval processes that could be reported on within confidentiality restrictions include: the number of applications; the number approved/rejected; discretionary approvals; exemptions; processing times; appeals; monitoring and enforcement actions. As well as potentially improving accountability and transparency, such information may help identify potential regulatory constraints and opportunities for improvements in approval processes.

Quarantine and translocation

Aquaculture production may require translocation of aquatic organisms to obtain access to broodstock or feed. The purpose of quarantine and translocation regulations governing the movements of aquatic organisms is to control pests and diseases, and the escape of translocated organisms, that may adversely affect production, market access, human health and/or the environment.

Under the World Trade Organization (WTO) Sanitary and Phytosanitary Agreement, member countries have the sovereign right to determine the ‘appropriate level of protection’, or acceptable risk, for their quarantine and translocation policies. Aspects of Australia’s qualitative ‘appropriate level of protection’ may present challenges for the achievement of consistent and transparent assessments, but alternative (more quantitative) approaches are not without problems.

At the national level, the absence of criteria for prioritising the processing of risk assessments may generate economic costs for Australia. For example, risk assessments of import or export proposals with the potential to generate large economic benefits for Australia may be delayed, while proposals with relatively minor economic benefits are being processed. With respect to aquaculture, prioritisation and processing delays may restrict access by producers to new broodstock, and to more efficient or cheaper feed. Further, delays in commencing and completing import risk assessments — five years or more in some cases — are seen by some of Australia’s trading partners as anti-competitive.

Progress on developing consistent translocation protocols varies significantly among Australian states. Inconsistencies in state policies risk challenges by trading partners that such policies breach the consistency requirement in WTO rules, and they may generate costs for Australian aquaculture producers.

Innovative approaches

Traditionally, governments in Australia have relied on prescriptive regulation to achieve environmental management objectives. Although direct regulation has been effective in some cases, it can at times be inflexible, expensive and provide limited incentive for innovation. Innovative approaches may have potential to complement (or in some cases replace) existing arrangements for aquaculture. For example:

- regulatory instruments (such as demerit schemes, environmental assurance bonds, and offsets) could be used to improve the efficiency and effectiveness of existing regulation;
- market-based approaches (such as tradeable permits for pollution discharges, and auctions for lease allocations) may achieve desired regulatory outcomes in least cost ways as they allow individuals to make their own benefit-cost tradeoffs in pursuing particular practices;
- voluntary approaches (such as environmental management systems, codes of practice, environmental labelling and cooperative agreements) may contribute to the capacity of the aquaculture industry to manage environmental impacts; and
- education and information approaches could play an important role, particularly where sound environmental management does not occur because resource users are not well informed or lack the necessary skills.

While innovative approaches may offer a number of potential advantages, the costs and benefits of particular options, including implementation and monitoring costs, need to be assessed prior to adoption. Further research could assist with assessing the likely contribution of innovative policy instruments to aquaculture management and sustainable management of the environment.

1 Aquaculture development in Australia

The growth of aquaculture in Australia has brought a number of regulatory and environmental management challenges. One challenge is how to satisfy the increasing demand for access to land and water resources for aquaculture, while managing potential conflicts with other resource uses. This raises issues about property rights, resource access and resource allocation. A related challenge is how to manage potential environmental impacts without unnecessarily restricting the development of the aquaculture industry. This Commission Research Paper discusses how planning and environmental regulatory arrangements may affect aquaculture production in Australia, and assesses the efficiency and effectiveness of these arrangements.

1.1 Background

‘Aquaculture’ is the farming and culturing of aquatic organisms, including finfish (such as salmon), crustaceans (such as prawns), molluscs (such as oysters) and aquatic plants (such as microalgae for betacarotene). Farming and culturing involves some form of intervention in the production process, such as regular stocking, feeding and protection from predators, and also implies ownership of the stock being grown (FAO 2002).

Globally, most known capture fisheries (wild catch) are at or near full exploitation. With these fisheries peaking, aquaculture is seen as the most important and likely means to increase global fish supplies (PMSEIC 2002). The Food and Agriculture Organization of the United Nations (FAO) has noted that aquaculture’s contribution to global supplies of fish, crustaceans and molluscs has increased from 3.9 per cent of total production by weight in 1970 to 27.3 per cent in 2000. The FAO predicts that, in the period to 2030, world capture production is projected to remain unchanged (from year 2000 levels), while world aquaculture production is projected to increase, albeit at a slower rate than in the past. Further, by 2030, global aquaculture production will be equivalent to capture fisheries (FAO 2002).

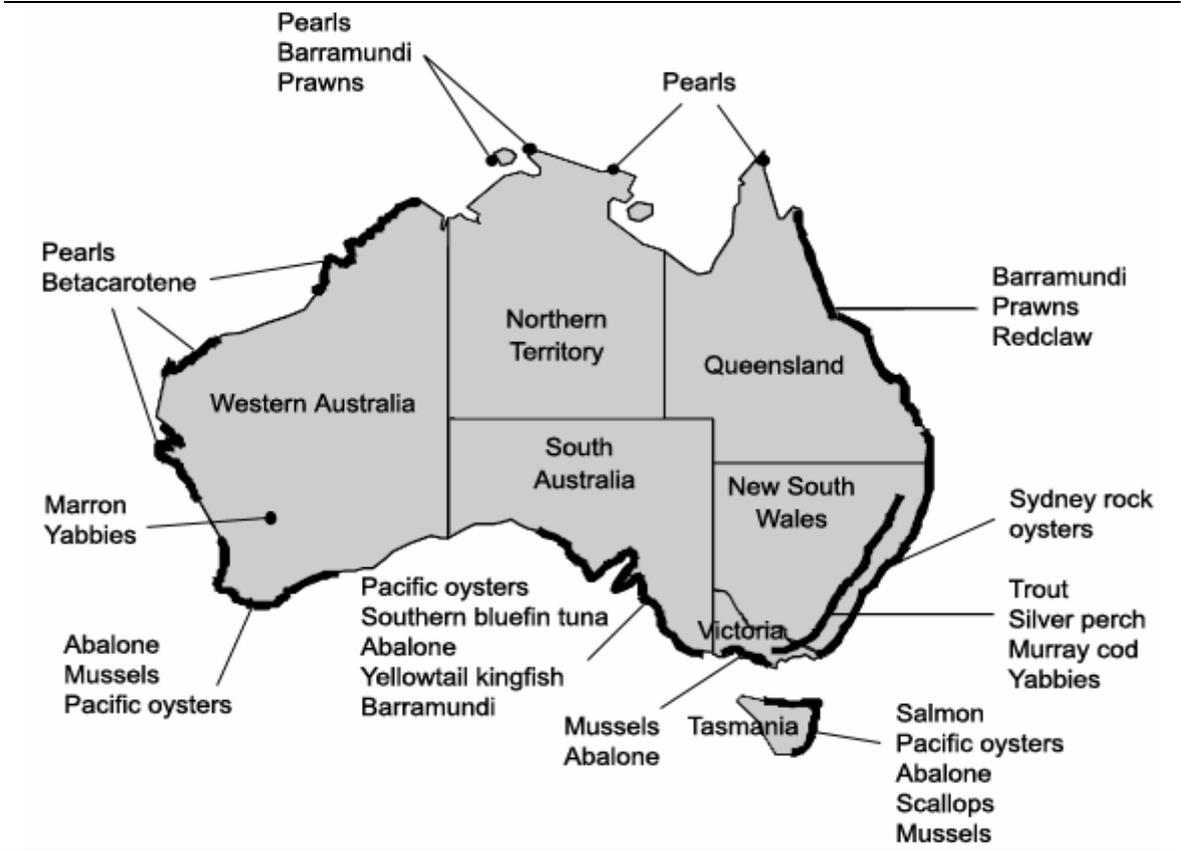
Small-scale commercial aquaculture began in Australia in the mid-1800s with the culturing of edible and pearl oysters. Atlantic salmon were introduced to Tasmania in the 1800s, and to New South Wales in the mid-1960s, but in both cases failed to become established. Atlantic salmon were reintroduced to Tasmania in the early 1980s, and commercial production began in the mid-1980s. From the mid-1980s,

across Australia, aquaculture development began to intensify and new species were farmed (Love and Langenkamp 2003).

The aquaculture industry is the fastest growing primary industry in Australia. The current emphasis within the industry is on meeting demand for quality or niche products. Aquaculture makes a significant contribution to the national economy, exports, employment and regional development. In 2001-02, the gross value of production of the aquaculture industry was around \$733 million, representing some 30 per cent of total fisheries production (by value). The industry grew at around 11 per cent per year in real terms between 1991-92 and 2001-02 (ABARE 2003).

The aquaculture industry is highly diverse, with most production currently in marine waters or on land in coastal areas. However, there is potential for significant land-based production using either fresh or saline water. The industry is characterised by a small number of large producers within each of the major species (southern bluefin tuna, pearl oysters, salmon, prawns and edible oysters), and many small producers across the remaining species (for example, yabbies and redclaw). Emerging species include yellowtail kingfish, snapper and abalone (see figure 1.1) (ABARE 2003; Love and Langenkamp 2003).

Figure 1.1 Main aquaculture areas in Australia



Source: adapted from NADC (2002).

Aquaculture production is expected to continue to grow strongly over the next decade and beyond. The extent to which the industry does grow will depend on several factors, including market demand, the supply of feed, broodstock and culture stock, the availability of finance, productivity improvements, research and development, and the regulatory framework (Cox et al 2001; NADC 2002).

The extent of environmental impacts can vary significantly across species, production approach and location (see sections 2.2-2.3). For marine aquaculture, potential environmental impacts can include habitat modification, waste discharges, fish escapes, spread of disease, and impacts on amenity values. For land-based freshwater aquaculture, potential environmental impacts include alteration of water flows, waste discharges, fish escapes, and spread of disease. Appropriate site selection, production methods and environmental management may be able to mitigate these impacts depending on the carrying capacity and scale of the operation.

Questions have been raised about whether the current environmental regulatory arrangements in Australia are appropriate — for example, whether aquaculture production is unnecessarily constrained, particularly in relation to gaining access to suitable sites with secure, long-term tenure, and the complexity and number of lease and licence requirements (see Cox et al 2001; NADC 2002; PC 2003a; PMSEIC 2002). At the same time, concerns have been expressed about the potential environmental impacts from aquaculture, and the adequacy of environmental regulatory arrangements (see ASEC 2001; Bryan 2002; ECC 2000).

Regulatory arrangements for aquaculture have also been examined in other countries because of concerns about efficiency and effectiveness. In 2001, a review of policy frameworks for aquaculture in Canada, Australia, New Zealand, Norway and the United States, highlighted that the frameworks ‘were often complex, confusing, involved many government departments and were in need of overhaul’ (OCAD 2001, p. 8). The review found that:

- the countries were coordinating their aquaculture activities among many departments, by means of numerous acts involving different levels of government;
- the countries were struggling to balance the growth of viable aquaculture industries with the increasingly important issue of environmental protection;
- the countries were confronting the same environmental issues, including escapes of aquaculture stock, disease, use of therapeutic agents and organic effluent; and
- major ‘turf wars’ existed within the governments of several of the countries over management and regulation of the aquaculture industry (OCAD 2001).

1.2 Purpose, scope and approach

The purpose of this Commission Research Paper is to assess the planning and environmental regulatory arrangements covering marine and land-based aquaculture production in Australia. The objectives are to:

- examine the nature and extent of planning and environmental regulatory arrangements relating to aquaculture production in Australia, and compare and contrast arrangements across jurisdictions;
- provide a qualitative assessment of the appropriateness, efficiency and effectiveness of existing regulatory arrangements; and
- consider alternative regulatory and non-regulatory arrangements, and their implications for efficiency and effectiveness.

The primary focus of the paper is on planning and environmental regulatory arrangements for aquaculture in the six Australian states of New South Wales, Victoria, Queensland, Western Australia, South Australia and Tasmania. There is some discussion of environmental regulatory arrangements for aquaculture that are administered by the Australian Government.

Marine aquaculture is defined as that occurring in marine waters below mean high water, and includes farming of marine finfish, shellfish and aquatic plants. Land-based aquaculture is defined as occurring on land, and may be either freshwater or saltwater, depending on the location and species farmed. Land-based aquaculture includes farming of finfish, shellfish (such as abalone), saltwater crustaceans (such as prawns), freshwater crustaceans (such as yabbies), and aquatic plants (see section 2.1).

The focus on planning and environmental regulatory arrangements covers aquaculture leases and operating licences, pollution licences, and development or planning approvals. Aspects of the broader marine and land use planning systems are examined in terms of their relationship to aquaculture production, but these systems are not examined in depth. The focus on aquaculture production includes breeding, hatching, rearing, growing and harvesting, but does not include processing, food health and safety, transportation and marketing.

The research approach included:

- consultation with interested parties, including government agencies, industry associations, research institutions and environmental organisations;
- review of existing research;
- analysis of regulatory arrangements for aquaculture; and

-
- a workshop for invited representatives from government, industry and environmental organisations to discuss and provide comment on the draft paper.

The paper will complement other developments relevant to the Australian aquaculture industry (see box 1.1). The paper will also inform various state-based aquaculture reviews (see section 1.4).

Box 1.1 Australian aquaculture industry developments

In 2002, an independent working group reported to the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) on issues surrounding 'sustainable aquaculture'. The working group flagged major opportunities and obstacles for industry growth and the potential role of science and innovation. Among other things, the working group recommended streamlining the industry's operating environment, and the development of nationally consistent guidelines or policies.

Also in 2002, the National Aquaculture Development Committee (NADC) reported to government and industry on an *Aquaculture Industry Action Agenda* — a blueprint for the future growth of the industry. The committee stated that all governments should strive to streamline the ecologically sustainable development (ESD) regulatory and administrative demands they place on industry, implement nationally agreed 'best-practice' principles for the management of aquaculture, and implement codes of practice and environmental management systems.

In April 2003, the Primary Industries Ministerial Council considered and endorsed a National Aquaculture Policy Statement. Prepared by the Australian Government, and state and territory governments, the statement recognises the contribution that aquaculture makes to the Australian economy and regional development. All Australian governments have committed to working in partnership with the aquaculture industry to achieve 'maximum sustainable growth', while also meeting national and international expectations for environmental, social and economic performance.

Sources: NADC (2002); PMSEIC (2002); PIMC (2003).

1.3 The role of government in aquaculture production

Aquaculture production often involves the use of publicly owned natural resources, such as Commonwealth, state or territory land and/or waters. However, the rights to access and use these natural resources are often not well defined. For example, proposals to use coastal or marine areas for aquaculture can bring conflicts with existing or potential uses, such as recreational and commercial fishing, traditional fishing, tourism, recreation, marine transport, and marine conservation.

Aquaculture production on either public or private land and/or waters may also generate external costs or negative externalities. This is where the actions of some

individuals ‘spillover’ and harm others in the community who are not compensated for this harm. For example, some aquaculture producers may cause water pollution that has negative impacts on other water users (in the same manner that aquaculture producers may be affected by negative water quality impacts caused by sediment and nutrient runoff from broadacre farming). The presence of negative externalities may result in inefficient allocation of resources. If transaction costs or other factors inhibit private negotiations, there may be a case for government intervention, as long as the benefits outweigh the costs of such action.

In Australia, governments have primarily used regulatory instruments to manage the potential environmental impacts of aquaculture, such as licensing of aquaculture production. However, governments have established and allocated certain property rights to use natural resources for aquaculture production, and are exploring market-based mechanisms, such as tradeable permits.

Governments should ensure that policies are not only effective, but are also the most efficient means for achieving the desired objectives. ‘Good regulation’ must not only bring net benefits to society, it must also be the most effective way of addressing an identified problem. Regulation should impose the least possible burden on those regulated, and on the broader community, in securing the desired objectives (Banks 2003a).

Unwarranted or poorly developed regulations can impose significant costs on business and the community, and adversely affect the environment. For regulation to meet the tests of ‘minimum effective regulation’, it needs to satisfy a variety of criteria (see Banks 2001; Banks 2003b; ORR 1998):

- regulation should not be unduly prescriptive and, where possible, it should be specified in terms of performance goals or outcomes;
- regulation should be clear and concise;
- regulation should be consistent with other laws, agreements and international obligations;
- regulation must be enforceable, but it should embody incentives or disciplines no greater than are needed for reasonable enforcement, and involve adequate resources for the purpose; and
- regulation needs to be administered by accountable bodies in a fair and consistent manner, and it should be monitored and periodically reviewed.

Regulation that is deficient in one or more of these respects may not achieve its objectives. It may also reduce competition, impose unnecessary costs, impede innovation, and create barriers to productivity and efficiency. While it can be fairly straightforward to identify the direct costs of regulation (such as administrative

costs), it can be difficult to identify indirect costs (such as the cost of complying with the regulation). It can also be difficult to attach monetary values to public benefits of regulation, such as the prevention or reduction of negative environmental impacts which may result from resource use.

An important mechanism for providing greater discipline on regulation-making in Australia, as well as an increasing number of other countries, has been the requirement to prepare a Regulation Impact Statement (RIS). The RIS process requires policy makers to consult with those affected, and to work through a sequential process of articulating the problem potentially requiring regulation, to assess a range of options, recommend the best option, and explain why other options (including non-regulatory) are not as effective (ORR 1998). The RIS process can also promote accountability and transparency. This is especially important in dynamic regulatory areas, such as environmental regulatory arrangements for aquaculture.

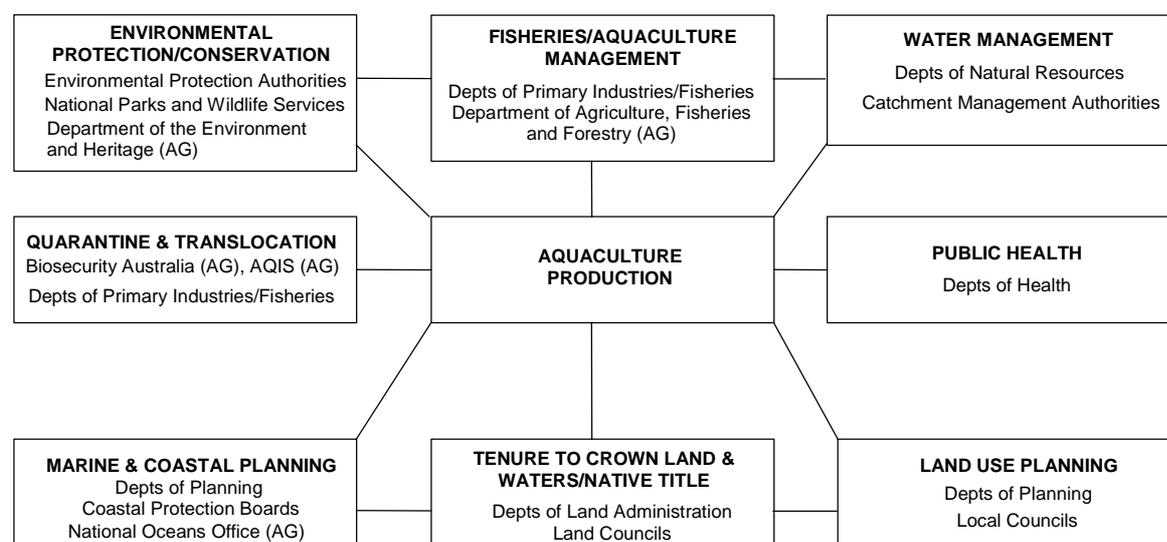
Since 1997 — in response to a report by the Small Business Regulation Taskforce — Australian Government departments and agencies have been required under a Cabinet directive to prepare RISs for all regulation that has a significant effect on business. All state and territory governments have RIS processes in place. However, RISs are required only for subordinate legislation in New South Wales, Victoria and Queensland, whereas in Western Australia, South Australia, Tasmania, ACT and Northern Territory, RIS requirements also apply to primary legislation.

1.4 The broad aquaculture regulatory framework

The Australian Government, and state, territory and local governments are responsible for different aspects of the broad regulatory framework for aquaculture production (see figure 1.2). A summary of state environmental regulatory arrangements relating to aquaculture production is provided in appendix A.

State and territory governments have primary responsibility for regulation of aquaculture production. Generally, state and territory departments of primary industries (or fisheries), planning, environment and land administration, as well as environment protection authorities, administer the regulatory framework and associated approvals. Aquaculture may be governed by state and territory legislation covering: fisheries or aquaculture; environment protection; coastal management; land administration; land use planning; native wildlife; and water management. Local government is usually responsible for administering development approvals for land-based aquaculture.

Figure 1.2 The broad regulatory framework for aquaculture



Note: State or Territory department or agency unless identified as an Australian Government department or agency (AG).

Source: Adapted from Nash (1995).

There are different planning and environmental regulatory arrangements for land-based and marine aquaculture given that land-based aquaculture is on public or private land, and marine aquaculture is on public waters. Depending on the location, species and type of production system, an aquaculture producer may require a number of different leases, licences and permits from various government departments and local government. Large-scale land-based and marine aquaculture proposals are usually required to undergo environmental impact assessment prior to receiving approval.

Freshwater land-based aquaculture usually requires various approvals, including an aquaculture licence, a works approval and/or environmental licence, and permits to take and dam water. If on public land, a land-based aquaculture operation may require a public lease.

In some jurisdictions, such as South Australia and Tasmania, a three-tiered approach is taken towards marine aquaculture involving:

- resource assessment, planning and zoning of certain areas for marine aquaculture;
- allocation of marine aquaculture leases that provide long-term tenure and the right to occupy and use a specific site within an aquaculture zone; and
- administration of various approvals (including aquaculture licences) that set out operating conditions (see box 1.2).

Box 1.2 Approvals required for a marine aquaculture operation

Approvals that may be required for marine aquaculture, with associated land-based facilities in the coastal area include:

- a marine aquaculture lease — provides long-term tenure, and the right to occupy and use a marine site;
- an aquaculture licence to undertake aquaculture production — contains operating conditions for specific species and environmental controls;
- a permit to take breeding or culture stock;
- a works approval (to control impacts from construction) and/or an environmental licence (to control waste discharges) (may be part of aquaculture licence);
- a licence for development in the tidal or coastal zone;
- a permit to clear marine and/or terrestrial vegetation; and
- a development or planning approval from local government.

In other jurisdictions, such as Victoria and Western Australia, annual aquaculture licences have been used for marine aquaculture without a separate lease, although the use of leases is under review in both jurisdictions. Western Australia also has separate legislative arrangements for pearling leases and licences.

The Australian Government has some direct regulatory involvement, most notably through the *Environment Protection and Biodiversity Conservation Act 1999*, the *Native Title Act 1993* and the *Quarantine Act 1908*. In Queensland, the Great Barrier Reef Marine Park Authority (Australian Government) has responsibility for regulation of aquaculture in or adjacent to the marine park, through the *Great Barrier Reef Marine Park Act 1975*.

Other national frameworks and arrangements that may affect aquaculture include:

- *Australia's Oceans Policy* (Commonwealth of Australia 1998) — a framework for integrated and ecosystem-based planning and management for Australia's marine jurisdictions;
- Australian fisheries management arrangements — the Australian Fisheries Management Authority arrangements controls Commonwealth wild catch fisheries, such as southern bluefin tuna (that may be farmed), and pilchards (that may be used as feed for finfish aquaculture); and
- the *National Representative System of Marine Protected Areas* (ANZECC Task Force 1999) — a strategy for expanding the national system of marine parks and reserves.

In April 1995, all Australian governments agreed to implement a National Competition Policy (NCP) to accelerate and broaden progress on microeconomic reform. Part of the NCP framework required governments to review and, where appropriate, reform all legislation that restricted competition unless the benefits of the restriction to the community as a whole outweighed the costs, and the objectives of the legislation could only be achieved by restricting competition (NCC 2001).

State governments have been conducting NCP reviews of state legislation, including fisheries and environmental protection legislation. In Victoria, for example, the review of the *Fisheries Act 1995* included examination of the nature and likely effect of the restrictions on competition arising from the legislation, the costs and benefits of the restrictions, and alternative means of achieving the same result (ACIL Consulting 1999). In Western Australia, the state government has recently responded to NCP reviews of the *Fish Resources Management Act 1994* and the *Pearling Act 1990* (Department of Fisheries 2002a).

Several jurisdictions have reviewed in the last five years, or are reviewing, aspects of their regulatory arrangements for aquaculture. For example:

- in 1999, a Victorian Aquaculture Regulatory Reform Task Force undertook a review of the regulatory environment for the aquaculture industry, and made a series of recommendations to improve the regulatory system (ARRTF 1999a);
- since 2001, South Australia has been developing a suite of aquaculture policies to implement the *Aquaculture Act 2001*;
- Western Australia is currently reviewing legislative arrangements for aquaculture (Ciffolilli 2003), preparing a strategy for the development of the industry (Lendich 2003), and a new Pearling Bill is being drafted;
- the Australian and Queensland Governments have developed a proposal that will establish a single environmental assessment process and performance standards for land-based aquaculture developments adjacent to the Great Barrier Reef (Commonwealth and Queensland Governments 2003) (see section 6.2); and
- Queensland has amended the *Fisheries Act 1994* for incorporation into the Integrated Development Assessment System under the *Integrated Planning Act 1997* (see section 6.2), and added provisions to the Fisheries Act to allow for accreditation under Commonwealth regulations.

State aquaculture management agencies have also agreed to advance an ESD reporting and assessment framework for aquaculture management (Fletcher 2002).

The next chapter provides an overview of the Australian aquaculture industry, explains different production systems, and outlines the potential environmental impacts from aquaculture production.

2 The aquaculture industry in Australia

Aquaculture in Australia is a highly diverse industry, with many different species being farmed using a range of production systems. Despite this diversity, the rapid growth in production in recent years has been dominated by five species (southern bluefin tuna, pearl oysters, salmon, prawns and edible oysters). Although growth prospects for Australian aquaculture are significant, there are several challenges needing to be addressed, including management of environmental impacts.

This chapter examines the value and distribution of Australian aquaculture production and highlights potential environmental impacts. It also briefly discusses a number of potential constraints to industry development relating to market development and access, investment, research and technology, and industry organisation and coordination.

2.1 Value of Australian aquaculture

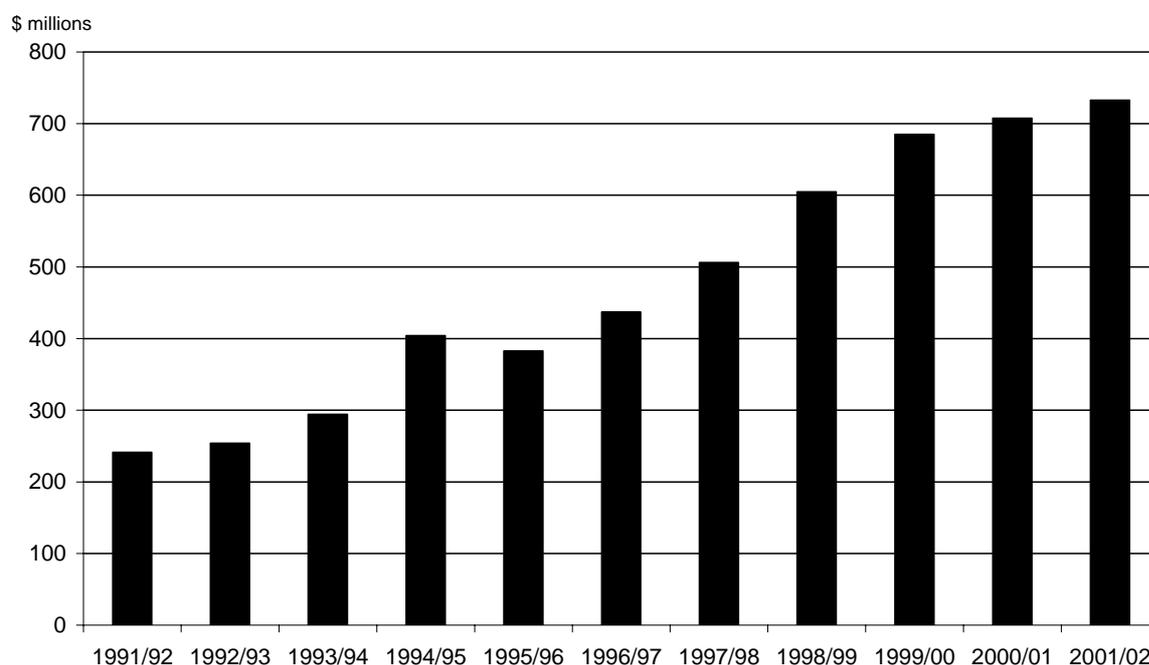
Australian aquaculture is a rapidly developing industry that, in recent years, has accounted for almost one third of the total value of Australian fisheries production by value. It is also an important contributor to regional development and employment.

In Australia, state and territory departments of primary industries and fisheries are the primary collectors of aquaculture production statistics. The Australian Bureau of Agricultural and Resource Economics (ABARE) collates and reports on these statistics. ABARE have recently identified some potential problems with respect to aquaculture data collection frameworks. Factors affecting the quality and processing of aquaculture data include the processes for reporting data to state departments by producers, and the resourcing of data collection agencies (Love et al 2004).

Value of production

ABARE reports the value of Australian aquaculture production in 2001-02 as \$733 million, with exports accounting for more than 60 per cent of this value. Between 1991-92 and 2001-02, aquaculture averaged an annual real growth rate of around 11 per cent, the highest of any Australian primary industry (see figure 2.1).

Figure 2.1 Value of Australian aquaculture production, 1991-92 to 2001-02



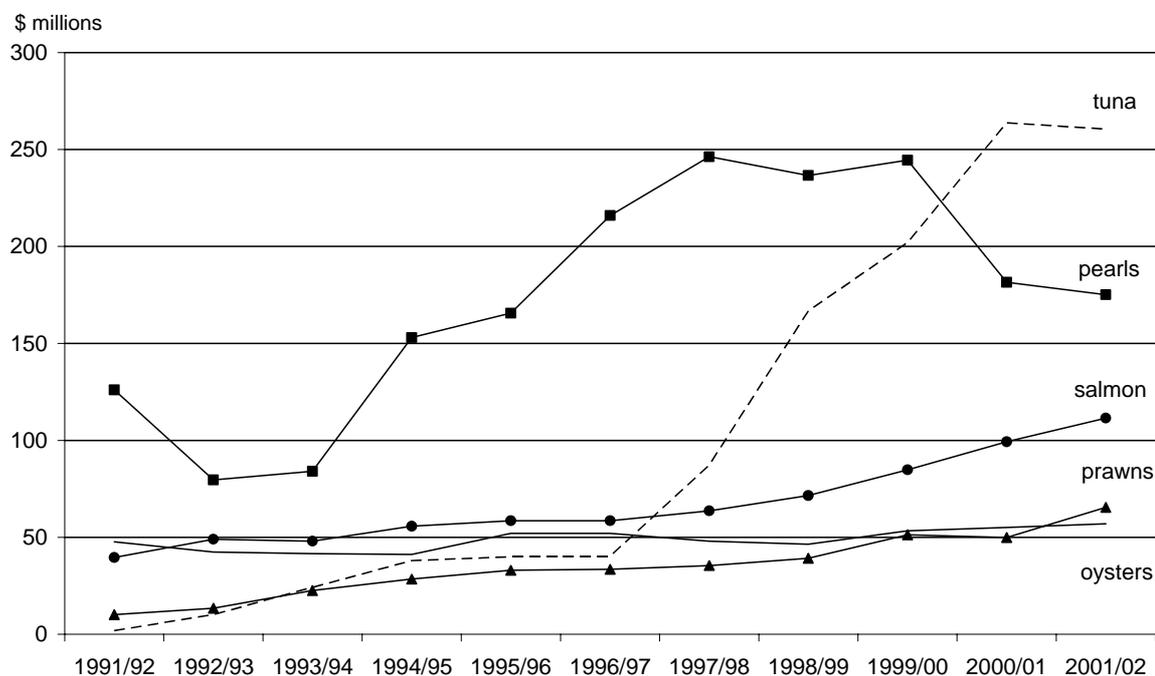
Sources: Brown et al (1997); Love and Langenkamp (2003).

In 2002, direct employment in the aquaculture industry was about 5000 people, with a significant percentage of these jobs being in regional areas, and further growth is expected (ABS 2002). As part of regional employment growth, there are potential opportunities for Indigenous communities in both coastal and inland areas from Indigenous aquaculture projects (Lee and Nel 2001). A barramundi joint venture in the Northern Territory between Tiwi Islanders and a Dutch aquaculture company, for example, has created a number of training and employment opportunities for local Indigenous communities (ABC 2001).

Value of production for key species

In Australia, there are over 70 different species under aquaculture development, with around 40 of these produced commercially (PMSEIC 2002). Growth since 1991 has largely been generated by five species produced in different jurisdictions — southern bluefin tuna (South Australia), pearl oysters (Western Australia), salmon (Tasmania), prawns (mainly Queensland) and edible oysters (New South Wales, South Australia and Tasmania) (see figure 2.2).

Figure 2.2 Value of aquaculture production for key aquaculture species, 1991-92 to 2001-02



Note: for pearls, production value for Northern Territory not available.

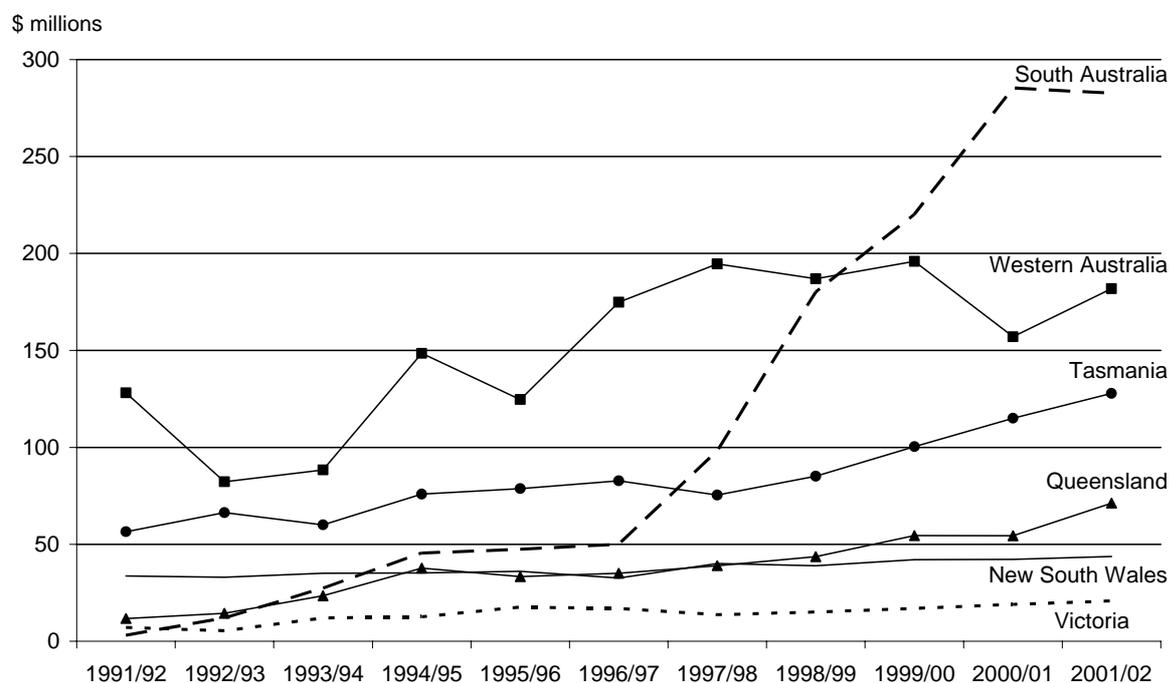
Sources: Brown et al (1997); Love and Langenkamp (2003).

These five species alone accounted for more than 94 per cent of the total value of production in 2001-02, with the three highest value species (southern bluefin tuna, pearl oysters and salmon) accounting for almost 75 per cent (ABARE 2003). Other established species farmed in Australia include trout, barramundi, silver perch, microalgae (for betacarotene), mussels and freshwater crustaceans (yabbies, marron and redclaw). There are also a number of emerging species, including abalone, scallops and yellowtail kingfish, as well as other marine and freshwater native fish. The value of production of these species within each jurisdiction is highlighted in table 2.1 (see below).

State value of production

While there has been consistent growth for the aquaculture industry overall (see figure 2.1), growth across jurisdictions has been more variable, reflecting several factors including differences in the production value of key species. For example, in recent years, the value of production in South Australia has risen above Western Australia, reflecting changes in the value of tuna and pearl oyster production (see figure 2.3).

Figure 2.3 State value of Australian aquaculture production, 1991-92 to 2001-02



Sources: Brown et al (1997); Love and Langenkamp (2003).

For the tuna farming industry, significant increases in returns between 1996-97 and 2000-01 resulted from higher world prices and production volumes. For the pearl industry, variable returns since 1997-98 have been caused by the general economic downturn in Asia, and an oversupply of low to medium quality pearls on the world market (Love and Langenkamp 2003).

On current estimates, the aquaculture industry is expected to continue to grow to a forecast production value of more than \$1 billion by the end of 2010 (ABS 2003). The industry has forecast, subject to high growth conditions, a potential value of \$2.5 billion by 2010 (NADC 2002). Future growth will depend on several factors that may be constraining the capacity of the industry to develop (see section 2.4).

2.2 Aquaculture sectors and production systems

The range of aquaculture sectors and production systems employed are shown in table 2.1. Most jurisdictions have a mix of marine and land-based production with finfish, crustacean and mollusc production. The potential environmental impacts associated with different production systems are discussed in section 2.3.

Table 2.1 Selected aquaculture production 2001-02, by jurisdiction and species

<i>Jurisdiction</i>	<i>Species</i>	<i>Production method</i>	<i>Licences</i>	<i>Value (\$'000)</i>
New South Wales	Oysters	Rack, raft and longline	406	31 538
	Prawns	Pond culturing	12	5 440
	Silver perch	Pond	148	2 450
	Trout	Ponds and raceway	66	2 020
	Yabbies	Ponds and farm dams	152	364
Victoria	Trout	Ponds and raceways	38	10 666
	Mussels	Longline	25	3 734
	Yabbies	Ponds and farm dams	56	338
	Warmwater finfish	Recirculation units	63	-
	Abalone	Flow through systems	15	-
Queensland ^a	Prawns	Pond culturing	78	59 000
	Barramundi	Cages and ponds	188	7 500
	Redclaw	Ponds and farm dams	251	990
	Oysters	Rack, longline, stick	111	520
	Jade and silver perch	Pond	168	330
Western Australia	Pearls	Longline	48	175 000
	Mussels	Longline	28	2 817
	Yabbies	Ponds and farm dams	54	1 281
	Marron	Ponds and farm dams	274	1 099
	Microalgae ^b	Ponds	-	-
South Australia	Southern bluefin tuna	Cage culture	40	260 500
	Oysters	Rack, longline	290	13 303
	Barramundi	Recirculating tanks	34	2 653
	Marron	Ponds and farm dams	141	282
	Yabbies	Ponds and farm dams	202	95
	Murray cod	Ponds, recirculating tanks	54	-
	Abalone	Raceway and ocean rafts	64	-
	Gold and silver perch	Pond culturing	121	-
	Scallops	Longline	78	-
Yellowtail kingfish	Cage culture	26	-	
Tasmania	Atlantic salmon	Cage culture	43	111 476
	Pacific oysters	Rack, longline	113	11 566
	Mussels	Longline	36	758
	Sea trout	Sea cages	17	-
	Scallops	Longline	23	-
Northern Territory	Pearls	-	26	-
	Barramundi	Cage culture	-	-

- Information is not available. ^a Licences can contain more than one species so the number of licences may be overstated. ^b Microalgae (betacarotene) is understood to be the second highest value sector in Western Australia. However, information is not available due to confidentiality restrictions (Lendich 2003).

Sources: ABARE (2003); Lendich (2003); state departments of primary industries or fisheries.

Aquaculture enterprises, across jurisdictions, vary from small enterprises using ponds and farm dams for freshwater crustaceans, to very large enterprises with more developed production systems, such as sea cage farming of tuna and salmon. One factor affecting the returns of larger producers is their capacity to vertically integrate functions, such as processing, marketing and transport, and thereby benefit from supply efficiencies and opportunities to value add (NADC 2002).

Most production systems (such as cages, longlines, raceways, and rack, tray and stick) are open (or flow-through) systems. These systems rely on interaction with natural water bodies to provide inputs, such as dissolved oxygen and nutrients, and to assist in removal of waste products, such as fish and food waste (see box 2.1). Closed (or recirculating) systems (such as those using ponds and tanks) can control the supply and condition of water both entering and being discharged from a production system (USEPA 2002).

Box 2.1 Selected aquaculture production systems

Cages — can be used within ponds, lakes, rivers, estuaries, and in the sea. The use of cages within a large body of water can allow for the removal of wastes. Cages are usually constructed of nylon or plastic, although steel mesh pens are now also in use. In Australia, cages are used for farming finfish, such as salmon and tuna.

Raceways — are enclosures where the water moves through, carrying wastes out at the lower end. Trout are most commonly produced in raceways.

Rope longlines — are used for growing mussels and pearl oysters. Mussels are grown using a longline system consisting of one or two headlines (horizontal ropes anchored at both ends and connected to large floats). The headlines support culture ropes or droppers at 0.5 to 1 metre intervals on which the mussels are attached.

Rack, stick and tray — rack culture is the most common method of rock oyster farming. Oyster spat settle on sticks placed on intertidal racks. When the young oysters are established, sticks are moved up river to allow the oysters to grow without further settlement of spat. The oysters remain there for two to four years prior to harvesting. Pacific oyster spat, however, are produced in hatcheries and then ongrown in baskets on racks in the intertidal zone or suspended below longlines.

Ponds — are artificial impoundments and are usually constructed of earth. Prawns are grown in ponds that must be near an adequate water supply. The amount of water used and the quality of the discharged water depends on the management regime.

Tanks — can be used as flow through systems (as in raceways) or in static systems (as for ponds). Tanks are typically used in closed systems that involve water being recirculated through filters and pumped back into the tank. Tanks make efficient use of water but are expensive to set up and operate. Species produced in tanks include barramundi and abalone.

Sources: Love and Langenkamp (2003); Natfish (1998).

The farming of most species is undertaken using hatchery broodstock (juveniles produced in a closed system). The ‘grow out’ farming of southern bluefin tuna is a significant exception — juvenile and young adult tuna are caught in the Southern Ocean under a quota system administered by the Australian Fisheries Management Authority. The two to four year old fish are then towed from the Great Australian Bight to Port Lincoln, where they are fattened and conditioned in sea cages for between three and five months (PIRSA 2000a).

Other aquaculture sectors that rely on wild fisheries include Sydney rock oysters, which are generally ongrown from naturally spawned spat collected in the wild, and the farming of gold and silver lipped pearl oysters, which are harvested from the sea floor following the seeding of wild caught shell (Lendich 2003).

2.3 Potential environmental impacts

A key challenge to further development of the Australian aquaculture industry is the management of environmental impacts. The potential environmental impacts associated with aquaculture will vary according to the type of species farmed, type of production system, management practices used, location of farms, environmental carrying capacity, and condition and/or value of the environment. An additional factor is the cumulative effect of impacts — for example, although impacts associated with individual operations may be small, the accumulation of impacts across many operations and over time, may exceed environmental thresholds.

Different individuals and groups have direct and indirect interests in the use of natural resources, and the management of potential environmental impacts. This may be because the individuals are part of a geographical community located close to aquaculture activities, and/or because they belong to interest or functional groups relevant to aquaculture, such as fishing organisations, research institutions and conservation organisations (Mazur et al in press).

Community perspectives of aquaculture, and the level of understanding of potential environmental impacts, can affect aquaculture development. At times, there may be objections to individual aquaculture proposals in new areas or extension of operations in existing areas. For example, proposals for aquaculture developments in sensitive areas, such as Western Port Bay, Victoria, or in Moreton Bay, Queensland, have been strenuously opposed. At times, sections of the community view the ecological sensitivity and aesthetic value of bays and inlets as precluding marine aquaculture (PMSEIC 2002). Community concerns may also bring calls for more regulation. If these concerns are based on inaccurate information, then this may increase the risk of unnecessary and/or inefficient regulation.

Identifying and recognising the potential environmental impacts from different aquaculture operations is a necessary step in developing and implementing an effective system of planning and regulation. This involves consideration of the likelihood of different potential environmental impacts, and their magnitude and risk. Aquaculture may be only one of a number of activities contributing to environmental impacts in a particular area. An understanding is required of both the cumulative impacts from different activities, and the marginal impacts from aquaculture relative to other activities.

For the purpose of identification of impacts, it can be helpful to separate potential environmental impacts into two categories — site location and construction impacts, and operational impacts (local and off-site) (refer to PIRSA 2003a for further discussion of this dichotomy). It is beyond the scope of this paper to explore, in detail, issues of scientific uncertainty associated with particular impacts.

Site location and construction impacts

The physical location and construction of aquaculture farms may have a number of potential environmental impacts (see table 2.2). How such impacts are accounted for in decision-making frameworks is an important question for resource planning and related processes (see section 4.2).

The location of production systems will generally cause some level of habitat modification, with associated impacts on biodiversity. The extent of modification depends on the type and variety of flora and fauna present, and construction processes. For example, the location of production systems, such as sea cages and oyster racks, may impact on seagrass and other macrobenthic flora and fauna, through the placement of posts and anchors. Inter-tidal production systems may also reduce the amount of habitat available to particular species, such as wading birds.

The location of production systems may also impact on amenity values commonly associated with estuarine and coastal ecosystems. These may include values associated with multiple use of certain areas (for example, fishing and tourism), and visual amenity (Preston et al 1997). For example, the Sorell Council in Tasmania has expressed concern that visual impacts associated with the extension of oyster leases in the Southern Pitt Water estuary may threaten the local tourist industry (ABC 2003a). Some local residents also expressed concern about visual impacts, pollution, and potential impacts on property values (Lovibond 2003).

Other site location impacts that may also need to be considered include impacts on heritage values of particular areas, such as shipwrecks, and Indigenous values.

Table 2.2 Potential environmental impacts of aquaculture farm location and construction

<i>Production system</i>	<i>Typical species</i>	<i>Potential impact</i>	<i>Cause of impact</i>
Cage culture	Tuna, salmon, barramundi, kingfish	Habitat modification/loss	Altered water currents and movement of sediments from anchoring points and structures; shading of marine floor
		Changes to local fish populations	Cages may act as fish attractant devices
		Amenity values	Reduced area for multiple use; reduced visual amenity; noise
Rack, tray and stick	Oysters	Habitat modification/loss	Altered water currents and movement of sediments from pole footings and structures; shading of marine floor
		Amenity values	Reduced area for multiple use; reduced visual amenity; noise
Ponds	Prawns	Habitat modification/loss	Construction of earthen dams
		Amenity values	Reduced visual amenity; noise

Sources: ASEC (2001); Crawford (2003); PIRSA (2003a); Preston et al (1997).

Operation impacts

Once an operation has been established at a suitable site, a range of local (on or near site) and off-site operating impacts may occur.

Local impacts

Local impacts may vary significantly. The extent and intensity of the impacts are dependent on the density farmed, production system used, and habitat into which the system is introduced (see table 2.3). In all cases, potential impacts are likely to be exacerbated where aquaculture developments are poorly sited and/or managed.

Intensive cage culture of finfish may present greater challenges to achieving ‘environmentally sustainable production’ than other types of aquaculture (Preston et al 1997). A significant local management problem with this ‘open’ system is the discharging of nutrients (such as fish waste and uneaten food) and chemicals, into waters in which cages are located. This process may damage macrobenthic communities directly below and adjacent to cages, and impact on overall water quality (Crawford 2003).

Table 2.3 Potential local environmental impacts of aquaculture farm operations

<i>Production system</i>	<i>Typical species</i>	<i>Potential impact</i>	<i>Cause of impact</i>
Cage culture	Tuna, salmon, kingfish	Marine floor degradation	Shading; nutrient discharge; chemical discharge; organic waste accumulation
		Lower water quality	Nutrient discharge; chemical discharge
		Disease	Infected fish or feed; fish escapes
		Competition with wild stocks	Fish escapes
		Genetic weakening of wild stocks	Fish escapes; interbreeding of farmed and wild fish
Loss of or distress to native wildlife	Attraction of 'nuisance' predators; entanglements in cage material (eg seals and birds); predator control measures		
Rope longlines	Mussels	Marine floor degradation	Marine floor shading; nutrient discharge; organic waste accumulation
		Removal of food for other filter feeders	Phytoplankton filtering
		Improved water quality in eutrophicated areas	Phytoplankton filtering
Rack, tray and stick	Oysters	Marine floor degradation	Shading; nutrient discharge
		Removal of food for other filter feeders	Phytoplankton filtering
		Spread of introduced marine organisms	Movement of shellfish between hatcheries and farms
		Improved water quality in eutrophicated areas	Phytoplankton filtering
Raceways	Trout	Lower water quality Disease	Nutrient discharge; chemical discharge Fish escapes; infected fish
Ponds	Freshwater crustaceans	Lower water quality	Nutrient discharge; chemical discharge
		Disease	Infected fish or feed
		Competition with wild stocks	Fish escapes
	Prawns	Loss of or distress to native wildlife	Attraction of 'nuisance' predators; predator control measures
Lower water quality		Nutrient discharge; chemical discharge	

Sources: ASEC (2001); Crawford (2003); SAEPA (2003); Pearson and Black (2001); PIRSA (2003a); Preston et al (1997).

Farming of mussels and oysters, which relies on good ambient water quality, generally has minimal local impacts. The filtering nature of these species is such that they may contribute to lowering phytoplankton (small, often microscopic aquatic plants suspended in water), and thereby contribute positively to water quality. However, in some waterways, this function may result in competition for phytoplankton with wild stocks and other filter feeders, and adversely affect water quality (PIRSA 2003a).

Prawn farming using pond culture has, in the past, been subject to criticism for the input of nutrients into adjacent estuarine waterways (Phillips et al 1993). In Australia, innovations in production and management systems, such as the use of nutrient settlement ponds, have enabled reduction of nutrient discharges (APFA 2002).

Off-site impacts

Aquaculture farm operations may also have more remote off-site impacts. For example, one concern is that cage production systems may spread pathogens and disease to wild fish stocks through water currents, fish escapes, and the use of imported feed fish (Love and Langenkamp 2003). Potentially, the stock within a cage may act as a vector which concentrates and/or increases the abundance of pathogens.

Concerns have also been raised about the potential negative impacts of fish escapes from sea cages on wild fish and recreational fishing. For example, in South Australia, there has been recent debate over the impact of escaped yellowtail kingfish on popular recreational fishing species such as whiting (ABC 2003b). To improve understanding and reduce potential impacts, the South Australian Government commissioned research into the identification of wild from farmed fish, and has tightened licence conditions to reduce potential for further fish escapes (Holloway 2003). Findings from the research indicate that farmed and wild fish can be readily distinguished, and that most escaped fish are unlikely to survive for any significant period. However, the research also found that a smaller subset of escaped fish may adapt and persist for 'longer' periods (Fowler et al 2003).

Another issue is the cumulative impact of soluble nutrient discharges where a number of aquaculture farms are located in the same water body. If the accumulation of nutrients goes beyond the assimilative capacity of a particular water body, such as an estuary or bay, then ecological impacts can be expected to occur. These system-wide impacts are more difficult to determine and manage because nutrients may also be washed into estuaries and coastal waters due to land-based activities (Crawford 2003).

A related issue is the potential for off-site impacts to be caused by interaction between production and biophysical factors. For example, in Boston Bay (South Australia) in 1996, the combination of a severe storm, suspended sediments, and the location of tuna cages in shallow water, is suggested to have killed large numbers of farmed tuna (Parliament of South Australia 1998). This highlights the importance of appropriate marine aquaculture planning provisions and consideration of such interactions when identifying potential sites (see section 4.2).

In some instances, off-site impacts can extend to affect human health. This is a particularly important issue for the farming of molluscs, such as oysters and mussels, which may selectively accumulate bacterial and chemical contaminants (Preston et al 1997). In 1997, for example, poor water quality and contaminated oysters from Wallis Lake in New South Wales caused a Hepatitis A outbreak (see box 2.2). In addition to issues of legal liability, this outbreak highlights the importance of water quality for ‘open’ aquaculture production systems.

Box 2.2 Wallis Lake Hepatitis A outbreak

In early 1997, NSW Health began detecting higher than usual notifications for viral Hepatitis A in New South Wales. Oysters cultivated in Wallis Lake were suspected as the source of the outbreak, and the Department of Health subsequently issued a warning that Wallis Lake oysters were suspected in an epidemic of viral Hepatitis A. Oyster farmers voluntarily recalled their products from sale and viral testing of oysters and testing of sediments and water from Wallis Lake revealed that the epidemic was associated with human faecal pollution.

A class action was initiated in late 1997. In 1999, the Federal Court ruled that the producer, local council and state government had been negligent. In a subsequent appeal, the High Court ruled that the public bodies involved were not negligent because they did not have exclusive control of the environment in which the oysters were grown. Separate actions in the Supreme Court are continuing.

Sources: Fowlie (1999); Oyster Farmers Association of NSW (2003).

2.4 Potential industry development constraints

Poorly conceived or implemented planning and environmental regulatory frameworks may unnecessarily constrain the further development of the aquaculture industry. However, there are also other potential constraints that may need to be addressed for development opportunities to be realised. Recent reviews, including the National Aquaculture Development Committee’s (NADC) report *Aquaculture Industry Action Agenda* (2002) and the Prime Minister’s Science, Engineering and Innovation Council’s (PMSEIC) report *Sustainable Aquaculture* (2002), have sought to address a number of constraints to industry development. These include:

- *Market development and access* — community perspectives of aquaculture and access to export markets may affect industry development. Lendich (2003) suggests that if aquaculture is viewed as ‘an unplanned, environmentally damaging industry’, it may be ignored by larger retailers who are moving towards buying products from producers exhibiting ‘genuine’ environmental stewardship. For access to export markets, NADC (2002) argues that, despite

steady improvements, trade barriers (tariff and non-tariff) continue to have an adverse impact.

- *Investment* — the ability of many parts of the aquaculture industry to attract significant new investment has been identified as a key constraint on future growth (Lendich 2003). NADC (2002) indicates that the scale and ownership structure of most aquaculture enterprises (such as small, family-owned businesses) is poorly suited to attracting equity financing (although this may be a problem for small businesses generally). As for most agricultural businesses, potential variation in climatic and other environmental conditions creates an additional level of risk when attempting to access finance and make production decisions (PWC 2003).
- *Technology and innovation* — further developments in technology and innovation will play a key role in the future growth and development of the industry (PMSEIC 2002). For example, the development of less expensive feeds, and feeds less reliant on wild caught species, may improve both profitability and sustainability. Technological advancement in turn often relies upon the level and organisation of funding for research and development. On this issue, NADC (2002, p. 28) found that there has been:
 - ... a tendency to spread limited research funds over a large number of species (~70), some of which appear to have relatively little to contribute to potential industry development and profitability.
- *Industry organisation and coordination* — there are concerns that the fragmented nature of the aquaculture industry has meant that industry-wide strategic planning has been difficult to achieve. In addition to improved research and development outcomes, both industry and government have identified that there may be clear advantages from a peak body representing the industry on issues such as the adoption of ‘best practice’, export promotion, and attracting ‘sound’ investment (NADC 2002; PMSEIC 2002). In 2003, the National Aquaculture Council, a peak body representing the aquaculture industry across Australia, was formed to address these and other issues.

2.5 Summary

- In Australia, there are over 70 different species under aquaculture development with around 40 of these produced commercially.
- Recent growth in the value of Australian aquaculture has largely been generated by five species produced in different jurisdictions.

-
- A variety of production systems are used ranging from ponds and farm dams for freshwater crustaceans to sea cage farming of tuna and salmon.
 - The scale and scope of environmental impacts will vary according to the type of species farmed, type of production system, management practices used, location of farms, environmental carrying capacity, and condition and/or value of the environment.
 - Identifying and recognising the potential environmental impacts from different aquaculture operations is a necessary step in developing and implementing an effective system of planning and regulation.
 - Aquaculture may be only one of a number of activities contributing to environmental impacts in a particular area. An understanding is required of both the cumulative impacts from different activities, and the marginal impacts from aquaculture relative to other activities.
 - Poorly conceived and/or implemented regulatory frameworks may unnecessarily constrain the further development of the aquaculture industry. Recent reviews have suggested that other potential constraints to industry development, include market development and access, investment, technology and innovation, and industry organisation and coordination.

