
Marine Aquaculture Areas



4. Marine aquaculture areas

The ECC's Terms of Reference require it to investigate and make recommendations on areas suitable for marine aquaculture, which can be developed on an environmentally sustainable basis. Marine aquaculture has the potential to contribute substantially to the Victorian economy.

The ECC's recommendations have focused on achieving a balance between providing access for aquaculture and minimising the impact on environmental values.

4.1 Overview

Marine aquaculture (or mariculture) is the cultivation and harvesting (or farming) of fish, shellfish and other aquatic species, including seaweeds, utilising seawater as a growing medium. Although the production levels from marine aquaculture are presently low in comparison to other States, there is potential for significant expansion in Victoria. Mussels are currently the main species for aquaculture, with most operations located in Port Phillip Bay. There are three categories of marine aquaculture each with specialised requirements and different impacts on the environment. See Appendix 7 for more details of operational requirements.

Land-based aquaculture of marine species

Land-based marine aquaculture appears to have immediate potential for economic growth. Seawater is pumped or diverted into the holding structures and subsequently discharged to sea, recirculated or utilised elsewhere. This form of aquaculture is relatively free of many of the technical problems which beset marine-based operations. The advantages and disadvantages of land-based aquaculture were outlined in the ECC's Interim Report published in February 1998. Compared with the criteria for marine-based aquaculture, the criteria for land-based proposals are simpler. Key criteria include salinity of water source, contaminants, water temperature, water quality, water intake site, and waste discharge.

Extensive marine aquaculture (generally shellfish)

While this form of aquaculture, where growth is dependent on naturally available food in the water column, requires larger areas for lease, it is a relatively non-intensive use. If sited so as not to interfere with other water users, most issues can be resolved. Supplementary feeding is not usually required.

Intensive marine aquaculture (generally finfish)

Cultivation is undertaken in controlled conditions and growth is promoted by the addition of food supplements. While the areas required for raising finfish at sea are not large, the use of supplementary feeding can have a significant impact in waters where there is inadequate water movement and exchange.

4.2 Victoria's aquaculture programs and the ECC's role

Marine aquaculture has major potential for growth within Victoria, and several initiatives over recent years have aimed to facilitate the development and growth of the aquaculture industry. The ECC has been requested to identify areas suitable for farming of marine species.

Since these terms of reference were given to the ECC in 1997, the Victorian Aquaculture Strategy was released in late 1998, and the Final Report of the Aquaculture Regulatory Reform Task Force was released in 1999. The EPA's State Environment Protection Policy (SEPP) (Waters of Victoria) provides for the management of aquaculture operations so that water quality is protected both for and from aquaculture. Schedule 6 (Waters of Port Phillip Bay) of the SEPP (Waters of Victoria) also requires aquaculture projects to include provision for site rehabilitation, as is accepted practice for land-based industries, to ensure that private operators do not pass on clean-up costs to the State.

The existing strategies and programs provide the framework to develop a profitable, diverse, ecologically sustainable and well managed aquaculture industry.

A major factor repeatedly identified as limiting aquaculture development in Victoria is lack of access to suitable sites in marine waters. Suitable sites are few in number outside Port Phillip Bay because of the high-energy nature of the open coastline and the ecological sensitivity of Victoria's major bays and inlets. The new Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (see page 10) increases the scrutiny that new developments such as marine aquaculture operations will undergo if they are proposed to be located in sensitive environments such as Ramsar wetlands.





Abalone are a valuable product suited to commercial aquaculture. Land-based farms are located near the coast with access to high quality sea water.
Photo: Peter Kinchington

The ECC has looked closely at potential sites for the various forms of aquaculture across Victoria's marine and coastal areas, working closely with industry, the Fisheries Co-Management Council's Aquaculture Sub-committee, and Fisheries Victoria's Aquaculture section.

The ECC highlights the following components of existing strategies and programs, stressing the importance of the provisions for protection of environmental values.

- Preparation of management plans for each new aquaculture area, which establishes the operational, environmental and administrative requirements, including specification of baseline and ongoing environmental monitoring requirements for management purposes.
- The establishment of a one-stop shop within Fisheries Victoria to provide a single point of contact between State Government and potential aquaculture proponents.
- Development of a Victorian Translocation Policy and guidelines.

4.3 Community views

The ECC received a considerable amount of input on marine aquaculture proposals following the release of the Draft Report. Two related issues dominated the submissions. Firstly, environmental risks associated with aquaculture operations in open waters were considered by some sections of the community to be so potentially serious that they believed that aquaculture should not proceed except in land-based facilities. Secondly, recommendations for aquaculture areas in some locations were strenuously opposed for these reasons, especially in sensitive environments such as Western Port and Corner Inlet, both listed as wetlands of international importance under the Ramsar Convention.

Several submissions commented that some recommendations appeared to be inconsistent with the ECC's own principle that aquaculture should not be practised on or immediately adjacent to sites with significant environmental values. Many submissions supported marine aquaculture in on-shore facilities, in preference to open water operations. See Appendix 2 for a fuller discussion of issues raised in submissions and the ECC's response.