3 Legislation and agencies

This chapter outlines the main legislation regulating aquaculture production before discussing alternative legislative approaches. It then outlines and discusses the functions and responsibilities of the principal regulatory agencies. Aspects of quarantine legislation and translocation policies are examined in chapter 8.

3.1 The legislative framework

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 responsibility for management of marine waters between the three and two hundred nautical mile limits, and also within three nautical miles, such as at Jervis Bay for defence and related purposes Australia has sovereignty over the territorial sea to 12 nautical miles. The Exclusive Economic Zone between 12 and 200 nautical miles confers sovereign rights for exploring, exploiting, conserving and managing living and non-living resources of the water, sea bed and subsoil (Commonwealth of Australia 1998; Walrut 2002).

State and territory legislation relating to fisheries or aquaculture, environment protection and land use planning are key components of the legislative framework for aquaculture production. Other state or territory legislation relating to coastal management, land administration, water management, conservation, native vegetation, national parks (including marine parks), heritage, native title, and food safety, may also regulate aquaculture production. Commonwealth legislation relating to environment protection, native title, and quarantine, may also regulate aquaculture production. Various approvals for aquaculture production may be required under the Commonwealth, state and territory legislation, including leases, licences, permits, and development approvals (see appendix A and B).

State fisheries and aquaculture legislation

The main state fisheries and aquaculture legislation, and the long titles and objects (where available), are shown in table 3.1. The long title and objects indicate the broad intent and general approach of the legislation.

Table 3.1 Main state fisheries and aquaculture legislation

<i>Jurisdiction</i>	<i>Long title and objects of legislation</i>
New South Wales <i>Fisheries Management Act 1994</i>	<p>Long title: An Act relating to the management of fishery resources.</p> <p>Objects: To conserve, develop and share the fishery resources of the state for the benefit of present and future generations. In particular, the objects of the Act include: to conserve fish stocks and key fish habitats; conserve threatened species, populations and ecological communities of fish and marine vegetation; and promote ecologically sustainable development, including the conservation of biological diversity; and, consistent with these objects, promote viable commercial fishing and aquaculture industries; promote quality recreational fishing opportunities; appropriately share fisheries resources between the users of the resources; and provide social and economic benefits for the wider community (s. 3).</p>
Victoria <i>Fisheries Act 1995</i>	<p>Long title: To provide a modern legislative framework for the regulation, management and conservation of Victorian fisheries including aquatic habitats (s. 1).</p> <p>Objects: To provide for the management, development and use of Victoria's fisheries, aquaculture industries and associated aquatic biological resources in an efficient, effective and ecologically sustainable manner; to protect and conserve fisheries resources, habitats and ecosystems including the maintenance of aquatic ecological processes and genetic diversity; to promote sustainable commercial fishing and viable aquaculture industries and quality recreational fishing opportunities for the benefit of present and future generations; to facilitate access to fisheries resources for commercial, recreational, traditional and non-consumptive uses; and to encourage community participation (s. 3).</p>
<i>Land Act 1958</i>	No stated long title or objects. Governs the granting of leases over unreserved Crown land for commercial, industrial, agricultural and other purposes.
Queensland <i>Fisheries Act 1994</i>	<p>Long title: An Act for the management, use, development and protection of fisheries resources and fish habitats and the management of aquaculture activities, and for related purposes.</p> <p>Objects: Main purpose is to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to apply, balance and promote the principles of ecologically sustainable development (s. 3).</p>
<i>Land Act 1994</i>	<p>Long title: An Act to consolidate and amend the law relating to the administration and management of non-freehold land and deeds of grant in trust and the creation of freehold land, and for related purposes.</p> <p>Objects: Land administered under this Act must be managed for the benefit of the people of Queensland by having regard to the following principles: sustainability; evaluation; development; community purpose; protection; consultation; and administration (s. 4). The principles are further defined.</p>
Western Australia <i>Fish Resources Management Act 1994</i>	<p>Long title: An Act relating to the management of fish resources, to repeal and amend certain Acts, and for related purposes.</p> <p>Objects: To conserve, develop and share the fish resources of the state for the benefit of present and future generations. Specifically, the objects include protection of fish and their environment; sustainable exploitation of fish resources; management of fishing, aquaculture and associated industries, aquatic eco-tourism and other tourism reliant on fishing; fostering the development of commercial and recreational fishing and aquaculture; optimisation of the economic, social and other benefits from the use of fish resources; allocation of fish resources between users (s. 3).</p>

(Continued next page)

Table 3.1 (continued)

<i>Jurisdiction</i>	<i>Long title and objects of legislation</i>
Western Australia <i>Pearling Act 1990</i>	Long title: An Act to regulate pearling and pearl oyster hatchery activities, to provide for the conservation and management of pearl oyster fisheries, to repeal the <i>Pearling Act 1912</i> and for connected purposes. No stated objects.
South Australia <i>Aquaculture Act 2001</i>	Long title: An Act to regulate marine and inland aquaculture; to amend the <i>Environment Protection Act 1993</i> and the <i>Fisheries Act 1982</i> ; and for other purposes. Objects: To promote ecologically sustainable development of marine and inland aquaculture; maximise benefits to the community from the state's aquaculture resources; and ensure the efficient and effective regulation of the aquaculture industry (s. 8 (1)).
Tasmania <i>Marine Farming Planning Act 1995</i>	Long title: An Act to provide for the planning of marine waters for marine farming and the allocation of marine farming leases. Objects: Purpose is to achieve well-planned sustainable development of marine farming activities having regard to the need to integrate marine farming activities with other marine uses; minimise any adverse impact of marine farming activities; set aside areas for other activities; and take account of land uses and the community's right to have an interest in marine farming activities (s. 4 (1)).
<i>Living Marine Resources Management Act 1995</i>	Long title: An Act to promote the sustainable management of living marine resources, to provide for management plans relating to fish resources, to protect marine habitats and to repeal the <i>Fisheries Act 1959</i> . Objects: To achieve sustainable development of living marine resources having regard to the need to increase the community's understanding of the integrity of the ecosystem upon which fisheries depend; provide and maintain sustainability of living marine resources; and take account of the community's needs and interests in respect of living marine resources (s. 7 (1)).
<i>Inland Fisheries Act 1995</i>	Long title: An Act to consolidate the law relating to inland fisheries. No stated objects.

Sources: State legislation.

All jurisdictions 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*, while Western Australia also has dedicated legislation for pearling (*Pearling Act 1990*).

The fisheries or aquaculture legislation contains various provisions regulating aquaculture production. In South Australian, the *Aquaculture Act 2001* includes provisions setting out the Minister's powers to make aquaculture policies, classes and terms of leases, licence requirements and conditions, establishment of bodies to administer or advise on aspects of the Act, and legal authority for associated activities. In other jurisdictions, generic fisheries legislation includes broadly

similar provisions for aquaculture regulation — New South Wales, Western Australia and Tasmania have specific divisions addressing aquaculture in their legislation, while in Victoria and Queensland, new sections have been created within the existing divisions of the legislation.

Commonwealth legislation

Aquaculture production may also be subject to Commonwealth legislation, such as the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and the *Great Barrier Reef Marine Park Act 1975*. Other Commonwealth legislation that may be relevant includes the *Native Title Act 1993* that may affect the use of public land and waters (see section 5.6). Commonwealth quarantine legislation can affect aquaculture operators' access to new species, broodstock and feed (see chapter 8).

Environment Protection and Biodiversity Conservation Act

The main Commonwealth legislation dealing with environmental impacts is the EPBC Act. Under the Act, actions likely to have a significant impact on a matter of national environmental significance are subject to a referral, assessment, and approval process (see section 6.2).

The EPBC Act also requires that the Australian Fisheries Management Authority (AFMA) conduct a strategic environmental impact assessment before it determines a 'plan of management' for a Commonwealth fishery. This affects management of fisheries, such as the southern bluefin tuna fishery and the northern pearl fishery, which are used as inputs for aquaculture. The Minister for Environment and Heritage may accredit the strategic assessment, and further approval under the EPBC Act is not required in relation to matters covered by the assessment. All fisheries with an export component must also undergo assessment under the EPBC Act to determine the extent to which management arrangements will ensure that the fishery is managed in an ecologically sustainable way. A single assessment is usually done for each fishery covering:

- accreditation for matters of national environmental significance;
- accreditation for protected species interactions; and
- export approval.

As criteria for strategic assessment and export approval are essentially the same, strategic assessment approval also provides a level of export approval. Further, AFMA envisage that strategic assessment approval will also overcome the need for

a separate protected species approval (AFMA 2003). In October 2003, the Western Australian northern pearl industry was granted accreditation under the EPBC Act to continue operating as an export industry.

Great Barrier Reef Marine Park Act

In Queensland, the Great Barrier Reef Marine Park Authority (GBRMPA) (an Australian Government statutory authority) administers permits for works in the marine park, and discharges into the marine park, under the *Great Barrier Reef Marine Park Act 1975*. The Australian and Queensland Governments have agreed to establish a single accredited environmental assessment process and performance standards for land-based aquaculture developments adjacent to the Great Barrier Reef. This proposal is intended to meet all Queensland and Commonwealth regulatory requirements while maintaining protection for the reef (see section 6.2).

Assessment of legislative framework

Legislative frameworks can be assessed in terms of the degree of complexity and clarity of objectives.

Legislative complexity

A significant number of different pieces of legislation regulates aquaculture production at different levels of government (see appendix A and B). The legislative framework may result in interpretation and coordination problems, and constrain aquaculture production. Ciffolilli (2003) in reviewing Western Australia's regulatory arrangements for aquaculture observed:

The complex interplay of legislation in other States ... show[s] that other Australian states, like Western Australia, have many disparate pieces of legislation that regulate aquaculture and require separate approvals. (Ciffolilli 2003, p. 14)

In South Australia, prior to the development of new aquaculture legislation, the Department of Primary Industries and Resources (PIRSA) stated:

There has been a growing demand for the clarification and simplification of the regulatory system for aquaculture. Aquaculture is presently regulated under multiple pieces of legislation across a number of government portfolios ... Current legislative arrangements are, arguably, cumbersome, and it is Government's role to clarify and simplify these arrangements for the benefit of all stakeholders. (PIRSA 2000b, p. 2)

Different legislative approaches can be used to provide for aquaculture management, such as the use of fisheries or dedicated aquaculture legislation (see

below). Regardless of which legislative approach is chosen, aquaculture needs an adequate legislative base that provides for subsequent regulation and administration of approvals in the most efficient way.

Legislative objectives

Clear legislative objectives promote consistency and certainty in setting the parameters of legal power under the legislation, and in guiding Ministers, government agencies and others in interpreting and applying the legislation. Clarity of objectives can be improved through identification of a single primary objective, supported by subsidiary objectives (PC 2002b).

Principles for good legislation design require that:

- objectives should be stated in legislation, and be clear and concise (Argy and Johnson 2003; ORR 1998; PC 2002b);
- objectives should ‘be specified broadly enough to allow consideration of all relevant alternative solutions, but should not be so broad or general that the range of alternatives becomes too large to assess, or the extent to which the objective has been met becomes too hard to establish’ (ORR 1998, p. D3); and
- where several objectives are deemed necessary, the legislation should specify a clear hierarchy among them in order to reduce uncertainty about their relevance and relative priority, and to minimise potential conflict between competing objectives (ORR 1998; PC 2002b).

Some of the older legislation relevant to aquaculture does not contain explicit objectives, for example, Victoria’s *Land Act 1958*, Western Australia’s *Pearling Act 1990*, and Tasmania’s *Inland Fisheries Act 1995*. In Western Australia, a new Pearling Bill is being drafted, and the Bill will contain objectives which are set within a hierarchical framework.

Some fisheries or aquaculture legislation contain broad objectives that are not clearly defined and appear difficult to implement without further guidance. Fisheries legislation in New South Wales, Victoria, Queensland and Western Australia, for example, have similar objectives for conservation and development of each state’s fisheries resources in an ecologically sustainable manner. South Australia requires the promotion of ‘ecologically sustainable development of marine and inland aquaculture’. The application of ecological sustainability can present problems in practice as:

... in practice its application is problematical since its principles can be contradictory, weighted inconsistently and interpreted in widely different ways. (PIRSA 2003b, p. 2)

Several fisheries or aquaculture Acts require the maximisation and/or provision of benefits to the broader community (New South Wales, Western Australia, and South Australia) or to ‘present and future generations’ (Victoria and Western Australia). However, the legislation provides little or no guidance as to:

- what factors should be taken into account in assessing public benefits and costs;
- how to weight benefits and costs among different community groups; or
- how to weight the interests of future compared with current generations.

The fisheries or aquaculture legislation may also have multiple, and sometimes conflicting, objectives. The objects of the fisheries legislation in New South Wales, Victoria, Western Australia and Tasmania, for example, all recognise explicitly that there are alternative uses of fishery resources — for example, commercial fishing, aquaculture, recreational fishing, tourism and ‘non-consumptive uses’. In New South Wales and Western Australian legislation, a purpose is to ‘share the fish resources of the state’. However, there is little guidance on the appropriate weights to be assigned to competing uses or how conflicts between uses are to be resolved.

Several fisheries or aquaculture Acts specify potentially conflicting objectives. For example, the New South Wales, Victorian, and Western Australian legislation sets a goal of ‘promoting’ or ‘fostering’ development of the commercial and recreational fishing and aquaculture sectors. However, aquaculture development may also conflict with development of other fishery sectors. For example, aquaculture production sometimes requires access to wild broodstock, which may reduce wild fish numbers available to commercial and recreational fishers (ARRTF 1999a). Furthermore, sites allocated to aquaculture purposes may no longer be available for recreational fishing, and aquaculture production may generate environmental effects that have adverse impacts on other fishery sectors (see section 2.3). Similarly, activities in other fishery sectors may conflict with aquaculture development, for example, through impacts on water quality or availability of wild sourced feeds.

Promotion of aquaculture or fisheries development may conflict with other objectives in the legislation, such as conservation of fishery resources. In order to determine whether specific legislative objectives are, on balance, in the public interest, the relative priority given to different objectives must be known. However, the legislation often does not specify priorities among objectives, and may be difficult to consistently interpret and administer. In some jurisdictions, the clarity of fisheries and aquaculture legislative objectives could be improved through the identification of a single primary objective, supported by subsidiary objectives.

Alternative legislative approaches

There are a number of broad legislative options for regulating aquaculture production, including:

- application of the provisions of existing legislation to aquaculture;
- amendment of existing legislation to incorporate aquaculture provisions; and
- enactment of dedicated aquaculture legislation.

Each option has different costs and benefits for the aquaculture industry and government in terms of administration, compliance and aquaculture management.

Application of existing legislation

Existing legislation governs aspects of aquaculture production in all jurisdictions. For example, planning legislation in each jurisdiction controls granting of development approval for land-based aquaculture activities. Environment protection legislation applies to large-scale land-based aquaculture in most states, apart from Tasmania and South Australia. Two Victorian reviews recommended use of the existing *Land Act 1958* to govern administration marine aquaculture leases, rather than enactment of new legislation (ARRTF 1999a; DNRE 2002).

There are several benefits to applying existing legislation to regulate aquaculture production. The legislation already exists, and may be the cheapest and fastest way to establish a regulatory framework for the industry. It may facilitate a consistent approach to regulation of different industries, ensuring a ‘level playing field’, and potentially promoting efficient resource allocation across industries (assuming the existing legislative framework is efficient).

However, there may be costs from applying existing legislation. The legislation may have unintended side-effects because of differences between aquaculture and other industries. Existing legislation may not address issues relevant to the aquaculture industry, for example, provision of access to broodstock or security of tenure over the use of public resources. At times, the objects of existing legislation do not clearly address or provide for aquaculture. Aquaculture operators and agencies may incur significant costs to identify which provisions from various pieces of legislation apply to the industry, and how the different provisions interact.

Amendment of existing legislation

All jurisdictions, except South Australia, have amended existing fisheries legislation to provide the core regulatory framework for aquaculture activities. Amendment of

existing legislation allows governments to state their objectives for aquaculture, establish a clear mandate, and address the particular needs of the aquaculture industry, while potentially retaining the benefits of established case law. Moreover, extension of existing fisheries legislation to include aquaculture may have benefits for ensuring an integrated approach to the use and conservation of fishery resources.

The potentially shorter timeframe for amendments of existing fisheries legislation than for enacting new legislation may allow governments to more quickly establish a regulatory framework for aquaculture. The use of existing planning or environment protection legislation may be cost-effective where only minor amendments are needed to effectively address aquaculture.

Even with amendment, differences in the characteristics of wild catch fisheries and aquaculture may make fisheries legislation inappropriate for application to aquaculture. In Canada, it has been observed that:

Many of the regulations under the Fisheries Act are not well adapted or directly relevant to aquaculture — a situation that results in the aquaculture industry being managed as a subset of the traditional fisheries. This is analogous to equating traditional livestock and crop agriculture to the hunting and gathering of animals and plants. (OCAD 2001, p. 1)

In 1999, a Victorian Task Force highlighted industry concerns about ‘unintended impacts of fisheries regulations and legislation, developed in response to the wild catch sector, on the emerging aquaculture sector’ (ARRTF 1999a, p. 13). The Task Force observed that the absence of clear provisions for aquaculture operators’ access to broodstock from wild fisheries may both impede aquaculture development and fail to address potential conflict with commercial and recreational fishers.

At times, fisheries legislation may have to be adapted to cater for land-based aquaculture. For example, the Victorian *Fisheries Act 1995* provided for the declaration of fisheries reserves only over Victorian ‘waters’, which did not cover land-based aquaculture. To allow the establishment of management plans for land-based aquaculture zones, the Victorian Government amended the Act to permit a ‘fisheries reserve’ to be declared on public land. This was necessary to permit land-based aquaculture zones to be established, and to bring land-based aquaculture activities within a similar resource allocation framework as marine aquaculture.

Where existing legislation requires substantial amendment to provide for effective management of aquaculture, the amendment process may be just as long and complex as the introduction of new aquaculture legislation. Furthermore, clarification of which sections of existing fisheries legislation apply to aquaculture may be a complex process, leading to uncertainty and significant transaction costs for aquaculture operators.

Enactment of new aquaculture legislation

An alternative to amending existing legislation is to develop new aquaculture legislation. South Australia is the only Australian state with dedicated aquaculture legislation. Tasmania has dedicated legislation governing marine aquaculture leases through the *Marine Farming Planning Act 1995*. In Western Australia, Ciffolilli (2003) in reviewing the legislative framework for the Minister for Agriculture, Forestry and Fisheries recommended the introduction of separate aquaculture legislation in that state. However, other states, such as Victoria and Queensland, have rejected this approach (ARRTF 1999a; MACQ 2003).

A benefit of dedicated aquaculture legislation is that it can be specifically tailored to address the needs of the aquaculture industry (OCAD 2001). Dedicated aquaculture legislation allows governments to express in legislation their objectives for aquaculture. In Western Australia, Ciffolilli (2003, p. 17) concluded:

I have very carefully considered the arguments for and against having a separate Aquaculture Act. ... I consider the arguments to be finely balanced (especially given the additional costs and administrative burdens). Ultimately, I am of the view that in order to encourage or facilitate the development of aquaculture, a separate Aquaculture Act should be drafted and come into existence.

Dedicated aquaculture legislation may allow separate administration of the regulatory frameworks applying to aquaculture and wild capture fisheries. This may lead to more efficient and effective legal and regulatory frameworks for each sector — the responsible agencies will have clearer objectives and may be able to focus more readily on the particular needs of an individual sector. Conversely, as marine resource management is moving towards an integrated management framework, it may not be desirable to have separate fisheries, aquaculture and marine conservation legislation. The separation of legislative powers may create complexities that makes integrated management more difficult to achieve.

A significant cost of enacting new aquaculture legislation is the potentially long and complex process involved. For example, introduction of the South Australian Aquaculture Act took more than three years from the release of the initial draft discussion paper in March 1999 until the Act came into effect in July 2002. The process of developing new policies to implement the Act is still in progress. A Victorian Task Force (ARRTF 1999a) considered but rejected the option of dedicated aquaculture legislation. Victoria's Department of Natural Resources and Environment (DNRE) concluded that the:

considerable time and public expense' required to introduce new legislation meant that 'new legislation should only be considered if existing legislation cannot be made to work satisfactorily. (DNRE 2002, p. 26).

The Queensland Ministerial Aquaculture Committee concluded that transferring the existing provisions relating to aquaculture from the Fisheries Act into a new Aquaculture Act would ‘achieve nothing administratively apart from adding another Act that government must administer’ (MACQ 2003, p. 8). Consolidation of aquaculture-related provisions from all state legislation would have the benefits of allowing industry operators to deal with only one agency, and raise the profile of the industry. However, the costs were judged to outweigh the benefits — general environmental provisions applying to all industries would be duplicated in an Aquaculture Act; other industries may seek separate legislation; and the range of issues to be dealt with by a consolidated Aquaculture Act would be ‘far beyond the expertise of one department’ (MACQ 2003, p. 8). Even in the states with dedicated aquaculture legislation (such as South Australia and Tasmania), aquaculture production is also regulated under additional legislation governing land use planning, land tenure and water management (see appendix A).

While all of the regulations applying to aquaculture production could potentially be integrated into a single piece of legislation, introducing such legislation would most likely be a protracted, complex and costly process. This approach does not appear to have been adopted in any jurisdiction for any industry. An alternative approach is to establish an integrated approvals process that brings all of the required approvals together under a single process for lodgement, assessment and appeal, managed by a single responsible agency (as implemented, for example, in New South Wales, see section 6.2). An integrated approvals process may provide greater clarity for the industry, address the specific needs of the aquaculture industry, minimise conflicts of objectives, and reduce the costs to aquaculture operators of identifying all of the regulatory requirements governing their activities.

Nationally consistent approaches

At times, different environmental regulatory arrangements and inconsistent treatment of aquaculture across jurisdictions may affect aquaculture development in Australia, and environmental management. For example, different environmental arrangements and conditions apply to coastal land-based prawn farming in adjacent areas in New South Wales and Queensland, and to marine aquaculture in adjacent marine areas of Western Australia and South Australia (see appendix A and B).

In 2002, an independent working group reporting to the Prime Minister’s Science, Engineering and Innovation Council (PMSEIC 2002), and the National Aquaculture Development Committee (2002) both proposed streamlining environmental regulatory arrangements for aquaculture. In addition, the two groups recommended development of nationally consistent guidelines/policies or nationally agreed best-practice principles for aquaculture management (see box 1.1).

The potential benefits and costs of national consistency vary depending on the approach. National consistency could be promoted through:

- development of a single environmental regulatory regime for aquaculture across all jurisdictions;
- harmonisation of environmental regulatory arrangements for aquaculture; and
- development of best-practice principles for management of aquaculture.

A nationally consistent approach could reduce inconsistent treatment of similar aquaculture activities at the state and territory level. However, the feasibility of this approach depends on whether all jurisdictions would agree to adopt it. A further issue is that a national approach (depending on how it was implemented), may be inconsistent with state and territory responsibilities for land and water management under the Constitution.

A reduction in the number of different sets of environmental regulatory arrangements across jurisdictions may generate cost savings for governments and the aquaculture industry. However, whether these savings were generated in practice would depend on the organisation and administration of these arrangements in each jurisdiction.

As environmental regulatory arrangements for aquaculture are typically part of a larger government system for management of environmental impacts, it may not be possible to separate aquaculture-related environmental regulation from other environmental regulation. One set of national regulatory arrangements may not be able to address the industry's diversity, and the different potential environmental impacts from each sector (see section 2.3).

Adoption by states and territories of a set of principles to promote consistency of regulation of aquaculture may be a more practical approach. This could involve jurisdictions adopting either uniform or harmonised legislation with the aim of introducing a single national system.

There may also be opportunities to develop best-practice principles for management of aquaculture. For example, there may be opportunities for greater national consistency in particular areas, such as monitoring and reporting regimes for aquaculture and environmental management. An ecologically sustainable development (ESD) reporting and assessment framework is currently being prepared by state and territory departments as a basis for discussion (Fletcher 2002).

3.2 Agencies involved in aquaculture regulation

Various state and territory departments and agencies, as well as local government and the Department of the Environment and Heritage (Australian Government), are involved in regulating aquaculture production and managing its environmental impacts. Other agencies, such as state health departments, national parks and wildlife services, rural water authorities, and catchment management authorities, also administer regulations that may affect aquaculture operators.

Main agencies in each jurisdiction

The functions of the main agencies involved in regulating aquaculture production and managing environmental impacts in each state are identified in table 3.2. In all states, the lead agencies are departments of primary industries or fisheries. These departments have broad responsibility for developing the regulatory framework, including policy development, tenure allocation, licensing of operators, and monitoring and enforcement of operating conditions.

Tasmania differs from the other states in that it divides lead responsibility for aquaculture management between two agencies — one responsible for managing marine aquaculture (the Department of Primary Industries, Water and Environment (DPIWE)), and the other responsible for inland aquaculture (the Inland Fisheries Service). This is under review and responsibility for regulation of freshwater fish farming may be transferred to DPIWE.

As well as regulating the aquaculture industry, state primary industries or fisheries departments are responsible for fostering industry development through providing business support, advice and financial assistance. In some states, such as New South Wales and Queensland, departments of state development may also promote aquaculture development through broad industry support services (see below).

Tenure may be allocated by various departments, including primary industries, fisheries, environment and land administration. Other agencies, for example, state environment protection authorities or planning departments, may also have input, particularly into identifying aquaculture planning areas or zones.

Management of the environmental impacts of aquaculture operations is spread across state agencies. The primary industries or fisheries departments incorporate environmental protection measures into their resource planning provisions for aquaculture zones, and into aquaculture licence conditions. Aquaculture operators may also require separate licences from state environment protection authorities and/or environment departments.

Table 3.2 Functions of main agencies involved in aquaculture management

	<i>Policy</i>	<i>Industry development</i>	<i>Tenure allocation</i>	<i>Aqua. licensing</i>	<i>Env't/ other licence^a</i>	<i>Development approval</i>	<i>Monitoring/enforcement</i>
New South Wales							
• NSW Fisheries	✓	✓	✓	✓	✓	✓	✓
• Dept of Env't and Conservation					✓	*	✓
• Dept of Infra. Planning and Nat. Resources					✓	✓	✓
• Local governments						✓	✓
Victoria							
• Dept of Primary Industries	✓	✓		✓			✓
• Environment Protection Authority					✓		✓
• Dept of Sustain. and Environment			✓		✓	✓	✓
• Local governments						✓ ^b	✓
Queensland							
• Dept of Primary Industries	✓	✓		✓		*	✓
• Dept of Natural Res. and Mines			✓		✓	*	✓
• Environmental Protection Agency					✓		✓
• Dept of Local Gov't and Planning	✓						
• Dept of State Devel.	✓	✓					
• Local governments						✓	✓
• GBRMPA ^c					✓		✓
Western Australia							
• Dept of Fisheries	✓	✓	✓	✓			✓
• Dept of Env't					✓		✓
• Dept of Planning and Infrastructure			✓				
• CALM ^d			✓ ^e				
• WAPC ^f /local governments						✓	✓
South Australia							
• Dept of Primary Industries and Resources (PIRSA)	✓	✓ ^g	✓ ^h	✓	✓		✓
• Environment Protection Authority	*		*	*	*	*	
• Planning SA	*					*	
• DAC ⁱ /local governments						✓	✓

(Continued next page)

Table 3.2 (continued)

	<i>Policy</i>	<i>Industry develop-ment</i>	<i>Tenure alloca-tion</i>	<i>Aqua. licensing</i>	<i>Env't/ other licence^a</i>	<i>Develop-ment approval</i>	<i>Monitoring/ enforce-ment</i>
Tasmania							
• Dept of Primary Industries, Water and Env't ^j	✓	✓	✓ ^k	✓	✓	*	✓
• Inland Fisheries Service ^l	✓	✓		✓			✓
• Local governments						✓ ^m	✓
Australian Government							
Department of the Environment and Heritage					✓		✓

* Must be consulted or may provide advice. ^a Includes environmental licences and other permits (eg. for water diversion and/or water discharges). ^b In most cases, does not apply to offshore waters. ^c Great Barrier Reef Marine Park Authority (Australian Government). ^d Department of Conservation and Land Management. ^e For aquaculture in special purpose areas in marine parks with consent of Minister for Environment. ^f Western Australia Planning Commission. ^g Undertaken by PIRSA Rural Solutions (a commercial arm of PIRSA). ^h Also an independent Tenure Allocation Board for marine waters. ⁱ Development Assessment Commission. ^j For marine farming in state waters. ^k Also independent Board of Advice and Reference for marine waters. ^l For inland freshwater aquaculture (under review and may be transferred to Department of Primary Industries, Water and Environment). ^m For land-based marine farming and freshwater aquaculture development.

Sources: Australian Government and state departmental information.

Environmental licensing requirements may cover water diversion, water discharges, works approvals, clearing of vegetation, and other activities that impact on the environment (see appendix A and B). Operators may be subject to general environmental ‘duty of care’ provisions under environmental protection legislation administered by state environment protection authorities.

While state governments have primary responsibility for regulating aquaculture production and granting marine aquaculture approvals, local governments are generally responsible for granting development approval for land-based aquaculture activities. Assessment of development approval applications is conducted within a framework of state planning and development legislation, and planning policies established by state planning departments (see section 4.3).

Applications involving activities on public land require approval and grant of a public lease (see section 5.5), and may be subject to native title (see section 5.6). Leases are granted by primary industries and land administration departments.

Other single purpose agencies may have significant involvement in some types of aquaculture activities. In South Australia, for example, certain coastal applications must, as part of the development approval process, be referred to the Coast

Protection Board. The board has the power to ‘direct’ the Development Assessment Commission (DAC), and local councils, to refuse or to place conditions on approvals for activities on ‘coastal land’.

The Australian Government also has some direct regulatory involvement as approval may be required for certain aquaculture activities under the EPBC Act (see above) or under the *Quarantine Act 1908* (see chapter 8).

Assessment of agency functions

State government departments of primary industries or fisheries often have potentially conflicting functions of policy development, implementation of regulation, industry promotion and development, and research. In New South Wales and Western Australia, for example, the fisheries departments are responsible for most aspects of aquaculture regulation, in addition to fostering industry development through providing business support, advice and financial assistance. There may be some size and efficiency advantages from the grouping of certain functions, such as policy development and administration of approvals. However, the potential conflict between regulatory and industry development functions may lead to undesirable regulatory outcomes, as well as public and industry mistrust over resource planning and allocation, approvals, monitoring and enforcement.

In some jurisdictions, industry development is undertaken by a separate unit of the line department. In South Australia, for example, PIRSA Rural Solutions is the commercial arm of the Department of Primary Industries and Resources. However, this separation may still result in potential conflict regarding aquaculture management and industry development by the department. In contrast, in Queensland, the Department of State Development has the lead role in industry development, although it is not involved in administering the regulatory framework.

Prospective aquaculture operators may experience significant costs and uncertainties through dealing with multiple agencies with different regulatory responsibilities for aquaculture management. Prospective operators may also experience difficulties identifying which approvals they need, which agencies they need to apply to, and whether there is a hierarchy of approvals.

In the context of management of water quality in the Great Barrier Reef, the Productivity Commission reported concerns expressed by aquaculture industry participants in Queensland about ‘regulatory duplication’ and poor coordination of processes among the ‘significant number of agencies regulating aquaculture establishment and operational activities’ (PC 2003a, p. 47).

In a report for the New South Wales Healthy Rivers Commission, White (2001, p. 78) has stated, in relation to the oyster industry, that:

The institutional miasma surrounding the management of coastal lakes and rivers ... is costly, inefficient, confusing, frustrating, ecologically damaging and a detractor to investment.

Unclear allocation of departmental responsibilities may result in important issues being neglected. For example, a number of South Australian agencies have legislative responsibility for promoting ESD, including conservation of biodiversity. However, agencies primarily accountable for biodiversity conservation, such as the Department of Environment and Heritage, and Department of Water, Land and Biodiversity Conservation, are not included in mandatory consultations in the assessment process for marine aquaculture leases or licences.

When multiple agencies share regulatory responsibility, and there is a lack of clarity about the allocation of roles and responsibilities, then accountability may be reduced. White (2001, p. 40) has identified that in New South Wales:

Many disparate organisations, state, local government and community, are partially responsible for the management of and health of estuaries and the oysters produced in them. ... Because many agencies are responsible, ultimately no one is

The different agencies involved in aquaculture management may also have conflicting functions and objectives. The New South Wales Healthy Rivers Commission 'has identified conflicting objectives amongst those agencies currently managing rivers and estuaries' (White 2001, p. 40). These included conflicts among goals of making natural resources available for agricultural land uses (such as cane growing, grazing and horticulture), water uses (such as fishing and aquaculture), and environmental uses (such as native vegetation conservation, river flows, and habitat) (HRC 2003a). To reduce these conflicts, the HRC recommended the establishment of an integrated and comprehensive regional planning process based on 'a set of jointly determined, mutually consistent goals that must be addressed by *all* regional plans' (HRC 2003a, p. 16).

Industry development and assistance

Some state governments have provided funding to promote the growth and development of the aquaculture industry, and prepared state-wide aquaculture development strategies or plans designed to promote industry investment and employment. While some of these strategies or plans have given some attention to streamlining approval processes, most efforts have focussed on encouraging investment in the industry, and assisting potential investors with business planning, species selection, site selection, and farm management (see box 3.1).

Box 3.1 Government support for industry development

The Australian and state governments have provided funding to the aquaculture industry and/or prepared aquaculture industry development plans. For example:

- Between 1994 to 2001, the Western Australian Government committed \$15-20 million to implement a state aquaculture development strategy. A draft strategy for the development of the aquaculture industry has recently been prepared and presented to the Minister for Fisheries (December 2003).
- In 1998, the Victorian Government prepared a Victorian aquaculture industry strategy committing \$3 million over two years to provide support to the aquaculture industry, and to undertake research and development. The 2001-02 Victorian Budget included \$3.5 million for a 'Regional Aquaculture Initiative' over four years, with the aim to increase aquaculture production to \$50 million by 2003-04. In 2002-03, \$1.2 million was provided over four years to develop new marine aquaculture zones. In 2003-04, \$2 million was committed to implement new government policy and establishing a new 'Aquaculture Advisory Group'.
- In New South Wales, the 2001-02 budget included a three year \$3 million 'Aquaculture Initiative', which featured a series of business investment forums, the development of sustainable aquaculture strategies for regional areas, and key research initiatives. The *North Coast Sustainable Aquaculture Strategy* provides a large amount of information to assist investors with business planning, species selection, site selection, and farm planning, design and operation.
- The Queensland Government recently invested around \$9 million in a new finfish aquaculture research facility in Cairns.
- The Tasmanian Government provides an annual allocation of approximately \$1.5 million for dedicated research into sustainable fisheries and marine farming.
- The Australian Government has allocated \$2.5 million in 2003-04 to help implement the Aquaculture Industry Action Agenda. The Fisheries Research and Development Corporation, a statutory Australian Government corporation, has allocated approximately \$2.3 million in 2003-04 for a range of aquaculture research projects.

Sources: Department of Urban Affairs and Planning and NSW Fisheries (2000); DNRE (1998); DPIWE (2002a); FRDC (2003); Lendich (2003); Macdonald (2003a); Macdonald and Troeth (2003).

Potentially, greater benefits may have been obtained both by the community and by the industry from devoting government resources to improving the regulatory framework. For example, New South Wales, Queensland and Western Australia have made limited progress with preparing statutory marine aquaculture plans. Potential aquaculture producers continue to face significant difficulties in obtaining access to suitable aquaculture sites with sufficient security of tenure to justify substantial investments (see chapters 4 and 5).

Without appropriate regulatory arrangements, the aquaculture industry is unlikely to realise its potential, and any funding spent on industry development will be less effective than otherwise. Improving the regulatory framework, for example, by reducing regulatory barriers to entry and expansion, would allow the aquaculture industry to develop on its own account, without government support.

State government funding

A department or agency cannot effectively be held accountable unless it is given sufficient authority and resources to fulfil the functions for which it is responsible. A department or agency is adequately resourced if it has sufficient funding, staff and infrastructure to:

- perform its functions and achieve its objectives efficiently;
- monitor its progress towards achieving its objectives, including whether internal governance processes have been complied with; and
- review the effectiveness of its objectives in meeting over-arching policy outcomes (PC 2003c).

State government funding for aquaculture programs

State government funding for departments of primary industries or fisheries for aquaculture programs is shown in table 3.3. This is not the total government expenditure on aquaculture — other agencies, including departments of state development and environment also fund aquaculture-related development, research and administration of regulation. Care should be taken with interpreting the table as each jurisdiction has different regulatory frameworks and funding requirements.

In 2003-04, departments of primary industries or fisheries in New South Wales, Western Australia and Tasmania received funding of between \$3-4 million for aquaculture management, leasing and licensing, compliance, business development, and research. In South Australia, PIRSA received funding in 2003-04 of around \$0.9 million. In Queensland, the Department of Primary Industries received around \$7.9 million, although over \$5 million was for research. In Western Australia and Tasmania, there is significant additional funding from user charges and fees.

In some jurisdictions, the lack of reliable long-term funding for core departmental aquaculture regulatory responsibilities may hinder the development of statutory planning and/or administration of regulation. This has potential to harm the development and growth of the industry. In Victoria, for example, the Department of Primary Industries has core annual funding of around \$100 000 for aquaculture

management, and the department relies on one-off special initiative budget funding to develop and implement the regulatory framework. In South Australia, the Department of Primary Industries and Resources has core annual funding of around \$430 000 for aquaculture management.

Table 3.3 State government funding for departments of primary industries or fisheries for aquaculture programs

	2000-01 actual \$m	2001-02 actual \$m	2002-03 actual \$m	2003-04 estimate \$m
New South Wales: NSW Fisheries ^a	4.1	4.6	5.1	3.6
Victoria: Dept of Primary Industries ^b	0.5	0.9	1.3	1.8
Queensland: Dept of Primary Industries ^c	5.6	7.9	7.6	7.9E
Western Australia: Dept of Fisheries ^d	2.4	4.8	3.7	3.6
South Australia: Dept of Primary Industries and Resources ^e	n/a	n/a	0.9	0.8
Tasmania: Dept of Primary Industries, Water and Environment ^f	3.9	4.2	4.6	3.9

n/a Not available. E Estimated. ^a The NSW Fisheries 2000-01, 2001-02 and 2002-03 budgets included additional 'Aquaculture Initiative' funding of \$0.5, \$1.0 and \$1.5 million respectively for a series of business investment forums, the development of sustainable aquaculture strategies for regional areas, and research initiatives. ^b Victoria: the 2001-02 Victorian Budget included \$3.5 million for a 'Regional Aquaculture Initiative' over four years. In 2002-03, \$1.2 million was provided over four years to develop new marine aquaculture zones. In 2003-04, \$2 million was committed to implement new government policy aimed at promoting opportunity and establishing a new Aquaculture Advisory Group. ^c Queensland: includes a percentage of funding for monitoring and enforcement. ^d Western Australia: annual operating revenue from user charges and fees for aquaculture and pearling is around \$4.5 million in addition to the government appropriation. ^e South Australia: the 2003-04 budget included commencement of a three year 'Innovative Solutions for Aquaculture Planning and Management' program, that will 'underpin a growing and ecologically sustainable aquaculture industry in South Australia'. ^f Tasmania: 50 per cent of the annual group budget for 'marine farming and wild fisheries management'. Annual marine farm fees and recoveries of around \$1 million are returned to the consolidated fund. The appropriation for freshwater aquaculture management is not available.

Sources: State budgets and departments of primary industries or fisheries annual reports, and state departmental information.

Financial reporting on aquaculture programs

In general, Australian Government, and state and territory government agencies are required under legislation to report financial and non-financial performance to their respective Australian or State Parliaments. In recent years, many governments have introduced reporting frameworks based on outputs and outcomes. To be effective, financial reporting should cover performance towards stated objectives and targets, including financial performance (PC 2003c).

In some jurisdictions, such as Western Australia, the Department of Fisheries reports to Parliament and to the community on four natural resources management programs: commercial fisheries; recreational fisheries; pearling and aquaculture; and fish and fish habitat protection. Performance for each output area is measured by quality, quantity, timeliness and cost, and government funding and expenditure on the pearling and aquaculture output can be readily determined. In 2002-03, for example, the pearling and aquaculture program received state government funding of \$3.7 million, out of total government funding of \$20 million for the department (Department of Fisheries 2003).

In other jurisdictions, such as New South Wales, it is not possible to identify what has been spent on specific outputs, such as aquaculture management, due to the aggregated nature of funding and expenditure that is reported. NSW Fisheries has one overarching departmental program, 'fisheries conservation and management' with no individually reported outputs. In 2002-03, NSW Fisheries received total state government funding of \$42.4 million for fisheries conservation and development, and aquaculture management (NSW Fisheries 2003). State government funding for aquaculture management by NSW Fisheries is not separately reported (from total funding) in the department's annual report, and this hinders external assessment of aquaculture program management. This limits the effectiveness of annual reporting due to a reduction in accountability and transparency of state funding for aquaculture management.

3.3 Summary

- Aquaculture production is subject to Australian Government, and state and territory government legislation covering marine and coastal management, environmental management, land use planning, land tenure, native title, quarantine and translocation. The legislative framework may result in interpretation and coordination problems, and constrain aquaculture production.
- Different legislative approaches can be used to provide for aquaculture management, such as the use of fisheries or dedicated aquaculture legislation. Regardless of which legislative approach is chosen, aquaculture needs an adequate legislative base that provides for subsequent regulation and administration of approvals in the most efficient way.
- The objectives of state aquaculture or fisheries legislation are not always clearly defined, they may overlap or be inconsistent, and there is a lack of clear guidance as to the relative weights to be placed on each objective.
- State government primary industries or fisheries departments often have potentially conflicting functions of policy development, implementation of

regulation, industry promotion and development, and research. While there may be some size and efficiency advantages from the grouping of certain functions, the potential conflict between regulatory and industry development functions may lead to undesirable regulatory outcomes, as well as public and industry mistrust.

- Some state governments have expended considerable resources and effort on the development of aquaculture development strategies or plans designed to promote investment and employment in the industry. Improving the regulatory framework, for example, by reducing existing regulatory barriers to entry and expansion, may allow the industry to develop on its own account, without government support.
- Insufficient long-term funding for core departmental aquaculture regulatory responsibilities may hinder the development of statutory planning procedures and/or administration of regulation — this has the potential to harm the development and growth of the industry.
- In some jurisdictions, such as New South Wales, it is not possible to identify what has been spent on specific departmental outputs, such as aquaculture management, due to the aggregated nature of funding and expenditure that is reported. This hinders external assessment of aquaculture program management, and limits the effectiveness of annual reporting due to a reduction in accountability and transparency of state funding for aquaculture management.

4 Marine and land use planning and aquaculture production

This chapter outlines the marine, coastal and land use planning arrangements in use in each jurisdiction, and explores how they interact with, and potentially affect, aquaculture production. In particular, it reviews state-based processes for resource planning for marine and coastal areas, and aquaculture planning for marine areas. It identifies whether dedicated marine aquaculture plans have been established in each jurisdiction, and the benefits and costs of such a planning approach. A brief overview of land use planning arrangements is then provided, and aspects of how these arrangements may affect aquaculture production are discussed.

4.1 Resource planning for marine and coastal areas

There can be significant competition for the use of marine and coastal areas (both waters and seabed) for different purposes, including recreational boating, recreational and commercial fishing, tourism, traditional use, aquaculture, marine conservation, marine transport, and energy and mining developments. The passive use of areas for aesthetic purposes (or visual amenity) can be a significant use in some areas, for example, in parts of coastal New South Wales. Different uses of marine and coastal areas bring different mixes of economic, environmental, and social benefits and costs.

In Australia, governments have undertaken resource planning for marine and coastal areas. The rationale for government intervention stems from the need to control potential conflicts of use and/or the environmental impacts that can arise from use and development in marine and coastal areas. Where the benefits are judged to outweigh the costs, governments may use a range of property rights and regulatory approaches to manage marine and coastal areas.

The allocation of property rights and/or the development of well-functioning planning approaches for marine and coastal areas can be a potentially complex task and is affected by the:

- diversity of uses and interests in the marine and coastal environment;
- complexities of the biological system and limited information;

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- limited information on environmental impacts, and their relative costs and benefits;
 - size of the Australian exclusive economic zone (EEZ); and
 - difficulty of upholding rights or enforcing regulatory controls over such a large area (Greiner et al 1997).

Governments could use property rights-based approaches to govern access to marine and coastal resources, where this reflected the community's expectations about what resource uses are acceptable. These rights comprise the bundle of ownership, use and entitlement rights that an owner has over a good or resource, and include the owner's responsibilities to others. The use of individual transferable quota systems for fisheries is an example of how property rights-based approaches are evolving.

Typically, governments use regulatory approaches to administer marine and coastal areas. For example, marine and coastal planning approaches provide for the assessment and allocation of marine and coastal resources for different purposes, and contribute to marine and coastal environmental management. Improving the efficiency and effectiveness of the regulatory framework is therefore critical to maximise community benefits.

Current approaches to marine and coastal planning

All six Australian states have either prepared or are in the process of preparing or updating a number of statutory and non-statutory marine and coastal planning instruments. Most states have an overarching coastal policy, regional coastal management plans, and a marine protected areas strategy (see appendix C). The Australian Government has prepared a non-statutory *National Oceans Strategy*, and the National Oceans Office is preparing a series of regional marine plans, such as the draft South-east Regional Marine Plan (NOO 2003) (see appendix C). Collectively, the Australian Government, and state marine and coastal planning instruments endeavour to promote an integrated approach to marine and coastal planning and management across different areas and agencies of government.

The state planning instruments tend to pursue common 'ends' or objectives for marine and coastal areas, but they often differ in their proposed 'means' and ability to influence specific outcomes (for further discussion, see Greiner et al 1997). For example, some jurisdictions have prepared statutory coastal plans outlining requirements for coastal management at the state and regional level. In Victoria, the statutory *Victorian Coastal Strategy* prepared under the *Coastal Management Act 1995* is supported by coastal action plans. The action plans provide for detailed

coastal planning for a region to facilitate recreational use and tourism, and to provide for protection and enhancement of significant features of the region's coast, including the marine environment.

In other jurisdictions, such as South Australia, there is no statutory coastal management policy, although there is a statutory *Land Not Within A Council Area (Coastal Waters) Development Plan* (similar to a land use plan). South Australia also has a non-statutory strategy for marine and estuarine areas. A new government coastal strategy is being prepared to improve the integration of the management and protection of the marine environment, coastal areas and estuaries, for their long term productivity and conservation.

State governments are at different stages in setting aside marine protected areas for marine conservation. Tasmania and Western Australia, for example, have marine protected area strategies, and have established marine reserves. Victoria has recently established a state-wide system of marine national parks and reserves. As governments protect specific areas for marine conservation, increased demand for the use of marine resources may shift to other marine areas and marine resources. An efficient regulatory framework is required to allocate marine resources for different purposes, and provide for management of specific sectors.

Provision for marine aquaculture

Some state marine and coastal planning instruments specifically recognise and provide for marine aquaculture (or marine farming). This allows for development of the aquaculture industry within the broader marine and coastal planning framework. In Tasmania, for example, the overarching *State Coastal Policy* is a statutory 'State Policy' under the *State Policies and Projects Act 1993*. The coastal policy is implemented through the Tasmanian Resource Management and Planning System where all other plans must be in accordance with the coastal policy. Under the Tasmanian *State Coastal Policy*:

Marine farming will be planned, developed and conducted in the coastal zone having regard to sustainable development considerations and in accordance with the *Marine Farming Planning Act 1995* and other relevant terrestrial and marine resource management and planning legislation and consistent with this Policy.

Marine Farming Development Plans will be prepared, approved and gazetted under the *Marine Farming Planning Act 1995* and consistent with the objectives, principles and outcomes of this Policy. (Tasmanian Government 1996, section 2.2)

In other jurisdictions, coastal strategies may constrain the development of the industry. The *Victorian Coastal Strategy*, for example, contains an objective to 'promote a sustainable aquaculture industry', but does not explicitly recognise the

potential for marine-based aquaculture in Victoria. Instead, the strategy gives priority to land-based systems:

The priority for coastal aquaculture development will be land based systems which provide appropriate waste minimisation, containment and treatment to ensure that impacts on the receiving marine environment are minimised. (VCC 2002, p. 46)

In Victoria, land-based systems in the coastal area have been preferred in the coastal policy despite the relatively low-polluting nature of some forms of marine aquaculture production, such as shellfish, which rely on high-quality receiving waters for production (see section 2.3). Notwithstanding the focus on coastal aquaculture, the Victorian Government has also been undertaking marine aquaculture planning.

In South Australia, the purpose of the statutory *Environment Protection (Water Quality) Policy 2003* is ‘to achieve the sustainable management of the waters of the State by protecting and enhancing water quality while allowing economic and social development’. This policy assists the aquaculture industry as it aims to ensure appropriate levels of water quality in aquaculture production areas. However, the policy also contains an ‘obligation not to cause certain environmental harm’ (s. 12). This includes that ‘a person must not, by discharging or depositing a pollutant into any waters, cause any ... loss of seagrass or other native aquatic vegetation’. This is a stringent test. It may not reflect the different values of different species of seagrass, or that it may not be necessary or the ‘best option’ to protect all species of seagrass in every location. It also does not allow the weighting of costs and benefits of protection against those of development. This provision has the potential to unnecessarily constrain aquaculture (and other) development in South Australia.

Integration of marine and coastal planning instruments

State marine and coastal planning instruments are in some cases outdated, lack implementation plans for on-ground action, and fail to adequately consider adjoining land uses. These problems can constrain aquaculture development, and affect existing aquaculture operations through poor coastal water management, with further implications for environmental management. There may also be a lack of integration between marine/coastal and natural resource management plans.

In 2002, in Western Australia, for example, a Ministerial Taskforce reviewed structural arrangements for coastal planning and management and found:

The coast of Western Australia is relatively well covered by a range of planning instruments including regional coastal strategies, structure plans, and detailed coastal plans. Some of these plans are now several years old and no longer specifically suited to current planning needs. Additionally, some parts of the coast covered by regional

coastal strategies do not have more detailed coastal plans to assist with on-ground management.

In addition, at present there is no effective strategic mechanism to ensure that plans prepared for the marine environment properly consider adjoining land use and vice-versa. For example, planning for marine reserves, port development, pearling and aquaculture development, and mineral and petroleum development do not necessarily give consideration to adjoining land and water uses. (Government of Western Australia 2002, p. 11)

The Ministerial Taskforce recommended a review of the existing arrangements to ensure that coastal planning and management was undertaken in an integrated manner. In April 2003, the Western Australian Government agreed that the current framework needed to be better integrated, and processes needed to be more transparent (Government of Western Australia 2003).

In South Australia, concerns have also been expressed about both the lack of statutory arrangements for marine and coastal management, and the integration between aquaculture management planning and marine conservation:

The lack of a modern coastal and marine management act and the lack of a state coastal policy continue as problems for South Australia. The current revision of the state's aquaculture management plans through a process which appears to pay little regard to the developing work on marine conservation is an example of the lack of integration between state government agencies. (Caton 2002, p. 42)

Poor linkages between different plans, and the lack of any mechanism to resolve trade-offs between different goals, have also been observed in New South Wales. In a report on oyster health and the management of estuaries and river systems, the Healthy Rivers Commission (HRC) reported that:

... there is at present no explicit link between aquaculture industry development plans and other land and water planning and management. Neither the potential risks nor measures to mitigate these risks are required to be identified. Consequently, no mechanism exists to recognise and resolve any trade-offs between safe oyster production and other present or future land and water use goals. (HRC 2003b, p. 10)

A marine and coastal planning system

Despite the number of marine and coastal planning instruments, there has been limited progress at the state level with the development of a statutory marine and coastal planning system equivalent to the land use planning system. A marine and coastal planning system may assist to:

- reduce conflict over resource use;
- manage impacts due to different uses and the proximity of certain activities;

-
- manage cumulative environmental impacts;
 - enable the conservation of significant marine and coastal areas; and
 - improve the performance of approvals systems by providing a consistent frame of reference for assessment of development applications.

Since 2001, South Australia has been developing a marine plan for the Spencer Gulf region. Similar marine plans are intended to be developed for all South Australian state waters. In Western Australia, there is a statutory planning system as part of the marine conservation reserve process, although this is focussed solely on the planning of high conservation areas and not the rest of the coastline. In Queensland, the Great Barrier Reef Marine Park is zoned under the *Great Barrier Reef Marine Park Act 1975* (Commonwealth). The Act provides for:

- establishment of the Great Barrier Reef Marine Park and the Great Barrier Reef Marine Park Authority (Australian Government); and
- a framework for planning and management of the marine park, including zoning plans, management plans and permits.

Outside of South Australia, Western Australia and the Great Barrier Reef, there are no statutory marine and coastal planning systems. In 2002, in Western Australia, a Ministerial Taskforce highlighted:

The lack of legislative framework for planning in the marine environment (other than marine reserves) has led to difficulties in planning for activities such as aquaculture, pearling, recreation, commercial activities and other activities such as tourism and port development (Government of Western Australia 2002, p. 48).

The absence of statutory marine and coastal planning can constrain the use, development and protection of marine and coastal areas. It may also make planning for particular uses or purposes, such as aquaculture production or marine reserves, more difficult. For example, there may be difficulties with sequencing and identification of areas for use, development and/or protection — it may not be possible to have production areas next to marine reserves because of the potential for adverse environmental impacts. The Australian Government has observed:

Management of our oceans purely on an industry-by-industry basis will not be sustainable in the long run. Activities such as fishing, tourism, shipping, aquaculture, coastal development and petroleum production must be collectively managed to be compatible with each other and with the ecological health of the oceans. (Commonwealth of Australia 1998, p. 11)

Further, in South Australia, the marine aquaculture planning process (see section 4.2) has been criticised for proceeding in advance of the broader marine planning process, which would also identify marine protected areas, marine mammal

colonies, and other significant environmental and recreational values (Grady 2002). However, it may be possible for phased implementation of different sectoral-based plans to contribute to a statutory marine and coastal planning system.

4.2 Aquaculture planning for marine and coastal waters

Aquaculture planning for marine and coastal waters, in conjunction with the use of aquaculture zones and leases (see chapter 5), may allow for further development of the marine aquaculture industry. It may also contribute to the management of marine and coastal waters by taking a more systematic approach to approvals. Where the development of marine aquaculture plans takes into account other potential marine and coastal uses, this could ultimately contribute to a broader approach to marine and coastal planning.

Apart from marine aquaculture planning, other factors may also influence site selection, and the development of the marine aquaculture industry. In New South Wales, for example, the size of the catchments containing the prawn industry result in a high risk of brackish water being unavailable for extended periods following rainfall. Factors such as a high energy coastline, and the marginality of some climates, may also limit aquaculture production (New South Wales Environment Protection Authority, pers. comm., 18 December 2003).

Marine aquaculture planning

There are two broad approaches to marine aquaculture planning:

- a statutory planning process with the use of formal marine aquaculture management plans and zones identifying where different types of aquaculture may be undertaken with a lease and/or licence (see chapters 5 and 6); and
- a non-statutory process where informal regional aquaculture plans provide general guidance on prospective sites and species, but with few linkages to lease and/or licence approvals.

In the Australian Government's draft South-east Regional Marine Plan, the National Oceans Office stated that:

In order for the aquaculture industry to meet the demand for their product, they need efficient management arrangements to support industry expansion. These management arrangements should include working with states and industry to provide planning and management guidance for aquaculture site selection in an efficient, integrated way, taking into consideration the physical and biological requirements of the species to be farmed and of the receiving ecosystem. (NOO 2003, p. 18)

Historically, governments have undertaken marine and coastal planning, and permitted occupation and use, through leases and/or licences. This approach has been taken to resolve competing demands for marine and coastal space. There is potential for considerable uncertainty and costs for both industry and the community if every use was considered as part of an ad hoc process.

At times, proposals for marine aquaculture developments can generate significant community concerns. Fisheries Western Australia, for example, noted that growth in marine aquaculture around Australia:

... has been accompanied by increasing public concern about equity in the planning and allocation of waters for aquaculture, and about the potential of the industry to cause environmental and visual pollution, and navigation conflicts. The public perception is that marine farming excludes other beneficial uses including conservation, recreational uses including fishing, and commercial fishing. (Fisheries Western Australia 1997, p. 1)

A significant benefit of a marine aquaculture planning process is that it can take into account a range of marine and coastal values for selected areas during plan preparation and community consultation processes. If a marine aquaculture planning process has been undertaken, the community may be more satisfied that individual applications will be dealt with in accordance with reasonable principles.

A marine aquaculture planning process can also address the potential for cumulative impacts (see section 2.3), and interactions with land-based development. However, the adequacy of any marine aquaculture plan will depend on the availability of research and information to inform the planning process.

Where such a marine aquaculture plan exists, depending on the potential impacts, simplified application procedures with limited referral and public consultation can also be appropriate (see section 6.3). Where there is no established marine aquaculture plan, more rigorous application and consultation procedures may be required to ensure public expectations for transparency and accountability are met, and all significant impacts are considered (Fisheries Western Australia 1997).

Current approaches to marine aquaculture planning

Jurisdictions have taken different approaches to marine aquaculture planning (see table 4.1). South Australia and Tasmania have statutory-based marine aquaculture planning regimes that have enabled development of the marine aquaculture sector, and provided for management of environmental impacts. Marine aquaculture planning is less advanced in New South Wales, Queensland and Western Australia. There are no provisions for managing aquaculture in Commonwealth waters, although this is under review.

Table 4.1 Summary of marine aquaculture planning regimes

<i>Jurisdiction</i>	<i>Instruments and focus</i>
New South Wales	<p>Statutory <i>State Environmental Planning Policy 62 – Sustainable Aquaculture (2000)</i> under the <i>Environmental Planning and Assessment Act 1979</i> — the aim of the policy is to encourage sustainable aquaculture, make aquaculture a permissible use in areas where a regional aquaculture strategy has been developed, establish minimum performance criteria and provide for graduated assessment.</p> <p>Statutory ‘regional sustainable aquaculture strategies’ — purpose to clarify agency roles, outline ‘best practice management’ (through a statutory aquaculture industry development plan) and provide for streamlined development approvals. Prepared through a whole-of-government process — other marine and coastal values considered during strategy preparation.</p> <p>Statutory ‘aquaculture industry development plans’ under the <i>Fisheries Management Act 1994</i> — the Minister is to have regard to any relevant plan in exercise of functions. Plans describe areas suitable for aquaculture and the type of aquaculture, suitable methods for undertaking aquaculture, suitable species, and contain performance indicators to monitor environmental performance.</p>
Victoria	<p>Statutory fisheries reserves management plans prepared under the <i>Fisheries Act 1995</i> — provide for management of the reserve and how aquaculture can be undertaken, including assessment criteria, management controls and monitoring. Prepared by the Department of Primary Industries — other marine and coastal values considered through a broader marine planning process (see box 4.2).</p>
Queensland	<p>Statutory management plans under the <i>Fisheries Act 1994</i> — a management plan may be prepared for aquaculture purposes. Prepared by Queensland Fisheries.</p>
Western Australia	<p>Non-statutory regional aquaculture development plans — to provide development and siting guidelines for selected areas for aquaculture. Prepared by the Department of Fisheries — other marine values considered during preparation. The Department has also prepared a series of site selection studies.</p> <p>Statutory management plans for marine parks under the <i>Conservation and Land Management Act 1984</i> — provide for management of marine parks and may allow recreational and commercial activity which is consistent with conservation. Special purpose areas may be zoned for aquaculture and pearling purposes. Prepared by the controlling authority for that park.</p>
South Australia	<p>Statutory aquaculture policies under the <i>Aquaculture Act 2001</i> — aquaculture zone policies are prepared for selected areas and identify aquaculture zones and management controls. Prepared by PIRSA — other marine and coastal values considered during plan preparation. No specified review period.</p>
Tasmania	<p>Statutory marine farming development plans under the <i>Marine Farming Planning Act 1995</i> — may be prepared for the whole or part of state waters, and any declared area which adjoins state waters and identify marine farming zones for marine farming. Each plan contains objectives, a description of the marine farming zones in the plan area, the type of fish allowed to be farmed in each zone, the maximum leased area for marine farming in each zone and management controls to regulate marine farming activities.</p> <p>Prepared by DPIWE or by approved applicants — other marine values considered during plan preparation. Plans must be reviewed at least once every 10 years.</p>
Australian Government	<p>No marine aquaculture planning regime in place for Commonwealth waters — state regime used (under review).</p>

Note: As well as approvals governed under marine aquaculture plans, aquaculture operators would typically require development or planning approvals for shore-based facilities from a local council, and a public lease over coastal foreshore (see section 5.5).

Sources: Commonwealth and state legislation.

Differences also exist in the types of marine aquaculture zones in aquaculture planning regimes across jurisdictions. South Australia, for example, has four different types of marine aquaculture zones — aquaculture, prospective, exclusion and emergency. In contrast, Tasmania provides for two types of zones — marine farming and emergency. Other jurisdictions do not differentiate between zones or use different marine aquaculture zoning approaches.

In South Australia, aquaculture zone policies are being prepared for selected areas, defining where marine aquaculture activities may be allowed. The plans identify management zones where limited amounts of aquaculture can occur (assessed on a case-by-case merit basis), aquaculture production zones, which are considered highly suitable for aquaculture, and aquaculture exclusion zones where aquaculture is not permitted. Prospective aquaculture zones can be declared for up to three years to permit investigations to determine whether the zone should become an aquaculture zone. The zone policy development process involves assessment of resource use, and the environmental, social and economic impacts of allowing aquaculture development.

In Tasmania, marine aquaculture can only be undertaken in areas specifically zoned for marine farming under a marine farming development plan (see box 4.1). However, an individual may apply to the Minister for approval to prepare a new marine farming development plan for a particular area. The Minister may also approve emergency plans to address short-term emergencies, such as algal blooms that affect local water quality. Emergency plans remain in force for a period not exceeding two years, and override an existing marine farming development plan to the extent of any inconsistency.

The Tasmanian approach arose because of several factors. In the early 1990s, demand for marine farm sites was greater than readily available areas. In addition, applications for new marine farm sites began to meet with vigorous opposition from local residents and community groups. The *Fisheries Act 1951* was seen as inadequate to manage industry growth and provide for other coastal zone uses (and users). In Tasmania, in late 1993, a moratorium was placed on the granting of new marine farms because appeals were by then stopping most applications in the courts, with considerable costs for the state, applicant and community. This led to a complete legislative and administrative review of procedures, aimed principally at establishing new marine aquaculture planning legislation (McLoughlin 1996).

New South Wales is developing a series of regional aquaculture strategies under the *Fisheries Management Act 1994*. There is currently a *North Coast Sustainable Aquaculture Strategy for Land-Based Aquaculture* and strategies are planned for six other areas by 2005. It is also proposed that similar strategies will be prepared for eleven marine/coastal areas, but there is no time frame for these strategies.

Box 4.1 **The Tasmanian marine farming planning process**

In Tasmania, the *Marine Farming Planning Act 1995* (MFPA) provides for zoning of areas of state waters through statutory marine farming development plans. The plans identify and provide for areas to be leased within the zones, and identify various management controls (such as carrying capacity and stocking density) to regulate marine farming activities in plan areas. Fourteen plans for different areas have been prepared so far with two currently under review. Part three of the MFPA sets out a detailed process for preparing a marine farming development plan including:

- identification of a potential marine farming development plan area, research and preparation of an environmental impact assessment for the area;
- preparation of a draft marine farming development plan;
- examination of the draft plan by the Marine Farming Planning Review Panel (an eight member expert-based body appointed by the Governor);
- public exhibition of the draft plans for two months, followed by an assessment of submissions by DPIWE which prepares a report for the Panel;
- consideration of the report by the Panel who may conduct formal hearings; and
- the Panel then sends the completed plan with a recommendation to the Minister for Primary Industries, Water and Environment, who may either approve the plan or return it to the Panel for further assessment.

After final approval of a plan, allocation of leasable areas may proceed (see section 5.2).

Sources: Cox et al (2001); DPIWE (1999); McLoughlin (1996).

Western Australia has primarily taken a non-statutory marine aquaculture planning approach and has produced several regional plans that provide guidance on potential marine aquaculture areas and environmental management (for example, the Gascoyne region (1996) and the Kimberly region (1996)). The principle objectives of these plans are to describe the region's aquaculture oriented resources, derive a strategy to facilitate the development of a sustainable aquaculture industry, and provide relevant, strategic management planning guidelines and recommendations.

In Western Australia, statutory planning for marine aquaculture may occur through establishment of marine parks and the use of special purpose (aquaculture) zones (such as in the Jurien Bay Marine Park). Marine parks are created to protect natural features and aesthetic values while allowing recreational and commercial uses that do not compromise conservation values — commercial uses could include aquaculture. However, Ciffolilli (2003, p. 62) has observed that in Western Australia, 'the lack of legislative framework for planning in the marine environment has led to difficulties in planning for activities such as aquaculture.'

Victoria is developing a series of statutory-based management plans for fisheries reserves (for aquaculture purposes) that were identified as part of a marine planning and assessment process (see box 4.2). Earlier, in 1998, in the *Victorian Aquaculture Industry Strategy*, the Department of Natural Resources and Environment observed:

One of the main limiting factors to aquaculture development in Victoria is the lack of access to suitable areas for aquaculture. The process to identify and allocate areas must be streamlined. Tenure must be provided in order to foster appropriate levels of investment and development. (DNRE 1998, p. 10)

Box 4.2 The Victorian marine planning process

In September 1991, the Victorian Land Conservation Council (LCC) was given terms of reference for an investigation into planning and management of marine and coastal areas. In June 1996, after two draft progress reports, the LCC released draft final recommendations identifying 21 multiple use marine parks, 22 sanctuary (or highly protected) zones within the parks, and 8 preferred marine aquaculture areas.

In July 1997, the Environment Conservation Council (ECC) replaced the LCC. The ECC was given new terms of reference requiring it to give recommendations on two matters: a representative system of marine parks; and areas suitable for marine aquaculture. In August 2000, after two draft progress reports, the ECC Marine, *Coastal and Estuarine Investigation Final Report* identified and recommended to Government the establishment of 13 highly protected marine national parks and 11 marine sanctuaries (covering 63 136 ha or 6.2 per cent of Victorian marine waters), 18 special management areas, and 12 marine aquaculture zones (covering 2682 ha), retention of multiple-use marine parks, and reservation of remaining areas as coastal waters reserve. The recommended aquaculture zones were more than a thirteen-fold increase over the previous area licensed for marine aquaculture.

The Victorian Government considered the recommendations in the ECC report and in June 2002 passed the *National Parks (Marine National Parks and Marine Sanctuaries) Act 2002*. In March 2003, the Victorian Minister for Agriculture announced that 9 new marine aquaculture zones, covering a total of 2435 ha, would be declared as fisheries reserves under the *Fisheries Act 1995*. Management plans will be prepared for all the fisheries reserves prior to the sites being leased for aquaculture.

Sources: Cameron (2003); VECC (2000); Victorian DPI (2003a).

In Queensland, there is no state marine aquaculture plan and limited guidance on site identification for prospective aquaculture operators. In March 2003, the Queensland Department of Primary Industries announced that it would prepare a statutory 'marine aquaculture management plan' addressing industry development and ecological sustainability. This would include guidelines and processes for marine aquaculture development and provide for a streamlined application process. The Queensland Department of Primary Industries commented that:

... there was currently a great deal of uncertainty for entrepreneurs hoping to establish marine aquaculture businesses in Queensland waters. Issues such as tenure and sharing the resources between aquaculture activities and other water users need to be clarified. (Queensland DPI 2003, p. 1)

There is no legal recognition for aquaculture in Australian waters beyond the three nautical mile limit. The Australian marine exclusive economic zone is the fifth largest in the world and new technologies and species are emerging that may enable aquaculture to be undertaken further off-shore and into these waters. NADC (2002, p. 18) have observed that 'clarifying aquaculture management in Commonwealth waters will provide certainty and access for investors to the resources in this area'. The Department of Agriculture, Fisheries and Forestry (Australian Government) is shortly to release a discussion paper exploring 'options for the management of aquaculture in Commonwealth waters'.

Across jurisdictions, different legislative arrangements govern the administration of public coastal land and waters, and coastal land use planning. Typically, government departments administer the use and lease of public coastal land and waters, including the coastal foreshore (see section 5.5). However, an aquaculture developer may also require a development or planning approval from a local council for land-based facilities associated with marine aquaculture, such as a wharf, boathouse or shed. Other government agencies, such as coast protection boards, may also have a role with administration of approvals. It may take considerable time for aquaculture developers to liaise with all agencies, and comply with all lease and licensing requirements. Given different legislative arrangements and the number of agencies with coastal management responsibilities, integrated and/or coordinated approval processes (see section 6.3), may assist efficient approval processing, rather than attempting to prepare new integrated coastal plans.

New Zealand proposed aquaculture reforms

New Zealand has proposed reform of its legislative framework for aquaculture management, and a reduction in the number of approvals (see box 4.3). The management regimes were fragmented, out of date, and did not provide for integrated coastal planning, aquaculture and fisheries management. In 2001, there was also a backlog of applications for more than 35 000 hectares of marine space, and indications were that this pressure was likely to increase (Minister for Fisheries and Minister for the Environment 2001).

Another problem was that marine farming and fishing rights sometimes conflicted. There was no mechanism available to allow water space to be allocated to a higher value use, without undermining existing rights. The end result was high costs

(mainly in the appeal process), and lengthy delays in the coastal planning system. Uncertainties in the planning process and difficulties with allocation were likely to have impacts on investment decisions and potential industry growth (Minister for Fisheries and Minister for the Environment 2001).

These reform proposals have subsequently been delayed. In 2003, the New Zealand Court of Appeal declared that the Maori Land Court had jurisdiction over customary claims to foreshore and seabed. This Court of Appeal decision could affect aquaculture development. In late 2003, the 28-month moratorium was extended by nine months until December 2004 to enable the government to consider the ruling, and implications for coastal management (Hodgson 2003a; 2003b).

Box 4.3 Aquaculture management reform in New Zealand

New Zealand has proposed a new aquaculture management regime which will involve:

- the creation of aquaculture management areas (AMAs) in regional coastal plans with marine farming allowed in the AMAs, but prohibited outside AMAs;
- regulation of the environmental effects of aquaculture under the *Resource Management Act 1991* (RMA), rather than being split between different approvals under the RMA and the *Fisheries Act 1996*;
- regional councils being able to consider the effect of aquaculture development on existing fishing activity so as to place AMAs in areas that minimise such conflicts;
- opportunity for aquaculture developers to negotiate an agreement with affected commercial fishing interests rather than development being automatically precluded;
- regional councils being able to tender the right to apply for a coastal permit for marine farming in a particular AMA; and
- the Crown preserving its capacity to recognise Treaty, aboriginal or customary rights relating to the coastal marine area if such rights are identified in the future.

Source: Ministry for the Environment (2002).

Assessment of marine aquaculture planning

In Australia, apart from South Australia and Tasmania, there is limited use of marine aquaculture plans and zones (see table 4.2). In Tasmania, the marine farming development plan process appears to have been successful in identifying areas for marine farming, and is a well-established planning process. However, some aspects of the transparency and accountability of marine farming decision-making could be improved. For example, there is presently no requirement for release of the reasons for a Minister's decision to approve a draft marine farming plan or return it to the Planning Review Panel for further assessment.

Table 4.2 Marine aquaculture planning instruments and zones

<i>Jurisdiction</i>	<i>Marine aquaculture plans</i>	<i>Marine aquaculture zones</i>	<i>Area of marine aquaculture zones (ha)</i>
New South Wales	No statutory marine aquaculture plans. Oyster Industry Sustainable Aquaculture Strategy in preparation.	na	na
Victoria	No statutory marine aquaculture plans. A draft Pinnace Channel aquaculture fisheries reserve management plan has been released. ^a	9 marine aquaculture zones declared as fisheries reserves — purpose to be determined in management plan (further 3 zones expected to be declared).	2435 ha declared (mainly for shellfish and abalone).
Queensland	No statutory marine aquaculture plans. Statutory marine-based aquaculture management plan in preparation.	na	na
Western Australia	Only one of the statutory marine park management plans includes designated zones. ^b Several non-statutory regional development plans.	4 special purpose (aquaculture) zones in Jurien Bay Marine Park.	Total zone area 1325 ha.
South Australia	1 statutory aquaculture zone policy for Lower Eyre Peninsula. Draft statutory aquaculture zone policy for Arno Bay. Other zone policies under review. ^c	4 management zones for Eyre region — Lincoln sub region (including 1 exclusion zone). 2 management zones for Arno Bay.	Eyre region includes around 557 ha for non finfish aquaculture, and around 17 725 ha for finfish (up to 5600 tonnes of tuna production) in an offshore zone. Arno Bay has a 6000 ha inner zone and a 3000 ha outer zone, both primarily for finfish (up to 2700 tonnes of production).
Tasmania	14 statutory marine farming development plans (also 1 emergency plan) (2 plans under review).	10 finfish zones. 87 shellfish/seaweed zones. 62 finfish/shellfish/seaweed zones.	Total zoned area around 16 970 ha. Total maximum leased area around 6800 ha.

na not applicable ^a In Victoria, further management plans are being prepared for the nine identified zones prior to sites being made available for aquaculture development. ^b In Western Australia, there are five marine conservation reserves with statutory management plans and four more in development. ^c In South Australia, nine non-statutory aquaculture management plans (including aquaculture zones, exclusion zones and management controls) covering all state waters were in place prior to introduction of *Aquaculture Act 2001*. New zone policies are being prepared for state waters.

Sources: State departmental information.

Despite offering certainty to aquaculture producers, local councils and the Tasmanian Conservation Trust have expressed concerns that the marine farming planning process is outside the land use planning framework (see Bryan 2002, Green 2003 and TCT 1999). However, the *Marine Farming Planning Act 1995* provides for a common approach to marine farming across state waters, and DPIWE appears to have the capacity and experience to manage the process and address environmental impacts. If individual Tasmanian local councils were responsible for marine aquaculture planning and decision-making, there could be potential capacity and consistency issues that could affect both aquaculture, and marine management.

In other jurisdictions, apart from site suitability, the lack of progress with marine aquaculture planning appears to have constrained the development of marine aquaculture. Queensland, for example, announced that it would develop a statutory marine-based aquaculture management plan in March 2003. It may be some years before New South Wales prepares regional aquaculture strategies for marine or coastal areas. Western Australia has identified some areas for marine aquaculture with associated non-statutory regional development plans to guide prospective aquaculture developers. The state also has the ability to prepare statutory management plans for marine parks which may include special purpose (aquaculture) zones (such as those identified as part of the Jurien Bay Marine Park). However, limited use has been made of these plans for aquaculture purposes.

The time taken to prepare marine aquaculture plans (or other plans) is a critical factor that may create uncertainty for aquaculture operators, unnecessarily constrain aquaculture development, and limit marine management. Overall, the longer it takes to prepare and implement appropriate marine aquaculture management plans, the longer it will take to further develop the marine aquaculture industry.

In Victoria, for example, a series of statutory management plans are being prepared for nine aquaculture zones that were declared in March 2003 but these plans may take several years to prepare and implement. However, the broad marine planning and assessment process started in 1991 and took nine years to identify, seek public comment (with six formal consultation periods), and recommend a system of marine national parks and aquaculture zones (see box 4.2). While effective consultation in developing broad marine and coastal plans is important, given the opportunity costs of not having such plans, there may be scope for expediting this process.

In Western Australia, there have been delays in marine aquaculture planning. In 1998, for example, Fisheries Western Australia (1998a) released a report on planning for aquaculture development at Jurien Bay. The purpose of the study was to assess the Jurien Bay's potential for aquaculture, and to identify locations which could be suitable for marine farming. Two areas for aquaculture were identified, one inshore and one offshore, to either be given statutory recognition under the

fisheries legislation; or to be declared a ‘special purpose zone (aquaculture)’ if included in a statutory marine reserve. However, it took until August 2003 for four aquaculture zones to be gazetted within the Jurien Bay Marine Park.

4.3 Land use planning and aquaculture production

This section briefly explains how land use planning operates, before considering how state-based land use planning arrangements may either facilitate or constrain aquaculture production. It does not review the role of land use planning, or individual state-based land use planning arrangements, in detail. Land-based proposals on public land (or Crown land) are considered in section 5.5.

Lack of recognition and provision for aquaculture in state-based land use planning arrangements can affect aquaculture production approvals — a land-based aquaculture operation usually requires development or planning approval from a local council (or state planning commission/development assessment commission). In South Australia, marine aquaculture may also require development approval.

Land use planning

Land use planning is an administrative approach to regulation of development. For example, land can be zoned for specific activities, such as rural, rural-residential, residential, commercial, or industrial, and development controls can be prescribed to manage potential impacts. Usually, land-based aquaculture would be provided for in rural or industrial zones. Such planning approaches are designed to preserve the rights associated with land titles by separating incompatible land uses (like industrial and residential uses), and manage potential environmental impacts.

A potential problem with land use zoning is the degree of flexibility of planning controls and land use definitions. While designed to provide some certainty to property owners regarding the nature of prospective development within their ‘neighbourhood’, zoning regulations and definitions also need to be flexible enough to respond to changes in community needs, and demand for new land uses.

Current approaches to land use planning

All jurisdictions examined have implemented land use planning instruments to designate land for particular purposes, and manage the local impacts of development (see table 4.3). Land use planning has been delegated to local councils with state governments retaining overall control of planning policy.

Table 4.3 Land use planning instruments and aquaculture

<i>Jurisdiction</i>	<i>Land use planning instrument</i>	<i>Provision for aquaculture</i>
New South Wales	<i>Environmental Planning and Assessment Act 1979</i> — objective to encourage the proper management, development and conservation of natural and artificial resources for the purpose of promoting the social and economic welfare of the community and a better environment. Local environmental plans prepared by councils, guide planning decisions for local areas through zoning and development controls. Four assessment categories: does not require a consent; requires a consent; requires a consent and additional issues to be covered; and prohibited.	<i>State Environmental Planning Policy (SEPP) 62 – Sustainable Aquaculture</i> (2000) defines ‘aquaculture’ as cultivating fish or marine vegetation for the purposes of harvesting the fish or marine vegetation or their progeny with a view to sale, or keeping fish or marine vegetation in a confined area for a commercial purpose. SEPP 62 – Sustainable Aquaculture makes aquaculture a permissible use in areas where a regional aquaculture strategy has been developed. No other state-wide aquaculture planning guidance for local councils.
Victoria	<i>Planning and Environment Act 1987</i> — primary objective ‘to provide for the fair, orderly, economic and sustainable use and development of land’. Local councils prepare planning schemes that set out policies and requirements for the use, development and protection of land. Within schemes, land is divided into zones that list land uses in terms of: uses that do not require a permit; uses that require a permit; and prohibited uses.	State-wide Victorian Planning Provisions define ‘aquaculture’ as ‘land used to keep or breed aquatic animals, or cultivate or propagate aquatic plants’. Also included in definition of ‘agriculture’. No state-wide aquaculture planning guidelines for local councils (although these are being prepared).
Queensland	<i>Integrated Planning Act 1997</i> — purpose to seek to achieve ecological sustainability by coordinating and integrating planning; managing development processes; and managing the effects of development. Under IPA, planning schemes are prepared by local councils to manage growth and change in their area. Planning schemes must take into account statutory ‘State Planning Policies’ (SPPs), such as the use of agricultural land and the disturbance and management of Acid Sulfate Soils. Development approvals required for certain activities.	No state-wide model plan provisions or definition of ‘aquaculture’. State-wide aquaculture planning guideline for local councils prepared by Department of Primary Industries.
Western Australia	<i>Town Planning and Development Act 1928</i> — relates to the planning and development of land for urban, suburban, and rural purposes. Local councils prepare town planning schemes to control and guide land use and development in a district or town, and assign zones for particular types of land use. Planning schemes set out whether a development application is required.	State-wide Model Scheme defines ‘agriculture – intensive’ to mean premises used for trade or commercial purposes, including outbuildings and earthworks, associated with a number of activities, including aquaculture. The State Planning Strategy (1997) outlines various criteria for plans including that aquaculture ‘is considered as a potential use’. No other state-wide aquaculture planning guidelines for local councils.

(Continued next page)

Table 4.3 (continued)

<i>Jurisdiction</i>	<i>Land use planning instrument</i>	<i>Provision for aquaculture</i>
South Australia	<i>Development Act 1993</i> — object to provide for proper, orderly and efficient planning and development. Local councils (or the Minister) prepare development plans setting out planning and development objectives and controls. Development approval required for certain activities.	The 'Planning Strategy for Regional South Australia' guides land uses in development plans. The potential role and place of marine and land-based aquaculture is identified in the regional strategy. No state-wide definition of 'aquaculture'. No other state-wide aquaculture planning guidelines for local councils.
Tasmania	<i>Land Use Planning And Approvals Act 1993</i> Local councils prepare planning schemes to exercise control over use and development within defined areas. A planning scheme sets out requirements for use and development, including when a land use permit is required.	A Planning Directive includes a 'Common Key Elements Template' (2003). The purpose of the Rural Resource Zone is to provide for the sustainable use and development of resources for agriculture, aquaculture, forestry, mining and other primary industries. No other state-wide aquaculture planning guidelines for local councils.

Sources: State legislation and planning provisions.

In all jurisdictions, development controls are attached to planning legislation. The aim of the controls is to ensure that the environmental impacts from a proposed development meet certain standards. An environmental impact assessment is usually required as part of a development application for aquaculture.

In Tasmania, for example, the *Land Use Planning and Approvals Act 1993* provides for local councils to exercise planning controls over land use and development. Typically, a land use permit is required for freshwater aquaculture whereas marine farming in state waters is exempt from the Act. However, marine farmers wishing to develop shore-based facilities require planning approvals from the local council. Some jurisdictions, such as Victoria and South Australia, have prepared statutory state planning strategies and 'model zone provisions' to provide for uniform land use planning approaches.

Assessing land use planning arrangements

Several matters relating to state-based land use planning arrangements may affect aquaculture production at the local level. These relate to state planning strategies, model planning schemes, and aquaculture planning guidelines.

State planning strategies

If state planning strategies do not recognise and provide for land-based aquaculture, then local councils may not do so either, and this has the potential to constrain both industry development, and the management of potential environmental impacts.

Some jurisdictions, such as South Australia and Western Australia, have a state planning strategy (or similar) to inform and guide the preparation of regional and local planning schemes. The benefits of state planning strategies include that:

- they can provide some degree of uniformity regarding the implementation of state government policies; and
- they can ensure that important state-wide issues are addressed at the local level.

However, if state planning strategies are overly prescriptive, they may reduce the flexibility of local government to respond to local issues.

The *State Planning Strategy for Regional South Australia* identifies that:

Aquaculture has generated major local employment and income for some areas. It can be landbased, carried out in ponds or tanks on land, or in open waters. Aquaculture development in open waters needs to be sustainably managed, avoid conflicts with other uses and protect water and seagrasses. The structures on a fish farm or on a service area on land need to be carefully designed and located to ensure the environmental and aesthetic values of the area are preserved. (Department of Transport and Urban Planning 2003, p. 6)

Specific goals identified in the regional strategy include to ‘encourage ecologically sustainable growth of the aquaculture industry while managing the resources on which the industry depends’, ‘promote the establishment and growth of land-based aquaculture industries where there is adequate water’, and ‘manage effluent disposal from land-based aquaculture’ (Department of Transport and Urban Planning 2003, p. 9). The regional strategy also recognises that:

- the Eyre Peninsula is well placed to continue to develop its significant aquaculture industry; and
- the Spencer Gulf has a growing aquaculture industry, and there is an opportunity to facilitate land-based aquaculture in environmentally suitable coastal locations.

In New South Wales, the *State Environmental Planning Policy (SEPP) 62 Sustainable Aquaculture* (2000) makes aquaculture a permissible use in areas where a regional aquaculture strategy has been developed. The SEPP implements the regional strategies by identifying and categorising aquaculture development on the basis of its potential environmental impact. The strategy is made up of two interlinked components: a ‘best management’ component and an integrated

approvals component. The ‘best management’ component provides the basis for the Aquaculture Industry Development Plans (AIDP) for Land-based Aquaculture under the provisions of the *Fisheries Management Act 1994*. The AIDP identifies ‘best management’ for business planning, species selection, site selection and design, planning and operation of the facility, and environmental approval requirements (Department of Urban Affairs and Planning and NSW Fisheries 2000).

The Western Australia *State Planning Strategy* administered by the Western Australia Planning Commission contains key principles and a list of strategies and actions for long-term strategic land use planning. Several criteria for land use planning, including that ‘aquaculture is considered as a potential use’, are contained in the strategy. The Planning Commission has promoted that ‘strategic and statutory planning addresses the future land and water requirements of the aquaculture industry’, and that ‘the needs of aquaculture were considered in regional plans’ (WAPC 1997, p. 19). If implemented in local planning schemes, the provisions have the potential to support development of land-based aquaculture.

In Queensland, a project to identify suitable sites for land-based aquaculture in the coastal zone is scheduled to be completed in May 2004. These sites will then be considered in future land planning undertaken by local councils and regional planning bodies.

Model planning schemes

At the state level, a model planning scheme often contains state-wide planning provisions, model zones, and definitions that can be used by all planning authorities. A model planning scheme may:

- better integrate planning policy and development control;
- improve coordination of planning at the state, regional and local levels;
- reduce the resources required by state and local government in the preparation and administration of schemes; and
- provide a balance between the need for certainty and flexibility.

Without a model planning scheme, there may be inconsistencies between schemes so that different provisions apply to different parts of a state without justification. Further, without a model planning scheme, local planning schemes may be difficult to understand and interpret, and there is a risk of inappropriate provisions being included in schemes. Such schemes may also take longer to prepare and to complete the necessary statutory processes for approval. This can generate additional costs to local government of preparing schemes, and additional workload for state planning departments in assessing and approving schemes.

Some jurisdictions, such as Victoria and Western Australia, have recently sought to implement model planning schemes or state-wide planning provisions. In Victoria, the state-wide *Victorian Planning Provisions* were introduced from 1999. The provisions are a statutory device to ensure that consistent approaches to various matters are maintained across Victoria, and that the construction and layout of planning schemes is always the same. One purpose of the planning provisions is to ‘provide a clear and consistent framework within which decisions about the use and development of land can be made’. The planning provisions contain uniform land use zones, and define ‘aquaculture’ as ‘land used to keep or breed aquatic animals, or cultivate or propagate aquatic plants’. ‘Aquaculture’ is also included in the definition of ‘agriculture’ for land zoning purposes.

Prior to the introduction of the Victorian Planning Provisions, the absence of a clear definition of ‘aquaculture’ had led to an inconsistent approach by local councils to planning and assessment of permit applications for aquaculture. For example, aquaculture was treated in different areas as either an unspecified use, animal husbandry or a feedlot (ARRTF 1999a). These different classifications could result in different conditions being applied to aquaculture, some of which may not be appropriate. This lack of consistency could constrain the development of the aquaculture industry across local council areas, and potentially provide perverse incentives for the industry to concentrate in areas where aquaculture was allowed.

In Western Australia, a ‘Model Scheme Text’ was gazetted as Regulations in October 1999, and replaced the often different and conflicting provisions of local planning schemes. The intention of the ‘Model Scheme Text’ was that it would provide more consistency in scheme provisions, benefit users and reduce resources required to prepare and administer schemes. Guidelines have also been prepared to provide information and advice to local governments, and others preparing planning schemes.

Despite the existence of the ‘Model Scheme Text’ and guidelines, a draft Western Australian strategy for the development of the aquaculture industry highlighted the need to ‘ensure that planning for land for aquaculture development is included in State Planning Commission, Ministry of Planning and local government planning documents, including town planning schemes where relevant’ (Lendich 2003, p. 42). Lack of an ‘aquaculture definition’ may result in local government not adequately providing for aquaculture in local planning schemes.

Aquaculture planning guidelines

State-wide aquaculture planning guidance may assist local councils to provide appropriately for land-based aquaculture in planning schemes, and inform how

aquaculture development applications should be assessed. In New South Wales, good practice guidelines are available from the Department of Infrastructure, Planning and Natural Resources to assist local councils in development assessment. In Queensland, state-wide aquaculture planning guidelines — *Aquaculture Activities – A Guide to Local Authorities in Developing IPA Planning Schemes Provisions Relating to Aquaculture* — have been prepared for local councils by the Department of Primary Industries.

Concerns regarding the unfamiliarity of some local councils with aquaculture development and resulting inconsistent treatment, for example, have been raised in a review of arrangements in Victoria (ARRTF 1999a, p. 19):

This problem [inconsistent approach by local councils] is compounded by local councils' unfamiliarity with the wide range of culture systems used within the aquaculture industry. As a result, some councils have actively encouraged aquaculture development while others have reportedly been less enthusiastic.

Similar issues have been raised in Queensland, where inconsistencies in assessment procedures and guidelines between regions has been identified as a problem (Bowen Collinsville Enterprise Group 2002). All local governments will require sufficient expertise in ecological processes to manage the potential environmental impacts from aquaculture as part of assessing applications for aquaculture approvals.

In 1999, the Victorian Aquaculture Regulatory Reform Task Force recommended the development of 'state-wide aquaculture planning approval guidelines' to assist planning authorities in interpreting how the planning provisions related to different aquaculture production systems. Local councils were generally supportive of the need for more information on the industry to assist the processing of aquaculture applications (ARRTF 1999a). However, despite their potential value (provided they are not overly prescriptive), the guidelines have yet to be released in Victoria (although they are near completion). Other jurisdictions may also benefit from the production of similar planning approval guidelines.

4.4 Summary

- Governments have an important role in resource planning for marine and coastal areas. The rationale for government intervention stems from the need to control potential conflicts of use and/or the environmental impacts that can arise from use and development in marine and coastal areas. Where the benefits outweigh the costs, governments may use a range of property rights and regulatory approaches.

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- A statutory marine and coastal planning approach can assist with the allocation of marine and coastal resources for different purposes, including aquaculture production, and contribute to marine and coastal environmental management.
 - State marine and coastal planning instruments tend to pursue common ‘ends’ or objectives for marine and coastal areas, but they often differ in their proposed ‘means’ and ability to influence specific outcomes, for example, whether they are statutory or non-statutory.
 - Some state marine and coastal planning instruments are not integrated, do not consider adjoining land uses, are outdated, and lack implementation plans. These problems can affect aquaculture development proposals, and existing aquaculture operations through poor marine and coastal water management, with further implications for environmental management.
 - The absence of statutory marine and coastal planning (including identification of zones and management controls) can constrain the use, development and protection of marine and coastal areas.
 - Aquaculture planning for marine and coastal waters, in conjunction with the use of aquaculture zones and leases, may allow for the further development of the marine aquaculture industry. It may also contribute to the management of marine and coastal waters, and the management of potential environmental impacts from aquaculture, especially if integrated with broader marine plans.
 - Apart from South Australia and Tasmania, there has been slow progress with marine aquaculture planning. The limited use of statutory marine aquaculture plans in New South Wales, Queensland and Western Australia, may either constrain marine aquaculture, or result in ad hoc approvals for individual sites, and resource use conflicts.
 - The lack of recognition and provision for aquaculture in state-based land use planning arrangements (particularly regional and local planning schemes) can adversely affect the granting of development approval for aquaculture.
 - If not overly prescriptive, a state planning strategy and/or state-wide model planning scheme may assist the integration of planning policy and development control, improve coordination, and reduce the resources required by state and local governments in the preparation and administration of schemes.
 - State-wide aquaculture planning guidance may assist local councils to provide appropriately for land-based aquaculture in planning schemes, and inform the assessment of applications for development approval.

5 Aquaculture leases and administration

This chapter outlines and discusses aquaculture lease arrangements for public (or Crown) land and water in the six Australian states. It examines the different approaches and categories of marine aquaculture lease, allocation methods, the lease term, nature and conditions, and lease fees and rentals. These matters, and the degree to which marine aquaculture leases are used in each jurisdiction, can have important implications for aquaculture production. The chapter then discusses how public land administration and lease arrangements may affect land-based aquaculture. The chapter finishes with an overview of how leases for public land or water may interact with native title arrangements.

Characteristics of efficient and effective lease systems include:

- sufficient flexibility, with different lease categories and potential uses;
- efficient and transparent methods for lease allocation and transfer;
- adequate lease term and renewal arrangements;
- adequate specification of the nature of the lease (ie property rights); and
- efficient processes and clear assessment criteria for applications to lease public land or water.

Property rights have varying attributes including: clear definition; verifiable; enforceable; value can be established; transferable; and manageable risk. The extent to which many of these attributes approach the ‘ideal’ — such as for clarity of definition and enforceability of rights — will affect the efficiency of the particular market. Some flexibility in property right design is necessary if markets are to evolve in response to improving technology and knowledge, and changes in community preferences (PC 2002c). However, there may be tradeoffs between flexibility of design and security of tenure.

5.1 Marine aquaculture lease categories and uses

Marine aquaculture leases are often used to provide tenure, or the right to occupy and use marine and coastal waters for aquaculture purposes. Tenure may be either short or long term, and occupation and use of waters may or may not be exclusive.

A lease may also be used as an instrument to assist site rehabilitation (ARRTF 1999a). A marine aquaculture lease is often used in conjunction with an aquaculture licence that sets out operating conditions for approved aquaculture activities (see chapters 6 and 7). Where applicable, an application for a marine aquaculture lease will need to address and be consistent with native title (see section 5.6).

Approaches and categories

Each jurisdiction takes a different approach to providing for marine aquaculture leases. This is reflected in the legislative framework and the different categories of marine aquaculture leases (see table 5.1). South Australia and Tasmania provide for marine aquaculture leases as part of dedicated aquaculture or marine farming legislation. In contrast, New South Wales and Western Australia use generic fisheries legislation, while Queensland and Victoria use generic land legislation.

New South Wales, South Australia and Tasmania each have several categories or classes of marine aquaculture lease. New South Wales has four classes of marine aquaculture lease depending on whether it is intensive or extensive cultivation, and the depth of water. South Australia has three types of aquaculture lease (pilot, development and production) depending on the stage of production. South Australia and Tasmania both provide for emergency leases under certain circumstances. An advantage of having different categories of lease is that it may allow for more flexible processes through different levels of assessment and targeting of specific conditions to the different categories of lease.

In contrast, Victoria and Queensland have no specific marine aquaculture lease arrangements, although the use of leases is under review in each jurisdiction. Potentially, each jurisdiction could grant leases for marine and coastal waters under their respective land legislation. In practice, both jurisdictions use aquaculture licences to allow use of marine areas for aquaculture purposes, without granting of a marine aquaculture lease. This may have implications for security of tenure and financing of aquaculture development (see section 5.3).

Western Australia has provision for pearl oyster farm and aquaculture leases under different legislation. Around 94 pearl oyster farm leases have been granted under the *Pearling Act 1990* for a considerable area. However, no aquaculture leases have been granted to date under the *Fish Resources Management Act 1994* because of issues regarding lease administration and native title. The fisheries legislation was originally drafted with reference to state native title legislation developed in the early 1990s. Subsequently, the Commonwealth native title legislation superceded the state native title legislation. However, it was not (presumably) identified that there were elements of the state native title legislation in the fisheries legislation

that needed to be repealed. This was discovered when it was decided that it was appropriate to start issuing leases in the late 1990s. The Western Australian fisheries legislation has now been amended and leases will be able to be granted from 2004.

In Western Australia, as coastal waters come within the definition of ‘Crown land’, the approval of the Minister for Lands must be obtained prior to the granting of an aquaculture lease over coastal waters. Through a delegation, the Executive Director of the Department of Fisheries may grant a lease over coastal waters. The Departments of Land Administration and Fisheries have also signed a memorandum of administrative arrangements to manage the site allocation and registration process for aquaculture leases. This minimises any potential duplication (Ciffolilli 2003).

Marine and coastal waters available for leasing

Some jurisdictions only allow marine aquaculture leases to be granted for areas zoned for marine aquaculture, whereas other jurisdictions potentially allow leases to be granted anywhere in marine and coastal waters, except for protected areas. In Tasmania, for example, a marine farming lease may only be granted for an area designated for that purpose in a statutory marine farming plan prepared under the *Marine Farming Planning Act 1995* (see section 4.2). However, any person may apply to the Minister for approval to prepare a marine farming plan for a specific area. If a plan was approved, this could allow marine farming in new areas.

South Australia provides for out-of-zone aquaculture through a short term pilot lease. Through this mechanism, an aquaculture operator may obtain approval to trial a particular species in a small area. If successful, a marine aquaculture management plan could be established for the area and a development lease granted. However, a marine aquaculture lease cannot be granted for identified exclusion zones, such as areas with significant conservation values. Potentially, a marine aquaculture lease could be granted anywhere in Western Australian coastal waters, except for certain protected marine areas (although this has not occurred to date — see above).

An advantage of using marine aquaculture leases in areas zoned for marine aquaculture is that it may allow for a ‘smoother’, and less costly approval process. The establishment of zones would require broad environmental assessment and community consultation. This could contribute to identification and resolution of potential conflicts in use and site location impacts. This would occur prior to any lease application and may provide increased certainty to both applicants and third parties. In comparison, ad hoc applications for the granting of a marine aquaculture lease may require considerable environmental assessment and consultation. This may increase costs for applicants and the community, and create uncertainty as to where marine leases may be granted.

Table 5.1 Categories of marine aquaculture lease

<i>Jurisdiction</i>	<i>Categories of marine aquaculture lease</i>
New South Wales <i>Fisheries Act 1994</i>	<p><i>Aquaculture lease</i> — a lease for an area of public water land^a (public land submerged by water), either for the whole area or a stratum.</p> <p><i>Class 1 lease</i> — extensive cultivation of fish or marine vegetation and a majority of the area under cultivation is in water less than 6 metres in depth, or where the area comprises or includes a bed where oysters are dredged.</p> <p><i>Class 2 lease</i> — extensive cultivation of fish or marine vegetation and a majority of the area under cultivation is in water 6 metres or more in depth (does not include dredging).</p> <p><i>Class 3 lease</i> — intensive cultivation of fish or marine vegetation.</p> <p><i>Class 4 lease</i> — fish ranching (artificial stocking of an area with juvenile fish that are able to roam freely and feed on naturally available food).</p>
Victoria <i>Land Act 1958</i>	No specific marine aquaculture lease (licences used instead). Under the Land Act, a lease may be potentially granted for any purpose for unreserved Crown land (includes most of the marine waters of the state) — a lease could be granted for marine aquaculture production.
<i>Crown Land (Reserves) Act 1978</i>	A lease may also be potentially granted for reserved Crown land under the Crown Land (Reserves) Act. The purpose of any (reserve) lease should be consistent with the purpose of the reserve — a lease could be granted for marine aquaculture production.
Queensland <i>Land Act 1994</i>	No specific marine aquaculture lease (licences used instead). Potentially, a lease may be granted for unallocated state land (includes all land below high water mark) — this could allow for a marine lease for aquaculture production. ^b
Western Australia <i>Fish Resources Management Act 1994 and Pearlising Act 1990</i>	<p><i>Aquaculture lease</i>^c — a lease for occupying or using an area of land or waters for the purposes of aquaculture. May only be granted for an area of land and waters vested for that purpose, or an area of coastal waters.</p> <p><i>Pearl oyster farm lease</i>^c — a lease for using an area of waters for the purposes of pearl oyster farming.</p>
South Australia <i>Aquaculture Act 2001</i>	<p><i>Aquaculture lease</i> — an aquaculture lease may be granted for an area of state waters and adjacent land (requires the concurrence of the Minister responsible for <i>Harbors and Navigation Act 1993</i>).</p> <p><i>Pilot leases</i> — may only be granted for an area comprising or including state waters outside of an aquaculture zone.</p> <p><i>Development or Production leases</i> — may only be granted for an area comprising or including state waters within an aquaculture zone or by conversion of a pilot lease.</p> <p><i>Emergency leases</i> — may only be granted for aquaculture emergency zones for the purpose of protecting stock or the environment.</p>
Tasmania <i>Marine Farming Planning Act 1995</i>	<p><i>Marine farming lease</i> — a lease may be granted for marine farming for any area designated for that purpose in a marine farming development plan.</p> <p><i>Special lease</i> — a special lease may be granted for marine farming for any area designated for that purpose in a marine farming development plan.</p> <p><i>Emergency lease</i> — holder of a lease for an area covered by an emergency plan may apply for an emergency lease under certain circumstances.</p>

^a Public water land means public land submerged by water (whether permanently or intermittently) but does not include land which is the subject of an aquaculture lease or land under any other lease. ^b This is one mechanism under consideration in the current development of the statutory marine aquaculture management plan. ^c An aquaculture lease or pearl oyster farm lease must not be granted for: an area of a marine nature reserve or an area of a marine park where aquaculture has been excluded; or for other areas of a marine park or a marine management area unless the Minister responsible for those areas approves the application.

Sources: State legislation.

5.2 Allocation of marine aquaculture leases

The efficiency of marine resource use and aquaculture production can be affected by how marine aquaculture leases are initially allocated, and whether they can be subsequently traded (see section 5.3).

State allocation approaches

All jurisdictions apart from Western Australia provide for a range of competitive and non-competitive approaches to allocate marine aquaculture leases — these include auctions, tenders, ballots and use of assessment criteria (see table 5.2). In Western Australia, the fisheries legislation does not specifically provide for a particular allocation process, nor whether aquaculture leases are to be competitively allocated (Ciffolilli 2003).

Generally, most jurisdictions allocate leases using administrative arrangements. In New South Wales, for example, applications for a marine lease are considered on a case by case basis by NSW Fisheries under the *Fisheries Management Act 1994*, without competitive processes. A person may be granted a lease for a specified area in a New South Wales estuary for the purpose of growing oysters.

South Australia and Tasmania have specialist tenure allocation boards that advise the responsible Minister on matters relating to tenure allocation and selection of lease applicants. In these jurisdictions, leases are granted by reference to various selection criteria. Victoria is considering various options for allocation of tenure and have proposed that for new sites, the lessee would be chosen by competitive tender, possibly including eligibility criteria and the use of an independent application evaluation panel (DNRE 2002).

In South Australia, the Aquaculture Tenure Allocation Board (ATAB) advises the Minister on allocation of tenure for aquaculture (PIRSA 2003c, p. 3):

The key objective of the tenure allocation process under the Aquaculture Act is to allocate tenure to operators who will use the marine resource at an optimum level (in terms of quality and quantity of output relative to the capacity of the environment).

To achieve this goal, PIRSA has proposed that ATAB will make a public call for applications, and assess applications against defined criteria. These include relevance to zone policies, the nature of the proposal, the economic benefit to the state, technical capacity, business capacity, environmental management capacity, regional employment and social benefits, and other relevant criteria (PIRSA 2003d). The ATAB assessment process is used to assess both the ‘competence’ of potential applicants, and ‘expected benefits’ to the community.

Table 5.2 Allocation of marine aquaculture leases

<i>Jurisdiction</i>	<i>Approaches to allocation of marine aquaculture leases</i>
New South Wales	The Minister may, on application, or by auction, public tender or ballot, lease an area of public water land (public land submerged by water) for use for aquaculture. In practice, leases are usually allocated on application. NSW Fisheries has just implemented a lease tender policy for all leases. The granting of a lease must not be inconsistent with any relevant aquaculture industry development plan. A lease does not authorise aquaculture without an aquaculture permit.
Victoria	The Minister may grant a lease by public auction, public tender or private negotiation. It is proposed that for new sites that the lessee would be chosen by competitive tender, possibly including eligibility criteria and the use of an independent application evaluation panel. ^a
Queensland	The lease of unallocated state land (includes all land below high water mark) may occur through public auction, tender or ballot, and without competition under certain circumstances. ^b A lease below high water mark may only be granted if it will not unduly affect safe navigation and sound development of the state's waterways and ports; the impact on marine infrastructure has been considered; it would not have a detrimental effect on coastal management; and it is consistent with the intent of any relevant state management plan.
Western Australia	The Minister may grant to any person an aquaculture lease to occupy or use an area of land or waters for the purposes of aquaculture. An aquaculture lease does not authorise the use of the lease without an aquaculture licence. A pearl oyster farm lease may not be granted unless the applicant holds a hatchery or pearling licence. A pearl oyster farm lease shall not be issued as of right and, if it would be in the better interests of the pearling industry to do so, the Executive Director may refuse to issue a farm lease. The area of a pearl oyster farm cannot exceed 4 square nautical miles.
South Australia	The Minister may grant a pilot lease for prospective aquaculture zones (competitive: merit assessment and ballot), or in unzoned areas (merit assessment). A development lease may be granted within aquaculture zones (competitive allocation process) or by conversion of a pilot lease. A development lease may be converted to a production lease if performance criteria are met. A lease may not be granted unless a corresponding licence will also be granted. The Aquaculture Tenure Allocation Board (ATAB) (six members) advise the Minister on any matter relating to the allocation of tenure for aquaculture. ATAB assesses lease applications against criteria including: relevance to zone policies; nature of the proposal; economic benefit to the state; technical and business capacity; environmental management capacity; and regional and social benefits.
Tasmania	Leases can be allocated by any means deemed appropriate by the three member independent Board of Advice and Reference including tender, auction or ballot. The Minister takes advice from the Board on the method of allocation, and the criteria to be used to select who should participate in the allocation process. In practice, the allocation assessment is based on several criteria, with some consideration of the highest bid if similar applications are received. The Board must take into account any financial or other benefits to the state from allocating a lease to a particular person; and may take into account any previous experience or knowledge of the person in marine farming; fostering of employment; any contribution made by the person to industry research; and the capacity of the person to address social and environmental matters likely to affect the zone.

^a Victoria is considering different options for administration of Crown leases, including allocation provisions.

^b There are currently no specific marine aquaculture leases. The mechanism(s) for granting of occupancy rights (in addition to the current aquaculture licence (usually 15 years) issued for marine-based aquaculture and the process by which these rights will be allocated are currently under consideration.

Sources: DNRE (2002); PIRSA (2003d); state legislation and departmental information.

The use of multiple selection criteria processes may also raise concerns about the transparency and accountability of lease allocation processes. In 1996, the Industry Commission discussed the Tasmanian lease allocation process as part of a report on the salmon industry and effects of import competition. The Industry Commission concluded:

The substantial Ministerial discretion is no doubt intended to promote the development of the industry. But the process is not transparent and like all non-transparent administrative processes may be open to accusations of bias. There is a strong case for allocating leases by open tender and for using selection criteria that are clear and publicly known in advance. (IC 1996, p. 26)

A competitive auction process would not prevent some pre-screening, such as a reference check and consideration of whether a potential lessee had previously been found guilty of serious breaches of the legislation and/or licence conditions. A requirement to lodge a bond covering site rehabilitation and environmental management could also be used (see section 9.1).

Some businesses may be concerned about the impacts of open competitive bidding processes on intellectual capital and innovation when applying for an unallocated lease site. For example, if a business has invested considerable resources in assessing a new site or developing a new product, then it would be reluctant to reveal the intellectual capital until it has possession of the site. Government agencies would need to weigh up the potential to stifle innovation in the assessment of how best to pursue broader efficiency goals.

Connections between aquaculture leases and other approvals

In some jurisdictions, there are strong linkages between aquaculture lease and licence requirements. For example, in New South Wales, South Australia and Western Australia, an aquaculture lease does not allow aquaculture without a corresponding licence. In South Australia, aquaculture licences are linked to a marine lease, are co-extensive with the lease term, and are automatically renewed on each renewal of the lease (or cancelled on termination of the lease).

In other jurisdictions, such as Queensland and Victoria, there are no formal links between leases and licences. At present, aquaculture licences govern aquaculture operations in marine and coastal areas in these jurisdictions. In Western Australia, it is implicit that a marine aquaculture lease and licence must be held by the same person (Ciffolilli 2003). However, in South Australia, there is no similar requirement for development and production leases.

The potential benefits of separating or ‘dissociating’ the holding of marine aquaculture leases (tenure) and licences (operating rights), and not requiring that they be held by the same person include:

- lowering of barriers to entry; for example, an aquaculture producer (who held an aquaculture licence) need not purchase an interest in a lease site; and
- improving the availability of finance and reducing the risks of holding a lease (Ciffolilli 2003; DNRE 2002).

However, the Victorian DNRE stated that:

... dissociation of tenure from operating rights could foster unproductive speculation in leases. Whilst it would be acceptable for a licence holder to choose not to work in the industry, it would not be acceptable for a leaseholder to allow a site to lie dormant - that is, to treat the lease solely as a speculative rather than a working asset. (DNRE 2002, p. 19).

DNRE identified that one potential way to resolve this was for leases to contain conditions requiring them to be actively worked, with specified maximum idle periods or minimum levels of activity. Also, the Minister could ‘choose the Crown’s tenants ... when leases are first issued, and subsequently when they are transferred’ (DNRE 2002, p. 19).

An important question is whether the trade-offs between open and competitive lease allocation processes, and development objectives attached to lease conditions (such as ‘maximum idle period’ or ‘minimum use’ requirements), justifies the use of government discretion in lease allocation and administration. There are some reasons for skepticism about the policy of insisting that lessees work their leases. If the motivation of the requirement is to avoid speculation, then it should be noted that speculation would be profitable only if any subsequent rise in the market price, of the lease tenure rights, more than covers the lessee’s cost of holding the lease in the interim (for example, interest costs). Therefore, the fear of speculation could spring from a concern that, due maybe to the thinness of the market in its early years, the value of the lease rights may become much higher in the future than when the lease was granted. Insisting that the lease be worked will not necessarily prevent such a rise in price. However, for as long as the government insists that the lessee work the lease, that provision will tend to reduce the value of the resource, by excluding some potential bidders.

Moreover, allowing a lease to be dormant for some time, even years, may be a necessary step towards channeling it into its most productive and efficient use, from a longer term perspective. This apparently paradoxical outcome arises if immediate conversion to some specific use precludes its more productive use in the future (or makes it too expensive). For example, the use of a bay for one type of aquaculture is

incompatible with its later use for a different, and potentially higher value, type of aquaculture.

Another reason proffered, for insisting that a lease be worked, is a concern that ‘parking’ the lease was being done not in order to speculate in the resource itself, but to boost the market price of the product, by reducing the market output. However, if there were any concerns about monopolies or speculative cartels dominating and distorting the normal functioning of the aquaculture industry, then these could be addressed through part IV ‘restrictive trade practices’ provisions of the *Trade Practices Act 1974*, when corporations are involved.

In some jurisdictions, an application for a marine aquaculture lease may trigger a number of other approvals, and potentially add to the complexity and length of approval processes. For example, in Queensland, an application to lease unallocated state land (which includes coastal waters) requires approval under the *Land Act 1994* and this may be subject to native title provisions (see section 5.6). In addition, if the proposed development encroaches upon unoccupied state land in a coastal management control district or erosion prone area, then approval is needed under the *Coastal Protection and Management Act 1995*.

5.3 Term, nature, conditions and rentals for marine aquaculture leases

The term, nature of the property right, conditions and rentals for a marine aquaculture lease may all influence the efficiency of regulatory arrangements for aquaculture, and the amount and type of marine aquaculture in each jurisdiction.

Marine aquaculture lease term

Different jurisdictions provide for different lease term and renewal arrangements (see table 5.3). For example, the term for a marine aquaculture lease varies from 30 years in Tasmania to 15 years in New South Wales. In Queensland, there is potential for a marine lease for aquaculture purposes to be granted for up to 50 years, but this has not occurred to date. Apart from Victoria, all states provide for marine aquaculture leases to be renewed for similar periods to the initial term.