Other people were frustrated that there were such negative views of aquaculture, especially as they believe there is the potential for some environmental benefits eg from the reduced pressure on some wild stocks. However there was little enthusiasm from the aquaculture industry itself for the proposed areas other than the extensions to existing sites, and only patchy support from local government for the proposed areas in their municipalities. Despite this, many believed that lack of access to suitable sites in marine waters or, at least, continuing uncertainty about whether such access will be provided, is an impediment to development of marine aquaculture in Victoria. The ECC agrees with this view.

User conflicts were an issue for some proposed zones, eg with commercial net fishers in some recommended areas, and with boating users in others. Infrastructure requirements and aesthetic issues were raised in relation to the draft recommendations for an aquaculture zone in Waratah Bay. Concerns about the potential impacts of abandoned infrastructure were raised several times in meetings and submissions.

Scientists recommended comprehensive monitoring and public reporting of existing operations as a means both to provide data on impacts, and potentially to allay community concerns about the environmental impacts of marine aquaculture.



4.4 Nutrient management and finfish culture in Port Phillip Bay

Nutrient enrichment is one of the major factors leading to degradation of aquatic systems around the world. Analysis of EPA monitoring data and the findings of the CSIRO Port Phillip Bay Environmental Study (1996) indicates that while much of the Bay appears to be in a good condition, the Werribee and Hobsons Bay segments are displaying signs of nutrient enrichment. These two areas are adjacent to two of the main inputs of nutrients to the Bay, the Western Treatment Plant and the Yarra River.

Nutrient enrichment is widely viewed as the single most important risk to the environmental quality of Port Phillip Bay (EPA 1997). The Port Phillip Bay Environmental Study recommended a target reduction in overall load of 1000 tonnes per year of nitrogen. It is Victorian Government policy – see Schedule F6 (Waters of Port Phillip Bay) of the SEPP (Waters of Victoria) – to reduce nitrogen inputs to Port Phillip Bay by 1000 tonnes per annum (approximately 15%) by the year 2006.

Some key risks leading to nutrient enrichment of the Bay include sewage, stormwater run-off from urban and rural land, and activities directly connected to the bay such as aquaculture. The Victorian Government has recently announced its new Victorian Stormwater Action Program. The program will improve the management of urban stormwater in metropolitan and regional areas, reducing adverse impacts on the environment.

Effects of aquaculture on world fish supplies

Global production of farmed fish and shellfish has more than doubled in the past 15 years. Many people believe that such growth relieves pressure on ocean fisheries, but the opposite is true for some types of aquaculture. Farming carnivorous species requires large inputs of wild fish for feed. Some aquaculture systems also reduce wild fish supplies through habitat modification, wild seedstock collection and other ecological impacts. On balance, global aquaculture production still adds to world fish supplies; however, if the growing aquaculture industry is to sustain its contribution to world fish supplies, it must reduce wild fish inputs in feed and adopt more ecologically sound management practices.

Source: Naylor, R.L. *et al.* (2000), *Nature* 405: 1017-1024.

The additional nutrient loading from active feeding aquaculture such as finfish farming is apparent as the supplied food represents a net input to the system. Passive feeding aquaculture can also alter the nutrient regime of an area as it effectively operates as a filter, or concentrator, of ambient food material. Sedimentation of excretory products is known to occur under mollusc farms. Similar sedimentation is observed beneath other types of aquaculture (EPA 1997).

Because finfish farming in the bay would require supplementary feeding (which would result in increased nitrogen input), the establishment of any proposed farms would need to be done with considerable caution. Finfish farming also has other risks which the community has expressed concern about such as the potential introduction of exotic organisms through the use of artificial feed. The use of therapeutic chemicals or biostimulants is already disallowed under the provisions of the SEPP (Waters of Victoria).

Although nutrient offsets appear to be a conceptually simple and attractive proposition (eg siting a shellfish or seaweed operation adjacent to a finfish operation) the ECC believes that in practice, for technical reasons it may be difficult to demonstrate no net nutrient input, especially at a local scale and, for economic or commercial reasons, the incentive to maintain offsets may waver. In addition, the legislative and administrative mechanisms for ensuring such offsets are maintained and monitored need to be clearly articulated.

Recommendation

R40 Commercial finfish aquaculture should not be considered in Port Phillip Bay until preliminary trials have been conducted under the following conditions:

- the trials are undertaken according to the nutrient reduction plan as outlined in clause 12, Schedule F6 (Waters of Port Phillip Bay) of the State Environment Protection Policy (Waters of Victoria); and
- a detailed monitoring program, including monitoring of the ongoing net nutrient balance, is carried out by the Department of Natural Resources and Environment.



Commercial operations should only be approved by the Department of Natural Resources and Environment after advising the Minister responsible for Fisheries and the Minister for Environment and Conservation that:

- the trial demonstrates that commercial operations can be carried out with no net additional nutrient input to Port Phillip Bay; and
- a mechanism is developed, and put in place, to ensure independent monitoring of the ongoing net nutrient balance of commercial finfish aquaculture operations in the bay.

4.5 Principles for selection and management of marine aquaculture areas

The terms of reference for this investigation required the ECC to make recommendations on areas suitable for marine aquaculture, which can be developed on an environmentally sustainable basis.

In the Interim Report (1998) and the Draft Report (1999), comment was sought on principles and criteria which were established for the selection and management of both marine and land-based aquaculture sites. This input built on that provided earlier in response to the LCC Draft Final Recommendations (1996).