Table 5.3 Marine aquaculture lease term and renewals

<i>Jurisdiction</i>	<i>Initial term</i>	<i>Renewal or extension</i>	<i>Term of renewal or extension</i>
New South Wales	Not exceeding 15 years	Yes	Not exceeding 15 years
Victoria			
- unreserved Crown land	Not exceeding 21 years ^a	No	-
- reserved Crown land	Not exceeding 21 years	No	-
Queensland	Not more than 50 years ^b	Yes	Not more than 50 years ^b
Western Australia			
- aquaculture lease	Not exceeding 21 years	Yes	Not exceeding 21 years
- pearl farm lease	Not exceeding 21 years	Yes	Not exceeding 21 years
South Australia			
- pilot lease	12 months or less	Yes	For up to 3 years in total
- development lease	3 years or less	Yes	For up to 9 years in total
- production lease	20 years or less	Yes	For successive terms
- emergency lease	3 months or less	Yes	For up to 6 months in total
Tasmania			
- marine farming lease	Not exceeding 30 years	Yes ^c	Not exceeding 30 years
- special lease	Not exceeding 30 years	Yes	Not exceeding 30 years
- emergency lease	Not exceeding 1 year	Yes	Case dependent ^d

^a No marine aquaculture leases have been granted and annual licences are used. In Victoria, the *Land Act 1958* allows for a lease to consist of an initial term plus options provided that the total duration does not exceed the statutory maximum of 99 years. ^b In Queensland, a lease for unallocated state land may be allocated for either a term of years or in perpetuity. A term lease may be issued for up to 100 years for a significant development. However, no marine aquaculture leases under the *Land Act 1994* have been granted to date and aquaculture licences (usually 15 years) are used; these licences do not provide for tenure or exclusive use over the area. ^c In Tasmania, a lessee, within 15 years before the lease expires, may apply for renewal. ^d Depending on the provisions of the relevant emergency plan.

Sources: State legislation.

While each jurisdiction provides for some form of marine aquaculture lease, Victoria, Queensland and Western Australia have not used them to date. Aquaculture licences are used instead because of issues concerning lease administration and native title implications (see section 5.6). In both Victoria and Western Australia aquaculture licences are used, with an annual right of renewal, subject to ‘good behaviour’. These licences give an operator the right to conduct a business for a specified period, but grant only limited tenure and occupancy rights.

A short term lease or licence, and/or uncertain tenure and renewal arrangements, may affect the development of the aquaculture industry. For example, in 1998, Fisheries Western Australia observed the annual licensing provisions were no longer adequate for managing aquaculture in marine and inland waters. This was because they did not provide security of tenure for aquaculture producers to the same extent as leasehold title (Fisheries Western Australia 1998b).

In 1999, similar concerns about the lack of lease arrangements were expressed in Victoria. An Aquaculture Regulatory Reform Task Force (ARRTF 1999a, p. vi) observed:

The current unavailability of long term leases to enable security of tenure for marine based aquaculture is a key barrier to entry into the industry and its further expansion.

Further, the ANZ Bank's Agribusiness Advisory Unit submitted to the Aquaculture Regulatory Reform Task Force (ARRTF 1999a, p. 32) that:

Clearly, both access to and the availability of loan capital is in part directly dependent upon operator certainty of tenure over the main asset utilised in conducting the business. Any move which improves this aspect would assist business entities raise loan capital.

Another area of concern to financiers is the perceived lower security of tenure for many aquaculture operations relative to land-based primary production, where land tenure and mortgagees' rights are generally well established. This may add further risk to a 'thin market' for aquaculture capital, and more uncertainty about the sale or salvage value of an aquaculture operation (Love 2003).

In Victoria, the Department of Primary Industry is considering 'legislative options regarding Crown leases for marine aquaculture', and is also developing a model 'Crown land lease' with 21 year tenure (DNRE 2002). Queensland is considering the merits of dedicated marine aquaculture leases compared with the continued use of licensing of marine aquaculture. However, the time taken to develop and implement marine aquaculture lease arrangements (including standard leases, terms, conditions and rentals) in Victoria, Queensland and Western Australia may be a constraint on the potential expansion of the marine aquaculture industry.

Nature of marine aquaculture leases

Important attributes of the property rights associated with a marine aquaculture lease are exclusivity, transferability and divisibility.

Exclusivity

The degree of 'exclusivity' vested by marine aquaculture lease arrangements varies in each jurisdiction (see table 5.4). Some jurisdictions, such as South Australia and Tasmania, grant exclusive occupation of the leased area to the lessee. In other jurisdictions, such as New South Wales and Western Australia, a lease provides exclusive rights to cultivate, take and own all fish or marine vegetation specified in the lease, that are within the leased area. However, in New South Wales and Western Australia, a lease does not confer the right of exclusive possession of the leased area and, in New South Wales, a lease is subject to the public right of fishing.

Table 5.4 Nature of marine aquaculture leases

<i>Jurisdiction</i>	<i>Exclusive occupation of leased area</i>	<i>Transferability</i>	<i>Divisibility</i>
New South Wales	No ^a	Yes (with approval)	Subdivide or sublet (with approval)
Victoria			
- unreserved Crown land lease	Yes	Yes (with approval)	Sublet (with approval)
- reserved Crown land lease	Yes	Yes	Yes
Queensland ^b	Yes	Yes (with approval)	Yes (with approval)
Western Australia			
- aquaculture lease	No ^c	No	No
- pearl farm lease	No	Yes (with approval)	Yes (with approval)
South Australia			
- pilot lease	Yes	No	No
- development lease	Yes	Yes (with approval)	If in conditions
- production lease	Yes	Yes (give notice)	If in conditions
Tasmania			
- marine farming lease	Yes ^d	Yes (with approval)	Yes (with approval) ^e
- special lease	No	Yes (with approval)	Yes (with approval) ^e

^a In New South Wales, an aquaculture lease provides a lessee with the exclusive right to cultivate within, and to take from, the leased area the species of fish or marine vegetation specified in the lease, and ownership of all fish or marine vegetation specified in the lease that are within the leased area. An aquaculture lease does not confer the right of exclusive possession of the leased area. A lease is subject to the public right of fishing.

^b No marine aquaculture leases under the *Land Act 1994* have been granted to date and aquaculture licences (usually 15 years) are used. An aquaculture licence does not provide exclusive access rights but any person other than the licence holder is prohibited from interfering with an aquaculture activity or fishing apparatus.

^c In Western Australia, an aquaculture lease provides a lessee with the exclusive right to farm within the leased area the species of fish that are specified in the lease, and ownership of all farmed fish within the leased area. The lease does not provide exclusive possession of the leased or marked off area. ^d In Tasmania, a marine farming or emergency lease confers on the lessee exclusive possession of the area specified in the lease; and any specified area of the seabed in the lease. ^e Subdivide or sublet with approval.

Sources: State legislation.

The degree of ‘exclusivity’ provided with a lease may relate, in part, to the approach taken with marine aquaculture planning and public scrutiny of marine aquaculture plans (see section 4.2). For example, Ciffolilli (2003, p. 29) has suggested that the:

The fact that South Australia and Tasmania make some provision for exclusive possession in respect of the site may be explained, to some extent, because those States have provisions in their legislation concerning “marine farming development plans” ... Marine farming development plans and aquaculture policies in those States come under public or parliamentary scrutiny, or both, in South Australia.

The nature of the aquaculture activity should be a significant factor in determining the degree of exclusivity or multiple use of the site. For example, sea bed ranching of scallops could allow access to the water column or surface water by other users, while farming of finfish in sea cages may require more restricted access.

Potentially, public access to a finfish or shellfish lease may interfere with regular aquaculture operations, disturb or harm the species being farmed, increase the risk of occupational health and safety issues, and translocation of pests and diseases. While the use of marine space for aquaculture does not preclude all other uses (or even multiple uses), there may be limits placed on navigation and recreational use close to marine farm areas because of concerns about security, mooring structures and fish health.

Transfer of leases

Generally, all jurisdictions, apart from Western Australia, allow for an aquaculture lease to be transferred, with the approval of the Minister (see table 5.4). In South Australia, a pilot lease may not be transferred (because of the nature of the ‘trial production’), whereas the transfer of a full-scale production lease only requires notice to be given to the Minister. Where leases are able to be traded, secondary markets would allow aquaculture leases to be allocated to their most valued use.

An important issue for lessees is the ability to move to more appropriate lease sites within a zoned area — this may bring efficiency benefits for the lessee, and improve management of environmental impacts. At times, after a venture has started operating, it may become apparent that the initial lease site is not the best site for marine aquaculture. Regulatory arrangements should provide for the potential transfer and relocation of lease sites after the pioneering phase has been completed, and give due recognition to the rights of existing lessees over new entrants. However, transaction costs and potential impacts on the security associated with relocating a lease may need to be considered.

Divisibility

All jurisdictions, apart from Western Australia, allow for certain aquaculture leases to be subdivided or sublet with approval, or if allowed in the lease conditions (South Australia). Western Australia allows for pearl farms to be subdivided but does not allow aquaculture leases to be subdivided — in part because of administrative issues and also native title (see section 5.6). The potential subdivision or subletting of leases may assist the efficient use of marine resources, and contribute to the growth of the aquaculture industry.

Other marine aquaculture lease conditions

A number of conditions are usually attached to a marine aquaculture lease. These include the species that may be farmed, requirements for marking and for fencing of

the lease area, and how a lease may be amended or cancelled. The specification of operating conditions is usually contained in an aquaculture licence (see section 7.2).

In New South Wales, for example, an aquaculture lease must specify the species of fish or marine vegetation authorised to be cultivated within the leased area. A lease does not authorise anything to be done contrary to the Act or the terms or conditions of an aquaculture permit relating to the leased area. The Minister may cancel the lease if it is not used for the purpose for which it has been granted; or if there has been a breach of conditions.

In Tasmania, a marine farming lease is subject to any condition the Minister determines. Examples include that a lessee must maintain marine farming structures and equipment on lease areas in a serviceable condition, that any predator control of protected species must be conducted with the required approvals, and that authorised persons be allowed to enter and inspect the lease area at all reasonable times. All lessees must mark the external boundaries of the lease area.

Marine aquaculture lease fees and rentals

Different arrangements exist in each jurisdiction regarding the imposition of annual marine aquaculture lease fees and rental payments (see table 5.5). Care should be taken with interpreting the table as each jurisdiction has different regulatory frameworks and fee requirements. In some jurisdictions, including New South Wales, South Australia and Tasmania, application and annual fee arrangements differ according to the type of aquaculture (ie finfish or shellfish) involved. Licence application fees may also be relevant (see table 6.8).

There has been limited use made of competitive tendering and charging of resource rentals. User fees and charges from marine aquaculture leases are not a resource rental, tax or fee, as the charges vary with the activity; and they are not a return to the government. A resource rent can be defined as the return on a resource over and above the normal profits (or returns) that could be generated in a competitive market. The rationale for governments to collect a resource rental payment on behalf of the community is that rent is derived from access and use of community-owned resources, such as marine and coastal areas, that are exchanged in a constrained market.

In Victoria, the ARRTF (1999a) asserted that lease rentals could help to ensure that the community receives an appropriate return for the use of a community owned asset for the purposes of aquaculture. DNRE (2002, p. 20) also argues that a resource rental ‘could be justified by the notion of charging a “fair return” for the private use of a community resource’.

Table 5.5 Marine aquaculture lease fees and rentals

<i>Jurisdiction</i>	<i>Marine aquaculture lease fees and rentals</i>
New South Wales	<p>NSW lease fees only apply to existing aquaculture (mainly oyster) leases:</p> <ul style="list-style-type: none"> • Aquaculture lease application fee: class 1, 2 and 3 lease \$553; and class 4 lease \$885 (unless lease offered by auction, public tender or ballot). • Aquaculture lease annual rental is \$41 per hectare or part thereof, and minimum rental for a leased area of \$111. <p>New aquaculture lease costs are subject to consideration of the NSW Fisheries tender policy and determination of lease value.</p>
Victoria	<p>No marine aquaculture leases as such (generally, lease rentals may be a single up-front payment or periodic rental and revenue is returned to the consolidated fund).</p> <p>Fee for a marine aquaculture licence for 12 months:</p> <ul style="list-style-type: none"> • Aquaculture (Crown land) type A licence application fee: \$1179. • Aquaculture (Crown land) type A licence application levy: \$929 (potential additional levy based on area and costs of administration).
Queensland	<p>No marine aquaculture leases as such (general lease application fee is \$167 and rental charged on a percentage of the unimproved value of the property, for example, 5 per cent).</p> <p>Fee for aquaculture licence with 15 year term:^a</p> <ul style="list-style-type: none"> • Class 1 licence holders (oyster areas and cage culture): \$104 application fee with minimum initial licence fee of \$259 or \$47 per hectare if 6 hectares or more, or \$47 per 200 metres of foreshore. Also an inspection fee of \$170 per area. • Class 2 (pearl oyster culture): \$104 application fee with minimum initial fee of \$1018 or \$7.25 per hectare if 141 hectares or more. Also an inspection fee at cost.
Western Australia	<p>Fee for aquaculture lease, grant or renewal: \$1850.</p> <p>Pearl farm lease application fee: \$1600.</p>
South Australia	<p>One application fee applies to both aquaculture lease and licence, largely attached to the licence (marine aquaculture application \$1600).</p> <p>Annual aquaculture lease fee across all sectors: \$45/ha.</p>
Tasmania	<p>Marine farm lease application fee: \$1231.</p> <p>Marine farm annual lease fee:</p> <ul style="list-style-type: none"> • shellfish farms are \$110 base and \$55 per hectare; and • finfish farms \$1925 base and \$220 per hectare.

^a In Queensland, aquaculture licences (usually 15 years) are used; these licences do not provide for tenure or exclusive use over the area.

Sources: State legislation and departmental annual reports.

A government would require a large amount of information to develop a fully efficient (optimal) resource rental system and to set the corresponding resource rental rate. However, this information is generally not available. A more efficient way to determine a resource rental is to use a competitive process, such as an auction, to induce individuals to reveal their willingness to pay for access and use of a natural resource (see section 9.2).

Governments have not clearly stated their policies on resource rentals for marine aquaculture leases. In South Australia, for example, the *Aquaculture Act 2001*

provides no guidance on whether full-scale production leases are to be granted for a nominal or for an estimated or actual market rent.

Walrut (2003) observes that several draft South Australian aquaculture policies also provide little clarification as to how rentals will be charged. The draft policies suggest that either:

- the rental will be set to recover costs associated with the use of the marine resources rather than to provide a return to the community for its use (draft aquaculture cost recovery policy); or
- the tendering process will adopt commercial tendering terms (draft aquaculture tenure allocation policy) (Walrut 2003).

Where justifiable, industry assistance is best addressed through explicit and transparent measures, and not, for example, through fee exemptions or subsidised lease rentals for public lands or waters (see also section 5.2 above). Further research could be undertaken to examine the scope for resource rental charges for the use of aquaculture sites on public land and waters, and how these charges could be most efficiently determined and collected.

5.4 Status of marine aquaculture leases

Previous sections have outlined the different arrangements in each jurisdiction that provide for the allocation and administration of marine aquaculture leases. Current use of marine aquaculture leases across jurisdictions is shown in table 5.6.

There are two broad groupings — those jurisdictions using and allocating marine leases, and those not. New South Wales, South Australia and Tasmania have made considerable use of marine aquaculture leases, both in terms of the number of leases and the area leased. Western Australia has also granted pearl oyster farm leases over a considerable area.

In contrast, Victoria, Queensland and Western Australia have granted no marine aquaculture leases. Western Australia has marine lease provisions, but no leases have been granted to date. The lack of marine aquaculture leases may have implications for industry development and the growth of marine aquaculture. This is particularly important given the significance of marine aquaculture in Australia at the present time (see section 2.1).

Table 5.6 Status of marine aquaculture leases

<i>Jurisdiction</i>	<i>Number and area of marine aquaculture leases</i>
New South Wales ^a	Around 3200 aquaculture leases (for oysters) have been granted for a total of around 4300 hectares for terms of 15 years. Some mussel and marine finfish aquaculture.
Victoria	No marine aquaculture leases have been granted. Around 983 hectares of aquaculture zones with 1/3 to 1/2 being farmed area (mainly mussel farming). Aquaculture licences granted under the <i>Fisheries Act 1995</i> with terms of 12 months are used instead of leases. Arrangements under review.
Queensland	No marine aquaculture leases have been granted and limited marine aquaculture. Aquaculture licences granted under the <i>Fisheries Act 1994</i> (usually for terms of 15 years). The licences do not provide any form of tenure or exclusivity. Under review.
Western Australia ^a	No marine aquaculture leases have been granted. Some marine aquaculture in Western Australia with around 83 approvals (not all active). Aquaculture licences granted under the <i>Fish Resources Management Act 1994</i> with terms of 12 months are used instead of leases. Around 94 pearl farm leases have been granted for a total of 184 square nautical miles area. Pearl oyster farms are predominantly situated in sheltered waters and range from Exmouth Gulf to the northern waters of the Kimberley.
South Australia ^a	Around 16 marine tuna aquaculture leases have been granted for a total of around 378 hectares for terms of 20 years. Some 24 marine tuna aquaculture pilot leases have been granted for a total of 1530 hectares for terms of up to 3 years (may be able to be converted to longer term production leases). Around 19 marine finfish aquaculture leases (eg for kingfish or snapper) have been granted for a total of around 330 hectares for terms of 20 years. Around 281 marine intertidal mollusc aquaculture leases (eg for oysters or scallops) have been granted for a total of around 1276 hectares for terms of 20 years. Around 37 marine subtidal mollusc aquaculture leases (eg for mussels and oysters) have been granted for a total of around 471 hectares for terms of 20 years.
Tasmania ^a	Around 210 marine farming leases (around 40 finfish and 170 shellfish leases) have been granted for a total of around 5 000 hectares for terms of up to 30 years. Around 50 per cent of water zoned for marine farming is under marine farming lease (total maximum leased area around 10 200 hectares).

^a An aquaculture or marine farming operating licence is required to engage in the activity of aquaculture or marine farming on a lease (see chapter 6).

Sources: State departmental annual reports and departmental information.

5.5 Public land and aquaculture

A land-based aquaculture operation may require access to, or tenure over, public (or Crown) land, such as coastal foreshore reserve or a pastoral lease. This may be for land-based aquaculture itself, or for placing a pipe across or under the coastal foreshore to take and discharge sea water from a coastal land-based site.

In all jurisdictions, access to coastal foreshore reserve, pastoral lease, or reserved land, or the building of a structure partially or wholly on public land, requires a licence or lease, or an easement over public land. Where applicable, an aquaculture

lease application for public land will need to address and be consistent with native title (see section 5.6).

In Western Australia, for example, around 36 per cent of the state is ‘unallocated Crown land’, 38 per cent is pastoral lease, and 19 per cent is reserves and other leases. It is considered that the majority of the land sites suitable for major aquaculture developments in the state (for example, prawn farming, abalone or microalgae) are on non-freehold sites. In addition, in Western Australia, all near coastal freehold sites require access by way of easement to the ocean (Lendich 2003). Aquaculture on any of these sites would require a public lease and, where applicable, would need to be consistent with native title.

Foreshore reserves

In some jurisdictions it can be difficult to gain access to foreshore reserves for aquaculture purposes. This issue does not only affect the aquaculture industry — for example, the Chairman of the Victorian Coastal Council has observed:

The Crown remains a difficult landlord, as often it is difficult for proponents who have projects on or affecting coastal Crown land to obtain a clear position from Government. On the one hand, this is understandable given the broad range of perspectives and interests that Government must reflect upon, but also reflects the general desire of governments to leave all options open for as long as possible. (James 2002, p. 210)

This highlights the importance of clear assessment criteria for lease applications and well functioning administration and approval processes (see section 6.3).

Pastoral leases and aquaculture

Pastoral leases are a form of land tenure covering some 44 per cent (338 million hectares) of Australia’s mainland area. Pastoral leases are generally situated in the Australian rangelands (the arid and semi-arid regions, and the tropical savannas). The predominant use of pastoral leases is for grazing livestock (primarily sheep and cattle) although there is increasing demand for land for non-pastoral uses, such as for conservation, tourism and aquaculture.

A pastoral lease is issued for a specified time, area and purpose as a contract between a state or territory government and a lessee. Generally, a pastoral lease must be used for pastoral purposes, although some supplementary or ancillary uses to pastoralism, such as small-scale aquaculture, may be allowed. A lease contains a number of conditions to control land use. The conditions set out the rights of both the lessee and the government, and the responsibilities of the lessee to undertake certain activities in a prescribed manner (PC 2002d).

Until recently, the main approach to accommodating non-pastoral land uses, including aquaculture, was by discretionary changes to lease conditions and rental rates by the relevant managing authority. This approach lacks transparency and may involve inconsistencies, thereby heightening uncertainty for investment decisions (PC 2002d).

The level of discretionary power has implications for the extent to which non-pastoral land uses may be facilitated through this mechanism. For example, in 2002 the Queensland Department of Natural Resources and Mines (DNRM) issued diversification guidelines as part of a broader review of its leasehold arrangements. The guidelines set out that any amendments to lease conditions must not be used to support incremental progression of additional uses to the point where these become the dominant use, such that if the:

... proposed additional use is assessed as being not complementary to the primary purpose, then the application will be refused in the first instance ... (DNRM 2002, p. 2)

The guidelines propose what could constitute a ‘complementary’ level for several types of diversification activities. For example, a lessee may use up to 5 hectares for aquaculture, subject to native title being extinguished (DNRM 2002). Where an activity fails the test of complementarity and the application is refused, the guidelines set out alternative approaches that could be used to enable a diversified use to become a major use, such as excision of the lease, or conversion to freehold.

Some jurisdictions, such as Western Australia, use permits to regulate non-pastoral uses on land covered by pastoral leases. While providing a more transparent framework, the capacity for permits to facilitate non-pastoral land use, under the current arrangements, is limited in that they are generally issued for short timeframes and are not transferable with the lease title (PC 2002d).

Where applicable, changes to existing land uses need to be consistent with native title. Other than seeking court determinations over native title rights, lessees, governments and traditional owners may seek to negotiate agreements for activities, such as aquaculture, to occur (see section 5.6).

Lease approval processes for public land

Lease approval for an aquaculture operation on public land may be affected by administrative processes, competitive allocation and native title (see section 5.6). In Western Australia, for example, depending on the complexities involved, the time taken to finalise each lease varies considerably from case to case, with delaying factors including:

- consultation with a range of planning and management bodies;

-
- survey and/or plan production;
 - disputes over rental;
 - changes to existing tenures;
 - legal complexities; and
 - procedural requirements of the Commonwealth *Native Title Act 1993*.

In Western Australia, it takes on average about eight weeks to complete preparation and registration of a lease document, where the land is immediately available for leasing. However, where a full consultation process is required, and if *Native Title Act* requirements necessitate prior acquisition, the timeframe could be up to three years (DPI 2004).

In Western Australia, the process used for granting access and tenure to public land has been found to be time consuming and costly for proponents (Lendich 2003). At times, the Department of Fisheries has been unable to progress aquaculture licence applications due to the lack of tenure for the site, even though all other relevant approvals had been granted (Independent Review Committee 2002 and box 5.1).

In Western Australia, leases will generally only be issued following a competitive allocation process if the land proposed to be leased is considered to be in an area of high demand. Direct lease offers without public competition will be considered where the land is not considered to be situated within an area of high demand. The ‘expression of interest’ process, as part of competitive allocation, can provide some uncertainty for a proponent compared with it being granted on request.

The ‘expression of interest’ process is also seen as an impediment to aquaculture development because proponents who identify a suitable site, often at considerable cost, risk not obtaining tenure if the site is subject to ‘expressions of interest’. The process reduces investor incentives to undertake detailed site identification studies, as there is a possibility that they will not be successful in becoming the preferred proponent through the ‘expression of interest’ process (Lendich 2003).

However, a competitive allocation process may be appropriate to promote the efficient use of resources, and target resources to the highest valued use. Undertaking the process in a timely way may overcome some of the concerns. The initial investigation of a potential lease by a proponent should also be of an appropriate scale given that their bid may not be the successful tender.

Box 5.1 Aquaculture proposals on public land in Western Australia

In Western Australia, prior to the introduction of a Ministerial Policy Guideline on assessment of applications in 1998, it could take considerable time to process aquaculture applications.

Southern Cross Aquaculture — In the mid-1990s, Southern Cross Aquaculture (SCA) identified an area of Crown land at Wyndham, as its preferred site for a 1000 hectare prawn farm. In October 1998, SCA approached the Department of Land Administration (DOLA) for a lease for the site, and applied to the Fisheries Department for an aquaculture licence. DOLA advised that a lease could only be granted if the site had been obtained through 'open public competition'. Using a new process, DOLA called for 'expressions of interest' for the site and, in October 1999, SCA was accepted as the preferred developer. DOLA then started negotiations with native title claimants about the granting of the lease.

After reviewing the proposal, the Environmental Protection Authority (WA EPA) recommended it be subject to a public environmental review (expected to take around 12 months). SCA subsequently applied for a five hectare pilot project and the WA EPA granted works approval in mid-2000. The Fisheries Department approved the aquaculture licence in April 2000 subject to tenure being obtained from DOLA. However, by mid-2002, 3½ years after applying, the lease had not been granted, and final clearances enabling construction to commence had not been obtained. Some of the delays were due to the new 'expressions of interest' process, native title negotiations and the time required for environmental review.

Cape Seafarms — In the mid-1990s, Cape Seafarms proposed developing a 150 hectare prawn farm at Heron Point. In 1996, Cape Seafarms commenced negotiations with government agencies for the necessary licences and leases for the project. The company completed the required consultative environmental review for the site in 1997. However, the Fisheries Department were unable to issue an aquaculture licence until environmental clearance had been obtained, and a lease was finalised.

DOLA could not issue the lease until negotiations with native title parties were completed. Due partly to an archaeological survey being required, it took nearly two years to reach agreement with the 18 parties involved. The Fisheries Department issued the aquaculture licence in mid-1999. Major delays to this project included resolution of native title concerns and gaining environmental approvals. Some delays were due to prawn farming being 'new' to the state, and there was a lack of government agency experience in assessing the environmental impacts of such farming.

Current approach — the Ministerial Policy Guideline on *Assessment of applications for authorisations for aquaculture and pearling in coastal waters of Western Australia* aims to improve administrative processes by specifying timeframes for assessment, matters to be taken into account in decision-making, and consultation requirements.

Source: Independent Review Committee (2002).

5.6 Native title and aquaculture leases

Where applicable, an application for an aquaculture lease for public land or waters will need to address native title — the rights and interests of Aboriginal and Torres Strait Islander people in land and waters according to their traditional laws and customs (NNTT 2002).

The *Native Title Act 1993* (NTA) (Commonwealth) applies to all land and water held by the Commonwealth of Australia (s. 6), and sets out the processes whereby native title can be recognised and protected. Native title is a pre-existing right and may be present over certain lands and waters even though there has been no court determination, or even a native title application.

Native title may exist over vacant public land, or over land held under pastoral lease (see above) or other forms of public lease that do not confer exclusive possession. It may also apply to all waters within Australia's Exclusive Economic Zone, including seabed and subsoil. In these areas, the creation and/or modification of public leases for aquaculture (and other) purposes must be consistent with the NTA.

Native title and land-based aquaculture

The NTA allows for aquaculture to occur as a 'primary production activity' on some existing leases, such as pastoral leases (sub. G, part 2, div. 3 of NTA), subject to notice of the proposed activity and an 'opportunity to comment' being given to affected native title claimants, native title bodies corporate and any other relevant native title representative bodies. Most state land legislation allows for aquaculture to be undertaken as a diversification activity, within an existing pastoral lease (PC 2002d) (for example, small scale farming of redclaw in dams or ponds).

Subdivision G of the NTA does not cover primary production activities, such as aquaculture, on large non-exclusive pastoral leases where the activity becomes the dominant land use (refer to s. 24GB(4)(a) of NTA). Therefore, where aquaculture is to be undertaken on a significant scale — such as prawn farming using large and multiple ponds — and is likely to be the dominant activity on land not held under exclusive possession, then a new lease specifically conferring the right to undertake the aquaculture activity is required. The conferral of rights, where native title claims are pending, must be done consistently with the processes set out in the NTA, particularly as to negotiation with traditional owners (see below). The time taken to negotiate agreements may depend on several factors, including the type of activity that is to be undertaken, the number of claimants involved, and the extent to which parties are able to support and facilitate negotiation.

In New South Wales, for example, the majority of vacant public land is subject to native title claim. As part of the ‘North Coast Regional Aquaculture Strategy’, potential applicants have been advised that aquaculture proposals that require works, such as road or water pipeline access, across public land under native title claims ‘should be avoided unless agreements can be made in writing with the claimants’ (Department of Urban Affairs and Planning and NSW Fisheries 2000).

Native title and marine based aquaculture

Native title may also apply to coastal and offshore waters. This was recently considered by the High Court in a native title claim over seas in the Croker Island region, 200 kilometres north-east of Darwin. In its October 2001 ruling, the High Court determined that the claimants (Yarmirr and others representing five clans) had native title rights over territorial seas in the area, but that these rights were non-exclusive in nature (NNTT 2001).

The implications of this ruling for the granting of marine aquaculture leases is likely to vary from case to case, depending on the nature and scale of the aquaculture lease, and the native title rights held by traditional owners in a particular area. For example, where marine aquaculture leases (and operations) clearly do not interfere with the non-exclusive rights of traditional owners in the area, then such leases (and operations) have no effect on native title and can be granted without reference to the NTA. Where uncertainty exists about the interaction of marine aquaculture and the rights of native title holders, then the NTA processes will need to be satisfied.

Indigenous land use agreements and other agreements

Native title issues, such as those that may arise in relation to some aquaculture lease applications, may be addressed through a process of negotiation. For example, in a review of Western Australia’s Project Development Approvals System, an Independent Review Committee (2002, p. 81) observed that:

... The most important policy in the native title area is the new Government’s preference for negotiation rather than litigation. A move away from the adversarial approach when dealing with native title towards an approach based on conciliation and negotiation can be expected to contribute significantly to a more timely processing of project approvals where these have native title implications.

A type of agreement recognised and described by the NTA are Indigenous Land Use Agreements (ILUAs). These agreements are legal documents that provide negotiated consent to undertake specified activities within a particular area. Once completed (consistent with NTA guidelines), ILUAs can be registered with the

National Native Title Tribunal, and thereby bind all native title holders in an area to the agreement, even if they were not involved directly in its negotiation (NNTT 2003).

Both governments and/or private enterprises may enter into agreements with traditional owners. For example, there may be benefits from governments negotiating regional ILUAs, where feasible, as part of broader planning and zoning processes, including for aquaculture. There have been a number of agreements negotiated between aquaculture enterprises and traditional owners for both land and water leases (see box 5.2).

Box 5.2 Native title agreements and aquaculture

Hutt Lagoon aquaculture project — In a 1998 agreement, Betatene Pty Ltd and the Nanda and Naaguja peoples of north-west Western Australia negotiated an agreement that allowed the company to expand the lease for its 250 hectare algae farm to 500 hectare to meet new contracts. The agreement was supported by Yamatji Land and Sea Council, the local native title representative body.

Croker Island pearls — In a 2000 agreement, Barrier Pearls Pty Ltd and traditional owners at Croker Island negotiated an agreement for a 10-year lease, with a 10-year option, for use of about two square kilometres of sea for culturing pearls. Barrier Pearls is also negotiating a second proposed agreement for pearl farming, also in the Croker Island region. Both agreements were supported by the Northern Land Council, the local native title representative body.

Sources: ATSiC (2002); Northern Land Council (2003).

5.7 Summary

- New South Wales, South Australia and Tasmania have dedicated marine aquaculture lease arrangements, and have made considerable use of marine aquaculture leases, in terms of the number of leases granted and the area leased.
- Western Australia has dedicated marine aquaculture lease arrangements but has yet to grant any marine leases. Western Australia has granted a number of pearl oyster farm leases for a considerable area.
- Queensland and Victoria have no specific marine aquaculture lease arrangements and have not granted any marine aquaculture leases. Both jurisdictions rely on aquaculture licences to allow the use of marine areas for aquaculture purposes, although the use of leases is under review.
- The limited use of dedicated marine aquaculture leases in Victoria, Queensland and Western Australia has implications for industry development and the growth

of marine aquaculture. This may be particularly important given the dominance of marine aquaculture to Australia aquaculture production at the present time.

- The efficiency of marine resource use and aquaculture production can be affected by how marine aquaculture leases are initially allocated, and whether they can be subsequently traded. All jurisdictions, apart from Western Australia, allow for an aquaculture lease to be transferred, with Ministerial approval.
- The lack of an open competitive bidding process for marine aquaculture leases based on price has potential to lead to distortions in resource use. In both South Australia and Tasmania, multiple selection criteria, one of which may be price, are used to assign leases as opposed to a competitive auction.
- In some jurisdictions, such as Queensland and Western Australia, an application for a marine aquaculture lease may trigger a number of other approvals, and this may increase the period of time to approve the granting of a lease.
- The term, nature of the property right, conditions and rentals for a marine aquaculture lease may all influence the amount and type of marine aquaculture in different jurisdictions.
- Different arrangements exist in each jurisdiction regarding the use of annual marine aquaculture lease fees and resource rentals. Further research could be undertaken to examine the scope for charging resource rentals for the use of aquaculture sites on public land and waters, and how these rentals could be most efficiently determined and collected.
- Where applicable, the lease of public land or waters for aquaculture purposes will need to address and be consistent with native title. Other than seeking court determinations over native title rights, lessees, governments and traditional owners may seek to negotiate agreements for aquaculture purposes.

6 Approval processes for aquaculture production

This chapter outlines the broad purpose of ‘approval’ systems, including licences, permits and development approvals. It identifies the main approvals applying to aquaculture across the six states of Australia, before qualitatively assessing their likely efficiency and effectiveness, and potential implications for aquaculture production.

Characteristics of efficient and effective approval systems include:

- requirements that are risk-based and not unduly prescriptive;
- effectively coordinated and/or integrated approval processes;
- adequate information and consultation for making decisions;
- timeliness in decision making; and
- appropriate administration charges and cost recovery (BIE 1996).

Other characteristics, such as efficient and effective monitoring, enforcement, appeal provisions, reporting and auditing, are discussed in chapter 7.

6.1 Purpose of approval systems

Governments frequently use approvals, such as licences and permits, to regulate activities by requiring application and consent before the activity can legally commence. These approvals often include conditions that holders must comply with. A local government planning or development approval is a similar instrument used to manage development on land (and, at times, at sea).

Approval systems provide governments with an ability to assess and manage the potential impacts of each activity before they commence. This may be particularly useful if potential negative impacts are large and difficult to reverse. They can also be useful planning instruments to minimise externalities that might arise through the proximity of a development to a potentially impacted area. Case-by-case assessment allows governments to target responses to the specific problems raised by each

proposed activity. This may be useful for aquaculture operations which may generate impacts that vary across site location, species and management practices.

Approval systems can also impose significant administrative, information collection and opportunity costs on businesses, governments and third parties where such systems are unnecessarily complex, time consuming and/or poorly administered. There may also be potential costs associated with regulation acting as a barrier to new operators entering the industry, and thereby reducing competition.

6.2 Licences, permits and development approvals

Various lease (see chapter 5), licence, permit and development approvals are often required for aquaculture production in each jurisdiction, depending on the location, species and production system (see appendix B). Leases provide the right to occupy and use public land and waters for aquaculture purposes, while aquaculture licences set out specific operating conditions. In addition to state agency approvals, other approvals that may be required include development/planning approvals from local government, and Australian Government approvals under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

State approvals

Tables 6.1, 6.2 and 6.3 provide examples of the types of approvals that are likely to be required across the states for three forms of large-scale aquaculture operations: marine; land-based coastal; and land-based freshwater (see appendix B for further information on mandatory and potential approvals). The number of approvals may not necessarily reflect the complexity of the regulatory framework, or the efficiency with which it is implemented.

Approval requirements vary across the six Australian states. Across all states, aquaculture licences are required for commercial-scale aquaculture, whether marine, land-based coastal or land-based freshwater. In some states, smaller scale aquaculture developments on private land, such as marron farming in Western Australia, may be exempted from licensing requirements. Marine aquaculture leases are required in some states (New South Wales, South Australia and Tasmania, and Western Australia for pearls) but not others. In some jurisdictions, such as New South Wales and Queensland, there are integrated approval systems (see below).

Table 6.1 Approvals for large-scale marine aquaculture and associated land-based facilities

<i>Approvals</i>	<i>NSW</i>	<i>VIC</i>	<i>QLD</i>	<i>WA</i>	<i>SA</i>	<i>TAS</i>
Mandatory approvals						
Aquaculture lease	✓			b	✓	✓
Aquaculture permit/licence	✓	✓	a	✓ b	✓	✓
Environmental discharge licence			c	✓		
Environmental works approval				✓		
Development/planning approval (land-based facility eg warehouse)	✓	✓	✓	✓	✓✓ d	✓
Potential approvals						
Lease of public land/water	✓	✓	✓	✓	✓	✓
Permit to impact marine plants	✓		a			
Land vegetation clearing permit	✓	✓	a	✓	✓	
Permit to take brood or culture stock	✓	✓	✓	✓ e	✓	✓
Works affecting coastal protection			a			
Works on tidal lands or waters			a			
Permit for works in GBRMP ^f			✓			
Discharge into GBRMP ^g			✓			

^a Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS), including coastal protection and fisheries approvals. Resource allocation approvals are assessed separately outside of IDAS. ^b Specific pearl oyster farm leases and licences apply for pearling. ^c Environmental matters are considered as part of a development approval. A 'personal environmental licence' may also be required. ^d Development approvals are required for land-based facilities (generally from local government), and for activities in marine waters (generally from Development Assessment Commission). ^e Ministerial exemption. ^f Great Barrier Reef Marine Park. ^g Under review.

Table 6.2 Approvals for large-scale land-based aquaculture on the coast

<i>Approvals</i>	<i>NSW</i>	<i>VIC</i>	<i>QLD</i>	<i>WA</i>	<i>SA</i>	<i>TAS</i>
Mandatory approvals						
Aquaculture permit/licence	✓	✓	a	✓	✓	✓
Development/planning approval	✓	✓	✓	✓	✓	✓
Environmental discharge licence	✓	✓	b	✓		d
Environmental works approval	✓	✓		✓	c	
Potential approvals						
Lease of public land/water	✓	✓	✓	✓	✓	✓
Water licence			✓			
Permit to impact marine plants	✓		a			
Land vegetation clearing permit	✓	✓	a	✓	✓	
Permit to take brood or culture stock	✓	✓	✓	✓ e	✓	✓
Works affecting coastal protection			a			
Works on tidal lands or waters			a			
Permit for works in GBRMP ^f			✓			
Discharge into GBRMP ^g			✓			

^a Queensland is integrating most of its development related controls under IDAS (see note ^a, table 6.1). ^b Environmental matters are considered as part of an operator's development approval. A 'personal environmental licence' may also be required. ^c An environmental works approval is not required if development approval has been approved under the Development Act. ^d Considered as part of development approval. ^e Ministerial exemption. ^f Great Barrier Reef Marine Park. ^g Arrangements under review.

Table 6.3 Approvals for large-scale land-based freshwater aquaculture

<i>Approvals</i>	<i>NSW</i>	<i>VIC</i>	<i>QLD</i>	<i>WA</i>	<i>SA</i>	<i>TAS</i>
Mandatory approvals						
Aquaculture permit/licence	✓	✓	a	✓	✓	✓
Development/planning approval	✓	✓	✓	✓	✓	✓
Environmental discharge licence	✓	✓	b	✓		d
Environmental works	✓	✓		✓	c	
Water licence	✓	✓	✓	✓	✓	✓
Potential approvals						
Lease of public land/water	✓	✓	✓	✓	✓	✓
Land vegetation clearing permit	✓	✓	a	✓	✓	
Dam permit	✓	✓	✓	✓	✓	✓
Permit to take brood or culture stock	✓	✓	✓	✓ e	✓	✓

a Queensland is integrating most of its development related controls under IDAS (see note **a**, table 6.1).

b Environmental matters are considered as part of an operator's development approval. A 'personal environmental licence' may also be required depending on the type of operation undertaken. **c** An environmental works approval is not required if development approval has been approved under the Development Act. **d** Considered as part of development approval. **e** Ministerial exemption.

Local government development approval is generally required in all states for land-based aquaculture and for land-based facilities that support marine aquaculture (such as storage sheds). Development approvals are not usually required for aquaculture activities in marine waters, except in South Australia, where development approval is also required for marine aquaculture. While arrangements vary across states, depending on the nature, size and location of an operation, water licences, approvals to access public land or waters, and approvals to clear marine and land vegetation, are potential requirements.

Environmental approvals

An aquaculture operation may require an environmental licence from the relevant state department of environment or environment protection authority (see table 6.4). Appendix D provides additional information on the main environmental licensing requirements relating to aquaculture across the six states.

State environment agencies are often involved with approval processes for land-based aquaculture, either through direct licensing or mandatory referral of applications by consent authorities. If an environment agency is not directly involved with processing aquaculture approvals, then it is important that the relevant approval authority has adequate expertise to address the potential environmental impacts from aquaculture.

The need for discrete environmental licences for aquaculture activities in marine waters varies considerably across the states. For marine aquaculture, state

environment agencies are directly involved in Western Australia (through works approvals and environmental licensing), and indirectly in South Australia (though mandatory referral of aquaculture licence applications and most lease conversions). There is limited environment agency involvement in marine aquaculture in New South Wales, Victoria and Tasmania.

Environmental approvals (for works and discharges) are required for land-based aquaculture in New South Wales, Victoria and Western Australia (see table 6.3). In Queensland and Tasmania, environmental matters are considered part of an operator's development approval, although a personal environmental licence may also be required in Queensland. In South Australia, environmental licences are not required for aquaculture activities, as these matters are covered by an aquaculture licence.

The South Australia Environment Protection Authority (SAEPA) has mandatory referral on applications for aquaculture licences to PIRSA under the *Aquaculture Act 2001*, most lease conversions and development approval (under most circumstances). An environmental works approval is not required if development approval has been approved under the *Development Act 1993*. While the SAEPA does not have the capacity to issue an environmental permit for aquaculture, it effectively retains a 'power of veto' over aquaculture licence applications which must be referred in accordance with section 59 of the Aquaculture Act.

The SAEPA is also a mandatory referral agency under the Development Act and can 'direct' the relevant Planning Authority on issues associated with development approvals for land-based aquaculture. The SAEPA can provide comment on development approval applications for all forms of aquaculture, but only has the 'power of veto' over development approval applications for land based aquaculture activities (unlike the 'power of veto' for all aquaculture licence applications). Given the Aquaculture Act provides the SAEPA with significant influence over the issuing of aquaculture licences, the requirement for referring development applications to the SAEPA may be able to be removed, as essentially this duplicates the referral process.

Environmental triggers

Across jurisdictions, different triggers are used to require environmental approval (such as a works approval and/or operating licence) and environmental assessment (see table 6.4). For example:

- in New South Wales, an environment protection licence is only required if an aquaculture venture discharges into a natural waterbody and there is supplementary feeding — oyster farming is exempt from this requirement;

Table 6.4 State environment agency aquaculture requirements

<i>Jurisdiction /agency</i>	<i>Type of approval</i>	<i>Listed activity or premises Threshold/exemptions</i>
New South Wales: DEC	Licence for either or both 'scheduled development work' and 'scheduled activities' required for listed activities/premise.	Aquaculture or mariculture for the commercial production of marine, estuarine or freshwater organisms, including aquatic plants or animals involving supplemental feeding in tanks or artificial waterbodies, and the discharge of effluent, liquid sludge or other waste water into natural waterbodies. Exemptions: oyster production.
Victoria: VEPA	Works approval and licence required for listed activity.	No approval provisions for marine aquaculture (although industry must comply with State Environment Protection Policies). Fish farms or other facilities for cultivation of edible aquatic organisms with a design water flow rate of 0.2 or more megalitres per day. Exemptions: premises discharging or depositing waste to land.
Queen- sland: QEPA	Development approval and licence required for level 1 environmentally relevant activities.	Level 1 environmentally relevant activity: cultivating or holding marine, estuarine or freshwater organisms (other than molluscs) in ponds or enclosures and wastes are released to waters. Level 2 environmentally relevant activity: cultivating or holding marine, estuarine or freshwater organisms (other than molluscs) in ponds or enclosures if the total area of the ponds or enclosures is 5 ha or more and no wastes are released to waters.
Western Australia: DoE	Works approval and licence required for listed activities (the Dept of Environment is currently reviewing the prescribed premises list).	Aquaculture (ponds or tanks): premises on which marine, estuarine or freshwater fish or prawns are propagated or reared; and supplementary feeding occurs, in ponds or tanks that discharge waste into waters or onto land. Threshold (ponds or tanks): production or design capacity: biomass of 1000 kilograms or more. Aquaculture (natural waters): premises on which marine, estuarine or freshwater fish or prawns are propagated or reared; and supplementary feeding occurs, in enclosures in naturally occurring waters. No threshold for natural waters.
South Australia: SAEPA	SAEPA has mandatory referral on aquaculture licences, most lease conversions and most development approvals.	Under the Aquaculture Act, matters referred to the SAEPA are: whether an aquaculture licence should be granted; whether a variation should be made to licence conditions; and whether a lease should be converted to another form of lease. The SAEPA is considering the removal of the requirement for development approvals to be sent to them for comment as an adequate assessment of aquaculture activities is already undertaken in accordance with mandatory provisions of the Aquaculture Act.
Tasmania: DPIWE	Level 2 activities assessed as part of development approval.	No provisions for marine aquaculture or land-based aquaculture production. Aquaculture processing of more than 100 tonnes is a level 2 activity. A producer who intends to process more than 100 tonnes of fish per year is required to prepare an EIA that is assessed by the Environmental Management Pollution Control Board as part of the development approval. Environment Division of DPIWE provide advice to councils on guidelines for level 1 activities ie < 100 tonnes production p.a.

Sources: State legislation and environmental protection policies.

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- in Queensland, there is no threshold if wastes are released to waters (level 1 activity), or a threshold of 5 hectares or more if no wastes are released to waters (level 2 activity) — mollusc farming is exempt from this requirement; and
 - in Western Australia, there are thresholds for works approvals and licences for fish or prawns grown in tanks and pond aquaculture with supplementary feed (production over 1000 kg), but no thresholds for operations in natural waters with supplementary feeding.

In some cases, the basis for calculation of thresholds for triggering environmental approvals may be unclear. Where such triggers are used, they should be based on assessment of the environmental risks associated with different types of production and levels of production intensity.

Environmental impact assessment

In some jurisdictions, such as New South Wales and Western Australia, large-scale aquaculture proposals with potential for significant impacts on the environment may be required to undergo environmental impact assessment.

In Western Australia, for example, environmental impact assessment undertaken for environmentally significant proposals (under s. 38 of the *Environmental Protection Act 1986*) is a separate and generally additional process to the works approval and licence requirements for proposals that are prescribed premises under the Environmental Protection Regulations 1987. These two processes need to be addressed by aquaculture proponents according to the respective requirements. However, there is provision within the respective processes for environmental impact assessment and works approvals to be considered concurrently.

In Western Australia, there are five levels of environmental impact assessment with different assessment procedures. The Western Australian Environmental Protection Authority (WAEPA) considers proposals, and where assessed, makes recommendations to the Minister for the Environment. The Minister then considers the advice and consults with relevant decision-making authorities as to whether a proposal should be approved. Where the Minister considers that a proposal can be implemented, the Minister places environmental conditions on the proposal. Auditing of these conditions is undertaken through the Department of Environment on behalf of the Minister.

Regulation of water quality

In most jurisdictions, point-source water pollution from land-based aquaculture operations (for example, water discharges from a prawn or trout farm) are highly regulated by state environment agencies. In contrast, there is often little regulation of discharges from diffuse sources of pollution (for example, runoff from pastoral activities or urban landuse), that have the potential to adversely affect the environment and some aquaculture sectors, such as shellfish. For example, the *Victorian State Environment Protection Policy (Waters of Victoria 2003)* has only limited provisions regulating management of pastoral stock, such as s. 39, which sets out that authorities are to 'encourage land holders and occupiers of Crown land to restrict stock access to surface waters'. Such activities are also unlicensed under the policy. This is in contrast to provisions for aquaculture, which include that producers must have appropriate licences and 'implement effective environmental management practices and appropriate environmental management systems' (s. 48).

The partial nature of environmental regulation of water quality raises questions about the appropriateness and cost-effectiveness of regulatory approaches for aquaculture, and other activities with potentially harmful impacts. The Productivity Commission in its report *Industries, Land use and Water Quality in the Great Barrier Reef Catchment* (PC 2003a), noted that the regulation of diffuse and point source discharges in the catchments adjacent to the Great Barrier Reef World Heritage Area could be re-examined to include:

... other activities responsible for diffuse source discharges, and to ensure that the level of regulation and control was consistent with the level of threat posed by each activity. (PC 2003a, p. 52)

A further issue is the level of potential environmental impacts from aquaculture (or other industries) that are currently allowed by regulation. The Queensland Aquaculture Industries Federation (QAIF) commented that:

Optimum and acceptable impact levels are critical and congruent to the issue of efficient and effective regulation. There is little point in having a development application process efficient in terms of limiting duplication, providing a timely response, and providing clear specification of information requirements if at the end of the process the application is always refused without reference to the actual impact levels. (Graham Dalton, QAIF, pers. comm., 18 December 2003)

Impact standards may need to be reviewed to ensure that they are commensurate with the risks to the environment and are not unduly constraining the operation of the aquaculture industry (or other industries).

Australian Government approvals

Environment Protection and Biodiversity Conservation Act approvals

The Australian Government's Department of the Environment and Heritage may have an approvals role under the EPBC Act. This may occur where an aquaculture development has or may have a significant impact on one of the six listed 'matters of national environmental significance', for example, actions that may affect World Heritage properties, Ramsar wetlands or nationally listed threatened species.

To improve the operation of the EPBC Act, the Australian Government is negotiating bilateral agreements with state and territory governments. Bilateral agreements have been signed between the Australian Government and the Tasmanian, Western Australian and Northern Territory Governments.

As at 30 November 2003, a total of 42 aquaculture-related actions had been referred to the Department of the Environment and Heritage (Australian Government) under the EPBC Act during the three years since its commencement on 16 July 2000. Of these, 25 actions were determined not to be controlled actions and therefore could proceed without the need for assessment or approval under the EPBC Act; five actions have been withdrawn; two have been approved; and 10 actions are currently undergoing assessment. Of the 12 controlled actions, nine are located in Queensland (M. Flanigan, Department of the Environment and Heritage, pers. comm., 16 December 2003).

More aquaculture projects have triggered the EPBC Act in Queensland because a significant proportion of the eastern Queensland coast abuts the Great Barrier Reef World Heritage Area. However, the operation of the Act does not appear to be affecting the development and approval of aquaculture projects with an appropriate level of environmental performance.

The Department of the Environment and Heritage is improving knowledge and understanding of the EPBC Act through:

- publication of a range of 'Administrative Guidelines on Significance' to help people to decide whether their actions are likely to impact significantly on matters of national environmental significance;
- a range of publications (including fact sheets, consultation papers, plans and booklets), and development of the EPBC website;
- funding for an EPBC Act information officer seconded from the Department to the National Farmers' Federation to assist farmers with operation of the Act;

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- providing specific assistance to aquaculture operators through site visits and presentations; and
 - reviewing the EPBC Act 'Administrative Guidelines on Significance' to ensure the views and concerns of stakeholders, including aquaculture operators, are adequately dealt with (M. Flanigan, Department of the Environment and Heritage, pers. comm., 16 December 2003).

The potential impact of the EPBC Act is a major concern to the aquaculture industry. There may be additional ways for the Department of the Environment and Heritage to work with the industry to increase understanding, and to improve the operation of the Act. For example, state aquaculture management plans may be able to be accredited under the EPBC Act, similar to the strategic environmental impact assessment and accreditation process for a 'plan of management' for a Commonwealth fishery (see section 3.1). Individual approval under the EPBC Act for actions in accordance with an accredited aquaculture management plan may then not be required.

Great Barrier Reef regulations

Aquaculture operators in Queensland may require a number of approvals for marine or coastal aquaculture from the Great Barrier Reef Marine Park Authority (GBRMPA) for works in the marine park and discharges into the marine park. The Australian and Queensland State Governments have proposed a joint accreditation process which will remove the need for the additional permits for land-based aquaculture developments affecting the marine park (Commonwealth and Queensland Governments 2003). The elements of the proposal are:

- the accreditation of Queensland environmental assessment law under the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000 which will remove the need for the additional permits from GBRMPA for land-based aquaculture developments affecting the marine park;
- accreditation of Queensland environmental assessment processes in a bilateral agreement under the EPBC Act; and
- consideration of case-by-case accreditation where necessary.

These elements are underpinned by modifications both to the Queensland Integrated Development Assessment System (IDAS), and to technical and operational standards. The expectation is that this will ensure that the assessment of actions under the single accredited process is conducted to the same standards that apply under the current arrangements. However, aquaculture proposals affecting the marine park may still trigger the EPBC Act.

6.3 Assessing approval processes

Concerns have been expressed about aquaculture approval processes which, at times, have been seen as unacceptably lengthy, complex and uncertain (IRC 2002; NADC 2002). A number of characteristics of approval systems may need to be addressed concurrently for significant improvements to occur.

Risk based management

Risk management incorporates the activities of risk assessment (identification and characterisation), risk management or mitigation, and risk communication (where results are provided to government, industry and community). The diverse nature of the aquaculture industry, and variability in environmental impacts across location, production systems, management practices and over time, means that incorporating effective risk management into environmental regulatory systems is critical.

The efficiency and effectiveness of aquaculture regulation could be improved by greater use of environmental risk assessment based on species, production system, site location and the condition of the environment (such as the quality of receiving waters). The extent of assessment, and the information sought from applicants should, where efficient to do so, reflect the risks attached to each proposal. For example, approval processes for oyster farming could be expected to be less onerous than for cage farming involving intensive supplementary feed because of differences in production and impacts (see section 2.3).

In all jurisdictions, risk management enters licensing and approval processes and the setting of licence and approval conditions to some extent. Risk management is also widely used to guide broad policy documents. For example, South Australia's *Aquaculture Resource Management and Ecologically Sustainable Development Policy Report* formally recognises risk management approaches and the policy is based on the *Australian Standard AS/NZS 4360:1999 Risk Management*:

... This framework considers the range of potential consequences of an issue or activity and how likely those consequences are to occur. The combination of the level of consequence and the likelihood is used to produce an estimated level of risk associated with the particular issue This process is completed for each of the issues with a risk ranking developed and the rationale for assigning the rankings recorded. (PIRSA 2003b, p. 16)

This policy also proposes that an ecological sustainability development assessment report be produced for all new applications, considering each application in the context of the environment in which it operates. The Risk Assessment Framework is proposed to apply to six management systems: offshore; inshore; intertidal; coastal; inland; and mobile systems. The policy notes that this is to reflect that

environmental impacts ‘... are largely determined by the management system involved and less so by the specific species and technology involved’ (PIRSA 2003a, p. 12).

There is some variation in approval processes for aquaculture licences, with all states having categories of licences depending on the species to be farmed. In some cases, different processes for the granting of licences apply. In Western Australia, for example, applicants must complete ‘Additional Information Sheets’ for certain species, including marron, yabbies, trout and silver perch. In the case of marron farming, there are two types of aquaculture licences and criteria for the granting of each varies.

Different processes are also involved in obtaining environmental licences, depending on the level of risk. Environmental impact statements (EIS), for example, are required for some proposals but not others. In New South Wales, under the *North Coast Sustainable Aquaculture Strategy*, only ‘Class 3’ aquaculture developments are considered ‘designated’ and need an EIS (see box 6.1).

Box 6.1 Risk based approval processes in New South Wales

The *State Environmental Planning Policy (SEPP) No. 62 — Sustainable Aquaculture* establishes a graduated environmental assessment regime for aquaculture development based on the environmental risks associated with site and operational characteristics. This policy applies where a regional aquaculture strategy has been developed. To date there is one such strategy for the North Coast and others are under development.

Assessment under this SEPP is to be based on a ‘project profile analysis’ made up of a matrix of environmental and operational criteria, with three levels of risk for each criteria. If a project has one or more level three risks it is considered a ‘designated development’ and subject to EIS. Advertising periods also vary depending on risk, with a minimum of 30 days for ‘class 2 and ‘3’ compared to 14 days for ‘class 1’.

Aquaculture developments not covered by SEPP 62 may be subject to an EIS. This depends on the council local environmental plan, initial assessment through a review of environmental factors and/or an eight part test, and whether it is triggered under schedule 3 of the Environment Planning and Assessment Regulation 2000 as a designated development.

Source: Department of Urban Affairs and Planning and NSW Fisheries (2000).

In Western Australia, there are five levels of environmental impact assessment with different procedures depending on the level of risk (WAEPA 2002). The first level is an ‘assessment on referral information’ where a proposal only raises one or a small number of significant environmental factors that can be readily managed, but

where conditions are deemed to be required. A more substantial level of assessment involves a proponent preparing an ‘environmental protection statement’, and undertaking wide consultation with agencies, interested groups and members of the public who are directly affected. Another level involves the WAEPA declaring a level of assessment termed ‘proposal unlikely to be environmentally acceptable’ where a proposal contravenes environmental objectives. In this case, the proponent can stop applying, re-present the proposal after modifying it to meet WAEPA concerns, or continue in knowledge that the WAEPA is not in favour of the proposal. This may also have the benefit of potentially improving the timeliness of decision-making by providing an early decision point (see below).

Several states are currently moving to expand the extent to which risk factors influence approval processes. For example, in Queensland, a small number of low risk activities are considered to be self-assessable and do not require development approvals, such as farming of certain Indigenous freshwater species. New South Wales is currently developing several regional aquaculture strategies which, like the *North Coast Sustainable Aquaculture Strategy*, will expand the use of risk-based approval processes in the state.

Development approval processes that depend on the level of risk were recommended in Victoria by the Aquaculture Regulatory Review Task Force (ARRTF 1999a). The Task Force recommended that the Victorian Planning Provisions be changed to allow land-based closed system recirculating facilities in industrial zones to be treated ‘as of right’ without the need for a planning permit (this is being progressed by the Victorian DPI).

Number of approvals and processing of approvals

The various approvals required of aquaculture operations can involve a number of agencies and pieces of legislation. Tables 6.5, 6.6 and 6.7 provide summaries of the number of approvals, Acts and agencies potentially applicable in each state for large-scale marine, coastal land-based and land-based freshwater aquaculture.

Within each state, there are some variations in the number of approvals, Acts and agencies across the three types of aquaculture. In New South Wales, for example, seven approvals, four Acts and four agencies are involved for marine aquaculture, seven, five and five respectively for land-based coastal, and eight, six and five for land-based freshwater. In Western Australia, the need to obtain many approvals from separate government agencies under a number of ‘essentially single purpose Acts’ may generate significant transaction costs for aquaculture operators (Ciffolilli 2003).

Table 6.5 Marine aquaculture: summary of approvals, Acts and agencies

<i>Jurisdiction</i>	<i>Number of approvals</i>	<i>Number of Acts</i>	<i>Number of agencies</i>	<i>Approval process^a</i>
NSW	7	4	4	Part integrated
VIC	5	3	3	Separate
QLD ^b	6	9	8	Part integrated
WA	7	5	5	Separate
SA	7	5	5	Part integrated
TAS	5	4	2	Part integrated

^a Approvals for land-based activities can be managed through an integrated system (whereby approvals are coordinated through a single interface or process, such as a one-stop-shop), or through a separate process whereby applicants apply for each approval separately. ^b State and Australian Government processes. Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS), including coastal protection and fisheries approvals. Resource allocation approvals are assessed separately outside of IDAS.

Sources: Commonwealth and state legislation.

Table 6.6 Land-based aquaculture in the coastal area: summary of approvals, Acts and agencies

<i>Jurisdiction</i>	<i>Number of approvals</i>	<i>Number of Acts</i>	<i>Number of agencies</i>	<i>Approval process^a</i>
NSW	7	5	5	Integrated
VIC	7	4	4	Separate
QLD ^b	7	10	7	Part integrated
WA	7	5	5	Separate
SA	5	5	4	Separate
TAS	4	3	2	Separate

^a Approvals for land-based activities can be managed through an integrated system (whereby approvals are coordinated through a single interface or process, such as a one-stop-shop), or through a separate process whereby applicants apply for each approval separately. ^b State and Australian Government processes. Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS). Resource allocation approvals are assessed separately outside of IDAS.

Sources: Commonwealth and state legislation.

Table 6.7 Land-based aquaculture (freshwater): summary of approvals, Acts and agencies

<i>Jurisdiction</i>	<i>Number of approvals</i>	<i>Number of Acts</i>	<i>Number of agencies</i>	<i>Approval process^a</i>
NSW	8	6	5	Integrated
VIC	9	5	5	Separate
QLD ^b	6	6	4	Part integrated
WA	9	6	6	Separate
SA	7	6	5	Separate
TAS	6	4	3	Separate

^a Approvals for land-based activities can be managed through an integrated system (whereby approvals are coordinated through a single interface or process, such as a one-stop-shop), or through a separate process whereby applicants apply for each approval separately. ^b Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS), including fisheries approvals. Resource allocation approvals are assessed separately outside of IDAS.

Sources: State legislation.

Potentially, approval systems may be simplified or improved by:

- rationalising the number of approvals required — this could involve removing unnecessary approval processes or merging several approvals into one;
- integrating approval processes — this could involve a lead agency coordinating or acting as a one-stop-shop, ‘case managing’ applications across agencies dealing with different aspects of an application, or accrediting approval processes to reduce duplication; and
- providing guidance to approval agencies or local councils.

Rationalising the number of approvals

Regulatory systems should be as simple as possible, given the policy objectives to be achieved. Reducing the number of applications and approvals required for aquaculture production can reduce administration and opportunity costs to business and governments. There may be scope, for example, to roll requirements attached to an aquaculture licence into an environmental licence (or vice versa). This may be possible given that the main role of an aquaculture licence is often to manage disease, and protect fish and ecosystem health. However, the capacities of an approval agency to address any new responsibilities would need to be considered.

The need for a discrete aquaculture licence has been questioned in Queensland, for example:

Aquaculture facilities are required to have a licence to operate pursuant to the Fisheries Act, issued by DPI. It is hard to understand why this is necessary given the other licensing requirements from various agencies. Other than for purposes of disease management, there is little justification for this licensing requirement, and disease management could adequately be addressed inside other licensing agencies. (Bowen Collinsville Enterprise Group 2002, p. 4)

In situations where approvals may be removed or rolled into other requirements, there may be a case for including the previous approval agency as part of the consultation process for remaining approvals. In South Australia, the SAEPA has mandatory referral on aquaculture licence applications and a separate environmental licence is not required.

Coordinating and/or integrating approval processes

Approval processes can involve potentially time consuming and administratively costly processes. This may involve a number of departments or agencies at each level of government, and between levels of government. Regulatory processes can increase risk and add to the costs of aquaculture production:

Aquaculture experts, financiers and venture capital companies consistently identified ‘excessive’ government regulation as one of the key factors adding to the already high level of production risk in the industry. In their view, ‘excessive’ regulation tended to draw out the approvals process for new operations, and so increase startup costs, as well as increase the risk that the project may not be approved at all, owing to the number of different approvals required from different agencies. (Love 2003, p. 49)

The arrangements in several jurisdictions have been subject to criticism from industry. For example, for Queensland, Australian Prawn Farmers Association (APFA) (2002, p. 23) has stated:

It is evident that there are a significant number of agencies regulating aquaculture establishments and operational activities and that their processes are poorly coordinated.

Similarly, Western Australian approval arrangements have also been the subject of concern by Ciffolilli (2003, p. 19):

... there are, potentially, many approvals that need to be obtained, from separate government agencies or authorities. The present approvals process within the State operates through a number of Acts that are essentially single purpose Acts. There is no Act or process that can bring together the approval requirements into a single process or even an integrated process.

Approval processes may also be slowed by requirements for approvals to be sought sequentially. For example, in both Western Australia and South Australia, aquaculture licences cannot be granted until other approvals have been obtained. In Western Australia, one of the main issues of concern to industry is, ‘bureaucratic issues associated with multiple, sequential attention to proposals by government departments who do not talk to each other’ (Lendich 2003, p. 54).

In some cases, proponents may be unaware of which processes go in parallel as opposed to in sequence, as has been highlighted in Western Australia (IRC 2002). Knowing which application to lodge first has also proven difficult in Queensland, with some aquaculture consultants recommending proponents put all applications in at the same time, despite changes required for one application potentially affecting others. There may be less of a problem, however, if applications can be assessed simultaneously, with only the ‘final sign off’ of a licence pending other approvals. Further, approval problems may also occur as a result of regulatory agencies making requests for information on an ongoing basis rather than outlining issues early and having them addressed in the one application process (Bowen Collinsville Enterprise Group 2002).

To streamline land-based approval processes, Queensland and New South Wales both introduced integrated development processes, whereby a lead agency coordinates the process of obtaining the necessary approvals. All other states rely on

applicants obtaining approvals separately for land-based aquaculture. In the case of marine aquaculture, however, Tasmania and South Australia have integrated systems, and Queensland has a part-integrated system (see box 6.2). Victoria is developing management plans that will comply with other agencies approval requirements so applicants will only require a lease and a licence (in effect, a form of integrated approval).

Through integrated approval systems, efficiencies may be gained from the internal information, contacts and expertise a lead government agency may have, or may develop over time. Making the application process easier can also lower the overall costs of new developments and potentially reduce regulatory barriers that may otherwise have discouraged entry to the industry. Achieving greater certainty and reducing the waiting time for approvals could make it easier for aquaculture developers to access finance on more favourable terms. An integrated process may also reduce the need for separate consultation processes for different approvals, reducing duplication for both the public and proponent (IRC 2002).

In reviewing Western Australia's legislative arrangements for aquaculture, Ciffolilli (2003, p. 23) noted that without streamlining and coordinating approvals:

... the process will continue to experience delays, officers from other government departments will continue to receive applications direct from proponents in circumstances when there is no need for such approval, and generally the process will not be as efficient, transparent and timely as it could be.

That said, coordinating approvals across government agencies by using a lead agency may not necessarily lead to greater efficiency. In some cases, if there are few approvals required, integrated systems or a lead agency may be unnecessary.

Ensuring government agencies have appropriate incentives for processing applications efficiently is an important element in designing such systems. The use of statutory timeframes is one approach to this issue (see below). A related issue is that agencies need to ensure that sufficient numbers of specialist agency staff are available to administer the technical aspects of aquaculture regulation (Lendich 2003), especially addressing issues relating to environmental impact assessment.

Integrating approval processes shifts some of the burden of obtaining approvals from applicants to government agencies, with associated resource implications. Issues of cost recovery may therefore need to be considered (see below). In particular, the proportion of charges to the 'user' (applicant) would need to consider, among other things, any public benefits associated with the assessment process itself.

Box 6.2 Integrated approval systems

New South Wales

All aquaculture developments are considered an 'integrated development' under the *Environmental Planning and Assessment Act 1979* (EP&A Act). This means a single development consent is given, even though separate approvals are still sought. Separate approvals are considered and granted concurrently with the consent authority (normally a local council) required to liaise with other approval authorities. Statutory timeframes for approvals are provided. If deemed a 'state significant project', the Department of Infrastructure, Planning and Natural Resources becomes the consent authority. Part IV of the EP&A Act is used where a local council has in place a local environmental plan, and Part V of the EP&A Act is used where it does not. Under Part V of the EP&A Act, NSW Fisheries would be the consent authority for aquaculture.

Queensland

Under the *Integrated Planning Act 1997* (IPA), Queensland is moving to integrate most of its development related controls under a single system called IDAS (Integrated Development Assessment System). Approvals being integrated include those under the *Coastal Protection and Management Act 1995* and *Fisheries Act 1994*. Resource allocation permits/approvals are assessed separately outside of IDAS and there are no plans to integrate these permits/approvals within IDAS. The IPA sets out defined statutory timeframes and processes, including appeals. An 'assessment manager' is assigned responsibility for assessing and deciding applications (usually a local government but occasionally a state government department), with 'referral' agencies either providing advice or 'concurrence' (which means an agency can refuse an application or insist on conditions). Projects declared as significant under the *State Development and Public Works Organisation Act 1971* are coordinated by the Department of State Development which provides case management for aquaculture projects during the assessment process.

Tasmania

Operates an integrated process for marine aquaculture, whereby marine farming lease and marine farming licence applications are lodged with a single branch in DPIWE. An officer then distributes forms to appropriate officers in other branches and arranges for any follow up.

South Australia

The lease, licence and development approval application process is integrated for marine applications. Applicants apply to PIRSA, which assesses lease applications for site selection, then forwards to the Aquaculture Tenure Allocation Board. If approved, applicants submit a licence application to PIRSA which assesses it, before forwarding to the EPA. Applicants then submit a development approval application to the Development Assessment Commission (DAC) which consults with government bodies and then makes a decision (PIRSA will forward to DAC information from lease and licence applications). If approved, PIRSA will issue applicant with a lease and licence.

Sources: State government information.

In the case of marine aquaculture, it may be possible to combine the application forms for aquaculture leases and licences. In South Australia, PIRSA (2003d) has proposed in its 'Draft Aquaculture Licensing and Leasing Policy Report' that applications for licences within state waters will involve a combined application. This could potentially save paper work and processing times.

Integrating and coordinating Australian Government assessment processes may also assist aquaculture proponents. For example, in Queensland, the Australian Government has simplified the application and approval process for projects that require assessment under both the EPBC Act and the GBRMP (Aquaculture) Regulations through a 'one-stop-shop' facility. Under this arrangement, a proponent makes a single application, and the one assessment and approval is conducted to satisfy both statutes. The Australian Government is streamlining assessment processes under the EPBC Act by entering into bilateral agreements with state and territory governments that accredit assessment processes to benchmarks set out in the EPBC Act (see above).

Guidance on approvals

Achieving improved coordination and consistency of approval processes may also be assisted by state governments providing guidance to local councils on development approval assessments. This could occur in a manner similar to guidance for land use planning schemes (see section 4.3).

Timeliness of approval processes

Timeliness is commonly regarded as one of the most important characteristics of an efficient and effective approval process (IC 1993). Timeliness is important both in terms of the time taken to process licences and approvals, and in terms of promised time lines being established and met. The opportunity cost of not operating while applications are being processed often represents the most significant cost for business in meeting regulatory requirements. The absence of a timeframe for decision making can also reduce approval process efficiency as it provides little certainty to investors or other interested parties.

Approvals can take as little as three months for simple applications to four years or more for more complex applications where extensive consultation is required (see Ciffolilli 2003; and box 5.1). Concerns over the time required to process applications have been noted in most states. In South Australia, for example, major concerns were raised in a Parliamentary Review of aquaculture arrangements in

1998, where examples were given of applicants waiting three years for a licence application decision (Parliament of South Australia 1998).

Concerns over the timeframes for approval processes for aquaculture developments have also been expressed in Queensland, for example:

Two proponents have purchased land within the Bowen Shire for the purposes of establishing prawn farms, and have begun seeking approvals from the various agencies at local, state and Commonwealth levels. One of these proponents has been told that it will take up to 2 ½ years to gain the necessary approvals from the range of agencies they must consult with. (Bowen Collinsville Enterprise Group 2002, p. 1)

Changes to the integrated approval system are being made in Queensland to address these issues. In addition, client management and whole of government meetings are being introduced by the Department of State Development.

In some cases, the impact of time delays on overall cost is likely to be a significant barrier to investment. Love (2003, p. 21) noted that:

... experts suggested that for a typical new aquaculture project in the \$2–5 million range, the cost of seeking and obtaining the necessary approvals could stretch to several hundred thousand dollars, with no guarantee of final success. This added to the cost and the risk of new projects, and reduced their attractiveness for potential investors.

What constitutes a reasonable timeframe for approval and therefore what might be considered a delay is likely to depend on the nature of the proposed development. Assessing the timeliness of approval processes may also be made difficult by some applicants not providing all the information necessary for decisions to be made. Maximum timeframes for approvals can build in allowances for unexpected additional information or other requirements.

Timeframes for approvals

Timeframes for decision-making on development approvals are specified in some jurisdictions but not others. For example, under the Environmental Planning and Assessment Regulations 2000 in New South Wales, applications are considered refused if the Department of Infrastructure, Planning and Natural Resources (DIPNR) has not made a determination within 60 days of receiving an application, and proponents can appeal to the Land and Environment Court.

Aquaculture licences are less likely to be subject to statutory timeframes for decision making than development approvals. For example, no timeframes are used for aquaculture licence decisions in Victoria, Western Australia, and Tasmania. No Australian Government timeframes for decision-making are stipulated for assessments by GBRMPA either. Statutory timeframes apply in New South Wales

and Queensland through the integrated approval systems (which includes aquaculture licences), and the timeframes applying to those processes.

Introduction of statutory timeframes for Western Australia has been raised as an option in a review of legislative arrangements for aquaculture:

Some of the complaints in Western Australia concerning the licensing process relate to delays in the consideration of applications by the EPA and the DEP [Department of Environment Protection]. A statutory time frame for response could be introduced in section 92 so that the EPA (and the DEP — in respect of works approval and licensing) are given a specific period within which either the approval or license is given or refused. (Ciffolilli 2003, p. 54)

The issue of timeliness of approval processes may also be addressed through broader mechanisms, such as reporting and auditing of processing times (see section 7.4), ‘streamlining’ of approvals, and improved agency coordination.

Early decision points

In some cases, there may be benefits for both applicants and assessing authorities if early decision points were an explicit part of an approvals system. For example, where it is clear that an application is unlikely to achieve approval, authorities could issue an early assessment advice before both the applicant and the authority have unnecessarily invested significant resources. A comprehensive and statutory planning system and zoning is likely to assist in the use of an early decision point, by providing a legal frame of reference for both applicants and assessing authorities, as to suitable areas for aquaculture (see section 4.2).

Information and consultation

Aquaculture operators, organisations and communities need to be able to understand the regulatory arrangements that apply, and how they may become involved with the regulatory system, such as through consultation.

Information

Governments can provide information packages, information on agency websites, model or template requirements and opportunities for applicants and communities to discuss matters with knowledgeable staff. The costs and benefits of governments providing such information relative to other providers (such as consultants) are factors that would need to be considered in developing such services. For example,

while electronic delivery has some cost advantages, accessibility to the internet and other information sources may need to be considered.

All jurisdictions provide some form of guidance material to assist applicants, often electronically. In Tasmania, for example, DPIWE (2001) has developed *Guidelines for the Preparation of a Development Proposal and Environmental Management Plan for a Proposed Marine Land Aquaculture*. These guidelines summarise the general information requirements for a development proposal and environmental management plan for land-based seawater fish farms. Tasmania also has an electronic business licensing system ('The Aquaculture Business Approvals Package'), which contains information and forms relating to key licences and approvals for freshwater and marine fish farms.

In Western Australia, considerable information is available to proponents about how to make an aquaculture application, including application forms and information sheets. Aquaculture Development Officers can advise and assist applicants and provide relevant reports and literature. In New South Wales, local councils or the DIPNR may also use 'planning focus meetings'. These meetings enable agencies and applicants to consult and determine information requirements for approvals (including EIS) at an early stage, provide proponents with advice on issues to address, and provide an opportunity to avoid duplicating consultation requirements in the conceptual stages of project development (IRC 2002).

In Queensland, a 'SmartLicence On-Line Service' can help businesses identify business licence requirements across the three levels of government, and a number of application forms are available on-line, with assistance to help complete them. Nevertheless, APFA noted that more reliable information on development requirements in Queensland is 'urgently required' (APFA 2002). This may reflect the number of approval processes required in Queensland (see tables 6.1 to 6.3), or the 'in-progress' state of implementation of the state's integrated development assessment system. Bowen Collinsville Enterprise Group (2002, p. 2) also noted that proponents have 'no way of knowing what the issues and requirements will be with a particular proposal before lodging a development application'.

While it is important to have appropriate information available and accessible, the availability of information does not of itself indicate an efficient or well understood process. As Ciffolilli (2003, p. 20) has noted '... the availability of information, while clearly of assistance, does not itself guide the process'.

Consultation

Effective consultation with third parties (potentially neighbours and communities of interest) can assist the preparation of management plans and individual applications, inform regulatory and business decision-making, allow public participation, minimise unanticipated effects, maximise the chance of community acceptance, and reduce the likelihood of appeals. In general, consultation approaches that depend on the nature and extent of a development are more likely to achieve the appropriate balance of benefits and costs of consultation than one-size-fits-all approaches. For individual applications, the benefits of consultation need to be weighed up against the potential costs due to the time required for consultation, and the potential uncertainty it can bring to development activity.

Most jurisdictions require applicants to undertake consultation as part of the assessment process for various development approvals. Public consultation prior to issuing of aquaculture licences is less extensive, although in Queensland, Western Australia and South Australia, public notification is required (such as in local newspapers). Victoria sometimes requires public notification or consultation before issuing an aquaculture licence, mainly for developments on public land or waters.

Concerns have been raised, however, that consultation requirements sometimes fail to account for the level of risks:

The requirement that every application for an aquaculture licence is to be the subject of public notice and reference to the [South Australian] Environmental Protection Authority appears to be excessive. A farmer wishing to grow yabbies in his farm dams for sale to an aggregator must be licensed under these provisions. Every such application will require advertising and reference to the Environmental Protection Authority. (Walrut 2003, p. 51)

In some states, the need for, and level of, consultation required depends on the nature and extent of the proposed project. For example, under the Western Australian *Environment Protection Act 1986* the WAEPA determines whether a proposal is likely to have a significant effect on the environment, the level of assessment required, and the need for formal public consultation (see above).

The amount of consultation required at the approval stage may depend on the extent of consultation undertaken in developing state and marine planning schemes, and how well this consultation was performed. If there is minimal consultation as part of broad planning schemes, community concern is more likely to arise and be stronger by the time that individual aquaculture ventures are proposed (Mazur et al in press). Adequate and effective consultation in determining broad planning and zoning schemes may mean less consultation is required when individual proposals are put forward. This can save developers, agencies and interested parties time and effort.

PIRSA, for example, in commenting on when consultation is likely to be appropriate, noted that:

... activities that are envisaged by, and that are consistent with, zone policies should generally not require notification. Activities that comply in general terms, but may have impacts beyond the boundary of the site due to design or other matters, should require notification of neighbours who can be heard by the relevant development authority. Only activities that are specifically not envisaged by zone policies should require full public notification with attendant rights to be heard and rights of third party appeal. (PIRSA 2000b, p. 22)

Administration fees and cost recovery

Government agencies charge aquaculture operators a range of application and licence fees for different approvals. The extent to which these charges are based on sound cost recovery principles is unclear. There may also be different interpretations of what is considered ‘cost recovery’, and how it should be applied, by both agencies and the aquaculture industry.

Cost recovery can be defined as fees and specific purpose taxes used by government agencies to recoup some or all of the costs of particular government activities. In 2001, the Productivity Commission completed an Inquiry into cost recovery by government agencies (PC 2001), and concluded that:

- most arrangements are ad hoc, lack transparency and have poor accountability and review mechanisms;
- a fundamental principle is that cost recovery should be implemented for efficiency reasons, not merely to raise revenue; and
- cost recovery may also have equity effects — by ensuring that those who use regulated products or request additional information, bear the costs.

To improve cost recovery processes, the Productivity Commission prepared guidelines for developing cost recovery schemes, including a framework for deciding on arrangements, called a ‘Cost Recovery Impact Statement’ (PC 2001). Regarding the extent to which agencies should charge fees and charges to recover regulatory costs, the Commission concluded that:

Charging regulated firms may be a more cost effective option if they are able to pass on some or all of the costs. In this case, consumers of regulated products would still ultimately pay. Where it is also impractical to charge the regulated firms, there may be a case for taxpayer funding of the regulatory activity. (PC 2001, p. xlii)

There are likely to be varying efficiency and equity implications from different cost recovery arrangements for aquaculture. For example, there may be implications for

resource allocation and inter-industry equity if aquaculture producers were charged the full cost of application assessments, but activities competing for the same resources, such as tourism, were not.

The costs of regulation (including costs of approval processes and auditing) for aquaculture can vary significantly depending on the variety of species, production systems and location. Hence, cost recovery charges may also need to vary. For example, approval and monitoring processes for potentially low impact, small-scale yabby farms are likely to be lower than for large-scale marine finfish farms. Cost recovery mechanisms can reflect these differences through varying charges, such as the use of different classes of licences with different fees.

At present, all jurisdictions charge fees for aquaculture licences (see table 6.8 and also table 5.5 for lease fees). The amount varies between, and within, jurisdictions depending on the size and nature of proposals, although most are of a similar order of magnitude. Additional fees may be charged for other approvals, such as environmental and development approvals. Care should be taken with interpreting the table as each jurisdiction has different regulatory frameworks and fee requirements. Consistent with the different activities undertaken by regulatory agencies, some states have both application fees and annual licence fees.

Charges are typically higher for marine farming in Tasmania, and for aquaculture on public land and water in Victoria. In Western Australia, for example, there are charges for applications and renewals of aquaculture licences and leases. These contribute to the cost of processing the applications, but fall significantly short of full cost recovery. As no further fees or charges apply to the aquaculture industry, policy development and compliance tasks are all government funded. In relation to the pearling industry, there are fees and charges for permits and leases but, in addition, costs are recovered by industry for compliance, fish health, policy development and administration of management committees (P. Rogers, Western Australian Department of Fisheries, pers. comm., 16 December 2003).

The mechanism used to recover costs should generally reflect the timing and nature of the costs incurred. For example, licence application fees could cover approval and renewal processes (along with site inspection fees), annual licence charges may cover broad regulatory management, and auditing fees may cover auditing and monitoring costs. Providing operators with options to reduce charges for good environmental performance or implementing environmental management systems (particularly in relation to auditing frequency and fees) may build greater acceptance for such charges.

A similar (but converse) issue to cost recovery is that of payments to operators for undertaking activities that may help governments to achieve policy goals. For

example, in its final report on *The Relationship between Healthy Oysters and Healthy Rivers*, the NSW Healthy Rivers Commission (2003b, p.16) noted that:

Many councils stated that limited financial resources have restricted their ability to undertake river health monitoring, but that benefits were likely if they were provided with access to water quality monitoring undertaken by oyster growers.

Reducing charges (as opposed to making direct payments) to aquaculture producers who provide such services could form part of a cost recovery system.

Table 6.8 State aquaculture licence fees and charges

<i>Jurisdiction</i>	<i>Application and annual fees and charges</i>
New South Wales	Aquaculture permit application fees: class A and B \$221, class C and F \$332, class D, G and H \$553, class E \$443, class I \$56. Annual permit contribution fee: \$388. Annual research contribution varies from \$23 to \$111 per hectare depending on class of permit.
Victoria	Aquaculture licence fees: Private land: Application fee \$238, Levy \$210, Issue Fee \$30 (Total \$478) Crown Land: Application fee \$1028, Levy \$810, Issue Fee \$30 (Total \$1868)
Queensland	Aquaculture permit assessment fee \$51.50, permit fee \$104.50. Marine aquaculture areas have annual fee based on the size of aquaculture area.
Western Australia	Aquaculture licence application fee for freehold land (except marron) \$130 plus fee for grant \$270 (Total \$400). Aquaculture licence application fee for freehold land (marron) \$130 (no grant fee). Aquaculture licence application fee for non-freehold land \$580 plus fee for grant \$270 (Total \$850).
South Australia	Land-based aquaculture licence application fee: \$100. Marine aquaculture licence application fee: \$1600. Licence fees: tuna \$87.40/ha (plus research levy); finfish - \$73.13/ha (plus research levy); shellfish (including quality assessment) \$307.90/ha (plus research levy); shellfish (abalone) \$69.80/ha (plus research levy), landbased \$115 or \$1,370 per licence (depending on category of risk).
Tasmania	Marine farming licence fees: Bivalve: first species \$1942.50, additional species \$111 each (eg Pacific oysters) Univalve: first species \$1720.50, additional species \$111 each (eg abalone) Finfish: first species \$1942.50, additional species \$111 each (eg salmon) Seaweed: \$444 each. Other species: \$111 each. Land-based farming licence fees: Univalve: first species \$1720.50, additional species \$111 each (eg abalone) Other species: \$333 each. Tasmanian Fishing Industry Council compulsory levy: \$350.

Sources: State legislation and policies.

6.4 Summary

- All states require aquaculture licences or permits for commercial-scale aquaculture, and some states require separate environmental approvals.
- In all states, development approvals are generally required for land-based aquaculture, but not marine aquaculture (except for South Australia that also requires a development approval for marine aquaculture).
- Obtaining the approvals necessary to operate an aquaculture operation can involve dealing with a number of agencies and processes — this can add administration and opportunity costs to aquaculture operators, governments and third parties.
- Jurisdictions vary in the triggers they use to require discrete environmental approval and the types of requirements imposed. Discrete environmental approval is often required for larger land-based activities, but is only required for marine activities in Queensland and Western Australia.
- The extent of approval assessment, consultation and information sought from applicants should, where efficient to do so, reflect the risks attached to a proposal.
- There would seem to be scope to simplify or improve approval systems by rationalising the number of approvals required, coordinating or integrating approval processes, or providing guidance to approval agencies and local government.
- To help streamline land-based approval processes, New South Wales and Queensland (in part) have both introduced integrated approval processes. In the case of marine aquaculture, Tasmania and South Australia have integrated systems.
- Complex aquaculture proposals may take up to four years or more to be approved where extensive consultation and many different approvals are required. Improved coordination and statutory timeframes for approval processing would provide greater certainty for applicants and incentives for prompt and efficient processing of applications.
- At present, all jurisdictions charge fees for administering aquaculture licences. Cost recovery measures need to be carefully developed and implemented.

7 Approval terms, conditions, monitoring and reporting

This chapter discusses terms and conditions attached to aquaculture licences, permits and planning or development approvals (including environmental conditions). It also discusses the role and importance of appeal, monitoring, enforcement and reporting provisions. As for chapter 6, reference to the term ‘approval’ includes licences, permits, and planning or development approvals.

7.1 Approval terms

The duration of aquaculture licences and permits is an important factor affecting investment decisions. In general, there are tradeoffs between providing licences or permits with a long duration to minimise administrative burdens with renewals, and generate certainty for investors, and maintaining flexibility in regulatory requirements. Different states have different licence terms. Western Australia and Victoria have one year aquaculture licences. Queensland, South Australia and Tasmania have 10 or 15 year licence terms, while New South Wales has an indefinite licence term (see table 7.1).

Table 7.1 **Aquaculture licence terms**

<i>Jurisdiction</i>	<i>New South Wales</i>	<i>Victoria</i>	<i>Queensland</i>	<i>Western Australia</i>	<i>South Australia</i>	<i>Tasmania</i>
Aquaculture licence or permit term	Indefinite	1 year	15 years	1 year	10 years maximum (linked to lease term)	10 years maximum

Source: State legislation.

Given the administrative burdens and uncertainty associated with annual renewals, it appears difficult to justify licence or permit terms of only one or two years. Licences or permits with longer terms could allow for revocation for clear and material breaches of conditions. Although there can be administrative cost savings from longer term licences, a range of terms and payment options could be offered as some operators may not want to pay fees in advance.

In most jurisdictions, there are different term lengths for marine aquaculture leases and aquaculture licences or permits (see tables 5.3 and 7.1). Marine aquaculture leases are typically between 20 to 30 years whereas aquaculture licences and permits are for shorter periods. New South Wales is a notable exception with an indefinite aquaculture licence. In South Australia, the lease term for production leases is 20 years while the term of the corresponding licence is shorter at ten years. However, in South Australia, the shorter terms for other types of leases (pilot and development) and their corresponding licences, match.

Matching lease and licence/permit terms may offer greater certainty for operators, and provide a single review point. However, these instruments are for different purposes. Leases provide the right to occupy and use public land and waters for aquaculture purposes, while aquaculture licences set out specific short-term operating conditions. It may be appropriate to have licence/permit terms (such as five to ten years), after which it may be considered that operating conditions and technologies have changed sufficiently to warrant a new assessment.

7.2 Conditions

A range of conditions are usually attached to aquaculture approvals setting out the producers' responsibilities in undertaking production activities. The key challenge facing regulators in setting conditions is that they should facilitate management of risks associated with production in the most efficient and effective manner possible (see section 6.3).

Unnecessarily prescriptive or inflexible conditions may cause some aquaculture producers to be over-regulated with associated financial and economic costs, while other producers may be under-regulated, and deliver environmental outcomes below the desired standard. In general, conditions are likely to lead to efficient and effective regulatory outcomes if they are able to:

- account for variability in operating conditions and management practices;
- account for variability in the quality of both intake and receiving waters;
- adapt to changing circumstances (or at least be up-to-date when conditions are set); and
- in the case of outcome-based conditions, provide incentives for the development and adoption of innovative solutions.

Currently, the incorporation of risk management in setting approval conditions for aquaculture does not appear comprehensive. Several concerns have been raised in Queensland, for example, that risk management in determining environmental

conditions has not been evenly applied across industries, and that the quality of receiving waters has often been overlooked in making decisions about the risks of aquaculture operations to waterways. Concerns over the lack of scientific risk-based approaches to environmental requirements were also raised by the Australian Prawn Farmers Association (APFA) (2002), which noted the urgent need for scientifically-based discharge standards that recognise catchment variability and other contributors to pollution loads in Queensland. In 2003, the Queensland Government established discharge and receiving water quality standards-based on good practice and ANZECC guidelines.

Overall, there appears to be scope for a closer matching of regulatory controls with environmental risk assessment based on species, site location and the condition of the environment (such as the quality of receiving waters). However, any refinement of regulation along these lines would need to consider the costs (including regulatory and administrative) and benefits. For effective risk management to occur, and be incorporated into regulatory and policy responses, information needs to be sufficiently reliable, timely and useful. A key challenge is the uncertainty associated with measuring and distinguishing the impacts of aquaculture operations compared to natural variations in water quality.

Case-by-case versus generic conditions

Some conditions are mandatory for all aquaculture operations (such as ‘core regulations’), some are mandatory for particular types of operations (such as those for prescribed sizes), while others are determined case-by-case by approval agencies. For aquaculture licences, conditions are typically not specified in regulation or legislation. However, in some cases, ‘standard’ conditions are used for particular types of licences. In Tasmania, for example, there are extensive standard conditions for the environmental management of aquaculture (see box 7.1).

Setting conditions on a case-by-case basis may better reflect the environmental circumstances and values of particular catchments, river systems or marine ecosystems, and seasonal influences on ecosystems and production activities that can vary across aquaculture operations and sites. For example, seasonal weather patterns are significantly different in wet tropic catchments compared with dry tropic catchments in Queensland, with implications for management regimes. Case-by-case approaches may also better reflect the latest in technological developments and management practices, and be more flexible. Further, such approaches may allow regulators to assess the degree of self-interest an aquaculture operation has in maintaining clean waters. The greater these self-interests, the less need there may be to use regulatory requirements, and there may also be opportunities for adopting innovative policy approaches (see chapter 9).

Input- and outcome-based conditions

Input-based conditions can relate to business operations (such as maximum stock per cubic metre), capital or infrastructure (such as minimum pond depth), location (such as prescribed distances from natural waterways), individual or personal requirements (such as being a ‘fit and proper person’), or business characteristics (such as likely profitability or status of business plans).

Satisfaction of input-based requirements can avoid or minimise undesirable outcomes. However, efficiency from a community-wide perspective requires that the costs be less than the benefits. In general, input-based requirements are more likely to be useful when outputs are difficult to measure, or the costs to businesses of developing their own compliance measures to meet regulatory goals are high relative to their earnings (BIE 1996).

In contrast, outcome- or performance-based regulations focus on the outputs to be achieved, such as concentrations of nitrogen and phosphorus in discharges to public waters. Such approaches allow a licence holder to choose the least cost method for attaining set environmental goals or standards (see section 9.2).

In general, aquaculture licences, environmental licences and development approvals include a mix of input and output-based requirements to manage the environmental risks associated with production. In Tasmania, for example, marine farm licence conditions have tended to focus on inputs (such as maximum stocking densities) rather than outputs (such as a minimum water quality standard) (see box 7.1). In the D’Entrecasteaux Channel area, for example, conditions include a maximum stocking density of 25 kilogram of Atlantic salmon per cubic metre, and a minimum height for salmonid cages of at least 1 metre clear of the seabed at low tide under normal growing conditions (DPIWE 2002b).

In New South Wales, development approvals can include input requirements, process requirements (such as preparation of an ‘environmental management plan’), and more technical requirements generally specified in terms of outputs (such as discharge levels).

At times, specific regulations may also be prescriptive. In Western Australia, for example, regulation 69 of the Fisheries Resources Management Regulations 1995 requires that the ‘holder of the licence must ensure the fish is not sold under the authority of the licence unless it is packed in the manner specified by the Executive Director.’ The same regulation also contains more flexible requirements, including that the licence holder must take all ‘reasonable’ precautions to prevent the spread of any disease at the place where aquaculture is carried on under licence.

Box 7.1 Examples of compliance conditions contained in marine farming licences (finfish farms) in Tasmania

Conditions relate to (1) compliance with environmental standards, (2) requirements for environmental monitoring, (3) environmental records to be kept by licence holders, and (4) environmental reports to be provided to the Department of Primary Industries, Water and Environment (DPIWE).

Examples of compliance conditions include:

- no unacceptable visual, chemical or biological impact on the benthos 35 metres beyond the boundaries of the lease area;
- no detectable levels of antibiotics or chemical residues derived from therapeutic use in sediments within or outside the marine farming lease area;
- wastes are to be disposed of in a manner that has no unacceptable adverse effect on the ecology of the marine environment or nearby shoreline;
- dissolved oxygen levels at 5 metres below the surface within lease areas and outside lease shall not fall below 6 mg/l or 80 per cent of saturation at any time whichever is the least; and
- no fish feed shall be present 35 metres beyond the boundary of the lease area.

Examples of requirements for environmental monitoring surveys include initial monitoring of current speed, depths of water, seabed characteristics and habitat profile, and an underwater video survey.

Environmental records to be kept by licence holders include quantities and date of use of all chemicals released into water, type of food, origin, stock biomass and usage on a monthly basis, and a record of date, extent and duration of any observed algal blooms. Environmental reports to DPIWE include significant incidents of disease or fish kills, presence of introduced marine pests, significant incidents of outgassing due to methane and hydrogen sulphide, and environmental monitoring surveys.

Source: DPIWE (2003).

Maintaining flexibility in regulatory standards by using outcome-based requirements also has potential disadvantages. For example, outcome-based requirements may be difficult or costly to measure, and may be affected by external factors, such as weather conditions or natural variations in nutrients. Aquaculture operators may not have the expertise (without significant cost) to develop cost-effective management designs and practices. That said, codes of practice that provide industry with specific guidance on how to meet outcome-based requirements may reduce some of these concerns (BIE 1996) (see section 9.3).

As well as operating and environmental requirements, some jurisdictions have additional layers of requirements. In Western Australia, for example, there are requirements for some approvals to be dependent on the 'best interests of the

industry'. Pearl aquaculture licence applications, for example, may be refused if they are not in the 'best interests' of the pearl oyster industry of Western Australia. In some cases, such regulations may provide an unfair competitive advantage for some individuals or producers, and be undesirable from a community-wide perspective.

Western Australia and Tasmania require persons holding an aquaculture licence be a 'fit and proper' person. The usefulness of such a requirement depends in part on how regulators are able to determine who is a 'fit and proper' person, and its usefulness as a proxy for environmental performance (or the achievement of other policy goals).

7.3 Appeals

The right to appeal, and the processes governing appeals, are important parts of regulatory governance as they may encourage regulator accountability and aid transparency (Argy and Johnson 2003). All states provide applicants with the right of appeal over both aquaculture licences and development approvals although there is some variation in process. For example, licence appeals are heard in most states by administrative or licensing tribunals established by the authority of the relevant Minister. The exception is South Australia, where appeals are heard through the District Court (see table 7.2).

Table 7.2 **Licence appeals**

<i>Jurisdiction</i>	<i>Appeal body</i>	<i>Third party appeals</i>
New South Wales	Administrative Appeals Tribunal	No
Victoria	Licensing Appeals Tribunal	No
Queensland	Fisheries Tribunal	Yes ('on specific grounds')
Western Australia	Fisheries Tribunal (soon to be replaced by a whole-of-government State Administrative Tribunal)	Yes ('if significantly affected')
South Australia	District Court (Administrative and Disciplinary Division)	No
Tasmania	Resource Management and Planning Appeal Tribunal	Yes ('any person')

Source: State legislation.

An important issue in considering appeal processes is the right or otherwise of third parties to appeal decisions. Despite the potential for greater accountability by allowing full third party appeals, a balance needs to be struck between accountability on the one hand, and minimising uncertainty, 'frivolous' objections, and legal and opportunity costs on the other (for example, see Bates 2002). Third

party appeals against a decision to grant an aquaculture licence are only allowed in Tasmania (any person), Queensland (on specific grounds) or Western Australia (if ‘significantly affected’). Other states do not allow third parties to appeal licence decisions (see table 7.2).

In the case of development approvals, third parties can generally appeal against decisions in New South Wales, South Australia, Victoria and Tasmania. In Queensland, third parties can only appeal against matters of administrative process (and not a decision). In Western Australia, third parties are not generally given the right to appeal (although some local councils do provide such rights).

Under the environmental protection legislation in each jurisdiction, appeals are usually open to proponents, decision-making authorities and third parties in relation to both environmental impact assessment, and works approvals and environmental licences.

7.4 Monitoring, enforcement and reporting

Monitoring, enforcement and reporting are critical functions in helping to achieve desired regulatory outcomes. How these functions are implemented has implications for the overall effectiveness of regulatory arrangements for aquaculture.

Monitoring

The Australian Aquaculture Industry Action Agenda Implementation Committee identified national standards for environmental monitoring as one of its key priority areas for the industry (Macdonald 2003b). Various communities also want to know how, and which, environmental impacts from aquaculture are being monitored, and how regulations and licence conditions are being enforced (Mazur et al in press).

Important components of environmental monitoring include:

- that there is baseline monitoring;
- that the monitoring occurs over a sufficient time frame (and addresses the long term);
- that it is performed at an appropriate scale (local and regional); and
- addresses relevant ecological indicators, such as nutrient levels, water quality and biological diversity.

All states in Australia require some form of monitoring for commercial aquaculture operations, normally as part of an environmental licence or permit. In Queensland,

for example, prawn farms must collect fortnightly water quality samples for self-monitoring and pay for independent laboratory tests, as part of their licence conditions.

In Tasmania, the industry is required to pay for regular, six monthly environmental monitoring (of individual sites and at regional scales) with underwater video, samples and feed monitoring. In addition, there is a resurvey of each site every two years. Monitoring is undertaken by private consulting firms, subject to departmental conditions. Examples of monitoring requirements for the Pitt Water Estuary include that operators:

- provide to the Secretary an estimate of numbers or biomass of each species of shellfish on an annual basis or as otherwise specified in the relevant marine farming licence; and
- regularly measure the growth of samples of shellfish in areas where the growth rates of shellfish have declined.

Where licensees are required to undertake significant monitoring activities, an issue that may require further consideration is the application of cost recovery principles to costs and charges (see section 6.3). For example, there may be scope to reduce license fees and other charges in exchange for some types of monitoring activities, such as water quality monitoring.

Some monitoring arrangements can be too prescriptive and may become out of date over time. In Tasmania, for example, there are indications that, after three years of monitoring of site conditions at some locations, there is sufficient information and assurance to suggest that less frequent monitoring of site conditions may be appropriate (D. Ross, DPIWE, pers. comm., 6 May 2003).

Another issue is the coordination and use of data and data systems. APFA (2002, p. 2) has noted in Queensland that:

... the EPA does not have any formal database to record the data collected and provided by the [prawn] farms. Each EPA Regional office has a different approach to data collection and storage, and there is often no central database. Therefore EPA cannot provide any reliable data in relation to farm performance across the state.

APFA (2002) also suggested greater consideration of strategic monitoring at the catchment level, with each land-based sector contributing to catchment monitoring (preferably in proportion to contribution to discharge levels).

Monitoring (and enforcement) may also be undertaken as part of broader compliance audits for particular regions and/or industries. In Western Australia, for example, a regional compliance audit was conducted in 2002 for aquaculture

ventures (including pearl and prawn farm licensees) in Shark Bay and Exmouth Gulf. Checks carried out under the audit included that licensees were operating within their designated location and that farms were operating within stocking guidelines. The audit found that all farms in the regions were complying with licence conditions (Department of Fisheries Western Australia 2002b).

There are current proposals to improve monitoring arrangements in some jurisdictions. In South Australia, for example, the *Draft Aquaculture Environmental Management Policy Report* (PIRSA 2003a) specifies that licence-specific environmental monitoring will be collated and reviewed by PIRSA annually. PIRSA will summarise results from licence holders on a sector-by-sector basis with consideration of the farming system being used, and data will be available via a public register. During this process, a review of individual/industry-wide farm practices will be conducted to encourage a continuous improvement program for each licence activity or the relevant sector. Similar policy ideas are being considered in Queensland. The Queensland 'Draft Policy on Land-based Aquaculture' reports intentions to establish a streamlined whole-of-government process for monitoring the on-going operation and management of aquaculture establishments (Aquaculture Inter-departmental Committee 2002).

The use of technological advancements, such as satellite imaging and Global Positioning Satellite (GPS) systems, may improve monitoring and enforcement outcomes. For example, GPS systems can be used by both farmers and regulating authorities to ensure that production is occurring within leases boundaries.

Enforcement

Concerns have been expressed about the adequacy of enforcement processes in several jurisdictions. In 2000, for example, a South Australian Parliamentary inquiry into tuna farming at Louth Bay noted:

The Committee is concerned about the level of compliance monitoring within the aquaculture industry. There is a need to ensure that licence conditions are being adhered to and this could be ascertained if frequent random checks were undertaken. There is a need for more compliance officers. (Parliament of South Australia 2000, p. xiv)

The Committee recommended that random auditing of tuna feedlots would assist the enforcement of legislation (Parliament of South Australia 2000).

A lack of enforcement resources was also frequently noted in submissions to the inquiry, including the following:

‘I am the only officer employed by the department [of Transport and Urban Planning] to carry out investigations into not only aquaculture but also land-based developments. On that score we have a limited amount of resources to do the work on the basis of being proactive; most of my work is reactive.’ (Mr Spratt, Development Assessment Commission) (Parliament of South Australia 2000, p. 12)

‘In my observation, aquaculture compliance is grossly under-resourced. There is one dedicated aquaculture compliance officer for the entire state, including onshore and offshore operations.’ (Ms Howard (Environmental Consultant), p. 12)

More recently, concerns over the escapes of kingfish in South Australia have brought into question both current regulatory requirements and the rigour of enforcement activity (see section 2.3).

In addition to managing environmental impacts, monitoring and enforcement activities can also help to improve public understanding of aquaculture activities and to ensure that stakeholders are well informed of compliance outcomes. For example, in commenting on regional aquaculture compliance auditing in Shark Bay and Exmouth Gulf, the Department of Fisheries (Western Australia) (2002b, p. 1) noted that:

... It is important from the community point of view that aquaculture is seen to be adhering to licence conditions and regulations, and that the water allocated is being used effectively in the manner intended.

The capacity of different states to improve the efficiency and effectiveness of monitoring and enforcement systems is likely to depend on regular auditing and performance review, including assessment of the application and use of monitoring data (including enforcement outcomes).

Reporting and auditing

At present, there appears to be limited reporting by, and auditing of, the main agencies responsible for aquaculture and environmental regulatory arrangements in each state (see also section 3.2 discussion of financial reporting). In the case of Queensland, for example, the annual reports of the Queensland Department of Primary Industries do not show performance indicators or report on approvals. While most states report on fishery and aquaculture management from a resource asset perspective (see, for example, the Western Australian Department of Fisheries annual state of fisheries report), little is reported on regulatory processes.

Within confidentiality restrictions, aspects of regulatory and approval processes that could be reported on include: the number of applications; the number approved/rejected; discretionary approvals; exemptions; processing times; appeals;

monitoring and enforcement actions. As well as potentially improving accountability and transparency, reporting such information may help to improve the application of regulation by identifying potential regulatory constraints and opportunities for improvements with approval processes (see section 6.3).

7.5 Summary

- There are tradeoffs between providing licences or permits with a long duration to minimise administrative burdens with renewals, and generate certainty for investors, and maintaining flexibility in regulatory requirements
- Unnecessarily prescriptive or inflexible conditions may cause some aquaculture producers to be over-regulated with associated financial and economic costs, while other producers may be under-regulated, and deliver environmental outcomes below the desired standard.
- Most conditions attached to aquaculture licences, environmental permits and development approvals are determined case by case and are not specified in regulations — they include a mix of input- and output-based requirements.
- Outcome- or performance-based requirements may offer efficiency benefits, although they may be more difficult to administer.
- Monitoring is important for the sustainable management of aquaculture, although some arrangements may be too prescriptive, and add unnecessary costs.
- Enforcement is also critical for regulatory effectiveness, but in some cases appears to suffer from a lack resources.
- The performance of monitoring and enforcement systems will likely benefit from regular auditing and review.
- At present, there is limited reporting and auditing of the performance of regulatory systems across the states. As well as potentially improving accountability and transparency, regular reporting may help to improve the application of regulation by identifying potential regulatory constraints and opportunities for improvements with approval processes.

8 Quarantine and translocation

This chapter outlines and discusses the main legislation and policies regulating quarantine and translocation of aquatic organisms. Translocation is broadly defined as ‘any assisted movement of [an aquatic] organism beyond its accepted distribution’ (MCFFA 1999, p. iii). Aquaculture production may require translocation of aquatic organisms, either within Australia or internationally, to obtain access to broodstock, culture stock or feed.

8.1 Quarantine and translocation measures

Translocation of aquatic organisms may occur as part of aquaculture development, stocking of waterways for recreational fishing, release or escape of aquaculture or aquarium species, and unintentional introductions from shipping (such as from ballast water). The main reasons for controlling movements of aquatic organisms are to control pests and diseases, and the escape of translocated organisms that may adversely affect production, market access, human health, and/or the environment. The transmission of pests and diseases borne by translocated organisms, or the escape of translocated organisms, may affect the composition of species and communities, through predation, competition for food or habitats, interbreeding with native species, or by altering the ecosystem.

Governments regulate translocation of aquatic organisms because of significant externalities or ‘spillovers’. The aquaculture and fishing industries, and the wider community, will incur costs from pest or disease outbreaks caused by movement of certain aquatic organisms. Importers of aquatic organisms are likely to bear only a small share of the total costs associated with pest and disease outbreaks, and may bear few, or none, of the costs of environmental degradation. Consequently, importers have reduced incentive to take into account the full risks associated with aquatic organism translocations. The irreversibility of some potentially significant impacts, and high transaction costs, are likely to prevent other mechanisms, such as prosecutions for negligence, from being effective alternatives to regulation.

Whether quarantine and translocation regulations should be implemented depends on whether their benefits to society as a whole exceed their costs. The major benefits and costs from aquatic quarantine measures are shown in box 8.1.

Box 8.1 Benefits and costs of aquatic quarantine/translocation measures

There are benefits and costs from quarantine and translocation measures to restrict movements of aquatic organisms.

Benefits include:

- reduced costs of managing or eradicating aquatic pests and diseases;
- reduced risk of losses in aquaculture and fisheries production caused by disease and pest incursions, and impacts from escaped aquatic organisms;
- human health benefits from reduced exposure to aquatic pests and diseases, and to chemicals (used to treat aquatic pests and diseases) affecting seafood;
- conservation of aquatic biodiversity (genes, species and aquatic habitats); and
- improved access to export markets from disease-free status.

Costs include:

- reduced access to new species for aquaculture production, which may hinder industry diversification;
- reduced access to healthier or faster-growing broodstock or culture stock, or to stock from different genetic populations, which may increase production costs, lower production quality, and diminish the genetic diversity of cultured populations;
- reduced availability of imported feed, reduced feed quality and/or higher feed costs;
- higher consumer prices and/or reduced consumer choice;
- industry compliance and government administration costs; and
- potential for trade disputes.

There may be other implications of quarantine measures, such as less competition from seafood imports into the domestic market. This may result in potential improvements in domestic aquaculture producers' profitability, but at the cost of higher consumer prices.

Sources: ARRTF (1999a); Binder (2002); Tanner (2003).

8.2 Quarantine and translocation legislation

International movements of aquatic organisms and their products are addressed under Commonwealth legislation governing national quarantine arrangements. Translocations of aquatic organisms within Australia are dealt with under state and territory legislation. The main legislation and policies governing quarantine and translocation, and their key provisions, are shown in table 8.1. Other legislation, such as general environmental legislation, may also be relevant.

National quarantine arrangements

As a member of the World Trade Organization (WTO), Australia has rights and obligations under a number of trade related agreements. In addition, Australia endorses the FAO Code of Conduct for Responsible Fishing, which is based on the principle that international trade in fish and fisheries products should be conducted in accordance with WTO and other international agreements (MCFFA 1999).

The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) sets the international context and legal framework for Australia's quarantine laws. The Agreement aims to prevent quarantine and food safety protocols from being used as a disguised form of protection. Member governments may introduce quarantine and food safety measures only if they:

- are based on a sound scientific assessment process;
- do not restrict trade more than necessary to achieve the desired level of protection; and
- do not discriminate between WTO member countries.

Australian regulations governing imports of animals, plants and their products are contained in the *Quarantine Act 1908*, the Quarantine Proclamation 1998, the Quarantine Regulations 2000, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and Food Standards Codes. Generally, imports are prohibited unless a permit has been granted.

Regulation of imports of animals and their products is undertaken by several Australian Government agencies. The Quarantine and Exports Advisory Council (QEAC) advises the Minister on quarantine policy and consults broadly with industry and the community.

Biosecurity Australia undertakes import risk assessments (IRAs) to determine policy on imports, while the Australian Quarantine and Inspection Service (AQIS) implements policy on a case-by-case basis. Biosecurity Australia is currently undertaking IRAs on freshwater crayfish, molluscs, freshwater finfish and prawns (AFFA 2003a). IRA proposals may be submitted directly to Biosecurity Australia as a request for market access, usually by the relevant government agency of a country seeking to export to Australia. Proposals may also be forwarded to Biosecurity Australia as a result of an application to AQIS for an import permit.

In regard to aquaculture-related import permits, AQIS charges currently comprise an application fee of \$80 plus an assessment fee, which is \$40 for aquaculture feeds, and \$180 for products with compliance agreements, such as salmon, and for live animals, including fish and genetic material.

Table 8.1 Main quarantine and translocation regulations and policies applying to aquatic organisms

<i>Jurisdiction</i>	<i>Legislative/regulatory provisions</i>
Commonwealth <i>Quarantine Act 1908</i>	Long title: An Act relating to quarantine. No objects. The aims of Australia's quarantine laws are to protect the country's human, animal and plant health status from diseases or pests causing harm to human beings, animals, plants, other aspects of the environment, or economic activities, and contribute to the regulatory framework for international trade. The Act provides powers for quarantine officers, sets out the legal basis for controlling imports of goods, animals and plants, and determines the offences for breaches of the Act.
National Policy for the Translocation of Live Aquatic Organisms	'All translocation proposals should undergo an adequate and balanced risk assessment process, particularly with regard to the pest potential, disease status, potential to introduce parasites and diseases and possibilities of affecting biodiversity, in accordance with consistent risk assessment protocols aimed at minimising adverse impacts.' Policy approved at the Ministerial Council on Forestry, Fisheries and Aquaculture in 1999.
New South Wales <i>Fisheries Management Act 1994</i>	A person must not bring into New South Wales live fish of a species not taken from New South Wales waters except under the authority of a permit issued by the Minister (s. 217 (1)).
Victoria <i>Fisheries Act 1995</i>	Unless authorised under this Act, a person must not bring into Victoria or take, hatch, keep, possess, sell, transport, put into any container or release into protected waters any aquatic species that is declared to be noxious under the Act (s. 76).
<i>Flora and Fauna Guarantee Act 1988</i>	A process is potentially threatening if, in the absence of appropriate management, it poses, or has the potential to pose, a significant threat to the survival or evolutionary development of a range of flora and fauna (s. 11(3)). Threatening processes include the introduction of live fish into waters outside their natural range within a Victorian river catchment after 1770, alteration to the natural flow and temperature regimes of rivers and streams, and introduction of exotic organisms into Victorian marine waters (Schedule 3).
Queensland <i>Fisheries Act 1994</i>	A person must not unlawfully bring non-Indigenous fisheries resources into Queensland; possess, rear, sell or buy non-Indigenous fisheries resources; or release non-Indigenous fisheries resources into Queensland waters, except for those prescribed under a regulation or management plan (s. 90).
Western Australia <i>Fish Resources Management Regulations 1995</i>	A person must not bring into the state, or a particular area of the state, a live fish of a species not endemic to the state, or that area of the state, except with the written approval of the executive director or an aquaculture licence (s. 176).
South Australia <i>Fisheries Act 1982</i>	A person must not bring into the state, or sell, purchase, deliver, possess or control, any exotic fish except as authorised by a permit granted by the director under this section (s. 49). Also broader controls under <i>Livestock Act 1993</i> .
Tasmania <i>Inland Fisheries Act 1995</i>	A person, without the written consent of the director, must not import any live aquatic crustacean, molluscan or invertebrate animal; or any kind or species of live fish that is capable of living and reproducing in inland waters; or living in captivity at a temperature below 10° Celsius; or any live salmon eggs or sperm (s.132).
<i>Living Marine Resources Management Act 1995</i>	It is an offence to release exotic fish into state waters (s. 125(1)&(2)). Unless otherwise authorised, a person must not bring live fish into the state, except for prescribed species of fish (s. 126).