As outlined in the Draft Report, the ECC has adopted the following principles for the selection and management of marine aquaculture areas. Two additional principles (the last two in the following list) have been adopted in response to a preference for land-based aquaculture, and widely expressed concerns about the risks of introducing diseases or exotic species through aquaculture of marine species.

A number of recent initiatives address minimising and controlling introductions of exotic species, including the Action Statement, *Introduction of exotic organisms* prepared under the *Flora and Fauna Guarantee Act 1988* and the Interim Victorian Protocol for Managing Exotic Marine Organism Incursions (2000). In addition NRE is developing codes of practice to minimise the risk of introduction and spread of exotic marine organisms via fishing and aquaculture.

Principles

- Aquaculture at each of the chosen sites must be able to demonstrate and deliver a significant socio-economic gain to the Victorian community.

- Aquaculture should not be practised on or immediately adjacent to sites with significant environmental values.
- Aquaculture should not impose permanent ecological change to the site where it is located or to the ecosystem of which it is a part.
- Conflict with other uses or values should be avoided.
- Aquaculture practices should not increase the risk of introducing exotic organisms and diseases into Victoria's marine waters.
- Public waters be available for aquaculture if there is no reasonable land-based alternative. The highest priority should be for the development of land-based aquaculture.

Technical criteria for marine aquaculture have been identified and revised through consultation with Fisheries Victoria, and are outlined in Appendix 7. Criteria include physical site details such as water depth and sediment characteristics, water movement and exchange, access and serviceability, and water quality.

Managing risks

The viability of all aquaculture operations is directly dependent on the maintenance of a healthy and productive aquatic environment. It is in the interests of aquaculture operators to ensure minimal pollution and to prevent negative environmental impacts. However, not all the effects of resource use by aquaculture on other members of society are understood. As a result, most resource use carries with it some risk that unintended or unaccounted impacts (for example, pollution) may occur.

To some extent, science can be used to reduce uncertainty about the effects of aquaculture on other users, although it can rarely eliminate it. Rather, it can be used to more narrowly define the boundaries of risk. As a result, scientific investigation and monitoring has a valuable role to play in avoiding resource use conflicts in the long term. In the meanwhile, however, government decision makers must still make decisions in the face of some uncertainty.

Since the risks of external costs associated with resource use can rarely be eliminated, the question arises of how much risk governments are willing to accept in exchange for aquaculture production. Governments need to trade off the known benefits that aquaculture production may generate to the community against the risks that external costs may arise. Monitoring any impacts from aquaculture will therefore become important.

Source: Holland & Brown (1999), Australian Bureau of Agricultural and Resource Economics Research Report 99.7



4.6 The proposed areas

In accordance with the principles for selection and management of marine aquaculture areas, aquaculture areas are recommended as follows:

Aquaculture zones

Aquaculture zones are areas that have demonstrated successful aquaculture performance or growth of target species in the past or, on advice from Fisheries Victoria and industry, will almost certainly be suitable for target species.

Aquaculture investigation areas were recommended in the ECC's Draft Report for areas which had shown evidence of aquaculture potential through growth of wild or cultured product, but which required further evaluation. No aquaculture investigation areas are recommended in this final report. In most cases further evaluation has been carried out and, together with input from industry and the community following release of the Draft Report, the ECC has decided that either the site does not have any immediate potential, or a smaller aquaculture zone is recommended within the former investigation area.

Aquaculture operations only use part of their lease area, for finfish this is approximately 5%, and for shellfish approximately 50%. This relatively low intensity of use reduces the risk of disease, allows for access between farmed areas and allows for fallowing of sites.

Twelve aquaculture zones are recommended with a total area of 2682 ha, a more than thirteen-fold increase of over the current area licensed for marine aquaculture. Each of the areas is described fully in the following section. For completeness, a description of the earlier recommendation in the ECC's Interim Report (1998) for Aquaculture Areas at Pinnacle Channel and Avalon (land-based) are included.

Aquaculture proposals outside the recommended areas

The selection of the proposed aquaculture zones was based on input from industry, Fisheries Victoria, the community and other relevant bodies such as port authorities. However as aquaculture is a rapidly developing industry, with offshore technology in particular undergoing rapid improvements, other areas may be suitable to meet future needs and requirements for marine aquaculture.

In addition some forms of marine aquaculture have only very general site requirements, eg abalone grow-out, and nomination of particular sites for these activities is unlikely to be of much assistance to industry.

For these reasons it is important that there be a mechanism to consider aquaculture development outside areas specifically recommended in this report. The Aquaculture Development Committee is the appropriate body for this and will ensure that such proposals are considered through the usual planning processes, and that there is an integrated public consultation process for all proposals. The role and workings of the Aquaculture Development Committee are covered in more detail in the Victorian Aquaculture Strategy (pages 18 and 24). The principles outlined on page 126 of this report should guide this Committee.

4.7 Recommended Marine Aquaculture Zones

The ECC recommends the following 12 marine aquaculture zones in areas that have demonstrated successful aquaculture performance or growth of target species in the past or, on advice from Fisheries Victoria and industry, will almost certainly be suitable for target species.