Sources: AFFA (2003b); MCFFA (1999); Commonwealth and state legislation and regulations.

The Department of the Environment and Heritage (Australian Government) regulates international movements of wildlife and wildlife products under the EPBC Act. The Act regulates exports of Australian native species, exports and imports of endangered or potentially endangered species recognised under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). It also regulates imports of live plants and animals that, if they became established in Australia, could adversely affect native species or their habitats. Under a memorandum of understanding, the Department of Environment and Heritage, and the Department of Agriculture, Fisheries and Forestry, have established consultation arrangements to help ensure that adequate protection of the environment is integral to the development of quarantine and live import policy.

Translocation policies

The National Policy for the Translocation of Live Aquatic Organisms (MCFFA 1999) sets out nationally agreed policy relating to movements of live aquatic organisms within Australia. The national policy aims to achieve consistent translocation policies based on:

... a nationally accepted, explicit and transparent risk assessment process, which is scientifically based and appropriate to the circumstances and considers both the likelihood of escape/release and subsequent survival and establishment of translocated species and their attendant consequences. (MCFFA 1999, p. 19)

While the national policy is intended as a guide for the development and implementation of risk assessment measures at state or territory level, the states and territories have legislative responsibility for translocations into, and within, their jurisdictions.

State translocation regulations are governed by fisheries legislation, which generally prohibit the import or any use of non-Indigenous fish species without a permit (see table 8.1). Translocation policies and protocols are developed and administered by state primary industries or fisheries departments. Environmental protection legislation may also be relevant, for example, Victoria's *Flora and Fauna Guarantee Act 1988*, and state environmental agencies may contribute to translocation policy development.

Progress on developing translocation protocols varies significantly among the states. Queensland and Western Australia, for example, independently adopted such protocols prior to the introduction of the national policy. South Australia has developed translocation protocols for Tasmanian Pacific oysters and Queensland barramundi, and a risk analysis for freshwater finfish is being undertaken. New South Wales has translocation protocols for Pacific oysters, Sydney rock oysters

and barramundi. Victoria is preparing 'Guidelines for assessing translocations of live aquatic organisms in Victoria'. Victoria has existing protocols for mussel and barramundi farming, which are being updated to be consistent with translocation guidelines, and other protocols will be prepared as required.

Other policies

In 1997, the Australian Government established the Fish Health Management Committee (FHMC) to develop a comprehensive aquatic animal health plan and to address management procedures for aquatic animal disease emergencies (AFFA 2002). The resulting national strategic plan for aquatic animal health, known as AQUAPLAN, was jointly developed by Australian governments and industry, and endorsed by governments in 1999. A review of the Plan, completed in 2002, recommended the replacement of the FHMC with the Aquatic Animal Health Committee (AAHC). Under AAHC, the aim of AQUAPLAN is to:

- integrate the states' aquatic animal health responsibilities with the Australian Government's role in quarantine, trade relationships, and market access;
- avoid duplication between states and address cross-border issues consistently; and
- foster private sector and expert input (AFFA 2002, p. 3).

Several states, for example, Queensland and South Australia, are developing aquatic animal health policies.

8.3 Assessment of quarantine/translocation framework

While the main concern of Australia's quarantine and translocation regulations and policies is with the potential breakdown of quarantine procedures and consequent entry of pests and diseases, other factors are also important to ensure community welfare is maximised. In particular, compliance with international obligations under the WTO is a critical factor in the design of Australia's quarantine and translocation regulations.

Risk assessment factors

Under the SPS Agreement, quarantine measures must be based on a sound scientific assessment process. Scientific assessment of appropriate protection levels is undertaken through risk assessments, including IRAs. Any quarantine measures that

are more stringent than relevant international standards must be scientifically justified by a risk assessment.

Considerable resources have been devoted to improving the transparency and scientific rigour of the IRA process (Tanner 2003). However, the economic criteria included in international IRA guidelines are limited:

Members shall take into account as relevant economic factors: the potential damage in terms of loss of production or sales in the event of entry, establishment or spread of a pest or disease; the costs of control or eradication in the territory of the importing Member; and the relative cost-effectiveness of alternative approaches to limiting risks. (SPS Agreement, article 5.3)

For specific import proposals, the SPS Agreement does not provide for consideration of costs and benefits to the wider community of importing aquatic organisms and their products (Binder 2002; Tanner 2003). For example, assessment of the net community benefit from imports of a species of fish requires a trade-off between the benefits from a lower pest or disease risk conferred by an import ban, and the wider benefits from industry diversification or availability of cheaper or different products conferred by permitting imports of the particular fish species (see box 8.1). These factors may, however, be taken into account in setting the appropriate overall level of risk.

Appropriate level of protection

Under the SPS Agreement, member countries have the sovereign right to determine the ‘appropriate level of protection’ (ALOP), or acceptable risk, for their quarantine and translocation policies. Countries are not required to define precisely their ALOP. AQIS has defined Australia’s ALOP as keeping risks to ‘an acceptably low level’, while Biosecurity Australia states that Australian Governments have ‘maintained a highly conservative but not a zero-risk approach’ to the management of risks (cited in Binder 2002, p. 17). Biosecurity Australia’s *IRA Handbook* defines Australia’s ALOP in ‘qualitative terms ... aimed at reducing risk to a very low level, but not to zero’ (AFFA 2003c, p. 5).

Some commentators have expressed concerns that the imprecision of the qualitative risk target may leave the regulator open to claims of hidden protectionism (see box 8.2). Binder (2002, p. 42), for example, has commented:

The more vague or ambiguous the desired risk target, the more difficult it is for a regulator to be consistent in its evaluation across cases, and the more vulnerable is a regulator to a charge of being susceptible to other influences.

Tanner (2003, p. 14) has observed:

[The 'appropriate level of protection'] has been criticised by some domestic stakeholders for not being sufficiently conservative and by overseas stakeholders and other domestic stakeholders for being too conservative. Its lack of precision and lack of transparency have attracted both domestic and international complaints. A number of Australia's major trading partners have accused Australia of using quarantine policy as an unjustified technical barrier to trade, resulting in increased trade tension and threats of retaliation.

Attempts to quantify risks more precisely, in terms of expected cost of pest or disease incursion, or as a probability of incursion, encounter practical problems (Binder 2002). The Joint Committee of Public Accounts and Audit (JCPAA) reviewed Australia's ALOP and decided that more precise definition is not warranted:

A more quantitative ALOP would invite debate and legal challenge as to whether quarantine measures for particular imports were consistent with the ALOP. Moreover, the WTO considers that Australia's current definition is appropriate. Indeed, other countries do not have a precisely defined ALOP. (JCPAA 2003, p. iv)

In contrast, the Senate Rural and Regional Affairs and Transport Committee concluded that a more quantitative assessment of risk would be beneficial (SRRATC 2000). The Committee recommended that Australia's ALOP 'be more explicit' because:

... putting in place quarantine measures determined against a concept which is inherently vague and unsubstantiated, and which can only be inferred from analysing decisions on quarantine applications, is a recipe for inviting confusion and criticism. (SRRATC 2000, p. 97)

Tanner (2003, p. 15) suggested that further research into the benefits and costs of the current ALOP would be worthwhile and concluded:

Considerable government resources have been devoted to improving the transparency and scientific rigour of the IRA process and the delivery of quarantine functions ... By contrast, the task of clarifying the concept of ALOP seems to have been neglected. At first glance, this omission seems somewhat surprising, given that the ALOP is the objective of Australia's quarantine policy and everything else flows from how that objective is defined. However on reflection, the paucity of studies examining the ALOP can be readily explained by the complexity of the concept and the potential political difficulties inherent in making more explicit the trade-off of the costs and benefits of a particular ALOP.

Box 8.2 Challenges to Australian quarantine arrangements

Salmon case

In 1975, Australia banned imports of fresh, chilled and frozen salmon from Canada and the United States. These countries challenged the ban in the WTO as an unjustified technical barrier to trade. In 1998, the WTO found against Australia on the grounds that the ban had not been justified by a comprehensive risk analysis, and there were arbitrary or unjustified distinctions in the level of protection applied to salmon and other fish.

Australia undertook a new IRA on the import of salmonid products and non-salmonid marine finfish. As a result of the risk analysis, quarantine restrictions were relaxed for salmonids and tightened for marine finfish.

Subsequently, Tasmania imposed tighter quarantine controls on salmon imports into Tasmania. In 2000, in response to another Canadian challenge, the WTO found the Tasmanian measures were inconsistent with the SPS Agreement and were not supported by the Australian IRA. The Tasmanian quarantine measures remain in place. No further WTO action is currently pending.

European Commission challenge

In 2003, the European Commission (EC) challenged Australia's overall quarantine arrangements, including the 'exercise of discretion granted to a Director of Quarantine' and the prohibition of imports where an IRA has not been undertaken:

The effect of this regime appears to be that the import of products is a priori prohibited, although there is no risk assessment. (WTO 2003)

The EC criticised the substantial delays in the commencement and completion of IRAs, and highlighted examples of uncompleted risk assessments that were commenced in 1997 and 1998. The EC commented that (WTO 2003):

Risk assessments appear to be commenced, if at all, only once the import of a product has been specifically requested. In some cases, no risk assessment has been commenced despite such request. In other cases it has been commenced but not completed.

The EC's action has been joined by Canada, Chile, India, and the Philippines. The challenge is currently still under investigation.

Philippines challenge

In August 2003, a WTO panel was established to examine Australia's quarantine measures for fresh fruit and vegetables at the request of the Philippines. Australia's response states that its measures are fully WTO-consistent and that:

The Philippines appears to be interested in making a broad systemic challenge to Australia's quarantine regime, rather than contesting the WTO-consistency of import conditions contained in specific SPS measures. If permitted, this sort of broad open-ended challenge would strike at the right of WTO Members to have quarantine regimes which provide for the application of WTO-consistent measures necessary for the protection of human, animal or plant life or health within their territory.

Sources: Binder (2002); DFAT (2003); SRRATC (2000); WTO (2003).

Application of WTO assessment factors to translocation measures

Under WTO rules, the acceptable level of risk determined by each country must 'be consistently applied both within Australia and to international trade' (MCFFA 1999, p. 4). The SPS Agreement includes a 'consistency requirement' that member countries must, in determining the ALOP, avoid 'arbitrary or unjustifiable distinctions' in the risk levels 'if such distinctions result in discrimination or a disguised restriction on international trade' (article 5.5).

Ensuring consistency with all WTO obligations ... in a domestic risk assessment process for translocation can only strengthen our approach should we have reason to prevent importation of organisms that have the potential to adversely affect the Australian environment (and hence our natural resources based industries). (MCFFA 1999, p. 4)

The ALOP and assessment protocols applied in domestic translocation policies should generally be consistent with those applied in quarantine assessments of imports from other countries. While individual states and territories retain the discretion to adopt different processes, statutory requirements or assessment criteria, significant differences should be 'explicitly justified and explained' (MCFFA 1999, p. 18).

Until the introduction of the national translocation policy, translocation applications for aquatic organisms were, at the national level, treated in an ad hoc manner and assessed individually, without common guidelines (MCFFA 1999). The national policy is intended to 'bring more consistency, certainty and transparency to the decision making process' (MCFFA 1999, p. 24).

Introduction of the national policy has assisted moves to harmonise state and territory protocols, and to ensure protocols are based on sound scientific principles. However, requirements for assessment and notification continue to vary between jurisdictions. Scientifically-based protocols are currently being developed.

State risk analysis

At state level, progress varies on the development of translocation policies and scientifically-based assessment processes. At times, industry has been critical of the transparency and scientific rigour of state risk assessment processes. For example, industry submissions to a Victorian review of regulatory arrangements for aquaculture argued that 'the regulations pertaining to noxious species appear overly restrictive and in some cases seem to be inconsistently applied' (ARRTF 1999a, p. 41). The Victorian Regulatory Review Task Force concluded that the risk

assessment process would be improved by a clearer statement of the assessment criteria (see box 8.3).

Box 8.3 Victorian translocation policy

In 1999, a Victorian review of regulatory arrangements for aquaculture identified a number of examples where the level of risk implicit in translocation assessments appeared inappropriate. For example:

- European carp is declared a noxious species and cannot be farmed, yet it is a widespread and well-established species in Victorian waters; and
- a Victorian research institute sought permission from Fisheries Victoria to import redclaw into Victoria for experimentation. Permission was refused under the noxious species regulations. Yet redclaw can be purchased live from Victorian seafood wholesalers.

The final report recommended that the criteria used in aquaculture translocation assessments be clearly stated in aquaculture guidelines. This would improve the transparency of the process and assist aquaculture operators to develop business proposals in a manner most likely to comply with the legislation. Victoria is preparing 'Guidelines for assessing translocations of live aquatic organisms in Victoria'.

Sources: ARRTF (1999a; 1999b).

In some jurisdictions, different translocation regimes exist for endemic and non-endemic species. In Western Australia, for example, fisheries regulations control the translocation of aquatic species into the state that are not endemic. However, the regulations do not control the translocation of endemic species into, or within, the state. In 1997, a Memorandum of Understanding was entered into between the Western Australian Environmental Protection Authority and the Department of Fisheries in relation to an assessment process for the translocation of non-endemic fish into, and within, the state. A similar protocol does not exist for endemic species.

Translocation of endemic species of aquatic organisms within states and territories may expose the community to similar risks as translocation of species that are not endemic to the state or territory. For example:

- species endemic to one area of a state or territory may not be endemic to other areas of the state or territory;
- populations of the same species may be infected with different pests and diseases in different areas of the same state or territory; and
- populations of the same species may have diverse genetic profiles in different areas of the state or territory.

A legal review of the Western Australian fisheries legislative arrangements by Ciffolilli recommended that if the protocols are to be formalised by way of regulation, then the legislation ought to be amended to regulate or prohibit the transport of fish within the state (Ciffolilli 2003).

The national translocation policy is intended to provide ‘consistent, national guidelines from which local assessment processes can be developed and implemented’ (MCFFA 1999, p. 18). While progress on development and adoption of nationally consistent translocation policies and processes is still proceeding, it must be expected that comprehensive review of state translocation regimes will take time. Moreover, some states have given priority to review and reform other aspects of their aquaculture regulatory system. An issue for the aquaculture industry is the degree to which the aquarium trade is subject to the same quarantine and translocation controls.

Timeliness of decision making

A recent Commonwealth Parliamentary inquiry into Australia’s quarantine system (JCPAA 2003) found evidence of significant backlogs in the IRA process (see box 8.4). No criteria have been established to prioritise the processing of IRAs and the process may lack transparency. Lengthy delays in commencing and completing IRAs — five years or more in some cases — are seen by some of Australia’s trading partners as anti-competitive. The European Commission and the Philippines have challenged Australia’s quarantine arrangements in the WTO (see box 8.2).

Box 8.4 Assessment backlog

A recent inquiry into Australia’s quarantine system by the Joint Committee of Public Accounts and Audit found a significant backlog in dealing with applications to import commodities, which had led to ‘a degree of frustration expressed by some of Australia’s trading partners’ (JCPAA 2003, p. 26). The Parliamentary Committee recommended that sufficient resources be provided to Biosecurity Australia to reduce the backlog over the next five years, and ensure that consideration of applications commences within six months (JCPAA 2003). However, the Committee:

... does not support rushing particular IRAs or manipulating the waiting list to favour applications from particular countries. It is important that the science underpinning the quarantine measures arising from an IRA is not compromised by haste. As well, ‘playing favourites’ risks creating the perception that Australia is prepared to compromise its quarantine to facilitate trade with particular countries. (JCPAA 2003, p. 28)

Source: JCPAA (2003).

As well as creating difficulties for Australia's relationships with trading partners, risk assessment backlogs may generate costs for Australian aquaculture producers by restricting their access to new broodstock or culture stock and to more efficient or cheaper feed. These factors may hinder aquaculture development and limit consumer access to different or cheaper seafoods.

The risk assessment process has significant direct costs, with each IRA estimated to cost around \$400 000 in 2001 (Tanner 2001). With more than 200 risk assessments either in progress or awaiting consideration (JCPAA 2003), removal of the backlog would require the provision of significant resources. Options may need to be considered for more cost-effective ways to undertake the less complex risk assessments. Tanner (2001) suggests that the majority of IRAs are not controversial.

Even with an increase in resourcing for risk assessments, processing delays will be inevitable at times. However, the absence of criteria for prioritising the processing of risk assessments may generate economic costs for Australia. For example, risk assessments of import or export proposals with the potential to generate large economic benefits for the Australian community may be significantly delayed while proposals with relatively minor economic benefits are being processed. The absence of clear ordering criteria may create the potential for ad hoc ordering changes, and lead to concerns about transparency and accountability.

In 2002, the National Aquaculture Development Committee recommended:

That, as part of a transparent decision-making system, the Commonwealth Government liaise closely with members of the aquaculture industry and State and Territory governments on import risk assessments and other quarantine-related processes. (NADC 2002, p. 21)

8.4 Summary

- Aquaculture production may require translocation of aquatic organisms to obtain access to broodstock, culture stock or feed.
- Regulating movements of aquatic organisms aims to control pests and diseases and the escape of translocated organisms that may adversely affect production, market access, human health and/or the environment.
- Governments regulate quarantine and translocation because importers have reduced incentive to take into account the full risks associated with aquatic organism movements. However, there are trade-offs between the benefits and costs of such measures.
- WTO rules set conditions on member countries' quarantine arrangements so as to prevent quarantine and food safety protocols from being used as a disguised

form of protection. Under WTO rules, quarantine and translocation protocols must be non-discriminatory, transparent, consistent, and based on scientific risk assessments.

- Australia's qualitative quarantine target (ALOP) may present challenges for the achievement of consistent and transparent assessments, but alternative (more quantitative) approaches are not without problems.
- Progress on developing consistent translocation protocols varies significantly among the states. Inconsistencies in state policies risk challenges by trading partners that such policies breach the consistency requirement in WTO rules, and they may generate costs for Australian aquaculture producers.
- A significant backlog in dealing with applications to import commodities has led to frustration expressed by some of Australia's trading partners, challenges to Australia's quarantine arrangements, and potential costs to aquaculture producers.

9 Innovative approaches

Traditionally, governments in Australia and overseas have relied on direct regulation to achieve environmental management objectives. For example, marine and land use planning and tenure arrangements, and licensing, permits and development approvals are direct regulatory approaches that have been used across Australia to regulate aquaculture. Although direct regulation has been effective in some cases, it can at times be inflexible, expensive and provide limited incentive for innovation (IC 1997).

This chapter discusses selected innovative regulatory, market-based and voluntary approaches for managing the potential environmental impacts of aquaculture. It highlights some of the benefits and costs of different approaches, and how they may complement (or replace) existing arrangements. Some of these approaches are in use in some jurisdictions, but are not yet common across jurisdictions. It should be recognised that assessment of specific policy options requires detailed case-by-case evaluation — such assessment is beyond the scope of this paper.

9.1 Innovative regulatory instruments

Several jurisdictions have implemented, or are considering implementing, innovative regulatory instruments with the potential to improve the efficiency and effectiveness of aquaculture regulation, including demerit schemes, environmental assurance bonds, offsets, and industry management agreements.

Demerit schemes

Demerit schemes for environmental management can operate in a similar way to schemes applying to motor vehicle drivers. For example, poor practices or breaches of licence or approval conditions could result in the accumulation of demerit points, and potentially in licence revocation.

A ‘demerit system’ operates for aquaculture in Tasmania under the *Living Marine Resource Management Act 1995* (ss. 242 - 250) and the *Marine Farm Planning Act 1995* (ss. 121 - 124). Features of the Tasmanian model include:

- a demerit point is allocated for each ‘penalty unit’ imposed — demerit points are allocated to the person committing the offence, and to the relevant licence under which the person was operating when the offence was committed (but not to the lease);
- demerit points are carried over for a period of five years; and
- accumulation of 200 demerit points results in licence disqualification.

The introduction of a demerit system was identified in a review of legislative arrangements for aquaculture in Western Australia, where it was noted that:

... a demerit point system similar to that introduced in Tasmania has been suggested as a means to warn licencees of any transgression of licence conditions, such as being outside the licence boundaries. An offence could be a penalty of 50 points with a total of 200 points resulting in the loss of license or formal prosecution. (Ciffolilli 2003, p. 77)

Some potential benefits of a demerit scheme may be to:

- encourage licence holders to take their licence obligations more seriously;
- facilitate a hierarchical system of penalties that would be readily understandable, given the familiarity within the community generally with demerit systems; and
- increase transparency in the enforcement system, and operators understanding of the consequences of any breaches.

However, development of such a system could involve considerable start up costs. Maintaining formal records could also add to the existing administrative burden on regulatory authorities.

Environmental assurance bonds

Environmental assurance bonds (EABs) are a policy instrument that can be used to help ensure that the costs of environmental damage are borne by parties undertaking certain activities. Prior to beginning operation, a business may purchase EABs that specify environmental performance over a set time period. At the end of the time period, the business either receives a refund of its commitment or the bond is used to ameliorate environmental damage that may have occurred.

EABs or similar instruments have been applied in a number of natural resource management contexts to shift the cost of ameliorating environmental damage onto

producers, thereby increasing the incentive for sound environmental management. The Great Barrier Reef Marine Park Authority, for example, has used funds held under a performance bond scheme to pay for the removal of a damaged tourist pontoon, and also to manage the pollution risk associated with the passage of transport ships through reef waters (ABARE 1993). In the mining industry, most jurisdictions use some type of bond payment to manage the rehabilitation of mining sites (for example, see Robinson and Ryan 2002, and Victorian DPI 2003b).

A key challenge for the design and use of EABs is the extent to which it is possible to calculate a bond amount that accurately reflects the risks associated with production. Where such risks cannot be equated with a level of bond payment (for example, if potential damage is very large, uncertain and/or irreversible), then other approaches (including direct regulation or prohibition) will need to be considered. A further challenge is ensuring that the level of payment does not impose undue liquidity constraints on producers. The use of EABs may be inappropriate when monitoring and enforcement costs are high. The cumulative impact of the use of different EABs by various agencies may also be an issue for some producers.

EABs could be applied to a range of aspects of aquaculture production, including site rehabilitation and the recapture of escaped fish. For example, Mathis and Baker (2002) describe the potential for EABs to be used in the Texas shrimp farming industry (Gulf of Mexico) to fund the ‘clean-up’ of escaped shrimp.

Ciffolilli (2003) notes that some jurisdictions in Australia already have provisions for aquaculture permit holders to enter into bond agreements. For example, s. 152(d) of the *Fisheries Management Act 1994* (New South Wales) specifies that aquaculture permit conditions may include:

... conditions requiring the permit holder to enter into a bond or guarantee or other financial arrangement for the due performance of the holder’s obligations under this Act (including for the destruction of noxious fish and the restoration of, or removal of material from, the area in which the aquaculture has been undertaken)...

Under this provision, lease bonds were introduced for oyster leases in 2001 to ensure the post-production rehabilitation of lease sites (NSW Fisheries 2001). Potentially, bonds could be used for all leases of public water or land where site rehabilitation works may be necessary.

Offsets

Offsets allow a business to conduct an activity that may have negative environmental impacts in exchange for positive offsetting actions. For example, a

business may be allowed to alter a wetland substantially if it agrees to undertake activities to protect, restore and/or enhance another wetland (Murtough et al 2002).

A potential benefit of this approach is that businesses must directly account for environmental costs within investment and production decisions. However, to be effective, offset rates must accurately reflect the relationship between environmental damage and mitigating action. In some instances, it may not be feasible to resolve the scientific uncertainty associated with calculation of such a measure.

An aquaculture application using offsets, suggested by Brennan (2002), is to allow the development of prawn farms where prospective aquaculture producers buy and retire land used for sugar cane as an offset for prawn farm discharges. In this way, prawn farms could be developed without increasing overall nutrient and chemical loads in particular catchments. A significant implementation issue is the determination of an offset rate between prawn farms, which generate point source discharges, and land used for sugar cane, which generates diffuse source discharges with a potentially high level of variation. Further, this type of offset would not address other potential environmental impacts associated with prawn farms, such as the potential spread of pathogens or disease to wild stock.

The possible application of offsets was also raised in the New South Wales Georges River – Botany Bay Inquiry, which suggested that development applications with significant water quality impacts could still be granted if businesses ‘can demonstrate a net benefit by the use of offsets’ (HRC 2001, p. 49). Following the inquiry, the New South Wales Government noted that ‘green offsets’ could be applied to activities that impact on river and estuarine environments, to safeguard both environmental values and activities dependent on environmental values, including recreational fishing and oyster farming. In this case, offsets could be used to distribute the responsibility of maintaining environmental quality amongst resource users, including non-aquaculture primary producers, government (in recognition of the ‘public good’ nature of positive environmental outcomes), and the oyster growers themselves (NSW Government 2002).

Industry management agreements

Another potential approach is for producer cooperatives or groups to be given greater powers and responsibility for resource management. For example, an industry group for aquaculture in a particular area, such as a bay or estuary, could be given responsibility to manage aquaculture production subject to the achievement of agreed government/industry objectives (ACIL Consulting 1999).

Resource management by industry groups is occurring in some sectors of the fishing industry. For example, in the Challenger scallop fishery near Nelson in New Zealand, the Challenger Scallop Enhancement Company (CSEC) (an unlisted public company wholly owned by around 35 quota holders) works cooperatively with the New Zealand Government. CSEC has responsibility for a range of activities, including research, stock enhancement, and the management and enforcement of catch levels. CSEC enters into contracts with fisheries participants and its activities are funded through a statutory fee on landings (Townsend 2002).

Townsend (2002) notes that, historically, with respect to fisheries management, cooperative management may be best suited to homogeneous sectors with a small number of participants. For the aquaculture industry in Australia, there are several sectors, such as tuna in South Australia and salmon in Tasmania, for which cooperative management opportunities may exist.

9.2 Market-based approaches

Market-based approaches can be used to ‘harness market forces’ to ‘encourage firms (and/or individuals) to undertake pollution control efforts that are in their own interests and that collectively meet policy goals’ (Stavins 2002, p. 1). These instruments can be more efficient than prescriptive regulation because they allow producers to make their own benefit-cost tradeoffs in pursuing specific practices. Consequently, they may achieve desired regulatory outcomes in least cost ways. However, a lack of information or high costs associated with market creation and participation may outweigh the potential benefits. In other cases, such as when environmental outcomes from market-based instruments may be uncertain and environmental thresholds may be breached, application will be limited.

A number of market-based approaches could potentially be developed for the aquaculture industry. These include tradeable permits for pollution discharges, and auctions for lease allocations.

Tradeable permits for pollution discharges

Tradeable permits for pollution discharges can be developed by setting an aggregate limit on discharges, allocating discharge credits among businesses, and then allowing businesses to trade discharge credits within that limit. In contrast to a regime of strict licences or controls, creating a market for discharges provides an incentive for businesses to produce fewer discharges for each unit of output and, where possible, to sell surplus credits to other businesses (PC 2003a).

A key challenge with this approach is the initial determination and allocation of discharge credits. If the aggregate level is set too high, there may be an overall increase in environmental damage, or, if set too low, the market may determine a permit price that is too high to facilitate trade between participants. A further challenge is to ensure that producers only discharge pollution equivalent to the quantity of permits or credits that they hold entitlements to (ABARE 2001).

The use of tradeable discharge permits may have significant potential to reduce discharges for aquaculture sectors that produce point source discharges, such as trout and prawn farms, whose discharges can be readily monitored. For example, point source discharge licences for aquaculture usually set the maximum permissible discharge that may be produced, and the licence fees reflect this maximum. Conversion of the maximum level to a set of tradeable credits would provide an incentive to produce output with the least possible quantity of discharge. This incentive may influence a number of aspects of production, including decisions about human and physical capital investment. Further, this approach has the advantage of allowing producers to pay only for the amount of pollution that they decide to emit, and thereby reduce the potential for producers with low abatement costs to cross-subsidise less efficient producers.

Using tradeable permits for producers with diffuse source discharges, such as sea cage farms for tuna and kingfish, is more problematic given the challenges associated with measurement and monitoring. An alternative approach may be to target inputs (PC 2003a). For example, tradeable permits to use pellet fish feed (containing nitrogen and other nutrients), within an aggregate limit, could be used for producers that share receiving waters. This would require measurement and accreditation of existing and new feeds (for example, with lower nutrient levels) and ongoing monitoring of actual feed input levels against input permits.

Auctions for aquaculture leases

Auctions can be an efficient way of allocating a resource (such as a marine lease area), for which no conventional or ongoing market exists. By forcing bidders to reveal information about their valuation of the resource, auctions may allocate the resource to the bidder who values it the most. This can result in an efficient allocation of the resource — that is, one that maximises community welfare.

Auctions have become an increasingly popular instrument to allocate a range of public resources. For example, spectrum licences, conservation funds, pollution emission permits and water rights have all been allocated through auctions.

There is potential for the use of auctions to determine resource allocation for aquaculture purposes, such as auctions for marine aquaculture leases, instead of the administrative approaches for lease allocation currently used in South Australia and Tasmania (see section 5.2). For example, a recent discussion paper, *Legislative Options Regarding Crown Leases for Marine Aquaculture*, by the Victorian Department of Natural Resources and Environment proposed that:

For new sites the lessee would be chosen, and rental set, by competitive tender, including eligibility criteria and the use of an independent application evaluation panel if desired. (DNRE 2002, p. 30)

To be efficient, a tender should be open, with a competitive bidding process. There are a number of potential problems with the use of evaluation panels and assessment criteria (see section 5.2).

The main potential advantage is that auctions can allocate resources efficiently without requiring governments to have accurate prior knowledge of resource values to potential bidders. This outcome is achievable by promoting competition among bidders, so that those who place the highest value on the good bid highest for it. Auctions can therefore assign resources to those able to make the best use of them. Compared with administrative methods of allocating public resources, auctions may be more transparent and less dependent on the judgments of administrators about resource values to potential users.

However, auctions can perform poorly if they are not carefully designed and conducted. Market conditions (including the number of potential bidders) and design issues can distort auction outcomes and affect the revenue raising potential of an efficient allocation. Innovative auction designs which allow bidders to select particular packages of items (for example, a package of adjacent sites for aquaculture) may improve the scope for auctions to be used as a potentially efficient instrument for resource allocation (Chan et al 2003).

At times, auction design and conditions may be geared towards maximising revenue for governments rather than achieving efficiency. For example, governments may create artificial scarcity by restricting the number of marine aquaculture leases available at auction, in order to increase revenue. But this may be inefficient, and produce potentially lower benefits for the community by restricting excessively the number or extent of leases.

9.3 Voluntary approaches

Voluntary approaches to environmental management may contribute to the capacity of the aquaculture industry to manage environmental impacts and, in some cases,

can replace existing regulatory approaches. The Productivity Commission (PC 2003a, p. 218) highlighted that voluntary approaches and self-regulation:

... can have the advantage of industry and grower support (with potential benefits in terms of compliance), as well as efficiency benefits by tapping into the information and relationship base that exists within industries that governments do not have.

Despite these potential advantages, concerns have been raised about whether voluntary measures are likely to improve environmental outcomes (OECD 2003; Segerson and Li 1999). For example, the private benefits to firms or individuals may be insufficient to elicit participation. Further, OECD (2003, p. 14) notes that the efficiency of voluntary approaches is often low because 'environmental targets tend to be set for individual firms or sectors, rather than at a national level'.

Segerson and Li (1999, p. 284) suggest that voluntary approaches may be most effective when:

... (i) there is prior consultation with interested parties regarding the design and objectives of the programme; (ii) the objectives of the programme are clearly identified and quantified; (iii) the programme is phased-in over time with interim objectives; (iv) the resulting agreement is binding; ...

A number of voluntary instruments could potentially be applied to the aquaculture industry, including environmental management systems (EMSs), codes of practice (COP), environmental labelling, and cooperative agreements.

Environmental Management Systems

An EMS is a type of management framework that can be applied to businesses to help to identify, prioritise and manage environmental impacts in a systematic and continuous manner (see box 9.1).

Private businesses may choose to adopt an EMS for a number of reasons. The Productivity Commission (PC 2002e, p. 1), for example, noted that:

An agricultural business may voluntarily adopt an EMS because it: provides improved financial returns; is the least cost way of meeting regulatory requirements (or anticipated requirements); and/or can help achieve environmental management objectives and provide intangible benefits to the business and community.

An important factor influencing adoption of EMSs is the extent of private benefits that producers can expect to gain as a consequence of improved environmental management. One incentive for producers is the potential to achieve ISO (International Organization for Standardization) certification, and thereby better manage environmental impacts while creating an economic and marketing advantage for their business.

Box 9.1 Environmental Management Systems

An EMS provides a management framework that achieves continuous improvement through a 'plan, do, check, review' cycle. Environmental impacts and legal responsibilities are identified and a structured approach is taken to review and bring improvement. An EMS normally encompasses:

- a review of the significant environmental effects over which a business or organisation has control and influence;
- the implementation of an environmental policy and programs, including targets to deal with significant effects;
- the establishment of a management system to internalise controls; and
- periodic audits of these stages.

An EMS can provide a management framework within which a 'best management practice' can be integrated and/or a code of practice upheld.

Sources: EMS Working Group (2001); OECD (1998).

Some aquaculture producers are using EMSs. The Rocky Point Prawn Farm in Queensland, for example, has achieved ISO 14001 certification for an EMS to allow it to manage environmental impacts more effectively and to:

... demonstrate to their customers and to neighbouring communities that they are committed to achieving sound environmental practice. (QEPA 2002, p. 2)

Macdonald (2003c) has also noted that the EMS processes implemented by the company have directly contributed to Rocky Point Prawn Farm prawns becoming the 'benchmark of the premium market' for exports to Japan.

In South Australia, tuna farmers have jointly funded an environmental monitoring system to help manage environmental impacts associated with the sea cage farming of southern bluefin tuna. The Tuna Environmental Monitoring Program (TEMP) monitors the seafloor in proximity to sea cages to satisfy licence conditions (SARDI 2002). Although the incentive for tuna farmers to fund TEMP is predominantly to satisfy licence conditions, it may also positively contribute to consumer and community perspectives of the sustainability of South Australian produced tuna.

The extent to which gains in both profitability and environmental performance can potentially be achieved through EMSs is likely to vary, from case to case, depending on a range of factors, including the region, type and size of businesses, and consumer preferences (PC 2002e). Further, the Productivity Commission (PC 2002e, p. 10) noted that:

Given the limited empirical information available on the efficacy of EMSs in achieving private and/or public goals, and the various factors which determine the extent of private and public benefits and costs, increased research on the efficiency and effectiveness of EMSs in agriculture may be needed.

Codes of Practice

Codes of practice (COP) are documents that provide information and guidance to industry participants about ways to achieve ‘best management practice’. Such documents vary from general guidelines to highly detailed production checklists. In many cases, these codes are developed by industry experts and aim to provide practical assistance on how to operate a successful and sustainable aquaculture business.

In 1998, a peak national aquaculture body, the Australian Aquaculture Forum, developed a general COP for sustainable development in the aquaculture industry. The code was developed through a consultative process involving a wide range of stakeholders and was designed to encourage minimum standards for environmental performance (Australian Aquaculture Forum 1998). The document is currently used as a broad reference document by a number of state-based aquaculture councils and industry associations.

A potential extension of COP is for governments to allow operators to be ‘deemed to comply’ with regulations if they follow practices outlined in codes. This approach may have several potential benefits, including the capacity to:

- be updated in a more timely manner than government regulations;
- incorporate the expertise of those being regulated (potentially resulting in more effective guidance and greater industry acceptance and willingness to comply); and
- offer businesses well defined compliance requirements (which may be of particular benefit to small businesses who may lack the resources and expertise to operate successfully under performance-based regulation).

One aquaculture sector that has recently developed a COP specifically to help industry participants manage environmental impacts, and to partly meet regulatory requirements is the prawn farming industry. The *Environmental Code of Practice for Australian Prawn Farmers 2001* is designed to enable prawn farmers to achieve ‘best practice environmental management’ and to meet their legal obligation under the ‘general environmental duty of care’ of the *Environmental Protection Act 1994* (Queensland) (APFA 2002).

COP may also be used to improve the management of particular environmental impacts. For example, in Tasmania, the Marine and Marine Industries Council (2002) has developed a joint government and industry strategy for the management of seal interactions with salmon sea cages. Under the strategy, operators demonstrating compliance with a COP for seal interactions can employ ‘approved mitigation measures’, such as ‘seal crackers’ (small explosive devices which are thrown into the water to deter seals from interacting with fishing operations). The strategy also provides for new measures to be authorised, subject to trials.

The degree to which COP may influence environmental outcomes and be used to achieve compliance with regulations depends on the extent and coverage of the code and the rate of adoption by industry participants. There is currently limited information available for adoption rates across aquaculture sectors.

Environmental labelling

Environmental labelling is a process whereby businesses label their products to demonstrate positive attributes of their product or production process, such as sound environmental management. Labels may be used to demonstrate individual attributes of production or to highlight overarching production processes, such as COP and EMSs.

NADC (2002) has suggested that government and industry, as part of a broad marketing strategy, investigate the potential for using labels to promote Australian aquaculture products internationally as being high quality and ‘environmentally clean’. One example of such a labelling scheme has been developed by the Marine Stewardship Council (MSC), to allow consumers to identify fisheries businesses that have met an MSC environmental management standard (MSC 2002).

The benefits and costs of labelling will depend on several factors, including the level of consumer awareness and understanding of environmental impacts, the credibility of label information, and the cost of developing and promoting labels. Jones and Lansdell (2000) highlight the importance of independent testing and verification of label claims, and the existence and use of provisions that ban misleading or deceptive claims.

Cooperative agreements

The proximity of aquaculture producers and the collective risks posed by poor environmental management may create an incentive for producers to enter into cooperative agreements. For example, in the Huon estuary in Tasmania, aquaculture

producers using sea cage production systems have entered into a cooperative agreement to introduce a voluntary cap on the level of feed input to minimise the risk of algal blooms (Ross, D., DPIWE Tasmania, pers. comm., 12 June 2003). This action followed a report by the Commonwealth Scientific and Industrial Research Organisation (CSIRO 2000) that found an increased risk of localised algal blooms in the Huon estuary in summer, due to the potential combination of dissolved nutrients, reduced freshwater flows and higher sea temperatures.

Townsend (2002) notes that, with respect to fisheries management, private bargaining through cooperative agreements has reduced the need for some types of environmental regulation. Further, such agreements may, in some instances, form the basis for devolving resource management powers and responsibilities to industry groups (see section 9.1).

9.4 Other approaches: education and information

Education and information provision are two other policy approaches that can assist the management of environmental impacts from aquaculture. These approaches can be applied to individual businesses, industry sectors or the community.

At times, the provision of information or education to businesses and/or individuals may be as effective as regulatory measures for obtaining desired results. For example, information provided to individuals or companies about the implications of their actions, or for businesses to maintain a good reputation could be an effective strategy for changing behaviour. Similarly, attempting to educate the community of the need for change is another possible strategy (ORR 1998).

Education and information approaches are typically better suited to situations where environmental management does not occur because resource users are not well informed or lack the necessary skills. Also, education and the provision of information may be more effective when the desired change in resource use and associated environmental management increases profits (PC 2003a).

In some situations, it may be necessary to combine education with other instruments to increase their overall effectiveness, particularly when the desired change in resource use is not immediately profitable (PC 2003a). For example, education could be combined with a regulatory or market-based instrument, to bring a change in resource use. Similarly, COP for specific aquaculture sectors could be used in combination with licence rebates for adopting such practices.

As well as increasing the level of understanding of operators about management of environmental impacts, there may be opportunities to increase the level of

community understanding of aquaculture. The National Oceans Office, for example, observed in the Draft South-east Regional Marine Plan that:

Another pressure faced by the aquaculture industry is the negative perception of it by the general community. This needs to be addressed by improving community understanding. (NOO 2003, p. 18)

An industry consultant in Western Australia has also identified that:

In general the world is becoming more environmentally aware and concerned about industries that do not have sustainable management practices. Without an effective education program, a major constraining influence on the growth of sustainable aquaculture could be the Western Australian public and local communities' level of tolerance of aquaculture development. (Lendich 2003, p. 51)

Governments and the aquaculture industry may have a role in ensuring that the community is provided with sufficient information to develop an adequate understanding of the aquaculture industry, including that appropriately planned and managed aquaculture is economically, socially and environmentally sustainable. It may also be important to improve the level of knowledge and expertise of environmental agencies charged with approving and monitoring aquaculture operations (Lendich 2003).

9.5 Summary

- Traditional regulatory approaches may lack flexibility, be expensive and provide limited incentive for innovation.
- Innovative approaches to managing the potential environmental impacts of aquaculture operations, such as selected regulatory arrangements, market-based instruments and voluntary arrangements, may complement (or replace) existing arrangements.
- Innovative regulatory instruments (such as demerit schemes, environmental assurance bonds, offsets, and industry management agreements) could be used to improve the effectiveness and efficiency of aquaculture regulation.
- Market-based approaches (such as tradeable permits for pollution discharges, and auctions for lease allocations) may achieve desired regulatory outcomes in least cost ways, as they allow individuals to make their own benefit-cost tradeoffs in pursuing particular practices.
- Voluntary approaches (such as environmental management systems, codes of practice, environmental labelling and cooperative agreements) may contribute to the capacity of the aquaculture industry to manage environmental impacts and, in some cases, replace existing regulatory approaches.

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- Education and information approaches could play an important role, in particular, where sound environmental management does not occur because resource users are not well informed or lack the necessary skills.
 - A full assessment of the costs and benefits of particular innovative approaches is required before selecting one approach over another.
 - In some instances, administration, monitoring and compliance costs associated with alternative arrangements may outweigh potential benefits. In other cases, such as when environmental outcomes from alternative approaches may be uncertain and environmental thresholds may be breached, application will be limited.

10 Concluding comments

Aquaculture in Australia is a diverse and growing industry that makes a significant contribution to regional economic development and employment. There is potential for a well-managed aquaculture industry to continue to grow, while providing for sustainable management of the environment.

Aquaculture comprises a range of diverse activities, and involves the use of public and private resources, with potential for various environmental impacts, some of which may be significant. However, aquaculture production is subject to an unnecessarily complex array of legislation and agencies — covering marine and coastal management, environmental management, land use planning, land tenure, native title, and quarantine and translocation.

The potential environmental impacts from aquaculture vary according to the type of species farmed, type of production system, management practices used, location and number of farms, environmental carrying capacity, and condition and/or value of the environment. Recognising the variation in potential environmental impacts from different aquaculture operations is a necessary step in developing and implementing an efficient and effective environmental management regime. It is important to recognise that aquaculture may be only one of a number of activities contributing to environmental impacts in a particular area. An understanding is required of both the cumulative impacts from different activities, and the impacts from aquaculture relative to other activities.

Regulations shape incentives, influence how people behave and interact, and can help societies deal with otherwise intractable problems. Given the potential for significant environmental impacts from some aquaculture operations, some environmental regulation is clearly required. However, environmental regulatory arrangements that are unwarranted, or poorly developed and implemented, can impose unnecessary costs on aquaculture producers, consumers and the community, and adversely affect competitiveness and the environment.

To be efficient and effective, regulation needs to satisfy a number of criteria, including that there are clearly defined objectives, and that the regulation is consistently and transparently applied, not unduly prescriptive, and enforceable (Banks 2003a). Appendix E highlights some key features of efficient and effective environmental regulatory arrangements for aquaculture, as discussed in this paper.

The use of regulatory impact statement (RIS) processes can promote accountability and transparency. This is especially important in dynamic regulatory areas that may change quickly over time, such as environmental regulatory arrangements for aquaculture. The RIS process requires policy makers to consult with those affected, and to work through a sequential process of articulating the problem potentially requiring regulation, to assess a range of options, recommend the best option, and explain why other options (including non-regulatory), are not as effective.

The six Australian states have taken different approaches with environmental regulatory arrangements for aquaculture — for example, with marine aquaculture planning, and requirements for aquaculture, environmental and development approvals.

All jurisdictions use statutory and non-statutory planning processes to assess and allocate marine resources for aquaculture purposes, and provide for management of the marine environment. Compared to South Australia and Tasmania, statutory marine aquaculture planning is less developed in New South Wales, Queensland and Western Australia. Slow progress with statutory marine aquaculture planning may constrain marine aquaculture development. It may also result in ad hoc approvals, and resource use conflicts, as individual aquaculture developments are assessed in the absence of a resource planning framework.

For both marine and land-based aquaculture, a number of leases, licences, permits and development approvals may be required from government departments, agencies and local government depending on the location, species and production system. Major differences between state regulatory arrangements and aquaculture and environmental approvals include:

- South Australia and Tasmania have dedicated aquaculture legislation and do not require discrete environmental approvals for marine or land-based aquaculture — environmental conditions are covered as part of an aquaculture or marine farming approval;
- New South Wales and Victoria require both aquaculture and environmental approvals for land-based aquaculture, but only an aquaculture approval for marine aquaculture (in New South Wales, considered under an integrated development approval system);
- Queensland and Western Australia require both aquaculture and environmental approvals for marine and land-based aquaculture (in Queensland, this is part of an integrated development assessment system for approvals);
- large aquaculture developments with potential for significant environmental impacts may require additional environmental assessment in New South Wales and Western Australia; and

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- in all jurisdictions, except in South Australia, development approvals are not usually required for aquaculture activities in marine waters, but development approvals are required for land-based aquaculture.

The number of individual approvals, and the time required to obtain different approvals, can create barriers to entry into the aquaculture industry or expansion of existing operations. In some cases, there would appear to be scope to simplify approval systems by reducing the number of individual approvals required — for example, by introducing one approval that covers interrelated aspects of aquaculture production, including fish health and environmental management, rather than having individual aquaculture and environmental approvals. Approval processes could also be improved through the introduction of statutory timeframes for approval processing, and the provision of guidance to approval agencies or local government on the processing of approvals.

Further coordination of approval processes and more streamlined processing may provide greater certainty for applicants, and incentives for prompt and efficient processing of applications by agencies. There is potential for further research on the compliance costs of aquaculture approval processes in each jurisdiction, and ways to improve approval processes.

At present, there appears to be limited reporting by, and auditing of, the main agencies responsible for environmental regulatory arrangements for aquaculture in each state. Within confidentiality restrictions, aspects of regulatory and approval processes that could be reported on include: the number of applications; the number approved/rejected; processing times; and appeals. As well as potentially improving accountability and transparency, the reporting of such information may help to improve the application of regulation by identifying regulatory bottlenecks and opportunities for improvements with approval processes.

The efficiency and effectiveness of aquaculture regulation could be improved by greater use of environmental risk assessment based on species, production system, management practices, site location and the condition of the environment (such as the quality of receiving waters). For example, marine finfish farming in enclosed bays has different environmental impacts to marine farming in the open ocean, and marine finfish farming has different environmental impacts to land-based finfish farming. Any refinement of regulation along these lines, however, would need to consider the costs (including regulatory and administrative) and benefits.

There is a need for further research across industries to assess if the level of regulation and control is consistent with the level of environmental risk posed by each industry. For example, in most jurisdictions, point source water pollution from land-based aquaculture, such as prawn or trout farms, is often more heavily

regulated than are diffuse sources of pollution from other land uses, such as pastoral or horticultural farming. This has implications for the efficient and effective management of environmental impacts, and the development of the aquaculture industry.

There is potential for greater use of innovative policy instruments to complement (or in some cases replace) existing regulatory and administrative controls. For example, the use of auctions for marine lease allocation, and the use of tradeable discharge permits to manage discharges of effluent, may have merit. However, the costs and benefits of innovative policy instruments, including implementation and monitoring costs, will need to be assessed. Further research is needed to help assess the likely contribution of innovative policy instruments for management of aquaculture.

State government departments that are primarily responsible for the aquaculture regulatory arrangements often have potentially conflicting functions of policy development, implementation of regulation, industry promotion and development, and aquaculture research. There may be some size and efficiency advantages from the grouping of certain functions, but the conflict between regulatory and development roles may lead to public and industry mistrust over resource planning and allocation, regulatory approvals, monitoring and enforcement. Further, there is a risk that departments with resource planning and allocation, developmental and regulatory functions may provide conflicting or confusing advice to aquaculture operators.

The Australian and state governments have supported the growth of the aquaculture industry and selected sectors by providing funding for research, industry development and marketing. At times, this focus on industry development has occurred despite the compelling prior need to establish or refine environmental regulatory arrangements for aquaculture. Without appropriate regulatory arrangements, the aquaculture industry is unlikely to realise its potential, and any government funding of industry development will be less effective than otherwise.

Several state governments, including those in Victoria, Queensland and Western Australia, are currently reviewing parts of their aquaculture regulatory arrangements to improve administrative arrangements and approval processes. There is an opportunity to learn from successful reforms in other jurisdictions, both in Australia and overseas, to improve environmental regulatory arrangements for aquaculture.

A Summary of aquaculture regulatory arrangements

This appendix provides a summary of environmental regulatory arrangements for aquaculture in New South Wales, Victoria, Queensland, Western Australia, South Australia and Tasmania.

Table A.1 New South Wales aquaculture regulatory arrangements

	<i>Key features of legislation and/or administration</i>
Main legislation: <i>Fisheries Management Act 1994</i>	Long title: An Act relating to the management of fishery resources. Objects: To conserve, develop and share the fishery resources of the state for the benefit of present and future generations. In particular, the objects of the Act include: to conserve fish stocks and key fish habitats; conserve threatened species, populations and ecological communities of fish and marine vegetation; and promote ecologically sustainable development, including the conservation of biological diversity; and, consistent with these objects: promote viable commercial fishing and aquaculture industries; promote quality recreational fishing opportunities; appropriately share fisheries resources between the users of the resources, and provide social and economic benefits for the wider community (s. 3).
Aquaculture definition	Includes cultivating fish or marine vegetation for the purposes of harvesting the fish or marine vegetation or their progeny with a view to sale, or keeping fish or marine vegetation in a confined area for a commercial purpose (such as a fish-out pond). Does not include keeping anything in a pet shop for sale or in an aquarium for exhibition, or anything done for the purposes of maintaining a collection of fish or marine vegetation otherwise than for a commercial purpose, or any other thing prescribed by the regulations (<i>Fisheries Management Act 1994</i> , s.142).
Other legislation	Environmental protection — <i>Environmental Planning and Assessment Act 1979</i> and <i>Protection of the Environment Operations Act 1997</i> Planning and land use — <i>Environmental Planning and Assessment Act 1979</i> Access to public land — <i>Crown Lands Act 1989</i> Water management — <i>Water Management Act 2000</i> Native vegetation — <i>Native Vegetation Conservation Act 1997</i>
Policies/other instruments	<i>Statutory State Environmental Planning Policy 62 – Sustainable Aquaculture(2000)</i> under the <i>Environmental Planning and Assessment Act 1979</i> — the aim of the policy is to encourage sustainable aquaculture, make aquaculture a permissible use in areas where a regional aquaculture strategy has been developed, establish minimum performance criteria and provide for graduated assessment.

<i>Key features of legislation and/or administration</i>	
Policies/other instruments (continued)	Statutory Regional Sustainable Aquaculture Strategies — clarify agency roles, outline 'best practice management' (through a Statutory Aquaculture Industry Development Plan) and provide for streamlined development approvals. Prepared through a whole-of-government process — other marine and coastal values considered during strategy preparation.
Primary administrators	NSW Fisheries Also: Department of Environment and Conservation (DEC), Department of Infrastructure, Planning and Natural Resources, Department of Lands, and local governments.
Marine aquaculture resource planning and management	Statutory Aquaculture Industry Development Plans under the <i>Fisheries Management Act 1994</i> — the Minister is to have regard to any relevant plan in exercise of functions. A plan describes areas suitable for aquaculture and the type of aquaculture, suitable methods for undertaking aquaculture, suitable species, and contain performance indicators to monitor ecologically sustainable development performance.
Categories of marine aquaculture lease	Aquaculture lease — a lease for an area of public water land (land submerged by water), either for the whole area or a stratum. 'Public water land' means public land submerged by water (whether permanently or intermittently) but does not include land which is the subject of an aquaculture lease or land under any other lease. Class 1 lease — extensive cultivation of fish or marine vegetation and a majority of the area under cultivation is in water less than 6 metres in depth, or where the area comprises or includes a bed where oysters are dredged. Class 2 lease — extensive cultivation of fish or marine vegetation and a majority of the area under cultivation is in water 6 metres or more in depth (does not include dredging). Class 3 lease — intensive cultivation of fish or marine vegetation. Class 4 lease — fish ranching (artificial stocking of an area with juvenile fish that are able to roam freely and feed on naturally available food).
Marine aquaculture lease allocation	The Minister may, on application, or by auction, public tender or ballot, lease an area of public water land (land submerged by water) for use for aquaculture. In practice, leases are usually allocated on application. NSW Fisheries has just implemented a lease tender policy for all leases. Granting of a lease must not be inconsistent with any relevant aquaculture industry development plan. A lease does not authorise aquaculture without an aquaculture permit.
Marine aquaculture lease term and renewal	Lease term: not exceeding 15 years. A lease may be renewed for consecutive terms.
Nature of marine aquaculture lease	Does not provide exclusive occupation of the site. A lease provides a lessee with the exclusive right to cultivate within, and to take from, the leased area the species of fish or marine vegetation specified in the lease, and ownership of all fish or marine vegetation specified in the lease that are within the leased area. A lease does not confer the right of exclusive possession of the leased area and a lease is subject to the public right of fishing. Lease may be transferred with approval. Lease may be subdivided or sublet with approval.
Aquaculture permit/licence	Indefinite

<i>Key features of legislation and/or administration</i>	
Environment licence (DEC)	<p>Licence for either or both 'scheduled development work' and 'scheduled activities' for listed activity/premises.</p> <p>Listed activity: aquaculture or mariculture for the commercial production of marine, estuarine or freshwater organisms, including aquatic plants or animals involving supplemental feeding in tanks or artificial waterbodies, and the discharge of effluent, liquid sludge or other waste water into natural waterbodies.</p> <p>Exemptions: oyster production.</p>
Environmental impact assessment	<p>The <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act) considers assessments under both Part IV and V. Part IV of the EP&A Act is used where a local council has in place a local environmental plan, and part V of the EP&A Act is used where it does not. Under Part V of the EP&A Act, NSW Fisheries would be the consent authority for aquaculture.</p>
Land use planning or 'development approval'	<p><i>Environmental Planning and Assessment Act 1979</i> — objective to encourage the proper management, development and conservation of natural and artificial resources for the purpose of promoting the social and economic welfare of the community and a better environment.</p> <p>Local environmental plans prepared by councils, guide planning decisions for a local areas through zoning and development controls. Four development assessment categories: does not require a consent; requires a consent; requires a consent and additional issues to be covered; and prohibited.</p> <p><i>State Environmental Planning Policy 62 – Sustainable Aquaculture (2000)</i> makes aquaculture a permissible use in areas where a regional aquaculture strategy has been developed.</p>

Sources: New South Wales State legislation and policies.

Table A.2 Victorian aquaculture regulatory arrangements

<i>Key features of legislation and/or administration</i>	
Main legislation: <i>Fisheries Act 1995</i>	<p>Long title: To provide a modern legislative framework for the regulation, management and conservation of Victorian fisheries including aquatic habitats (s. 1).</p> <p>Objects: To provide for the management, development and use of Victoria's fisheries, aquaculture industries and associated aquatic biological resources in an efficient, effective and ecologically sustainable manner; to protect and conserve fisheries resources, habitats and ecosystems including the maintenance of aquatic ecological processes and genetic diversity; to promote sustainable commercial fishing and viable aquaculture industries and quality recreational fishing opportunities for the benefit of present and future generations; to facilitate access to fisheries resources for commercial, recreational, traditional and non-consumptive uses; and to encourage community participation (s. 3).</p>
Aquaculture definition	No definition in <i>Fisheries Act 1995</i> .
Other legislation	<p>Environmental protection — <i>Environment Protection Act 1970</i></p> <p>Planning and land use — <i>Planning and Environment Act 1987</i></p> <p>Access to Public land — <i>Land Act 1958</i> or <i>Crown Land (Reserves) Act 1978</i></p> <p>Water management — <i>Water Act 1989</i></p> <p>Native vegetation — <i>Planning and Environment Act 1987</i></p>
Policies/other instruments	<p>Statutory <i>State Environment Protection Policy (Waters of Victoria) (2003)</i></p> <p>Purpose: To help achieve sustainable surface waters by setting out the environmental values and beneficial uses of water, and the environmental quality to protect them, and goals for protection. Administered by the Environment Protection Authority.</p>
Primary administrators	<p>Department of Primary Industries</p> <p>Also: Environment Protection Authority, Department of Sustainability and Environment, and local governments.</p>
Marine aquaculture resource planning and management	<p>Statutory Fisheries Reserves Management Plans under the <i>Fisheries Act 1995</i> — provide for management of the reserve and how aquaculture can be undertaken, including assessment criteria, management controls and monitoring. Prepared by the Department of Primary Industries — other marine and coastal values considered through a broader marine and coastal planning process.</p>
Categories of marine aquaculture lease	<p>No specific marine aquaculture lease.</p> <p>Under the <i>Land Act 1958</i>, a lease may be potentially granted for any purpose for unreserved Public land (includes most of the marine waters of the state) — a lease could be granted for marine aquaculture production.</p> <p>A lease may also be potentially granted for reserved Public land under the <i>Crown Land (Reserves) Act 1978</i>. The purpose of any (reserve) lease should be consistent with the purpose of the reserve — a lease could be granted for marine aquaculture production.</p>
Marine aquaculture lease allocation	<p>The Minister may grant a lease by public auction, public tender or private negotiation. It is proposed that for new sites that the lessee would be chosen by competitive tender, possibly including eligibility criteria and the use of an independent application evaluation panel.</p>
Marine aquaculture lease term and renewal	<p>Lease term: Not exceeding 21 years (but a lease may consist of an initial term plus options provided that the total duration does not exceed the statutory maximum of 99 years).</p> <p>A lease may not be renewed.</p>

<i>Key features of legislation and/or administration</i>	
Nature of marine aquaculture lease	Provides for exclusive occupation of the site. Lease may be transferred with approval. Lease may be subdivided or sublet with approval.
Aquaculture permit/licence	1 year
Environment licence (Environment Protection Authority)	Works approval and licence for listed activity: fish farms or other facilities for the cultivation of edible aquatic organisms with a design water flow rate of 0.2 or more megalitres per day. Exemptions: premises discharging or depositing waste to land. No provisions for marine aquaculture.
Land use planning or 'development approval'	<i>Planning and Environment Act 1987</i> — primary objective 'to provide for the fair, orderly, economic and sustainable use and development of land'. Local councils prepare planning schemes that set out policies and requirements for the use, development and protection of land. Within schemes, land is divided into zones that list land uses in terms of: uses that do not require a permit; uses that require a permit; and uses that are prohibited. State-wide Victorian Planning Provisions define 'aquaculture' as 'land used to keep or breed aquatic animals, or cultivate or propagate aquatic plants'. Also included in definition of 'agriculture'.

Sources: Victorian State legislation and policies.

Table A.3 Queensland aquaculture regulatory arrangements

<i>Key features of legislation and/or administration</i>	
Main legislation: <i>Fisheries Act 1994</i>	<p>Long title: An Act for the management, use, development and protection of fisheries resources and fish habitats and the management of aquaculture activities, and for related purposes.</p> <p>Objects: Main purpose is to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to apply, balance and promote the principles of ecologically sustainable development (s. 3).</p>
Aquaculture definition	The cultivation of live fisheries resources for sale other than in circumstances prescribed under a regulation (Schedule to <i>Fisheries Act 1994</i>)
Other legislation	<p>Environmental protection — <i>Environmental Protection Act 1994</i></p> <p>Planning and land use — <i>Integrated Planning Act 1997</i></p> <p>Access to Public land — <i>Land Act 1994</i></p> <p>Water management — <i>Water Act 2000</i></p> <p>Native vegetation — <i>Vegetation Management Act 1999</i></p> <p><i>Great Barrier Reef Marine Protection Act 1975</i> (Commonwealth)</p>
Policies/other instruments	<p>Statutory <i>Environmental Protection (Water) Policy (1997)</i></p> <p>A framework for setting and formalising water quality objectives for all Queensland waterways. Requires local government to develop and implement environmental plans for sewage management, trade waste management, urban stormwater quality management, and water conservation. Administered by the Environmental Protection Agency.</p>
Primary administrators	<p>Department of Primary Industries – Queensland Fisheries Service</p> <p>Also: Department of Natural Resources and Mines, Environmental Protection Agency, Department of Local Government and Planning, Department of State Development, local governments, and the Great Barrier Reef Marine Park Authority (Australian Government).</p>
Marine aquaculture resource planning and management	Statutory Marine-based Aquaculture Management Plan (under development) — to provide guidelines and processes for marine aquaculture development in Queensland. Being prepared by the Queensland Fisheries Service.
Categories of marine aquaculture lease	<p>No specific marine aquaculture lease.</p> <p>Potentially, a lease may be granted under the <i>Land Act 1994</i> for unallocated state land (includes all land below high-water mark) — this could allow for a marine lease for aquaculture production. However, no marine aquaculture leases have been granted to date and aquaculture licences (usually 15 years) are used; these licences do not provide tenure or exclusivity over the area. While there are no exclusive access rights, any person other than the licence holder is prohibited from interfering with an aquaculture activity or fishing apparatus. Marine leases are one mechanism under consideration in the current development of the statutory marine aquaculture management plan.</p>
Marine aquaculture lease allocation	<p>There are currently no specific marine aquaculture leases. The mechanism for granting of occupancy rights (in addition to the current aquaculture licence issued by DPI for marine-based aquaculture and the process by which these rights will be allocated are under consideration.</p> <p>Under the <i>Land Act 1994</i>, the lease of unallocated state land (includes all land below high-water mark) may occur through public auction, tender or ballot, and without competition under certain circumstances.</p>

<i>Key features of legislation and/or administration</i>	
Marine aquaculture lease allocation (continued)	A lease below high-water mark may only be granted if it will not unduly affect safe navigation and sound development of the state's waterways and ports; the impact on marine infrastructure has been considered; it would not have a detrimental effect on coastal management; and it is consistent with the intent of any relevant state management plan.
Marine aquaculture lease term and renewal	Lease term: Not more than 50 years. A lease may be renewed for consecutive terms. No marine aquaculture leases have been granted to date and aquaculture licences (usually 15 years) are used without any form of tenure.
Nature of marine aquaculture lease	Provides for exclusive occupation of the site. Lease may be transferred with approval. Lease may be subdivided or sublet with approval.
Aquaculture permit/licence	15 years
Environment licence (Environmental Protection Agency)	Licence for level 1 environmentally relevant activities — level 1 environmentally relevant activity: cultivating or holding marine, estuarine or freshwater organisms (other than molluscs) in ponds or enclosures in waters and wastes are released to waters. Licence or 'development approval' for level 2 environmentally relevant activities — level 2 environmentally relevant activity: cultivating or holding marine, estuarine or freshwater organisms (other than molluscs) in ponds or enclosures in waters if the total area of the ponds or enclosures is 5 ha or more and no wastes are released to waters.
Land use planning or 'development approval'	<i>Integrated Planning Act 1997</i> (IPA) — purpose to seek to achieve ecological sustainability by coordinating and integrating planning; managing development processes; and managing the effects of development. Under IPA, planning schemes are prepared by local councils to manage growth and change in their area. Planning schemes must take into account statutory State Planning Policies (SPPs). Examples of current SPPs include the use of agricultural land and the disturbance and management of Acid Sulfate Soils. Development approvals required for certain activities. Development approvals for land-based facilities issued by local councils. Applications for development related activities are assessed through the Integrated Development Assessment System (IDAS) under the <i>Integrated Planning Act 1997</i> . Statewide aquaculture planning guideline for local councils prepared by Department of Primary Industries. A project to identify suitable sites for land-based aquaculture in the coastal zone is scheduled to be completed in May 2004. These sites will then be considered in future land planning undertaken by local councils and regional planning bodies.

Sources: Queensland State legislation and policies.

Table A.4 Western Australian aquaculture regulatory arrangements

	<i>Key features of legislation and/or administration</i>
Main legislation: <i>Fish Resources Management Act 1994</i>	Long title: An Act relating to the management of fish resources, to repeal and amend certain Acts, and for related purposes. Objects: To conserve, develop and share the fish resources of the state for the benefit of present and future generations. Specifically, the objects include protection of fish and their environment; sustainable exploitation of fish resources; management of fishing, aquaculture and associated industries, aquatic eco-tourism and other tourism reliant on fishing; fostering the development of commercial and recreational fishing and aquaculture; optimisation of the economic, social and other benefits from the use of fish resources; allocation of fish resources between users (s. 3).
<i>Pearling Act 1990</i>	Long title: An Act to regulate pearling and pearl oyster hatchery activities, to provide for the conservation and management of pearl oyster fisheries, to repeal the <i>Pearling Act 1912</i> and for connected purposes. No stated objects.
Aquaculture definition	The keeping, breeding, hatching or culturing of fish (<i>Fish Resources Management Act 1994</i> , s. 4).
Other legislation	Marine parks (and zoning) — <i>Conservation and Land Management Act 1994</i> Environmental protection — <i>Environmental Protection Act 1986</i> Planning and land use — <i>Town Planning and Development Act 1928</i> Access to Public land — <i>Land Administration Act 1997</i> Water management — <i>Rights in Water and Irrigation Act 1914</i> Native vegetation — <i>Soil and Land Conservation Act 1945</i>
Policies/other instruments	Statutory Coastal Zone Environmental Protection Policy (in preparation) Identify environmental values to be protected, objectives and criteria. Administered by the Environmental Protection Authority.
Primary administrators	Department of Fisheries Also: Department of Environment, Environmental Protection Authority, Department of Land Administration, Department of Conservation and Land Management, West Australian Planning Commission, and local governments.
Marine aquaculture resource planning and management	Statutory Management Plans for Marine Parks under the <i>Conservation and Land Management Act 1984</i> — provide for management of marine parks and may allow recreational and commercial activity which is consistent with conservation. Special purpose areas may be zoned for aquaculture purposes. Prepared by the controlling authority for that park. Also non-statutory regional aquaculture development plans — to provide development and siting guidelines for selected areas for aquaculture. Prepared by the Department of Fisheries — other marine and coastal values considered during plan preparation.
Categories of marine aquaculture lease	<i>Aquaculture lease</i> — a lease for occupying or using an area of land or waters for the purposes of aquaculture. An aquaculture lease may only be granted for an area of land and waters vested in the Minister for that purpose, or an area of coastal waters. <i>Pearl oyster farm lease</i> — a lease for using an area of waters for the purposes of pearl oyster farming.
Marine aquaculture lease allocation	The Minister may grant to any person an aquaculture lease to occupy or use an area of land or waters for the purposes of aquaculture. An aquaculture lease does not authorise the use of the lease without an aquaculture licence.

<i>Key features of legislation and/or administration</i>	
Marine aquaculture lease allocation (continued)	A pearl oyster farm lease may not be granted unless the applicant holds a hatchery or pearling licence. A pearl oyster farm lease shall not be issued as of right and, if it would be in the better interests of the pearling industry to do so, the Executive Director may refuse to issue a farm lease. The area of a pearl oyster farm cannot exceed 4 square nautical miles.
Marine aquaculture lease term and renewal	Lease term: 21 years. A lease may be renewed for consecutive terms.
Nature of marine aquaculture lease	Does not provide exclusive occupation of the site. Lease may not be transferred with approval. Lease may not be subdivided or sublet with approval.
Nature of pearl lease	Non-exclusive occupation of the site. Lease may transferred with approval. Lease may subdivided or sublet with approval.
Aquaculture permit/licence	1 year
Environment licence (Department of Environment)	Works approval and licence Aquaculture (ponds or tanks): premises on which marine, estuarine or freshwater fish or prawns are propagated or reared; and supplementary feeding occurs, in ponds or tanks that discharge waste into waters or onto land. Threshold (ponds or tanks): production or design capacity: biomass of 1000 kilograms or more. Aquaculture (natural waters): premises on which marine, estuarine or freshwater fish or prawns are propagated or reared; and supplementary feeding occurs, in enclosures in naturally occurring waters. No threshold for natural waters.
Environmental impact assessment	Under section 38 of the <i>Environmental Protection Act 1986</i> , proposals that are likely, if implemented, to have a significant impact on the environment should be referred to the Environmental Protection Authority. The Environmental Protection Authority considers proposals, and where a proposal is assessed, makes recommendations to the Minister for the Environment. The Minister then considers the advice of the Environmental Protection Authority and consults with relevant decision-making authorities in making a decision as to whether a proposal can be implemented. Where the Minister considers that a proposal can be implemented, the Minister places environmental conditions on the proposal. Auditing of these conditions is undertaken through the Department of Environment on behalf of the Minister.
Land use planning or 'development approval'	<i>Town Planning and Development Act 1928</i> — relates to the planning and development of land for urban, suburban, and rural purposes. Local councils prepare town planning schemes to control and guide land use and development in a district or town, and assign zones for particular types of land use. Planning schemes set out whether a development application is required. State-wide Model Scheme Text defines 'agriculture – intensive' to mean premises used for trade or commercial purposes, including outbuildings and earthworks, associated with a number of activities, including aquaculture. The State Planning Strategy (1997) outlines various criteria for plans including that aquaculture 'is considered as a potential use'. Also, that statutory planning addresses the future land and water requirements of the aquaculture industry. No other state-wide aquaculture planning guidelines for local councils.

Sources: Western Australian State legislation and policies.

Table A.5 South Australian aquaculture regulatory arrangements

	<i>Key features of legislation and/or administration</i>
Main legislation: <i>Aquaculture Act 2001</i>	Long title: An Act to regulate marine and inland aquaculture; to amend the <i>Environment Protection Act 1993</i> and the <i>Fisheries Act 1982</i> ; and for other purposes. Objects: To promote ecologically sustainable development of marine and inland aquaculture; maximise benefits to the community from the state's aquaculture resources; and ensure the efficient and effective regulation of the aquaculture industry (s. 8 (1)).
Aquaculture definition	Farming of aquatic organisms for the purposes of trade or business or research, but not including an activity declared by regulation not to be aquaculture, where farming of aquatic organisms means an organised rearing process involving propagation or regular stocking or feeding of the organisms or protection of the organisms from predators or other similar intervention in the organisms' natural life cycles (<i>Aquaculture Act 2001</i> , s. 3)
Other legislation	Environmental protection — <i>Environment Protection Act 1993</i> Planning and land use — <i>Development Act 1993</i> Access to Public land — <i>Crown Lands Act 1929</i> Water management — <i>Water Resources Act 1997</i> Native vegetation — <i>Native Vegetation Act 1991</i>
Policies/other instruments	Statutory <i>Environment Protection (Water Quality) Policy (2003)</i> The principal object of this policy is to achieve the sustainable management of waters, by protecting or enhancing water quality while allowing economic and social development. Administered by the Environment Protection Authority.
Primary administrators	Primary Industries and Resources South Australia (PIRSA) Also: Environment Protection Authority, Planning SA (within Department of Transport), Native Vegetation Council, Department of Environment and Heritage, Development Assessment Commission and local governments.
Marine aquaculture resource planning and management	Statutory Aquaculture Zone Policies under the <i>Aquaculture Act 2001</i> — aquaculture zone policies are prepared for selected areas and identify aquaculture zones and management controls. Prepared by PIRSA — other marine and coastal values considered during policy preparation.
Categories of marine aquaculture lease	<i>Aquaculture lease</i> — an aquaculture lease may be granted for an area of state waters and adjacent land (requires the concurrence of the Minister responsible for <i>Harbors and Navigation Act 1993</i>). <i>Pilot leases</i> — may only be granted for an area comprising or including state waters outside of an aquaculture zone. <i>Development or Production leases</i> — may only be granted for an area comprising or including state waters within an aquaculture zone or by conversion of a pilot lease. <i>Emergency leases</i> — may only be granted for aquaculture emergency zones for the purpose of protecting stock or the environment.
Marine aquaculture lease allocation	The Minister may grant a pilot lease for prospective aquaculture zones (competitive: merit assessment and ballot), or in unzoned areas (merit assessment). A development lease may be granted within aquaculture zones (competitive allocation process) or by conversion of pilot lease. A development lease may be converted to a production lease if performance criteria are met. A lease may not be granted unless a corresponding licence will also be granted.

<i>Key features of legislation and/or administration</i>	
Marine aquaculture lease allocation (continued)	The Aquaculture Tenure Allocation Board (ATAB) (six members) advise the Minister on any matter relating to the allocation of tenure for aquaculture. ATAB assess lease applications against criteria including: relevance to zone policies; nature of the proposal; economic benefit to the state; technical and business capacity; environmental management capacity; and regional and social benefits.
Marine aquaculture lease term and renewal	<p>Lease term:</p> <ul style="list-style-type: none"> • pilot lease - 12 months or less • development lease - 3 years or less • production lease - 20 years or less • emergency lease - 3 months or less <p>A lease may be renewed for consecutive terms:</p> <ul style="list-style-type: none"> • pilot lease - for up to 3 years in total • development lease – for up to 9 years in total • production lease - for successive terms • emergency lease - for up to 6 months in total
Nature of marine aquaculture lease	<p>Pilot lease - does provide exclusive occupation of the site; may not be transferred with approval; may not be subdivided or sublet with approval.</p> <p>Development lease - does provide exclusive occupation of the site; may be transferred with approval; may be subdivided or sublet with approval, if in lease conditions.</p> <p>Production lease – does provide exclusive occupation of the site; may be transferred with approval (give notice); may be subdivided or sublet with approval, if in lease conditions.</p>
Aquaculture permit/licence	10 years maximum
Environment licence (Environment Protection Authority)	The has mandatory referral on applications for aquaculture licences under the <i>Aquaculture Act 2001</i> , most lease conversions and development approval. The Environment Protection Authority could potentially licence a land-based aquaculture activity for discharge purposes, but only where certain criteria are met (ie significant discharge, chemical contamination and/or temperature change to the receiving environment). Currently, no land-based aquaculture operations are licensed by the Environment Protection Authority in South Australia under these criteria.
Land use planning or 'development approval'	<p><i>Development Act 1993</i> — object to provide for proper, orderly and efficient planning and development.</p> <p>Local councils (or the Minister) prepare development plans setting out planning and development objectives and controls. Development approval required for certain activities.</p> <p>The Planning Strategy for Regional South Australia guides land uses in development plans. The potential role and place of marine and land-based aquaculture is identified in the regional strategy.</p> <p>No state-wide definition of 'aquaculture'.</p> <p>No other state-wide aquaculture planning guidelines for local councils.</p>

Sources: South Australian State legislation and policies.

Table A.6 Tasmanian aquaculture regulatory arrangements^a

	<i>Key features of legislation and/or administration</i>
Main legislation: <i>Marine Farming Planning Act 1995</i> (marine farming)	Long title: An Act to provide for the planning of marine waters for marine farming and the allocation of marine farming leases. Objects: Purpose is to achieve well-planned sustainable development of marine farming activities having regard to the need to integrate marine farming activities with other marine uses; minimise any adverse impact of marine farming activities; set aside areas for other activities; and take account of land uses and the community's right to have an interest in marine farming activities (s. 4 (1)).
<i>Living Marine Resources Management Act 1995</i> (marine farming)	Long title: An Act to promote the sustainable management of living marine resources, to provide for management plans relating to fish resources, to protect marine habitats and to repeal the <i>Fisheries Act 1959</i> . Objects: To achieve sustainable development of living marine resources having regard to the need to increase the community's understanding of the integrity of the ecosystem upon which fisheries depend; provide and maintain sustainability of living marine resources; and take account of the community's needs and interests in respect of living marine resources (s. 7 (1)).
<i>Inland Fisheries Act 1995</i> (freshwater aquaculture)	Long title: An Act to consolidate the law relating to inland fisheries. No stated objects.
Marine farming definition (no definition of aquaculture)	Marine farming is defined as the farming, culturing, ranching, enhancement and breeding of fish or marine life for trade, business or research (<i>Marine Farming Planning Act 1995</i> , s. 3; <i>Living Marine Resources Management Act 1995</i> , s. 3). A fish farm is defined as any area on land or in inland waters used to farm, culture, hatch, rear, ranch, enhance or breed freshwater fish for commercial or research purposes (<i>Inland Fisheries Act 1995</i>).
Other legislation	Environmental protection — <i>Environmental Management and Pollution Control Act 1994</i> Planning and land use — <i>Land Use Planning and Approvals Act 1993</i> Access to Public land — <i>Crown Lands Act 1976</i> Water management — <i>Water Management Act 1999</i> Native vegetation — under State Resource Management and Planning System Also: <i>Marine and Safety Authority Act 1997</i> and <i>National Parks and Wildlife Act 1970</i>
Policies/other instruments	Coastal management — <i>State Coastal Policy 1996</i> and <i>State Coastal Policy Validation Act 2003</i> Water management — State Policy on Water Quality Management 1997
Primary administrators	Department of Primary Industries Water and the Environment (DPIWE) for marine farming and the Inland Fisheries Service for freshwater fish farming. This is under review and freshwater fish farming may be transferred to DPIWE. Also: local governments.

<i>Key features of legislation and/or administration</i>	
Marine farming resource planning and management	Statutory Marine Farming Development Plans under the <i>Marine Farming Planning Act 1995</i> — may be prepared for the whole or part of state waters, and any declared area which adjoins state waters and identify marine farming zones for marine farming. Each plan contains objectives, a description of the marine farming zones in the plan area, the type of fish allowed to be farmed in each zone, the maximum leased area for marine farming in each zone and management controls to regulate marine farming activities. Prepared by the Department of Primary Industries, Water and Environment or by approved applicants — other marine and coastal values must be considered during plan preparation. Plans must be reviewed at least once every 10 years.
Categories of marine farming lease	<i>Marine farming lease</i> — a lease may be granted for marine farming for any area designated for that purpose in a marine farming development plan. <i>Special lease</i> — a special lease may be granted for marine farming for any area designated for that purpose in a marine farming development plan. <i>Emergency lease</i> — the holder of a lease for an area covered by an emergency plan may apply for an emergency lease under certain circumstances.
Marine farming lease allocation	Leases can be allocated by any means deemed appropriate by the three member independent Board of Advice and Reference including tender, auction or ballot. The Minister takes advice from the Board on the method of allocation, and the criteria to be used to select who should participate in the allocation process. In practice, the allocation assessment is based on several criteria, with some consideration of the highest bid if similar applications are received. The Board must take into account any financial or other benefits to the state from allocating a lease to a particular person; and may take into account any previous experience or knowledge of the person in marine farming; fostering of employment; any contribution made by the person to industry research; and the capacity of the person to address social and environmental matters likely to affect the zone.
Marine farming lease term and renewal	Marine farming lease – term not exceeding 30 years and may be renewed for consecutive terms. Special lease – term not exceeding 30 years and may be renewed for consecutive terms. Emergency lease – term not exceeding 1 year and may be renewed subject to provisions in the relevant emergency plan.
Nature of marine farming lease	Marine farming lease - does provide exclusive occupation of the site, may be transferred with approval and can be subdivided or sublet with approval. Special lease - does not provide exclusive occupation of the site, may be transferred with approval and can be subdivided or sublet with approval.
Marine farming permit/licence	10 years maximum
Environment licence (DPIWE)	No provisions for marine farming or land-based aquaculture production. Aquaculture processing of more than 100 tonnes is a level 2 activity and assessed as part of development approval. A producer who intends to process more than 100 tonnes of fish per year is required to prepare an environmental impact assessment that is assessed by the Environmental Management Pollution Control Board. Environment Division of DPIWE provide advice to local councils on guidelines for Level 1 activities ie <100 tonnes production per year.

<i>Key features of legislation and/or administration</i>	
Land use planning or 'development approval'	<p><i>Land Use Planning And Approvals Act 1993</i></p> <p>Local councils prepare planning schemes to exercise control over use and development within defined areas. A planning scheme sets out requirements for use and development, including when a land use permit is required.</p> <p>A draft Planning Directive includes a Common Key Elements Template (2002) that defines: 'intensive livestock production' to mean use and development of land to intensively breed or farm marine and other animals for commercial purposes. Examples include a feedlot and intensive aquaculture.</p> <p>In the template, the purpose of the Rural Resource Zone is to provide for the sustainable use and development of resources for agriculture, aquaculture, forestry, mining and other primary industries.</p> <p>No other state-wide aquaculture planning guidelines for local councils.</p>

^a The term 'marine farming' is used instead of marine aquaculture in Tasmania.

Sources: Tasmanian State legislation and policies.

B Mandatory and potential approvals

This appendix outlines the mandatory and potential approvals that may apply to marine, coastal land-based and freshwater land-based aquaculture in New South Wales, Victoria, Queensland, Western Australia, South Australia and Tasmania. It also identifies the key legislation and relevant administering agency.

Marine aquaculture

A large-scale marine aquaculture venture (ie commercial-scale salmon or tuna farm), with associated land-based facilities (ie wharf, storage sheds and offices) in the coastal area, may require a number of approvals, including leases, licences, permits and development approvals. Smaller marine aquaculture operations may require less approvals.

Approvals

- **Mandatory:** for aquaculture (lease and/or licence), development approval and environmental pollution (works and/or licence).
- **Potential:** for broodstock, works on tidal land, Public lease/licence, to clear marine vegetation, and to clear native vegetation on land.
- **Other requirements:** for development in or adjacent to coastal and/or marine parks.
- **Other matters (may also require approval but not listed):** for example, state building, native wildlife, native title and heritage, cultural and archaeological site legislative requirements, and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and *Native Title Act 1993* requirements.

Any application for approval may require further referral or consultation with additional agencies to those identified.

New South Wales

Mandatory: marine aquaculture and associated land-based facilities

- Aquaculture lease — *Fisheries Management Act 1994* — NSW Fisheries.
- Aquaculture permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Development consent — *Environmental Planning and Assessment Act 1979* — local government (in most cases).

Potential approvals: marine aquaculture and associated land-based facilities

- Broodstock permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Licence or lease over Public land (foreshore) — *Crown Lands Act 1989* — Department of Lands (DoL).
- Permit to cut, remove or damage marine vegetation — *Fisheries Management Act 1994* — NSW Fisheries.
- Development consent (to clear native vegetation on land) — *Native Vegetation Conservation Act 1997* — Department of Infrastructure, Planning and Natural Resources (DIPNR).

Other requirements: marine aquaculture and associated land-based facilities

- Marine Parks Authority (MPA) — *Marine Parks Act 1997* — MPA to be consulted if aquaculture proposal in vicinity of marine park.
- NSW Coastal Council — *Coastal Protection Act 1979* — Coastal Council to be consulted if development in coastal zone.
- Marine aquaculture involving cages in the sea or other natural waterbody, in general, does not require an environment protection licence under the *Protection of the Environment Operations Act 1997*.

Victoria

Mandatory: marine aquaculture and associated land-based facilities

- Aquaculture licence — *Fisheries Act 1995* — Department of Primary Industries (DPI).
- Planning permit — *Planning and Environment Act 1987* — local government (for land-based facility).

Potential: marine aquaculture and associated land-based facilities

- General permit (broodstock collection) — *Fisheries Act 1995* — DPI.
- Lease of Public land (foreshore) — *Land Act 1958* or *Crown Land (Reserves) Act 1978* — Department of Sustainability and Environment (DSE).
- Land vegetation permit — *Planning and Environment Act 1987* — local government or DSE.

Other requirements: marine aquaculture and associated land-based facilities

- Lease of Public land (coastal or marine waters) — *Land Act 1958* or *Crown Land (Reserves) Act 1978* — DSE (may not be required).
- Victorian Coastal Council — *Coastal Management Act 1995* — planning permit on coastal Public land cannot be issued without prior consent of Minister for Conservation.

Queensland

Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS), including coastal protection and fisheries approvals. All aquaculture developments are considered as material change of use, while disturbance to marine plants, carrying out works in a declared Fish Habitat Area, and carrying out waterway barrier works are classified as operational works. Under IDAS, if a proposed aquaculture development is involved in all the above activities, the proponent will apply for only one approval, a development permit.

Resource allocation approvals are assessed separately outside of IDAS and are required for aquaculture developments that involve the use or interference with unallocated tidal lands or state waters, and works in a declared fish habitat area (only one resource allocation application is required for these approvals). A resource allocation authority does not give the holder any ownership or tenure over the land, and a development approval is still required. An applicant will have to obtain a ‘resource allocation authority’ under the *Fisheries Act 1994* before applying for a development approval under the *Integrated Planning Act 1997*.

Mandatory: marine aquaculture and associated land-based facilities

- Development approval — *Integrated Planning Act 1997* — local government (for land-based facility) (local government is assessment manager with the Environmental Protection Agency either a concurrence agency or assessment

manager under the *Environmental Protection Act 1994* — environmental impacts are considered as part of an operator’s development approval). The aquaculture licence under the *Fisheries Act 1994* is being incorporated into IDAS.

Potential: marine aquaculture and associated land-based facilities

- General fisheries permit (culture stock collection) — *Fisheries Act 1994* — DPI (QFS) (requires native title notification to relevant claimants/Land Councils).
- Works approval — tidal lands (approval to construct works on tidal lands or waters) — *Transport Infrastructure Act 1995* — Environmental Protection Agency (being incorporated into IDAS).
- Permit to occupy vacant Public land — *Land Act 1994* — Department of Natural Resources and Mines (DNRM) (for works or structures that cross state land ie foreshore) (requires native title notification to relevant claimants/Land Councils).
- Environmental licence (if waste released to waters) — *Environmental Protection Act 1994* — Environmental Protection Agency (most aquaculture defined as an ‘environmentally relevant activity’ so considered as a ‘material change of use’ which requires a ‘personal licence’. A personal environmental licence may be required in addition to the development approval — this will depend on the type of operation undertaken).
- Application to clear land vegetation — *Vegetation Management Act 1999* — DNRM (being incorporated into IDAS).
- Permit to remove, destroy or damage marine plants — *Fisheries Act 1994* — DPI (QFS) (being incorporated into IDAS).
- Approval for works — *Coastal Protection and Management Act 1995* — if the development encroaches on unoccupied State land in a coastal management control district or erosion prone area (being incorporated into IDAS).
- Permit (works or structures in either State Marine Park waters or Australian Government Marine Park waters) — *Marine Parks Act 1982* and/or *Great Barrier Reef Marine Park Act 1975* — Queensland Parks and Wildlife Service (QPWS) or QPWS/Great Barrier Reef Marine Park Authority (GBRMPA).
- Marine park discharge permit — *Great Barrier Reef Marine Park (Aquaculture) Regulations 2000* — GBRMPA (if land-based discharge into waters contiguous with the Great Barrier Reef Marine Park and World Heritage Area).

Permits are required for the operation of aquaculture facilities within the Great Barrier Reef Marine Park under the Great Barrier Reef Marine Park Regulations

1983 (ie for cage culture, sea ranching, seawater intake and discharge structures from land-based aquaculture facilities). The accreditation process (see below) for Queensland law under the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000, do not apply to aquaculture facilities or associated structures located in the marine park. The accreditation process only applies to land-based aquaculture facilities that discharge aquaculture waste to waterways leading to the marine park (ie those not discharging aquaculture waste directly into the marine park).

In July 2003, the Commonwealth and Queensland Governments (2003) proposed a joint accreditation process which will remove the need for a permit under the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000 for aquaculture developments affecting the marine park. The elements of the proposal are:

- the accreditation of Queensland environmental assessment law under the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000 which will remove the need for the additional permits from GBRMPA for land-based aquaculture developments affecting the marine park;
- accreditation of Queensland environmental assessment processes in a bilateral agreement under the EPBC Act; and
- consideration of case-by-case accreditation where necessary.

These elements are being underpinned by modifications both to the Queensland Integrated Development Application System, and to technical and operational standards. The expectation is that this will ensure that the assessment of actions under the single accredited process is conducted to the same standards that apply under the current arrangements.

Other requirements: marine aquaculture and associated land-based facilities

- Lease (coastal or marine waters) — *Land Act 1994* — DNRM (may not be required).
- The *State Development and Public Works Organisation Act 1971* provides for state planning and development through a coordinated system of public works organisation, for environmental coordination, and for related purposes. The Department of State Development coordinates an information gathering and approvals procedure in the application and assessment of projects of state significance under the Act.

Western Australia

Mandatory: marine aquaculture and associated land-based facilities

- Aquaculture licence — *Fish Resources Management Act 1994* — Department of Fisheries (DoF).
- Works approval — *Environmental Protection Act 1986* — Department of Environment (DoE).
- Environmental licence — *Environmental Protection Act 1986* — DoE.
- Development approval — *Town Planning and Development Act 1928* — local government (or Western Australian Planning Commission (WAPC) if of regional significance) (for land-based facility).

Potential: marine aquaculture and associated land-based facilities

- Ministerial exemption to take broodstock — *Fish Resources Management Act 1994* — DoF (no permit currently provided for).
- Public lease (foreshore) — *Land Administration Act 1997* — Department of Land Administration (DoLA).
- Notice of intent to clear land vegetation — *Soil and Land Conservation Act 1945* — Commissioner of Soil and Land Conservation (if clear more than 1 ha of native vegetation) (may be referred to the Environmental Protection Authority if significant environmental impacts) (under review).

Other requirements: marine aquaculture and associated land-based facilities

- Aquaculture lease — *Fish Resources Management Act 1994* — DoF (may not be required).
- Under the *Environmental Protection Act 1986*, development proposals that are likely, if implemented, to have a significant impact on the environment should be referred to the Environmental Protection Authority for assessment. The Environmental Protection Authority makes recommendations to the Minister for the Environment who considers if a proposal can be implemented, and what environmental conditions are required to be placed on the proposal.
- Approval may also be required from a port authority if the aquaculture site is in a port area.
- Note: specific pearl oyster farm leases and licences apply for pearling under the *Pearling Act 1990*.

South Australia

Mandatory: marine aquaculture and associated land-based facilities

- Aquaculture lease — *Aquaculture Act 2001* — Department of Primary Industries and Resources (PIRSA).
- Aquaculture licence — *Aquaculture Act 2001* — PIRSA (referral to Environment Protection Authority).
- Development approval — *Development Act 1993* — Development Assessment Commission (DAC) (for use of marine waters).
- Development approval — *Development Act 1993* — local government (or DAC) (for land-based facility).

Potential: marine aquaculture and associated land-based facilities

- Permit to take broodstock — *Fisheries Act 1982* — PIRSA.
- Application to clear land vegetation (may include seagrass) — *Native Vegetation Act 1991* — Native Vegetation Council.
- Lease of Public land (foreshore) — *Crown Lands Act 1929* — Department of Environment and Heritage (DEH).

Other requirements: marine aquaculture and associated land-based facilities

- Coast Protection Board — *Coast Protection Act 1972* — assesses and comments on development applications on coastal land referred by local government/DAC.
- *Harbours and Navigation Act 1993* stipulates navigational marking and location requirements — Department of Transport.
- Licence — *Environment Protection Act 1993* — Environment Protection Authority (potential licensing of an aquaculture operation for discharges under general discharge provisions).

Tasmania

Mandatory: marine aquaculture (marine farming) and associated land-based facilities

- Marine farming lease — *Marine Farming Planning Act 1995* — Marine Farming Branch, Department of Primary Industries, Water and Environment (DPIWE).

- Marine farming licence — *Living Marine Resources Management Act 1995* — Marine Farming Branch, DPIWE.
- Development approval — *Land Use Planning and Approvals Act 1993* — local government (consults with and may receive advice from Environment Division of DPIWE) (for land-based facility).

Potential: marine aquaculture (marine farming) and associated land-based facilities

- Licence or lease of Public land (foreshore) — *Crown Lands Act 1976* — Public Land Services (DPIWE).
- Taking of broodstock — *Living Marine Resources Management Act 1995* — Marine Farming Branch, DPIWE.

Other requirements: marine aquaculture (marine farming) and associated land-based facilities

- Environment Division, DPIWE — *State Policy on Water Quality Management 1997* — consider effluent discharge and associated emission standards for inland waters; and assess the environmental risks and determine whether an environmental impact assessment is required under the *Environmental Management and Pollution Control Act 1994*.
- No specific land clearing legislation controlling non-forestry related clearing under the *Tasmanian Resource Management and Planning System* — land clearing may not require approval.

Table B.1 Marine aquaculture: summary of approvals, Acts and agencies

	<i>Number of approvals</i>	<i>Number of Acts</i>	<i>Number of agencies</i>	<i>Approval process^a</i>
NSW	7	4	4	Part integrated/ part separate
VIC	5	3	3	Separate
QLDb	6	9	8	Part integrated/ part separate
WA	7	5	5	Separate
SA	7	5	5	Part integrated/ part separate
TAS	5	4	2	Part integrated/ part separate

^a Approvals for land-based activities can be managed through an integrated system (whereby approvals are coordinated through a single interface or process such as a one-stop-shop), or through a separate process whereby applicants apply for each approval separately. ^b State and Australian Government processes are involved. Queensland is integrating most of its development related controls under IDAS, including coastal protection and fisheries approvals. Resource allocation approvals are assessed separately outside of IDAS.

Sources: Commonwealth and state legislation.

Land-based aquaculture in the coastal area

A large-scale land-based aquaculture venture in the coastal area using saltwater (ie a commercial-scale prawn farm or abalone farm) may require a number of approvals, including leases, licences, permits and development approvals. Smaller land-based aquaculture operations in the coastal area may require less approvals.

Approvals

- **Mandatory:** for aquaculture, development and pollution (works and licence).
- **Potential:** for broodstock, works on tidal land, Public lease/licence, to clear marine vegetation, and to clear native vegetation on land.
- **Other requirements:** for development in the coastal zone and/or near coastal and/or marine parks.
- **Other matters (may also require approval but not listed):** for example, state building, native wildlife, native title and heritage, cultural and archaeological site legislative requirements, and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and *Native Title Act 1993* requirements.

Any application for approval may require further referral or consultation with additional agencies to those identified.

New South Wales

Mandatory: land-based aquaculture in the coastal area

- Aquaculture permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Environment protection licence (for scheduled development and scheduled activity – premises based) if discharging into a natural water body — *Protection of the Environment Operations Act 1997* — DEC (the scheduled development licence would be revised with appropriate conditions to form the scheduled activity – premises based licence).
- Development consent — *Environmental Planning and Assessment Act 1979* — local government (for land use).

Potential: land-based aquaculture in the coastal area

- Broodstock permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Licence or lease over Public land — *Crown Lands Act 1989* — DoL.

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- Permit to cut, remove or damage marine vegetation — *Fisheries Management Act 1994* — NSW Fisheries.
 - Development consent (to clear native vegetation on land) — *Native Vegetation Conservation Act 1997* — DIPNR.

Other requirements: land-based aquaculture in the coastal area

- Marine Parks Authority — *Marine Parks Act 1997* — to be consulted if aquaculture proposal in vicinity of marine park.
- NSW Coastal Council — *Coastal Protection Act 1979* — to be consulted if development in coastal zone.

Victoria

Mandatory: land-based aquaculture in the coastal area

- Aquaculture licence — *Fisheries Act 1995* — DPI.
- Works approval — *Environment Protection Act 1970* — Environment Protection Authority.
- Discharge licence — *Environment Protection Act 1970* — Environment Protection Authority.
- Planning permit — *Planning and Environment Act 1987* — local government (for land use).

Potential: land-based aquaculture in the coastal area

- General permit (broodstock collection) — *Fisheries Act 1995* — DPI.
- Lease of Public land — *Land Act 1958* or *Crown Land (Reserves) Act 1978* — DSE.
- Land vegetation permit — *Planning and Environment Act 1987* — local government or DSE.

Other requirements: land-based aquaculture in the coastal area

- Victorian Coastal Council — *Coastal Management Act 1995* — planning permit on coastal Public land cannot be issued without prior consent of Minister for Conservation.

Queensland

Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS) (see above).

Mandatory: land-based aquaculture in the coastal area

- Development approval — *Integrated Planning Act 1997* — local government (for land use) (local government is assessment manager with the Environmental Protection Agency either a concurrence agency or assessment manager under the *Environmental Protection Act 1994* — environmental impacts are considered as part of an operator's development approval). Aquaculture licence being incorporated into IDAS — *Fisheries Act 1994* — DPI (QFS).

Potential: land-based aquaculture in the coastal area

- General fisheries permit (culture stock collection) — *Fisheries Act 1994* — DPI (QFS) (requires native title notification to relevant claimants/Land Councils).
- Works approval — tidal lands (approval to construct works on tidal lands or waters) — *Transport Infrastructure Act 1995* — Environmental Protection Agency (being incorporated into IDAS).
- Permit to occupy vacant Public land — *Land Act 1994* — DNRM (for works or structures that cross state land) (requires native title notification to relevant claimants/Land Councils).
- Environmental licence (if waste released to waters) — *Environmental Protection Act 1994* — Environmental Protection Agency (most aquaculture defined as an 'environmentally relevant activity' so considered as a 'material change of use' which requires a 'personal licence'. A personal environmental licence may be required in addition to the development approval — will depend on the type of operation undertaken).
- Application to clear land vegetation — *Vegetation Management Act 1999* — DNRM (being incorporated into IDAS).
- Water licence (pump water from water course or bore) — *Water Act 2000* — DNRM.
- Permit to remove, destroy or damage marine plants — *Fisheries Act 1994* — DPI (QFS) (being incorporated into IDAS).
- Permit (works or structures in either State Marine Park waters or Australian Government Marine Park waters) — *Marine Parks Act 1982* and/or *Great Barrier Reef Marine Park Act 1975* — QPWS or QPWS/GBRMPA.

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- Approval for works — *Coastal Protection and Management Act 1995* — if the development encroaches on unoccupied State land in a coastal management control district or erosion prone area) (being incorporated into IDAS).
 - Marine park discharge permit — *Great Barrier Reef Marine Park (Aquaculture) Regulations 2000* — GBRMPA (if discharge waste into waters contiguous with the Great Barrier Reef Marine Park and World Heritage Area) (arrangements under review — the Australian and Queensland Governments (2003) have proposed a joint accreditation process which will remove the need for this permit for aquaculture developments affecting the marine park) (see above).

Other requirements: land-based aquaculture in the coastal area

- The *State Development and Public Works Organisation Act 1971* provides for state planning and development through a coordinated system of public works organisation, for environmental coordination, and for related purposes. The Department of State Development coordinates an information gathering and approvals procedure in the application and assessment of projects of state significance under the Act.

Western Australia

Mandatory: land-based aquaculture in the coastal area

- Aquaculture licence — *Fish Resources Management Act 1994* — DoF.
- Works approval — *Environmental Protection Act 1986* — DoE.
- Environmental licence — *Environmental Protection Act 1986* — DoE.
- Development approval — *Town Planning and Development Act 1928* — local government (or WAPC if of regional significance) (for land use).

Potential: land-based aquaculture in the coastal area

- Ministerial exemption to take broodstock — *Fish Resources Management Act 1994* — DoF (no permit currently provided for).
- Public lease — *Land Administration Act 1997* — DoLA.
- Notice of intent to clear land vegetation — *Soil and Land Conservation Act 1945* — Commissioner of Soil and Land Conservation (if clear more than 1 ha of native vegetation) (may be referred to the Environmental Protection Authority if significant environmental impacts) (under review).

Other requirements: land-based aquaculture in the coastal area

- Under the *Environmental Protection Act 1986*, development proposals that are likely, if implemented, to have a significant impact on the environment should be referred to the Environmental Protection Authority for assessment and recommendations to the Minister for the Environment. The Minister considers if a proposal can be implemented and what environmental conditions are required to be placed on the proposal.

South Australia

Mandatory: land-based aquaculture in the coastal area

- Aquaculture licence — *Aquaculture Act 2001* — PIRSA.
- Development approval — *Development Act 1993* — local government (or DAC) (for land use).

Potential: land-based aquaculture in the coastal area

- Permit to take broodstock — *Fisheries Act 1982* — PIRSA.
- Application to clear land vegetation (may include seagrass) — *Native Vegetation Act 1991* — Native Vegetation Council.
- Lease of Public land — *Crown Lands Act 1929* — DEH.

Other requirements: land-based aquaculture in the coastal area

- Coast Protection Board — *Coast Protection Act 1972* — assesses and comments on development applications on coastal land referred by local government or DAC.
- Public lease — *Harbors and Navigation Act 1993* — Minister of Transport has delegated approval to Minister for Primary Industries (considered as part of aquaculture lease).
- Licence — *Environment Protection Act 1993* — Environment Protection Authority (potential licensing of an aquaculture operation for discharges under general discharge provisions).

Tasmania

Mandatory: land-based aquaculture in the coastal area

- Marine farming licence (land-based)— *Living Marine Resources Management Act 1995* — Marine Farming Branch, DPIWE.
- Development approval — *Land Use Planning and Approvals Act 1993* — local government (consults with and may receive advice from Environment Division of DPIWE) (for land use).

Potential: land-based aquaculture in the coastal area

- Application to use Public land (licence or lease) — *Crown Lands Act 1976* — Public Land Services (DPIWE).
- Broodstock — *Living Marine Resources Management Act 1995* — Marine Farming Branch, DPIWE.

Other requirements: land-based aquaculture in the coastal area

- Notification of intention to take/discharge ocean water that may be considered by the Environmental Management and Pollution Control Board — DPIWE (part of overall application).
- ‘Taking of live fish for purpose of marine farming’ (eg broodstock) is part of marine farming licence.
- Environment Division, DPIWE — *State Policy on Water Quality Management 1997* — consider effluent discharge and associated emission standards for inland waters; and assess the environmental risks and determine whether an environmental impact assessment is required under the *Environmental Management and Pollution Control Act 1994*.
- No specific land clearing legislation with any control of non-forestry related clearing occurring under the *Tasmanian Resource Management and Planning System* — land clearing may not require approval.

Table B.2 **Land-based aquaculture in the coastal area: summary of approvals, Acts and agencies**

	<i>Number of approvals</i>	<i>Number of Acts</i>	<i>Number of agencies</i>	<i>Approval process^a</i>
NSW	7	5	5	Integrated
VIC	7	4	4	Separate
QLD ^b	7	10	7	Part integrated/ part separate
WA	7	5	5	Separate
SA	5	5	4	Separate
TAS	4	3	2	Separate

^a Approvals for land-based activities can be managed through an integrated system (whereby approvals are coordinated through a single interface or process such as a one-stop-shop), or through a separate process whereby applicants apply for each approval separately. ^b State and Australian Government processes are involved. Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS), including coastal protection and fisheries approvals. Resource allocation approvals are assessed separately outside of IDAS.

Sources: Commonwealth and state legislation.

Land-based aquaculture (freshwater)

A large-scale land-based freshwater aquaculture venture (ie commercial-scale trout or native fish farm using freshwater) may require a number of approvals, including leases, licences, permits and development approvals. Smaller land-based freshwater aquaculture operations may require less approvals.

Approvals

- **Mandatory:** for aquaculture, freshwater, development and pollution (works and licence).
- **Potential:** for broodstock, Public lease, clearing of native vegetation on land, dam and water management.
- **Other matters** (may also require approval but not listed): for example, state building, native wildlife, native title and heritage, cultural and archaeological site legislative requirements, and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and *Native Title Act 1993* requirements.

Any application for approval may require further referral or consultation with additional agencies to those identified.

New South Wales

Mandatory: land-based aquaculture (freshwater)

- Aquaculture permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Development consent — *Environmental Planning and Assessment Act 1979* — local government (for land use).
- Environment protection licence (for scheduled development and scheduled activity – premises based) if discharging into a natural water body — *Protection of the Environment Operations Act 1997* — DEC (the scheduled development licence would be revised with appropriate conditions to form the scheduled activity – premises based licence).
- Water licence (to take and use water) — *Water Management Act 2000* — DIPNR.

Potential: land-based aquaculture (freshwater)

- Broodstock permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Licence or lease over Public land — *Crown Lands Act 1989* — DoL.
- Development consent (to clear native vegetation on land) — *Native Vegetation Conservation Act 1997* — DIPNR.
- Dam (works approval)— *Water Management Act 2000* — DIPNR.

Victoria

Mandatory: land-based aquaculture (freshwater)

- Aquaculture licence — *Fisheries Act 1995* — DPI.
- Planning permit — *Planning and Environment Act 1987* — local government (for land use).
- Works approval — *Environment Protection Act 1970* — Environment Protection Authority.
- Discharge licence — *Environment Protection Act 1970* — Environment Protection Authority.
- Water licence (take and use freshwater) — *Water Act 1989* — Rural Water Authorities.

Potential: land-based aquaculture (freshwater)

- General permit (broodstock collection) — *Fisheries Act 1995* — DPI.
- Public lease — *Land Act 1958* or *Crown Land (Reserves) Act 1978* — DSE.
- Land vegetation permit — *Planning and Environment Act 1987* — local government or DSE.
- Licence to construct a dam — *Water Act 1989* — Rural Water Authorities (on rivers) or DSE (in declared water supply catchment or if exceeds certain limits).

Queensland

Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS) (see above).

Mandatory: land-based aquaculture (freshwater)

- Development approval — *Integrated Planning Act 1997* — local government (for land use) (local government is assessment manager with the Environmental Protection Agency either a concurrence agency or assessment manager under the *Environmental Protection Act 1994* — environmental impacts are considered as part of an operator's development approval). Aquaculture licence being incorporated into IDAS — *Fisheries Act 1994* — DPI (QFS).
- Water licence (pump water from water course or bore) — *Water Act 2000* — DNRM.

Potential: land-based aquaculture (freshwater)

- General fisheries permit (culture stock collection) — *Fisheries Act 1994* — DPI (QFS) (requires native title notification to relevant claimants/Land Councils).
- Public lease — *Land Act 1994* — DNRM (requires native title notification to relevant claimants/Land Councils).
- Environmental licence (if waste released to waters) — *Environmental Protection Act 1994* — Environmental Protection Agency (most aquaculture defined as an 'environmentally relevant activity' so considered as a 'material change of use' which requires a 'personal licence'. A personal environmental licence may be required in addition to the development approval — will depend on the type of operation undertaken).
- Application to clear land vegetation — *Vegetation Management Act 1999* — DNRM (being incorporated into IDAS).

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- Dam licence (if dam on a watercourse or if dam walls exceed certain limits) — *Water Act 2000* — DNRM.

Other requirements: land-based aquaculture (freshwater)

- The *State Development and Public Works Organisation Act 1971* provides for state planning and development through a coordinated system of public works organisation, for environmental coordination, and for related purposes. The Department of State Development coordinates an information gathering and approvals procedure in the application and assessment of projects of state significance under the Act.

Western Australia

Mandatory: land-based aquaculture (freshwater)

- Aquaculture licence — *Fish Resources Management Act 1994* — DoF.
- Development approval — *Town Planning and Development Act 1928* — local government (or WAPC if of regional significance) (for land use).
- Works approval — *Environmental Protection Act 1986* — DoE.
- Licence — *Environmental Protection Act 1986* — DoE.
- Water licence (to take water) — *Rights in Water and Irrigation Act 1914* — WRC (DoE).

Potential: land-based aquaculture (freshwater)

- Ministerial exemption to take broodstock — *Fish Resources Management Act 1994* — DoF (no permit currently provided for).
- Public lease — *Land Administration Act 1997* — DoLA.
- Notice of intent to clear land vegetation — *Soil and Land Conservation Act 1945* — Commissioner of Soil and Land Conservation (if clear more than 1 ha of native vegetation) (may be referred to the Environmental Protection Authority if significant environmental impacts) (under review).
- Dam permit — *Rights in Water and Irrigation Act 1914* — WRC (DoE).

Other requirements: land-based aquaculture (freshwater)

- Under the *Environmental Protection Act 1986*, development proposals that are likely, if implemented, to have a significant impact on the environment should

be referred to the Environmental Protection Authority for assessment and recommendations to the Minister for the Environment. The Minister considers if a proposal can be implemented and what environmental conditions are required to be placed on the proposal.

South Australia

Mandatory: land-based aquaculture (freshwater)

- Aquaculture licence — *Aquaculture Act 2001* — PIRSA.
- Development approval — *Development Act 1993* — local government (or DAC) (for land use).
- Water licence (to take and use) — *Water Resources Act 1997* — Department of Water, Land and Biodiversity Conservation (DWLBC).

Potential: land-based aquaculture (freshwater)

- Permit to take broodstock — *Fisheries Act 1982* — PIRSA.
- Application to clear land vegetation — *Native Vegetation Act 1991* — Native Vegetation Council.
- Public lease — *Crown Lands Act 1929* — DEH.
- Permit to construct a dam — *Water Resources Act 1997* — DWLBC.

Other requirements: land-based aquaculture (freshwater)

- Licence — *Environment Protection Act 1993* — Environment Protection Authority (potential licensing of an aquaculture operation for discharges under general discharge provisions).

Tasmania

Mandatory: land-based aquaculture (freshwater)

- Fish farm licence — *Inland Fisheries Act 1995* — IFS (function may be transferred to DPIWE).
- Development approval — *Land Use Planning and Approvals Act 1993* — local government (consults with and may receive advice from Environment Division of DPIWE) (for land use).

- Water licence — *Water Management Act 1999* — DPIWE.

Potential: land-based aquaculture (freshwater)

- Application to use Public land (licence or lease) — *Crown Lands Act 1976* — Public Land Services (DPIWE).
- Permission to construct a dam — *Water Management Act 1999* — DPIWE.
- Permit for broodstock — *Inland Fisheries Act 1995* — IFS (function may be transferred to DPIWE).

Other requirements: land-based aquaculture (freshwater)

- Environment Division, DPIWE — State Policy on Water Quality Management 1997 — consider effluent discharge and associated emission standards for inland waters; and assess the environmental risks and determine whether an environmental impact assessment is required under the *Environmental Management and Pollution Control Act 1994*.
- No specific land clearing legislation controlling non-forestry related clearing under the *Tasmanian Resource Management and Planning System* — land clearing may not require approval.

Table B.3 Land-based aquaculture (freshwater): summary of approvals, Acts and agencies

	<i>Number of approvals</i>	<i>Number of Acts</i>	<i>Number of agencies</i>	<i>Approval process^a</i>
NSW	8	6	5	Integrated
VIC	9	5	5	Separate
QLD ^b	6	6	4	Part integrated/ part separate
WA	9	6	6	Separate
SA	7	6	5	Separate
TAS	6	4	3	Separate

^a Approvals for land-based activities can be managed through an integrated system (whereby approvals are coordinated through a single interface or process such as a one-stop-shop), or through a separate process whereby applicants apply for each approval separately. ^b Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS), including fisheries approvals. Resource allocation approvals are assessed separately outside of IDAS.

Sources: State legislation.

B Mandatory and potential approvals

This appendix outlines the mandatory and potential approvals that may apply to marine, coastal land-based and freshwater land-based aquaculture in New South Wales, Victoria, Queensland, Western Australia, South Australia and Tasmania. It also identifies the key legislation and relevant administering agency.

Marine aquaculture

A large-scale marine aquaculture venture (ie commercial-scale salmon or tuna farm), with associated land-based facilities (ie wharf, storage sheds and offices) in the coastal area, may require a number of approvals, including leases, licences, permits and development approvals. Smaller marine aquaculture operations may require less approvals.

Approvals

- Mandatory: for aquaculture (lease and/or licence), development approval and environmental pollution (works and/or licence).
- Potential: for broodstock, works on tidal land, Public lease/licence, to clear marine vegetation, and to clear native vegetation on land.
- Other requirements: for development in or adjacent to coastal and/or marine parks.
- Other matters (may also require approval but not listed): for example, state building, native wildlife, native title and heritage, cultural and archaeological site legislative requirements, and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and *Native Title Act 1993* requirements.

Any application for approval may require further referral or consultation with additional agencies to those identified.