It is expected that marine aquaculture zones approved by Government will be established as Fisheries Reserves under section 88(2)(iii) of the *Fisheries Act* 1995 and a management plan prepared for each area, prior to the sites within the zone being leased. The Victorian Aquaculture Strategy broadly outlines the process for commercial development of the marine aquaculture zones.

Recommendations

- R41** Each aquaculture area be subject to preparation of a management plan, including:
- specification of baseline and ongoing environmental monitoring requirements;
 - access to the zone by other users;
 - design, construction, maintenance and visual impact of structures; and
 - any additional requirements for individual areas noted in recommendations E1 to E12 below.



R42 Until the completion and approval of a Victorian Translocation Policy consistent with the National Policy for the Translocation of Live Aquatic Organisms, (Ministerial Council on Forestry, Fisheries and Aquaculture 1999), translocation of marine organisms for aquaculture be conducted according to interim translocation protocols or codes of practice, which should be publicly available. Preparation of the State policy and associated codes of practice should include public consultation.

R43 NRE expand existing and introduce new research and monitoring programs for existing and new aquaculture operations to include the following:

- assessment of changes in benthic species composition and abundance beneath aquaculture farms;
- monitoring for introduced species, pathogens, diseases, nutrient enrichment (particularly when supplementary feeding is used) and other potential ecosystem effects on the surrounding environment;
- an assessment of recovery times following cessation of aquaculture activities in an area;
- participation by the proponent in, and contribution to the cost of these programs; and
- publicly available reports.

R44 Aquaculture operations which use supplementary food ensure that the food is tested and certified to be free from diseases, pathogens, other unwanted species, and therapeutic chemicals, subject to Import Risk Analyses (IRAs) to be developed by AQIS for processed aquatic animal feeds, aquatic meals and other aquatic animal products (see AQIS 1997).

R45 Conditions of aquaculture licences include provision for an instrument such as a performance bond to ensure that the operator undertake restoration of the site should the operation be abandoned or destroyed.

R46 Other uses within licensed sites be allowed, except where they affect safe, secure and efficient aquaculture operations.

Recommended Aquaculture Zones

Recommendation

E The recommended areas shown on Map A (numbered E1 to E12) be made available for marine aquaculture subject to recommendations R41 to R46 above

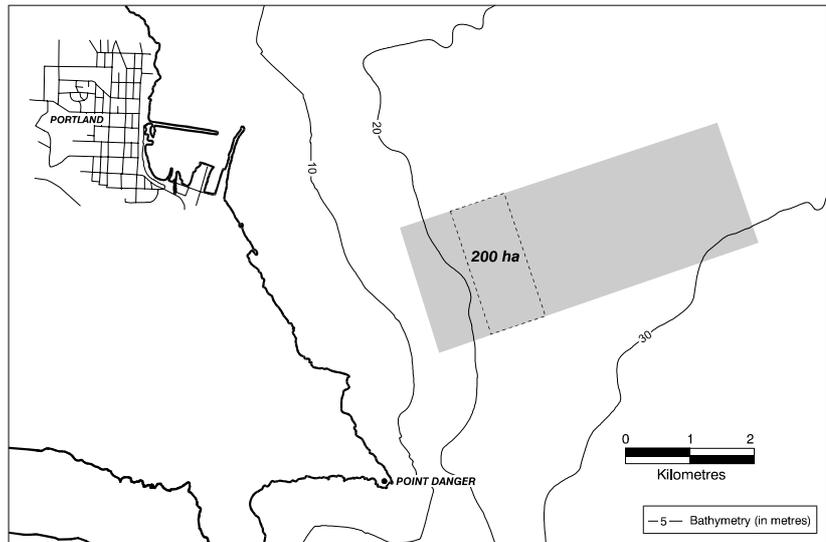
- E1** Portland Aquaculture Zone
- E2** Grassy Point Aquaculture Zone
- E3** Clifton Springs Aquaculture Zone
- E4** Point Lillias Aquaculture Zone (land-based)
- E5** Avalon Aquaculture Zone (land-based)
- E6** Bates Point Aquaculture Zone
- E7** Kirk Point–Werribee Aquaculture Zone
- E8** Beaumaris Aquaculture Zone
- E9** Mount Martha Aquaculture Zone
- E10** Dromana Aquaculture Zone
- E11** Pinnacle Channel Aquaculture Zone
- E12** Flinders Aquaculture Zone.