New South Wales

Mandatory: marine aquaculture and associated land-based facilities

- Aquaculture lease — *Fisheries Management Act 1994* — NSW Fisheries.
- Aquaculture permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Development consent — *Environmental Planning and Assessment Act 1979* — local government (in most cases).

Potential approvals: marine aquaculture and associated land-based facilities

- Broodstock permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Licence or lease over Public land (foreshore) — *Crown Lands Act 1989* — Department of Lands (DoL).
- Permit to cut, remove or damage marine vegetation — *Fisheries Management Act 1994* — NSW Fisheries.
- Development consent (to clear native vegetation on land) — *Native Vegetation Conservation Act 1997* — Department of Infrastructure, Planning and Natural Resources (DIPNR).

Other requirements: marine aquaculture and associated land-based facilities

- Marine Parks Authority (MPA) — *Marine Parks Act 1997* — MPA to be consulted if aquaculture proposal in vicinity of marine park.
- NSW Coastal Council — *Coastal Protection Act 1979* — Coastal Council to be consulted if development in coastal zone.
- Marine aquaculture involving cages in the sea or other natural waterbody, in general, does not require an environment protection licence under the *Protection of the Environment Operations Act 1997*.

Victoria

Mandatory: marine aquaculture and associated land-based facilities

- Aquaculture licence — *Fisheries Act 1995* — Department of Primary Industries (DPI).
- Planning permit — *Planning and Environment Act 1987* — local government (for land-based facility).

Potential: marine aquaculture and associated land-based facilities

- General permit (broodstock collection) — *Fisheries Act 1995* — DPI.
- Lease of Public land (foreshore) — *Land Act 1958* or *Crown Land (Reserves) Act 1978* — Department of Sustainability and Environment (DSE).
- Land vegetation permit — *Planning and Environment Act 1987* — local government or DSE.

Other requirements: marine aquaculture and associated land-based facilities

- Lease of Public land (coastal or marine waters) — *Land Act 1958* or *Crown Land (Reserves) Act 1978* — DSE (may not be required).
- Victorian Coastal Council — *Coastal Management Act 1995* — planning permit on coastal Public land cannot be issued without prior consent of Minister for Conservation.

Queensland

Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS), including coastal protection and fisheries approvals. All aquaculture developments are considered as material change of use, while disturbance to marine plants, carrying out works in a declared Fish Habitat Area, and carrying out waterway barrier works are classified as operational works. Under IDAS, if a proposed aquaculture development is involved in all the above activities, the proponent will apply for only one approval, a development permit.

Resource allocation approvals are assessed separately outside of IDAS and are required for aquaculture developments that involve the use or interference with unallocated tidal lands or state waters, and works in a declared fish habitat area (only one resource allocation application is required for these approvals). A resource allocation authority does not give the holder any ownership or tenure over the land, and a development approval is still required. An applicant will have to obtain a ‘resource allocation authority’ under the *Fisheries Act 1994* before applying for a development approval under the *Integrated Planning Act 1997*.

Mandatory: marine aquaculture and associated land-based facilities

- Development approval — *Integrated Planning Act 1997* — local government (for land-based facility) (local government is assessment manager with the Environmental Protection Agency either a concurrence agency or assessment

manager under the *Environmental Protection Act 1994* — environmental impacts are considered as part of an operator’s development approval). The aquaculture licence under the *Fisheries Act 1994* is being incorporated into IDAS.

Potential: marine aquaculture and associated land-based facilities

- General fisheries permit (culture stock collection) — *Fisheries Act 1994* — DPI (QFS) (requires native title notification to relevant claimants/Land Councils).
- Works approval — tidal lands (approval to construct works on tidal lands or waters) — *Transport Infrastructure Act 1995* — Environmental Protection Agency (being incorporated into IDAS).
- Permit to occupy vacant Public land — *Land Act 1994* — Department of Natural Resources and Mines (DNRM) (for works or structures that cross state land ie foreshore) (requires native title notification to relevant claimants/Land Councils).
- Environmental licence (if waste released to waters) — *Environmental Protection Act 1994* — Environmental Protection Agency (most aquaculture defined as an ‘environmentally relevant activity’ so considered as a ‘material change of use’ which requires a ‘personal licence’. A personal environmental licence may be required in addition to the development approval — this will depend on the type of operation undertaken).
- Application to clear land vegetation — *Vegetation Management Act 1999* — DNRM (being incorporated into IDAS).
- Permit to remove, destroy or damage marine plants — *Fisheries Act 1994* — DPI (QFS) (being incorporated into IDAS).
- Approval for works — *Coastal Protection and Management Act 1995* — if the development encroaches on unoccupied State land in a coastal management control district or erosion prone area (being incorporated into IDAS).
- Permit (works or structures in either State Marine Park waters or Australian Government Marine Park waters) — *Marine Parks Act 1982* and/or *Great Barrier Reef Marine Park Act 1975* — Queensland Parks and Wildlife Service (QPWS) or QPWS/Great Barrier Reef Marine Park Authority (GBRMPA).
- Marine park discharge permit — *Great Barrier Reef Marine Park (Aquaculture) Regulations 2000* — GBRMPA (if land-based discharge into waters contiguous with the Great Barrier Reef Marine Park and World Heritage Area).

Permits are required for the operation of aquaculture facilities within the Great Barrier Reef Marine Park under the Great Barrier Reef Marine Park Regulations

1983 (ie for cage culture, sea ranching, seawater intake and discharge structures from land-based aquaculture facilities). The accreditation process (see below) for Queensland law under the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000, do not apply to aquaculture facilities or associated structures located in the marine park. The accreditation process only applies to land-based aquaculture facilities that discharge aquaculture waste to waterways leading to the marine park (ie those not discharging aquaculture waste directly into the marine park).

In July 2003, the Commonwealth and Queensland Governments (2003) proposed a joint accreditation process which will remove the need for a permit under the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000 for aquaculture developments affecting the marine park. The elements of the proposal are:

- the accreditation of Queensland environmental assessment law under the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000 which will remove the need for the additional permits from GBRMPA for land-based aquaculture developments affecting the marine park;
- accreditation of Queensland environmental assessment processes in a bilateral agreement under the EPBC Act; and
- consideration of case-by-case accreditation where necessary.

These elements are being underpinned by modifications both to the Queensland Integrated Development Application System, and to technical and operational standards. The expectation is that this will ensure that the assessment of actions under the single accredited process is conducted to the same standards that apply under the current arrangements.

Other requirements: marine aquaculture and associated land-based facilities

- Lease (coastal or marine waters) — *Land Act 1994* — DNRM (may not be required).
- The *State Development and Public Works Organisation Act 1971* provides for state planning and development through a coordinated system of public works organisation, for environmental coordination, and for related purposes. The Department of State Development coordinates an information gathering and approvals procedure in the application and assessment of projects of state significance under the Act.

Western Australia

Mandatory: marine aquaculture and associated land-based facilities

- Aquaculture licence — *Fish Resources Management Act 1994* — Department of Fisheries (DoF).
- Works approval — *Environmental Protection Act 1986* — Department of Environment (DoE).
- Environmental licence — *Environmental Protection Act 1986* — DoE.
- Development approval — *Town Planning and Development Act 1928* — local government (or Western Australian Planning Commission (WAPC) if of regional significance) (for land-based facility).

Potential: marine aquaculture and associated land-based facilities

- Ministerial exemption to take broodstock — *Fish Resources Management Act 1994* — DoF (no permit currently provided for).
- Public lease (foreshore) — *Land Administration Act 1997* — Department of Land Administration (DoLA).
- Notice of intent to clear land vegetation — *Soil and Land Conservation Act 1945* — Commissioner of Soil and Land Conservation (if clear more than 1 ha of native vegetation) (may be referred to the Environmental Protection Authority if significant environmental impacts) (under review).

Other requirements: marine aquaculture and associated land-based facilities

- Aquaculture lease — *Fish Resources Management Act 1994* — DoF (may not be required).
- Under the *Environmental Protection Act 1986*, development proposals that are likely, if implemented, to have a significant impact on the environment should be referred to the Environmental Protection Authority for assessment. The Environmental Protection Authority makes recommendations to the Minister for the Environment who considers if a proposal can be implemented, and what environmental conditions are required to be placed on the proposal.
- Approval may also be required from a port authority if the aquaculture site is in a port area.
- Note: specific pearl oyster farm leases and licences apply for pearling under the *Pearling Act 1990*.

South Australia

Mandatory: marine aquaculture and associated land-based facilities

- Aquaculture lease — *Aquaculture Act 2001* — Department of Primary Industries and Resources (PIRSA).
- Aquaculture licence — *Aquaculture Act 2001* — PIRSA (referral to Environment Protection Authority).
- Development approval — *Development Act 1993* — Development Assessment Commission (DAC) (for use of marine waters).
- Development approval — *Development Act 1993* — local government (or DAC) (for land-based facility).

Potential: marine aquaculture and associated land-based facilities

- Permit to take broodstock — *Fisheries Act 1982* — PIRSA.
- Application to clear land vegetation (may include seagrass) — *Native Vegetation Act 1991* — Native Vegetation Council.
- Lease of Public land (foreshore) — *Crown Lands Act 1929* — Department of Environment and Heritage (DEH).

Other requirements: marine aquaculture and associated land-based facilities

- Coast Protection Board — *Coast Protection Act 1972* — assesses and comments on development applications on coastal land referred by local government/DAC.
- *Harbours and Navigation Act 1993* stipulates navigational marking and location requirements — Department of Transport.
- Licence — *Environment Protection Act 1993* — Environment Protection Authority (potential licensing of an aquaculture operation for discharges under general discharge provisions).

Tasmania

Mandatory: marine aquaculture (marine farming) and associated land-based facilities

- Marine farming lease — *Marine Farming Planning Act 1995* — Marine Farming Branch, Department of Primary Industries, Water and Environment (DPIWE).

- Marine farming licence — *Living Marine Resources Management Act 1995* — Marine Farming Branch, DPIWE.
- Development approval — *Land Use Planning and Approvals Act 1993* — local government (consults with and may receive advice from Environment Division of DPIWE) (for land-based facility).

Potential: marine aquaculture (marine farming) and associated land-based facilities

- Licence or lease of Public land (foreshore) — *Crown Lands Act 1976* — Public Land Services (DPIWE).
- Taking of broodstock — *Living Marine Resources Management Act 1995* — Marine Farming Branch, DPIWE.

Other requirements: marine aquaculture (marine farming) and associated land-based facilities

- Environment Division, DPIWE — *State Policy on Water Quality Management 1997* — consider effluent discharge and associated emission standards for inland waters; and assess the environmental risks and determine whether an environmental impact assessment is required under the *Environmental Management and Pollution Control Act 1994*.
- No specific land clearing legislation controlling non-forestry related clearing under the *Tasmanian Resource Management and Planning System* — land clearing may not require approval.

Table B.1 Marine aquaculture: summary of approvals, Acts and agencies

	<i>Number of approvals</i>	<i>Number of Acts</i>	<i>Number of agencies</i>	<i>Approval process^a</i>
NSW	7	4	4	Part integrated/ part separate
VIC	5	3	3	Separate
QLDb	6	9	8	Part integrated/ part separate
WA	7	5	5	Separate
SA	7	5	5	Part integrated/ part separate
TAS	5	4	2	Part integrated/ part separate

^a Approvals for land-based activities can be managed through an integrated system (whereby approvals are coordinated through a single interface or process such as a one-stop-shop), or through a separate process whereby applicants apply for each approval separately. ^b State and Australian Government processes are involved. Queensland is integrating most of its development related controls under IDAS, including coastal protection and fisheries approvals. Resource allocation approvals are assessed separately outside of IDAS.

Sources: Commonwealth and state legislation.

Land-based aquaculture in the coastal area

A large-scale land-based aquaculture venture in the coastal area using saltwater (ie a commercial-scale prawn farm or abalone farm) may require a number of approvals, including leases, licences, permits and development approvals. Smaller land-based aquaculture operations in the coastal area may require less approvals.

Approvals

- **Mandatory:** for aquaculture, development and pollution (works and licence).
- **Potential:** for broodstock, works on tidal land, Public lease/licence, to clear marine vegetation, and to clear native vegetation on land.
- **Other requirements:** for development in the coastal zone and/or near coastal and/or marine parks.
- **Other matters (may also require approval but not listed):** for example, state building, native wildlife, native title and heritage, cultural and archaeological site legislative requirements, and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and *Native Title Act 1993* requirements.

Any application for approval may require further referral or consultation with additional agencies to those identified.

New South Wales

Mandatory: land-based aquaculture in the coastal area

- Aquaculture permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Environment protection licence (for scheduled development and scheduled activity – premises based) if discharging into a natural water body — *Protection of the Environment Operations Act 1997* — DEC (the scheduled development licence would be revised with appropriate conditions to form the scheduled activity – premises based licence).
- Development consent — *Environmental Planning and Assessment Act 1979* — local government (for land use).

Potential: land-based aquaculture in the coastal area

- Broodstock permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Licence or lease over Public land — *Crown Lands Act 1989* — DoL.

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- Permit to cut, remove or damage marine vegetation — *Fisheries Management Act 1994* — NSW Fisheries.
 - Development consent (to clear native vegetation on land) — *Native Vegetation Conservation Act 1997* — DIPNR.

Other requirements: land-based aquaculture in the coastal area

- Marine Parks Authority — *Marine Parks Act 1997* — to be consulted if aquaculture proposal in vicinity of marine park.
- NSW Coastal Council — *Coastal Protection Act 1979* — to be consulted if development in coastal zone.

Victoria

Mandatory: land-based aquaculture in the coastal area

- Aquaculture licence — *Fisheries Act 1995* — DPI.
- Works approval — *Environment Protection Act 1970* — Environment Protection Authority.
- Discharge licence — *Environment Protection Act 1970* — Environment Protection Authority.
- Planning permit — *Planning and Environment Act 1987* — local government (for land use).

Potential: land-based aquaculture in the coastal area

- General permit (broodstock collection) — *Fisheries Act 1995* — DPI.
- Lease of Public land — *Land Act 1958* or *Crown Land (Reserves) Act 1978* — DSE.
- Land vegetation permit — *Planning and Environment Act 1987* — local government or DSE.

Other requirements: land-based aquaculture in the coastal area

- Victorian Coastal Council — *Coastal Management Act 1995* — planning permit on coastal Public land cannot be issued without prior consent of Minister for Conservation.

Queensland

Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS) (see above).

Mandatory: land-based aquaculture in the coastal area

- Development approval — *Integrated Planning Act 1997* — local government (for land use) (local government is assessment manager with the Environmental Protection Agency either a concurrence agency or assessment manager under the *Environmental Protection Act 1994* — environmental impacts are considered as part of an operator's development approval). Aquaculture licence being incorporated into IDAS — *Fisheries Act 1994* — DPI (QFS).

Potential: land-based aquaculture in the coastal area

- General fisheries permit (culture stock collection) — *Fisheries Act 1994* — DPI (QFS) (requires native title notification to relevant claimants/Land Councils).
- Works approval — tidal lands (approval to construct works on tidal lands or waters) — *Transport Infrastructure Act 1995* — Environmental Protection Agency (being incorporated into IDAS).
- Permit to occupy vacant Public land — *Land Act 1994* — DNRM (for works or structures that cross state land) (requires native title notification to relevant claimants/Land Councils).
- Environmental licence (if waste released to waters) — *Environmental Protection Act 1994* — Environmental Protection Agency (most aquaculture defined as an 'environmentally relevant activity' so considered as a 'material change of use' which requires a 'personal licence'. A personal environmental licence may be required in addition to the development approval — will depend on the type of operation undertaken).
- Application to clear land vegetation — *Vegetation Management Act 1999* — DNRM (being incorporated into IDAS).
- Water licence (pump water from water course or bore) — *Water Act 2000* — DNRM.
- Permit to remove, destroy or damage marine plants — *Fisheries Act 1994* — DPI (QFS) (being incorporated into IDAS).
- Permit (works or structures in either State Marine Park waters or Australian Government Marine Park waters) — *Marine Parks Act 1982* and/or *Great Barrier Reef Marine Park Act 1975* — QPWS or QPWS/GBRMPA.

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- Approval for works — *Coastal Protection and Management Act 1995* — if the development encroaches on unoccupied State land in a coastal management control district or erosion prone area) (being incorporated into IDAS).
 - Marine park discharge permit — *Great Barrier Reef Marine Park (Aquaculture) Regulations 2000* — GBRMPA (if discharge waste into waters contiguous with the Great Barrier Reef Marine Park and World Heritage Area) (arrangements under review — the Australian and Queensland Governments (2003) have proposed a joint accreditation process which will remove the need for this permit for aquaculture developments affecting the marine park) (see above).

Other requirements: land-based aquaculture in the coastal area

- The *State Development and Public Works Organisation Act 1971* provides for state planning and development through a coordinated system of public works organisation, for environmental coordination, and for related purposes. The Department of State Development coordinates an information gathering and approvals procedure in the application and assessment of projects of state significance under the Act.

Western Australia

Mandatory: land-based aquaculture in the coastal area

- Aquaculture licence — *Fish Resources Management Act 1994* — DoF.
- Works approval — *Environmental Protection Act 1986* — DoE.
- Environmental licence — *Environmental Protection Act 1986* — DoE.
- Development approval — *Town Planning and Development Act 1928* — local government (or WAPC if of regional significance) (for land use).

Potential: land-based aquaculture in the coastal area

- Ministerial exemption to take broodstock — *Fish Resources Management Act 1994* — DoF (no permit currently provided for).
- Public lease — *Land Administration Act 1997* — DoLA.
- Notice of intent to clear land vegetation — *Soil and Land Conservation Act 1945* — Commissioner of Soil and Land Conservation (if clear more than 1 ha of native vegetation) (may be referred to the Environmental Protection Authority if significant environmental impacts) (under review).

Other requirements: land-based aquaculture in the coastal area

- Under the *Environmental Protection Act 1986*, development proposals that are likely, if implemented, to have a significant impact on the environment should be referred to the Environmental Protection Authority for assessment and recommendations to the Minister for the Environment. The Minister considers if a proposal can be implemented and what environmental conditions are required to be placed on the proposal.

South Australia

Mandatory: land-based aquaculture in the coastal area

- Aquaculture licence — *Aquaculture Act 2001* — PIRSA.
- Development approval — *Development Act 1993* — local government (or DAC) (for land use).

Potential: land-based aquaculture in the coastal area

- Permit to take broodstock — *Fisheries Act 1982* — PIRSA.
- Application to clear land vegetation (may include seagrass) — *Native Vegetation Act 1991* — Native Vegetation Council.
- Lease of Public land — *Crown Lands Act 1929* — DEH.

Other requirements: land-based aquaculture in the coastal area

- Coast Protection Board — *Coast Protection Act 1972* — assesses and comments on development applications on coastal land referred by local government or DAC.
- Public lease — *Harbors and Navigation Act 1993* — Minister of Transport has delegated approval to Minister for Primary Industries (considered as part of aquaculture lease).
- Licence — *Environment Protection Act 1993* — Environment Protection Authority (potential licensing of an aquaculture operation for discharges under general discharge provisions).

Tasmania

Mandatory: land-based aquaculture in the coastal area

- Marine farming licence (land-based)— *Living Marine Resources Management Act 1995* — Marine Farming Branch, DPIWE.
- Development approval — *Land Use Planning and Approvals Act 1993* — local government (consults with and may receive advice from Environment Division of DPIWE) (for land use).

Potential: land-based aquaculture in the coastal area

- Application to use Public land (licence or lease) — *Crown Lands Act 1976* — Public Land Services (DPIWE).
- Broodstock — *Living Marine Resources Management Act 1995* — Marine Farming Branch, DPIWE.

Other requirements: land-based aquaculture in the coastal area

- Notification of intention to take/discharge ocean water that may be considered by the Environmental Management and Pollution Control Board — DPIWE (part of overall application).
- ‘Taking of live fish for purpose of marine farming’ (eg broodstock) is part of marine farming licence.
- Environment Division, DPIWE — *State Policy on Water Quality Management 1997* — consider effluent discharge and associated emission standards for inland waters; and assess the environmental risks and determine whether an environmental impact assessment is required under the *Environmental Management and Pollution Control Act 1994*.
- No specific land clearing legislation with any control of non-forestry related clearing occurring under the *Tasmanian Resource Management and Planning System* — land clearing may not require approval.

Table B.2 **Land-based aquaculture in the coastal area: summary of approvals, Acts and agencies**

	<i>Number of approvals</i>	<i>Number of Acts</i>	<i>Number of agencies</i>	<i>Approval process^a</i>
NSW	7	5	5	Integrated
VIC	7	4	4	Separate
QLD ^b	7	10	7	Part integrated/ part separate
WA	7	5	5	Separate
SA	5	5	4	Separate
TAS	4	3	2	Separate

^a Approvals for land-based activities can be managed through an integrated system (whereby approvals are coordinated through a single interface or process such as a one-stop-shop), or through a separate process whereby applicants apply for each approval separately. ^b State and Australian Government processes are involved. Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS), including coastal protection and fisheries approvals. Resource allocation approvals are assessed separately outside of IDAS.

Sources: Commonwealth and state legislation.

Land-based aquaculture (freshwater)

A large-scale land-based freshwater aquaculture venture (ie commercial-scale trout or native fish farm using freshwater) may require a number of approvals, including leases, licences, permits and development approvals. Smaller land-based freshwater aquaculture operations may require less approvals.

Approvals

- **Mandatory:** for aquaculture, freshwater, development and pollution (works and licence).
- **Potential:** for broodstock, Public lease, clearing of native vegetation on land, dam and water management.
- **Other matters** (may also require approval but not listed): for example, state building, native wildlife, native title and heritage, cultural and archaeological site legislative requirements, and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and *Native Title Act 1993* requirements.

Any application for approval may require further referral or consultation with additional agencies to those identified.

New South Wales

Mandatory: land-based aquaculture (freshwater)

- Aquaculture permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Development consent — *Environmental Planning and Assessment Act 1979* — local government (for land use).
- Environment protection licence (for scheduled development and scheduled activity – premises based) if discharging into a natural water body — *Protection of the Environment Operations Act 1997* — DEC (the scheduled development licence would be revised with appropriate conditions to form the scheduled activity – premises based licence).
- Water licence (to take and use water) — *Water Management Act 2000* — DIPNR.

Potential: land-based aquaculture (freshwater)

- Broodstock permit — *Fisheries Management Act 1994* — NSW Fisheries.
- Licence or lease over Public land — *Crown Lands Act 1989* — DoL.
- Development consent (to clear native vegetation on land) — *Native Vegetation Conservation Act 1997* — DIPNR.
- Dam (works approval)— *Water Management Act 2000* — DIPNR.

Victoria

Mandatory: land-based aquaculture (freshwater)

- Aquaculture licence — *Fisheries Act 1995* — DPI.
- Planning permit — *Planning and Environment Act 1987* — local government (for land use).
- Works approval — *Environment Protection Act 1970* — Environment Protection Authority.
- Discharge licence — *Environment Protection Act 1970* — Environment Protection Authority.
- Water licence (take and use freshwater) — *Water Act 1989* — Rural Water Authorities.

Potential: land-based aquaculture (freshwater)

- General permit (broodstock collection) — *Fisheries Act 1995* — DPI.
- Public lease — *Land Act 1958* or *Crown Land (Reserves) Act 1978* — DSE.
- Land vegetation permit — *Planning and Environment Act 1987* — local government or DSE.
- Licence to construct a dam — *Water Act 1989* — Rural Water Authorities (on rivers) or DSE (in declared water supply catchment or if exceeds certain limits).

Queensland

Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS) (see above).

Mandatory: land-based aquaculture (freshwater)

- Development approval — *Integrated Planning Act 1997* — local government (for land use) (local government is assessment manager with the Environmental Protection Agency either a concurrence agency or assessment manager under the *Environmental Protection Act 1994* — environmental impacts are considered as part of an operator's development approval). Aquaculture licence being incorporated into IDAS — *Fisheries Act 1994* — DPI (QFS).
- Water licence (pump water from water course or bore) — *Water Act 2000* — DNRM.

Potential: land-based aquaculture (freshwater)

- General fisheries permit (culture stock collection) — *Fisheries Act 1994* — DPI (QFS) (requires native title notification to relevant claimants/Land Councils).
- Public lease — *Land Act 1994* — DNRM (requires native title notification to relevant claimants/Land Councils).
- Environmental licence (if waste released to waters) — *Environmental Protection Act 1994* — Environmental Protection Agency (most aquaculture defined as an 'environmentally relevant activity' so considered as a 'material change of use' which requires a 'personal licence'. A personal environmental licence may be required in addition to the development approval — will depend on the type of operation undertaken).
- Application to clear land vegetation — *Vegetation Management Act 1999* — DNRM (being incorporated into IDAS).

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- Dam licence (if dam on a watercourse or if dam walls exceed certain limits) — *Water Act 2000* — DNRM.

Other requirements: land-based aquaculture (freshwater)

- The *State Development and Public Works Organisation Act 1971* provides for state planning and development through a coordinated system of public works organisation, for environmental coordination, and for related purposes. The Department of State Development coordinates an information gathering and approvals procedure in the application and assessment of projects of state significance under the Act.

Western Australia

Mandatory: land-based aquaculture (freshwater)

- Aquaculture licence — *Fish Resources Management Act 1994* — DoF.
- Development approval — *Town Planning and Development Act 1928* — local government (or WAPC if of regional significance) (for land use).
- Works approval — *Environmental Protection Act 1986* — DoE.
- Licence — *Environmental Protection Act 1986* — DoE.
- Water licence (to take water) — *Rights in Water and Irrigation Act 1914* — WRC (DoE).

Potential: land-based aquaculture (freshwater)

- Ministerial exemption to take broodstock — *Fish Resources Management Act 1994* — DoF (no permit currently provided for).
- Public lease — *Land Administration Act 1997* — DoLA.
- Notice of intent to clear land vegetation — *Soil and Land Conservation Act 1945* — Commissioner of Soil and Land Conservation (if clear more than 1 ha of native vegetation) (may be referred to the Environmental Protection Authority if significant environmental impacts) (under review).
- Dam permit — *Rights in Water and Irrigation Act 1914* — WRC (DoE).

Other requirements: land-based aquaculture (freshwater)

- Under the *Environmental Protection Act 1986*, development proposals that are likely, if implemented, to have a significant impact on the environment should

be referred to the Environmental Protection Authority for assessment and recommendations to the Minister for the Environment. The Minister considers if a proposal can be implemented and what environmental conditions are required to be placed on the proposal.

South Australia

Mandatory: land-based aquaculture (freshwater)

- Aquaculture licence — *Aquaculture Act 2001* — PIRSA.
- Development approval — *Development Act 1993* — local government (or DAC) (for land use).
- Water licence (to take and use) — *Water Resources Act 1997* — Department of Water, Land and Biodiversity Conservation (DWLBC).

Potential: land-based aquaculture (freshwater)

- Permit to take broodstock — *Fisheries Act 1982* — PIRSA.
- Application to clear land vegetation — *Native Vegetation Act 1991* — Native Vegetation Council.
- Public lease — *Crown Lands Act 1929* — DEH.
- Permit to construct a dam — *Water Resources Act 1997* — DWLBC.

Other requirements: land-based aquaculture (freshwater)

- Licence — *Environment Protection Act 1993* — Environment Protection Authority (potential licensing of an aquaculture operation for discharges under general discharge provisions).

Tasmania

Mandatory: land-based aquaculture (freshwater)

- Fish farm licence — *Inland Fisheries Act 1995* — IFS (function may be transferred to DPIWE).
- Development approval — *Land Use Planning and Approvals Act 1993* — local government (consults with and may receive advice from Environment Division of DPIWE) (for land use).

- Water licence — *Water Management Act 1999* — DPIWE.

Potential: land-based aquaculture (freshwater)

- Application to use Public land (licence or lease) — *Crown Lands Act 1976* — Public Land Services (DPIWE).
- Permission to construct a dam — *Water Management Act 1999* — DPIWE.
- Permit for broodstock — *Inland Fisheries Act 1995* — IFS (function may be transferred to DPIWE).

Other requirements: land-based aquaculture (freshwater)

- Environment Division, DPIWE — State Policy on Water Quality Management 1997 — consider effluent discharge and associated emission standards for inland waters; and assess the environmental risks and determine whether an environmental impact assessment is required under the *Environmental Management and Pollution Control Act 1994*.
- No specific land clearing legislation controlling non-forestry related clearing under the *Tasmanian Resource Management and Planning System* — land clearing may not require approval.

Table B.3 Land-based aquaculture (freshwater): summary of approvals, Acts and agencies

	<i>Number of approvals</i>	<i>Number of Acts</i>	<i>Number of agencies</i>	<i>Approval process^a</i>
NSW	8	6	5	Integrated
VIC	9	5	5	Separate
QLD ^b	6	6	4	Part integrated/ part separate
WA	9	6	6	Separate
SA	7	6	5	Separate
TAS	6	4	3	Separate

^a Approvals for land-based activities can be managed through an integrated system (whereby approvals are coordinated through a single interface or process such as a one-stop-shop), or through a separate process whereby applicants apply for each approval separately. ^b Queensland is integrating most of its development related controls under the Integrated Development Assessment System (IDAS), including fisheries approvals. Resource allocation approvals are assessed separately outside of IDAS.

Sources: State legislation.

C Marine and coastal planning instruments

The purpose of this appendix is to outline marine and coastal planning instruments in use across jurisdictions in Australia.

Table C.1 Marine and coastal planning instruments

<i>Jurisdiction</i>	<i>Instruments and status</i>	<i>Purpose and administering agency</i>
New South Wales	Coastal Policy (1997) (Stat.)	To establish nine broad coastal protection and management goals to guide decision-making (CCNSW ^a).
	State Environmental Planning Policy No.71 - Coastal Protection (2002) (Stat.)	To ensure a consistent and strategic approach to coastal planning and management; and a development assessment framework for the coastal zone (DEC ^a).
	Representative System of Marine Protected Areas (being implemented)	To provide a systematic approach to identifying marine protected area sites, and for prioritising new areas for marine conservation (MPA ^a).
Victoria	Coastal Strategy (2002) (Stat.)	To establish a broad vision for the long-term sustainable management of the coast and a framework to guide decision-making (VCCB ^b).
	Coastal Action Plans (being implemented) (Stat.)	To establish strategic directions and objectives for coastal use and development in a region (RCBs ^b).
	State Environment Protection Policy (Waters of Victoria) (Stat.) (2003)	To help achieve sustainable surface waters by setting out the environmental values and beneficial uses of water, and the environmental quality to protect them, and goals for protection (VEPA ^b).
	Marine National Parks legislation (2002) (Stat.)	Establishes a representative system of marine national parks and marine reserves (Parks Victoria ^b).
Queensland	State Coastal Management Plan (2001) (Stat.)	A framework for the protection and management of coastal natural and cultural resources (QEPA ^c).
	Regional Coastal Management Plans (being developed) (Stat.)	Specific requirements inform, guide and direct outcomes in relation to development assessment decisions (QEPA ^c).

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Table C.1 (continued)

<i>Jurisdiction</i>	<i>Instruments and status</i>	<i>Purpose and administering agency</i>
Queensland (continued)	Environmental Protection (Water) Policy 1997 (Stat.)	A framework for setting and formalising water quality objectives for all Queensland waterways. Requires local government to develop and implement environmental plans for sewage management, trade waste management, urban stormwater quality management, and water conservation (QEPA ^c).
	Marine Protected Areas: A Draft Planning Framework (2000)	Future policy directions for the planning and establishment of marine protected areas (QPWS ^c). Also <i>Marine Parks Act 1982</i> with seven marine park management plans.
	Great Barrier Reef Water Quality Protection Plan (in preparation)	Developed jointly by the Australian and Queensland Governments to protect the reef from land-based sources of pollution.
Western Australia	Coastal Zone Management Policy (draft 2001)	Establish whole-of-government policy on coastal planning, management and protection (CPCC ^d).
	Coastal Statement of Planning Policy (2003) (Stat.)	Set objectives, measures and requirements for coastal planning strategies (WAPC ^d).
	Coastal Zone Environmental Protection Policy (in preparation) (Stat.)	Identify environmental values to be protected, objectives and criteria (DoE ^d).
	Coastal Strategy (in preparation)	Comprehensive resource inventories to guide locations for development (CPCC ^d).
	Marine Planning Strategy (in preparation)	Broad framework for resource allocation and multiple use of marine waters (CPCC ^d).
	New Horizons Policy (1998)	Broad framework to guide marine conservation and management (MPRA). Three-tiered approach to marine conservation reserves — marine nature reserves (conservation and scientific research), marine parks (protection and use) and marine management areas (CALM ^d).
South Australia	'Our seas and coasts' — a Marine and Estuarine Strategy (1998)	High-level strategy for sustainable use, management and conservation of the marine and estuarine environment (implemented by a cross-agency Marine Managers Forum).
	Living Coast Strategy (in preparation)	Integration of the management and protection of the marine environment, coastal areas and estuaries for long term productivity and conservation (DEH ^e).
	Environment Protection (Water Quality) Policy (2003) (Stat.)	The principal object of this policy is to achieve the sustainable management of waters, by protecting or enhancing water quality while allowing economic and social development (SAEPA ^e).
	Out of Councils (Coastal Waters) Development Plan	Provides objectives and principles of development control for coastal waters, and includes the Spencer Gulf and Gulf St Vincent, the off-shore islands and land three nautical miles seaward of low water mark around the off-shore islands.
	Marine Protected Areas Policy (in preparation)	Goals and process to establish a comprehensive representative system of marine protected areas (DEH/DPIR ^e).

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Table C.1 (continued)

<i>Jurisdiction</i>	<i>Instruments and status</i>	<i>Purpose and administering agency</i>
Tasmania	State Coastal Policy (1996) (Stat.) <i>State Coastal Validation Act 2003</i>	Protection of the natural and cultural values of the coast, use of the coast in a sustainable manner and integrated management and protection of the coastal zone is a shared responsibility — all other statutory plans required to be prepared in accordance (DPIWE ^f).
	Marine Protected Areas Strategy (1998)	Primary goal is to establish and manage a comprehensive, adequate and representative system of marine protected areas to protect Tasmania's biological diversity (RPDC ^f).
	State Policy on Water Quality Management 1997	Purpose is to achieve the sustainable management of Tasmania's surface water and groundwater resources by protecting or enhancing their qualities while allowing for sustainable development in accordance with the objectives of Tasmania's Resource Management and Planning System.
Australian Government	Australia's Oceans Policy (1998)	A framework for integrated and ecosystem-based planning and management between 3 and 200 nautical miles from the coast (NOO ^g).
	Regional Marine Plans (under the Oceans Policy) (South-eastern and North marine plans in preparation)	Based on large marine ecosystems, will integrate sectoral commercial interests and identify areas for marine conservation — binding on all relevant government agencies (NOO ^g).
	Great Barrier Reef — representative areas program (draft)	Increase the protection of biodiversity within the marine park through increasing the extent of marine national park zones (GBRMPA ^g).
COAG	National Representative System of Marine Protected Areas (being implemented)	Primary goal to establish and manage a comprehensive, adequate and representative system of Marine Protected Areas in Australian waters (COAG ^h).
Natural Resource Management Ministerial Council	A Framework for a National Cooperative Approach to Coastal Issues (2003) (paper out for consultation)	Six themes for national cooperation and action including: integration of management across catchments, coasts and oceans; management of threats; sustainable resource use; and building the capacity of coastal communities and industries.

(Stat.) Statutory policy or plan. ^a Coastal Council of NSW; Department of Environment and Conservation; and Marine Parks Authority. ^b Victorian Coastal Council; Regional Coastal Boards; and Environment Protection Authority. ^c Environmental Protection Agency; and Queensland Parks and Wildlife Service. ^d Coastal Planning and Coordination Council; Western Australian Planning Commission; Environment Protection Authority; Marine Parks and Reserves Authority and Department of Conservation and Land Management. ^e Department for Environment and Heritage; Department of Primary Industries and Resources; and Environment Protection Authority. ^f Department of Primary Industries, Water and Environment; and Resource Planning and Development Commission. ^g National Oceans Office and Great Barrier Reef Marine Park Authority. ^h Council of Australian Governments.

Sources: Australian Government and state departmental information.

D State environment agencies and aquaculture

The purpose of this appendix is to provide background information on state environment agencies, and detail specific environmental provisions relating to aquaculture.

New South Wales Department of Environment and Conservation

The newly formed Department of Environment and Conservation will incorporate a number of existing environmental and resource management agencies, including the New South Wales Environment Protection Authority, National Parks and Wildlife Service, and Resource NSW. The Environment Protection Authority is the primary agency responsible for protecting the environment in New South Wales. Its statutory objectives, under the *Protection of the Environment Administration Act 1991*, are to protect, restore and enhance the quality of the environment, and reduce risks to human health.

In New South Wales, a licence is required under the *Protection of the Environment Operations Act 1997* for either or both ‘scheduled development work’ and ‘scheduled activities’ if an activity fits the description in schedule 1 of the Act, and is not exempted from licensing. ‘Scheduled development work’ means work at any premises at which scheduled activities are not carried on that is designed to enable scheduled activities to be carried on at the premises (s. 47 *Protection of the Environment Operations Act 1997*). Licences may be issued or varied so as to cover either or both ‘scheduled development work’ or ‘scheduled activities’. Licences may regulate all forms of pollution (including water pollution) resulting from that work or those activities (s. 44 *Protection of the Environment Operations Act 1997*).

In terms of aquaculture, an environment protection licence is only required if an aquaculture venture discharges into a natural waterbody. Under the current definition, marine aquaculture involving cages in the sea or other natural waterbody, in general, does not require an environment protection licence.

Schedule 1 - Schedule of licensed activities

Schedule 1 indicates that a licence is required for premises at which the activity is carried on (s. 48 *Protection of the Environment Operations Act 1997*). Activities referred to in this schedule are activities that are premises-based (ie the occupier of the premises at which the activity is carried on must be the holder of a licence authorising the activity to be carried on at those premises).

Premises-based activities

Aquaculture or mariculture for the commercial production (breeding, hatching, rearing or cultivation) of marine, estuarine or freshwater organisms, including aquatic plants or animals (such as fin fish, crustaceans, molluscs or other aquatic invertebrates), but not including oysters, involving:

- (a) supplemental feeding in tanks or artificial waterbodies, and
- (b) the discharge of effluent, liquid sludge or other waste water into natural waterbodies (such as rivers, streams, lakes, lagoons, swamps, wetlands, watercourses (including natural watercourses that have been artificially modified) or tidal waters (including the sea)), whether or not the discharge is by means of a pipe, drain, drainage depression, canal or other artificial form of conveyance.

Environmental assessment may occur under both Part IV and V of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Part IV of the EP&A Act is used where a local council has in place a local environmental plan, and Part V of the EP&A Act is used where it does not. Under Part V, NSW Fisheries would be the consent authority for aquaculture.

Victorian Environment Protection Authority

The Victorian Environment Protection Authority is a statutory body established under the *Environment Protection Act 1970* for the control of pollution on land, in water and air. The Environment Protection Authority maintains and enforces standards of environmental quality through works approvals, licences, inspections, pollution abatement notices, and land use planning referrals.

A works approval is required under section 19A of the *Environment Protection Act 1970* for works at scheduled premises which will or is likely to alter or increase the discharge of wastes or emission of noise to the environment, or be used for the treatment/storage of prescribed industrial wastes. A works approval must be obtained prior to commencing works, or use that will make the premises or any alteration in plant regardless of use or impact on discharge at a scheduled premises.

A licence is required under section 20 of the *Environment Protection Act 1970* prior to discharging waste, emitting noise and/or the treatment/storage of prescribed

industrial waste from/at the scheduled premises and commissioning any works subject to works approval.

The *Environment Protection (Scheduled Premises and Exemptions) Regulations 1996* designate certain industrial or commercial activities (scheduled categories) as belonging to one or more of the following six types as defined in the Environment Protection Act:

Schedule 1 - waste discharged or likely to be discharged to the atmosphere

Schedule 2 - waste discharged or likely to be discharged onto any land or into any waters

Schedule 3 - noise is or is likely to be emitted

Schedule 4 - sites which accept any prescribed waste for the purposes of reprocessing, treatment, storage or disposal; or which generate and then reprocess, treat, store or dispose of certain wastes (listed in the Regulations)

Schedule 5 - premises where EPA may require a financial assurance to cover future clean up costs

Schedule 6 - premises at which any ozone depleting substance is handled

Scheduled 1, 2 or 4 premises require an EPA works approval before they are built or modified and an EPA licence to operate.

Environment Protection (Scheduled Premises and Exemptions) Regulations 1996

The premises listed in Table A are prescribed as schedule one, schedule two and schedule three premises for the purposes of the Act.

Table A Scheduled Premises

Description of premises

2. Primary industry and allied operations

(c) Fish farms or other facilities for the cultivation of edible aquatic organisms with a design water flow rate of 0.2 or more megalitres per day.

Premises discharging or depositing waste solely to land are exempt from licensing.

Queensland Environmental Protection Agency

The Queensland Environmental Protection Agency, which includes the Queensland Parks and Wildlife Service, is a department of the Queensland Government. Its role is to protect Queensland's natural and cultural heritage, promote sustainable use of its natural capital and ensure a clean environment in administering the *Environmental Protection Act 1994*, *Nature Conservation Act 1992*, *Marine Parks Act 1982* and *Coastal Protection and Management Act 1995*.

The *Environmental Protection Act 1994* outlines environmentally relevant activities (ERAs) that are usually industrial activities with the potential to release contaminants to the environment, for example, chemical processing, waste treatment, spray painting etc. Some agricultural activities such as piggeries, prawn farms and cattle feedlots, are also ERAs. ERAs are defined in schedule 1 of the regulations.

There are two levels of ERAs. Level 1 ERAs are considered to present a higher risk to the environment and require the operator to be licensed under the *Environmental Protection Act 1994*. There is an annual licence fee for level 1 ERAs. Level 2 ERAs are considered to present a lower risk to the environment than level 1 ERAs and require the operator to hold a level 2 approval or a development approval under the *Integrated Planning Act 1998*. There are no ongoing fees for level 2 ERAs.

Environmental Protection Regulation 1998 - Schedule 1

Level 1 and 2 environmentally relevant activities and licence fees.

Aquacultural and agricultural activities:

1. Aquaculture--cultivating or holding marine, estuarine or freshwater organisms (other than molluscs) in ponds or enclosures in waters:

(a) if the total area of the ponds or enclosures is 5 ha or more and no wastes are released to waters;

Level 2 Annual licence fee \$ -

(b) if the total area of the ponds or enclosures is less than 5 ha and wastes are released to waters;

Level 1 Annual licence fee \$500

(c) if the total area of the ponds or enclosures is 5 ha or more but less than 10 ha and wastes are released to waters;

Level 1 Annual licence fee \$1000

(d) if the total area of the ponds or enclosures is 10-ha or more but less than 20 ha and wastes are released to waters; and

Level 1 Annual licence fee \$2000

(e) if the total area of the ponds or enclosures is 20 ha or more and wastes are released to waters.

Level 1 Annual licence fee \$3300.

Western Australian Department of Environment

The Department of Environment, Water and Catchment Protection is to be incorporated in 2004 by amalgamating the Department of Environmental Protection with the Water and Rivers Commission, and the Swan River Trust.

Under the *Environmental Protection Act 1986*, occupiers of prescribed premises are required to be authorised in respect of certain changes leading to discharges of waste or emissions of noise, odour or electromagnetic radiation in accordance with (i) a works approval; (ii) a licence; or (iii) a requirement contained in an abatement notice.

Under Schedule 1, Part 1 of the *Environmental Protection Regulations 1987*, there are two categories of aquaculture developments where a works approval must be obtained prior to construction, and a licence must be obtained prior to commissioning or operating the facility.

Schedule 1 -- Prescribed premises

3. Aquaculture (ponds or tanks): premises on which:

- (a) marine, estuarine or freshwater fish or prawns are propagated or reared; and
- (b) supplementary feeding occurs, in ponds or tanks that discharge waste into waters or onto land.

Production or design capacity: biomass of 1000 kilograms or more.

4. Aquaculture (natural waters): premises on which:

- (a) marine, estuarine or freshwater fish or prawns are propagated or reared; and
- (b) supplementary feeding occurs, in enclosures in naturally occurring waters.

The Western Australian Department of Environment is currently undertaking a review of the prescribed premises category list, and the works approval and environmental licensing requirements may change over the next twelve months.

Western Australian Environmental Protection Authority

The Western Australian Environmental Protection Authority is established under Part II of the *Environmental Protection Act 1986* as an independent authority. The *Environmental Protection Act 1986* Part IV provides the legislative framework for the environmental impact assessment process. Under this process, the Environmental Protection Authority examines statutory planning schemes and development proposals to assess their likely impacts on the environment. If the impacts are likely to be significant then the Environmental Protection Authority

provides advice to the Minister for the Environment on whether the proposal or scheme should be allowed to proceed and, if so, under what conditions to ensure that the environment is protected. The Minister for the Environment then decides if the proposal can be implemented.

South Australian Environment Protection Authority

The South Australian Environment Protection Authority is South Australia's primary environmental regulator, responsible for the protection of air and water quality, and control of pollution, waste, noise, and radiation. The Environment Protection Authority administers the *Environment Protection Act 1993* and the *Radiation Protection and Control Act 1982*.

In South Australia, aquaculture operators only require an aquaculture licence and a separate environmental licence from the Environment Protection Authority is not required. The aquaculture licence is administered by PIRSA and the licence regulates all on-site activities, including environmental management.

The Environment Protection Authority has mandatory referral on applications for aquaculture licences (including licence amendments) to PIRSA under the *Aquaculture Act 2001*, most lease conversions and development approval (under most circumstances). An environmental works approval is not required if development approval has been approved under the *Development Act 1993*. While the Environment Protection Authority does not have the capacity to issue an environmental authorisation for aquaculture purposes, it effectively retains a 'power of veto' over aquaculture licence applications which must be referred to them in accordance with section 59 of the Aquaculture Act.

Under the *Environment Protection Act 1993* an environmental authorisation is required before certain prescribed activities may be undertaken. The Environment Protection Authority could potentially licence an aquaculture activity for discharges to marine or inland waters under a general clause, but only where certain criteria were met (ie temperature change and/or chemical contamination to the receiving environment).

(7) Discharges to Marine or Inland Waters: the conduct of operations involving discharges into marine waters or inland waters where-

(a) the discharges-

(i) raise the temperature of the receiving waters by more than 2 degrees celcius at any time at a distance of 10 metres or more from the point of discharge; or

(ii) contain antibiotic or chemical water treatments; and

(b) the total volume of the discharges exceeds 50 kilolitres per day.

In South Australia, the intent is for all aquaculture activities to be licensed under the *Aquaculture Act 2001*. It is unlikely that the clause identified above will be applied to the aquaculture sector. There are currently no aquaculture activities licensed in South Australia in accordance with this clause.

Tasmania Department of Primary Industries, Environment and Water

In Tasmania, the Environment Division of the Department of Primary Industries, Environment and Water (DPIWE) administers effluent discharges and associated emission standards for inland waters under the *State Policy on Water Quality Management 1997*. The Division assesses environmental risks and determines whether an environmental impact assessment (EIA) is required under the *Environmental Management and Pollution Control Act 1994*.

Under the *Environmental Management and Pollution Control Act 1994*, level 2 activities require preparation of an EIA and assessment by the Environmental Management and Pollution Control Board. However, there are no level 2 provisions for marine farming or land-based fish farming production. Fish processing of more than 100 tonnes is a level 2 activity — a producer who intends to process more than 100 tonnes of fish per year is therefore required to prepare an EIA that is assessed by the Environmental Management Pollution Control Board.

Table D.1 Summary of state environmental agencies and aquaculture requirements

	<i>Type of approval</i>	<i>Summary of listed activity or premises Threshold/exemptions</i>
NSW	Licence for either or both 'scheduled development work' and 'scheduled activities'.	Aquaculture or mariculture for the commercial production of marine, estuarine or freshwater organisms, including aquatic plants or animals involving supplemental feeding in tanks or artificial waterbodies, and the discharge of effluent, liquid sludge or other waste water into natural waterbodies. Exemptions: oyster production.
VIC	Works approval and licence.	No provisions for marine aquaculture. Fish farms or other facilities for the cultivation of edible aquatic organisms with a design water flow rate of 0.2 or more megalitres per day. Exemptions: premises discharging or depositing waste to land.

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Table D.1 (continued)

	<i>Type of approval</i>	<i>Summary of listed activity or premises Threshold/exemptions</i>
QLD	Licence for level 1 environmentally relevant activities. Licence or development approval for level 2 environmentally relevant activities.	Level 1 environmentally relevant activity: cultivating or holding marine, estuarine or freshwater organisms (other than molluscs) in ponds or enclosures in waters and wastes are released to waters. Level 2 environmentally relevant activity: cultivating or holding marine, estuarine or freshwater organisms (other than molluscs) in ponds or enclosures in waters if the total area of the ponds or enclosures is 5 ha or more and no wastes are released to waters.
WA	Works approval and licence.	Aquaculture (ponds or tanks): premises on which marine, estuarine or freshwater fish or prawns are propagated or reared; and supplementary feeding occurs, in ponds or tanks that discharge waste into waters or onto land. Threshold (ponds or tanks): production or design capacity: biomass of 1000 kilograms or more. Aquaculture (natural waters): premises on which marine, estuarine or freshwater fish or prawns are propagated or reared; and supplementary feeding occurs, in enclosures in naturally occurring waters. No threshold for natural waters.
SA	The Environment Protection Authority has mandatory referral on aquaculture licences, most lease conversions and development approval (under most circumstances).	The following matters are referred to the Environment Protection Authority under the Aquaculture Act: <ul style="list-style-type: none"> • whether a licence should be granted; • whether a variation should be made to licence conditions; and • whether a lease should be converted to another form of lease. The Environment Protection Authority is considering the removal of the requirement for development approvals to be sent to them for comment as an adequate assessment of aquaculture activities is already undertaken in accordance with the mandatory provisions of the Aquaculture Act. Potentially, the Environment Protection Authority could licence discharges to marine or inland waters under a general clause involving discharges into marine waters or inland waters where- (a) the discharges- (i) raise the temperature of the receiving waters by more than 2 degrees celcius at any time at a distance of 10 metres or more from the point of discharge; or (ii) contain antibiotic or chemical water treatments; and (b) the total volume of the discharges exceeds 50 kilolitres per day.
TAS	Level 2 activities assessed as part of development approval.	No provisions for marine farming or land-based aquaculture production. Fish processing of more than 100 tonnes per year is a level 2 activity. Fish Processing is defined as: the conduct of works for scaling, gilling, gutting, filleting, freezing, chilling, packing or otherwise processing fish for sale and in which 100 tonnes or more of product per year are produced. A producer who intends to process more than 100 tonnes of fish per year is required to prepare an EIA that is assessed by the Environmental Management Pollution Control Board. Environment Division of DPIWE provide advice to local councils on guidelines for Level 1 activities ie < 100 tonnes production per year.

Sources: State legislation.

E Efficient and effective environmental regulatory arrangements for aquaculture

Table E.1 contains some key features of efficient and effective environmental regulatory arrangements for aquaculture. The table does not present a ‘best practice model’ for aquaculture regulation. Environmental regulatory arrangements for aquaculture are dependent on the institutional structures and broader regulatory frameworks within each jurisdiction. The type and scope of aquaculture activities in each jurisdiction, and the particular environmental conditions within which aquaculture activities are conducted, are also important factors. ‘Best practice’ regulatory arrangements can only be determined after a thorough assessment of regulatory options (including innovative approaches), and their suitability to the particular circumstances of each jurisdiction.

Table E.1 Efficient and effective environmental regulatory arrangements for aquaculture

Features	Efficient and effective approaches	Section
Research and information		
Aquaculture and environmental research	Identification of potential environmental impacts, especially significant and cumulative impacts	s. 2.3
Legislation and regulations		
Legislation	Adequate legislative basis for aquaculture regulatory arrangements Clear and concise statement of legislative objectives for aquaculture Clear hierarchy where there are multiple objectives Coordination/integration of legislative provisions between (inter/intra) legislation	s. 3.1
Matching of regulation with environmental risk assessment	Regulatory impact statements and risk analysis	s. 1.3 s. 6.3
	Consideration of innovative approaches	s. 9.1-9.4

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Table E.1 (continued)

Features	Efficient and effective approaches	Section
Administration/management		
Agency functions	Clearly defined functions Separation of regulatory and industry development functions Allocation of reliable long-term funding for core departmental functions	s. 3.2
Resource planning and allocation		
Marine/coastal management	Statutory arrangements for marine and coastal management, and marine aquaculture planning Integration of aquaculture management and marine planning Identification and declaration of marine aquaculture zones	s. 4.1 s. 4.2
Land use planning	Recognition and provision for aquaculture in state and local government land use planning arrangements State planning strategies and/or model planning schemes inform preparation of regional and local planning schemes Guidelines on aquaculture land use planning and processing of development approvals for local government	s. 4.3
Aquaculture leases		
Lease categories and potential uses	Flexibility with lease categories to allow for different uses	s. 5.1
Lease allocation	Efficient allocation based on open competitive bidding process based on price, such as auctions	s. 5.2 s. 9.2
Lease term, renewal and transfer arrangements	Long term leases that provide adequate security of tenure Provision for trading of leases through secondary markets to allocate leases to their most valued uses Provision for lease site relocation after pioneering phase	s. 5.3
Specification of lease rights	Sufficient exclusivity to avoid interference with aquaculture operations Provision for subdivision or subletting of leases	s. 5.3
Charging for use of public resources	Resource rental charges	s. 5.3 s. 9.2
Access to public land and water	Clear assessment criteria for applications to use public land and water Where applicable, processes to address native title Sufficient flexibility in pastoral leases to permit aquaculture activities Timely processes for the granting of access and tenure to public land and water Targeting of lease terms to specific conditions	s. 5.5 s. 5.6 s. 5.5
Aquaculture approval processes (licences, permits and development approvals)		
Risk-based management	Thresholds for triggering environmental approvals based on assessment of environmental risks Impact standards commensurate with the risks to the environment	s. 6.2

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Table E.1 (continued)

Features	Efficient and effective approaches	Section
Risk-based management (continued)	The extent of assessment, and the information sought from applicants reflects the risks attached to each proposal	s. 6.3
	Consideration of innovative approaches	s. 9.1-9.4
Number of approvals	Approval systems are as simple as possible, given the policy objectives to be achieved	s. 6.3
Coordination and/or integration of approvals	Integrated systems for approvals: 'one-stop-shops', coordination by a lead agency, 'case management', or accreditation of approval processes	s. 6.2 s. 6.3
	Provision of guidance to approval agencies or local councils	
Timeliness of approval processes	Timeframes for decision-making on approvals Early decision points	s. 6.3
Information and consultation	Adequate information and effective consultation processes	s. 6.3 s. 9.4
	information sought from applicants reflects the risks attached to each proposal	
Administrative charges and cost recovery	Mechanism used to recover costs reflects the timing and nature of the costs incurred Cost recovery policy, including mechanisms to ensure costs are minimised	s. 6.3
Approval terms, conditions, monitoring and enforcement		
Approval terms	Adequate lease terms minimise administration costs while maintaining flexibility	s. 7.1
Conditions	Conditions are not unnecessarily prescriptive or inflexible in addressing risks associated with production	s. 7.2
Appeals	Adequate appeal provisions for agencies, applicants and third parties	s. 7.3
Monitoring and enforcement	Baseline monitoring, monitoring over a sufficient time frame, appropriate scale (local and regional), addresses relevant ecological indicators	s. 7.4
Reporting	Reporting of the number of applications; approvals approved/rejected; discretionary approvals; processing times; appeals; monitoring and enforcement actions; 'state of environment' monitoring	s. 7.4
	Reporting of program expenditure for aquaculture	s. 3.2
Quarantine and translocation		
Consistency with international obligations	Risk assessments based on sound scientific assessment Consistency of state translocation policies with national quarantine policy	s. 8.2
Certainty and transparency of risk assessment and decision-making processes	Clear statement of the appropriate level of protection adopted in quarantine and translocation policies	s. 8.3
	Transparent, scientifically-based risk assessment processes and protocols Clear statement of assessment criteria Assessment of the risks of translocation within states	
Timeliness of decision-making	Development of criteria to prioritise the processing of applications Adoption of cost-effective risk assessment processes	s. 8.3

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