Aquaculture Zones

E1 Portland Aquaculture Zone

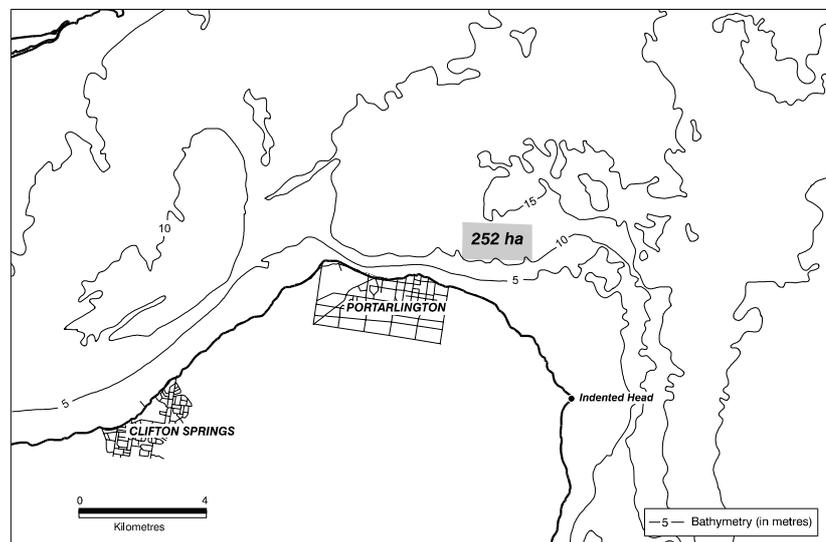
This area off Portland would be suitable for finfish. The area overlies low profile reef consisting of rubble interspersed with sand. The 200 ha area shown within the larger shaded area is indicative only. The actual zone should be located to avoid low profile reef. The aquaculture zone would be appropriately marked and should not represent a shipping hazard.



E2 Grassy Point Aquaculture Zone

This zone is an existing licence area where mussels have been grown successfully for many years. It is recommended that the existing zone be extended from 239 ha to 252 ha through the addition of an additional row to the northern edge of the licence area.

The diatom, which causes a bitter taste in mussels, blooms in association with cold water temperatures, and has from time to time been a particular problem at this site. The Pinnacle Channel area recommended as a Marine Aquaculture Area in the ECC's Interim Report (1998) is not subject to blooms and could be used as an area to cleanse the "bitter taste" diatoms from mussels grown at Clifton Springs and elsewhere in Port Phillip Bay.



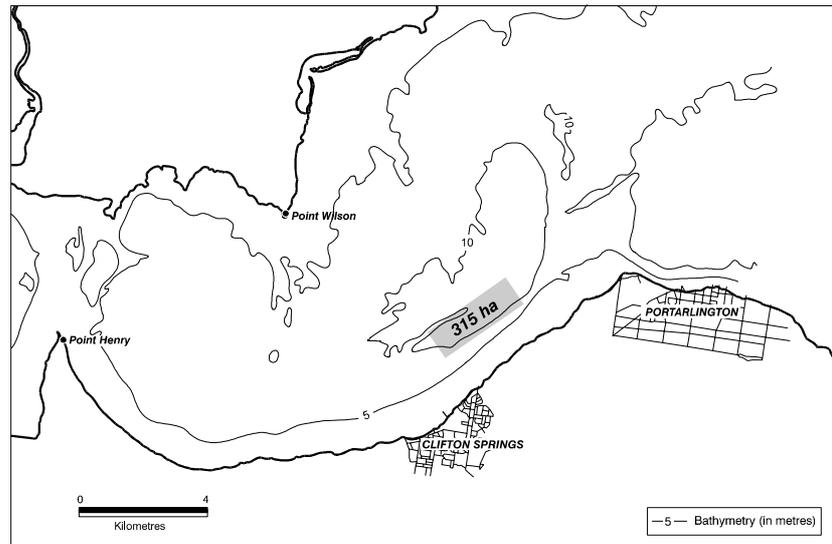
Aquaculture Zones

E3 Clifton Springs Aquaculture Zone

Clifton Springs has been a mussel production site since 1979. Some experimental production of abalone, scallops and flat oysters also occurs.

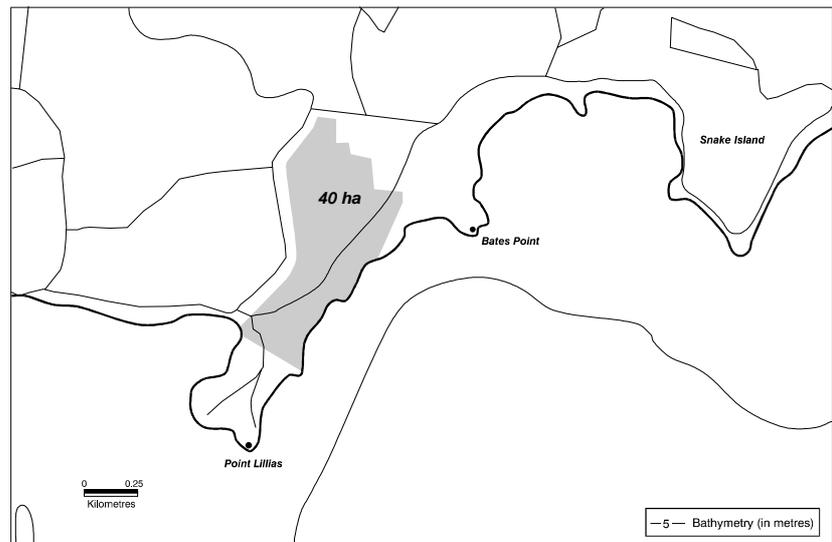
This 315 ha zone is adjacent to significant seagrass beds. Provided mussel ropes do not directly overhang seagrass, there are unlikely to be detrimental impacts on seagrass communities.

Algal blooms of the “bitter taste” diatom occur here, as at Grassy Point. Again the Pinnacle Channel area has the potential to minimise this problem.



E4 Pt Lillias Aquaculture Zone (land-based)

This 40 ha aquaculture zone replaces the 46 ha investigation area recommended in the ECC’s Draft Report. The natural values of this zone were intensively studied as part of the Environment Effects Study (EES) for the proposed relocation of the Coode Island chemical storage complex. This zone coincides with the area previously approved for the location of the complex (which did not proceed). The area is part of a large area on the western side of Port Phillip Bay designated as a Wetland of International Importance under the Ramsar Convention. A report commissioned by NRE classified the area included in this recommendation as not having values for waterbird habitat at a regional or higher level. The Environment Effects Study also indicated that while the actual site values are relatively low, the values of adjoining areas are very high (including some areas of international significance).



The detailed management plan for the area must ensure that the Ramsar and other values are protected. The management plan should include a detailed plan of the areas to be occupied and should include buffer areas between the aquaculture site and the high value adjoining areas. It should also specify rehabilitation measures for unoccupied areas to enhance the natural values. This zone is immediately south of the Avalon aquaculture zone recommended in the ECC’s Interim Report (1998), see E5 below.

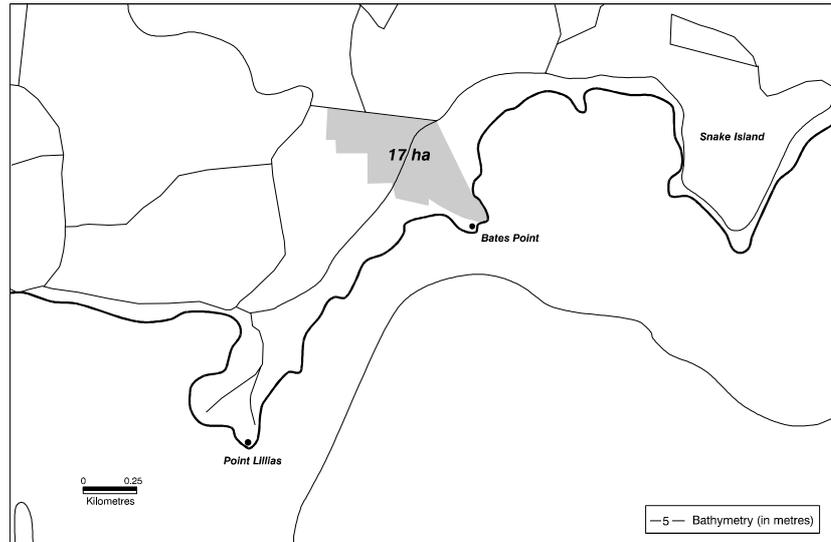
This area is suitable for the cultivation of abalone and finfish in an open system land-based aquaculture facility.



Aquaculture Zones

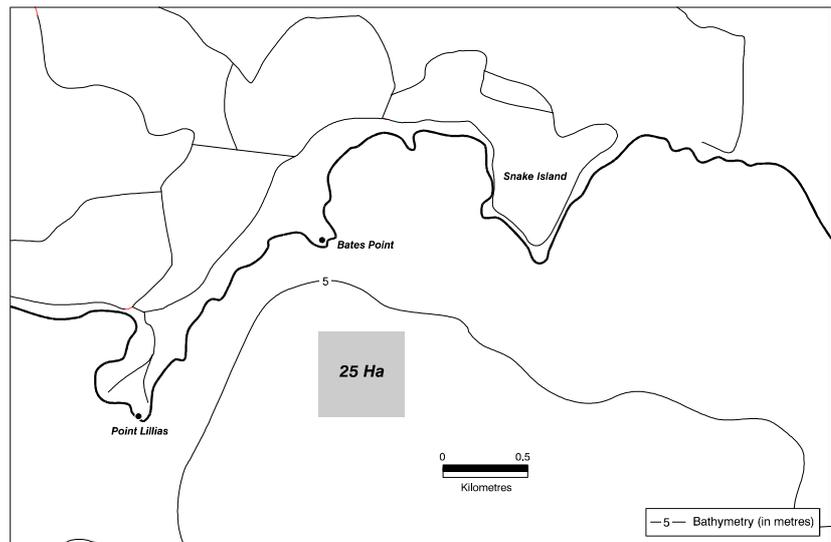
E5 Avalon Aquaculture Zone (land-based)

This 17 ha zone was recommended in the ECC's Interim Report (1998), and is currently under consideration by Government. Experimental production of abalone and finfish is being carried out on this site. An additional 30 ha north of this zone was also proposed in the Interim Report, but Fisheries Victoria now consider this site unsuitable, and an alternative area has been recommended at Point Lillias (see E4 above).



E6 Bates Point Aquaculture Zone

The recommended 25 ha area can be used as a holding facility for harvested product from other aquaculture areas, or as a nursery. In a nursery situation product would be on-grown from "seed" provided by hatcheries (eg flat oysters). Juveniles would then be grown to maturity in a land-based facility. This aquaculture zone will complement the adjacent land-based aquaculture zone (see E5).

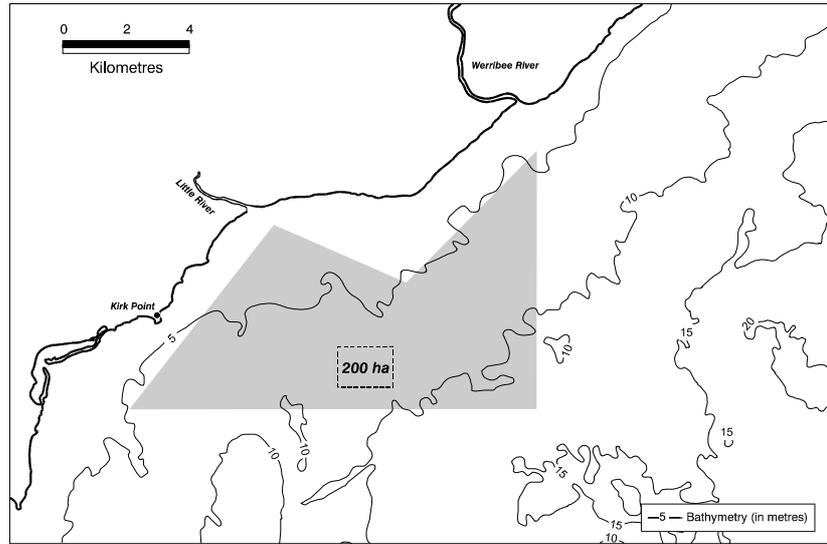


Aquaculture Zones

E7 Kirk Point–Werribee Aquaculture Zone

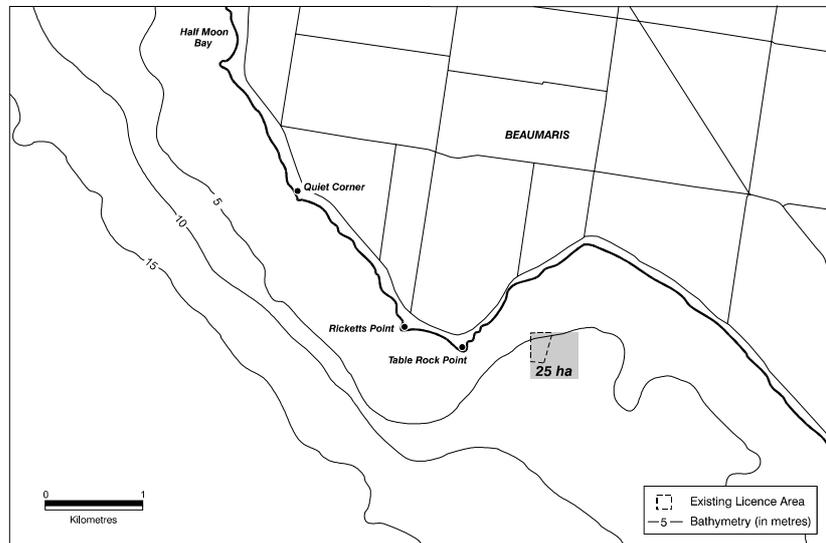
The 200 ha aquaculture zone indicated by the broken line is indicative only and the zone could be re-located to an alternative location within the shaded area, depending on site assessments and operational requirements. The shaded area is characterised by shallow water and is influenced by outflows from the Melbourne Water Western Treatment Plant at Werribee. As a result these waters are nutrient rich and are likely to be highly productive.

Suitable species groups for this area are seaweeds and shellfish. Products such as mulches and soil tonics for the horticultural market and agar for bacteriological plates could be produced from farmed seaweed. An aquaculture industry in this area has potential to reduce net nutrient inputs to Port Phillip Bay (also see section 4.4 on pages 125–126).



E8 Beaumaris Aquaculture Zone

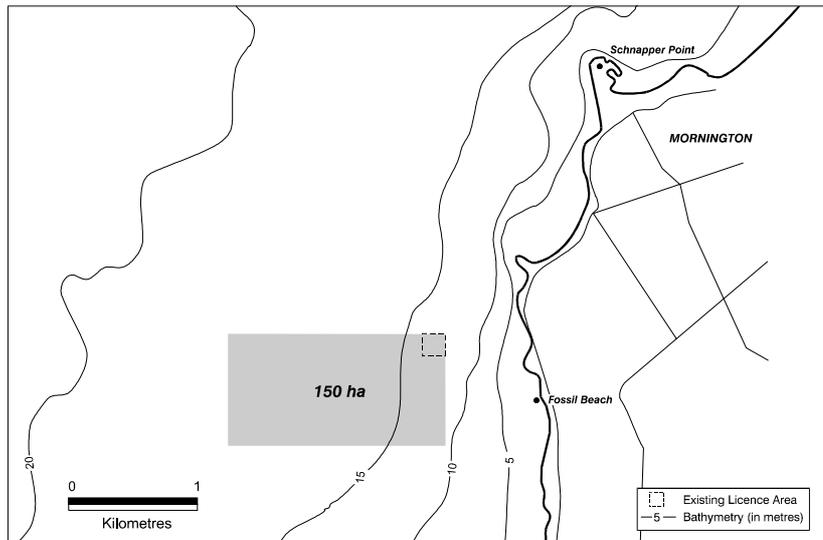
This recommended zone includes an existing lease area where mussels have been grown successfully for many years. It is recommended to expand the existing area from 6 ha to 25 ha. During the public consultation on this proposal, concern was expressed about abandoned aquaculture infrastructure in the area. The ECC has made recommendations in section 4.7 about site restoration. The management plan for this aquaculture zone should include provisions to ensure the clean-up of any abandoned infrastructure prior to further development of the zone.



Aquaculture Zones

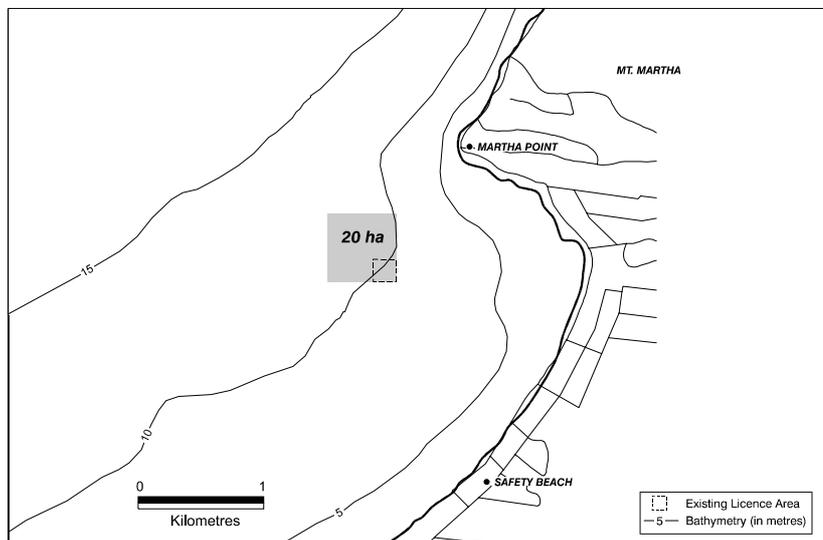
E9 Mount Martha Aquaculture Zone

This recommended zone includes a small existing licence area where mussels have been grown. It is recommended to expand the current area from 3 ha to 150 ha. During the public consultation on this proposal, some concerns were expressed about the size of the recommended aquaculture zone, and the potential for user conflicts. As a result the recommended zone has been reduced from 300 ha to 150 ha.



E10 Dromana Aquaculture Zone

This recommended zone includes a small existing area where shellfish are grown. It is recommended to expand the current area from 3 ha to 20 ha. During the public consultation on this proposal, strong concerns were expressed about the location and size of the recommended zone, particularly the potential for conflict with boating, and safety issues arising from the potential conflict. As a result the recommended aquaculture zone has been substantially reduced from 150 ha to 20 ha. The management plan for this zone must clearly address navigation and boating issues.



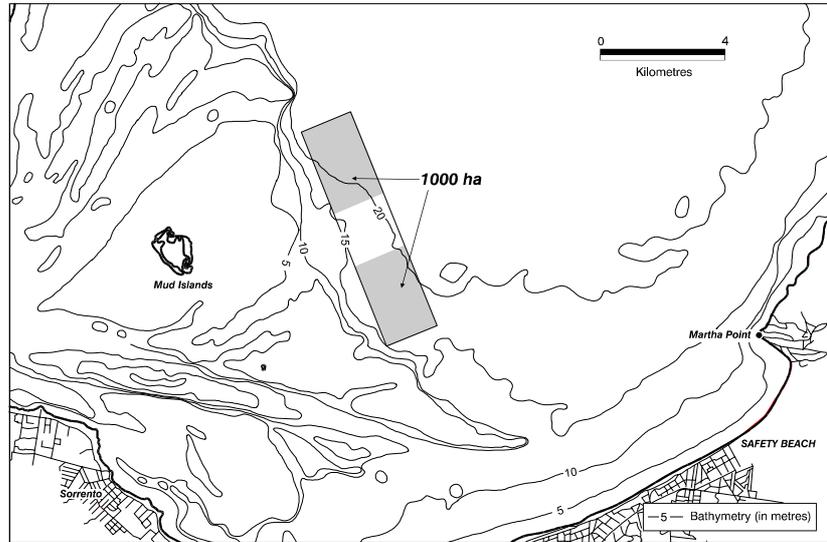
An inland marina development has been proposed at Brokil Creek to the east of the site. The aquaculture zone is located one kilometre from the Brokil Creek/Tassel Drain mouth and is unlikely to impact on potential boat traffic from such a development.



Aquaculture Zones

E11 Pinnacle Channel Aquaculture Zone

This 1000 ha zone, consisting of two 500 ha blocks, was recommended in the ECC's Interim Report (1998), and is currently under consideration by Government. The Pinnacle Channel area has favourable conditions for the growth of shellfish, particularly scallops. The area is not subject to algal blooms, and could be used to cleanse "bitter taste" diatoms from mussels grown elsewhere in Port Phillip Bay. A detailed description of the area can be found in the Interim Report.



E12 Flinders Aquaculture Zone

This site is an existing aquaculture licence area of 400 ha. Mussels are currently being grown on 17 (of the existing 25) three hectare leases with abalone being grown on the remaining eight leases. It is recommended to expand the existing area to 440 ha. Recommended expansion of the area involves removing two rows from the north-western section, because they are too shallow and subject to excessive wave action, and adding two full rows to the deeper eastern side.

Mussels are currently translocated here from Port Phillip Bay aquaculture licence areas to cleanse the "bitter taste" diatoms.

