Australian Government
Department of the Environment and Heritage

EPBC Act Policy Statement 2.2
Industry

Offshore Aquaculture

August 2006

Barramundi aquaculture farming
Images: Julie Jones / ©GBRMPA • Leigh Gray / ©GBRMPA

Pearl shell mariculture farming
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ISBN 0642553033

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Designed by Fusebox Design
Printed by Union Offset Printers

Table of contents

Introduction

The purpose of these guidelines is to assist any person in the marine aquaculture industry to decide whether or not actions which they propose to take require assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

'Action' is defined broadly under the EPBC Act and includes: a project, a development, an undertaking, an activity or series of activities, or an alteration to any of these things.

An action requires approval if it has, will have or is likely to have a significant impact on one of the following matters of national environmental significance protected under the EPBC Act:

- World Heritage properties
- National Heritage places
- Ramsar wetlands of international importance
- Listed threatened species and ecological communities
- Migratory species protected under international agreements
- The Commonwealth marine environment
- Nuclear actions.

If the action will have or is likely to have a significant impact on a matter of national environmental significance then it should be referred to the Australian Government Department of the Environment and Heritage (the Department) for a decision by the Minister for the Environment and Heritage (the Minister).

For the purposes of these guidelines, offshore aquaculture is defined as marine-based aquaculture operations involving sea cage aquaculture, line and rack aquaculture and ranching and seeding aquaculture.

EPBC Act policy statements

These offshore aquaculture guidelines should be read in conjunction with other relevant EPBC Act policy statements, in particular, the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*, which is the primary source of guidance as to whether an action is likely to have a significant impact on a matter of national environmental significance.

For actions on Commonwealth land or which may impact upon Commonwealth land, or by a Commonwealth agency which proposes to take an action anywhere in the world, you should also refer to *Significant Impact Guidelines 1.2 – Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies*.

These offshore aquaculture guidelines are one of a range of EPBC Act policy statements which provide more detailed guidance in relation to specific industry sectors and activities or specific places, species, or ecological communities which are protected under the EPBC Act. EPBC Act Policy Statements can be obtained from the Department's Community Information Unit on 1800 803 772 or can be downloaded from the web site at: www.deh.gov.au/epbc/policy/index.html

Scope of the guidelines

These guidelines apply specifically to marine-based aquaculture (incorporating relevant shore-based infrastructure such as sheds and site access), which includes operations in estuaries and embayments, and do not apply to land-based aquaculture in constructed environments such as ponds or hatcheries that may have a discrete emission point. Furthermore, these guidelines apply only to *sea cage aquaculture*, *line and rack aquaculture*, and *ranching and seeding aquaculture*.

These activities are defined as:

- **Sea cage aquaculture** – the use of cages to culture marine finfish such as tuna, salmon, snapper, kingfish, mulloway, rainbow or brook trout (marketed as ocean trout), barramundi, and lobsters, and molluscs such as abalone. Also commonly known in the aquaculture industry as sea pen aquaculture.
- **Line and rack aquaculture** – the use of lines, anchored to the seabed, and racks anchored with posts embedded in the seabed, to culture seaweed and molluscs such as mussels, oysters (pearls and edible), scallops and sea sponges.
- **Ranching and seeding aquaculture**:
  - **Ranching** – the release of organisms reared in captivity with the expectation that economically viable numbers will return enabling capture (e.g. fish).
  - **Seeding** – placing of organisms reared in captivity on the seabed to on-grow, for example, molluscs such as abalone, clams and scallops, holothurians, such as Beche de mer (sea cucumber), echinoderms such as urchins, and sponges.

Referrals under the EPBC Act

Referral of an action involves filling out a referral form and sending it to the Department. A referral identifies the person proposing to take the action and includes a brief description of the proposal, the project location, the nature and extent of any potential impacts on matters of national environmental significance, and any proposed mitigation measures.

>> Referral forms

Referral forms and a guide to assist in filling out the referral form can be obtained from the Department's Community Information Unit on 1800 803 772 or can be downloaded from the website at: http://www.deh.gov.au/epbc/assessmentsapprovals/referrals/guide.html

After the Department receives a referral, the Minister will make a binding decision as to whether assessment and approval is required under the EPBC Act (usually within 20 business days of receipt). If the Minister decides that the action is likely to have a significant impact on a matter of national environmental significance, then it requires assessment and approval under the EPBC Act.

If the Minister decides that the action is not likely to have a significant impact on a matter of national environmental significance, then it does not require assessment and approval under the EPBC Act. A person will not contravene the EPBC Act if the action is then taken in accordance with that decision and in line with any measures or undertakings in the referral.

Deciding whether a referral is required under the EPBC Act

These guidelines are intended to assist you in undertaking a 'self-assessment' to decide whether or not your action is likely to have a significant impact on any matters of national environmental significance. Your self-assessment should be as objective as possible and based on sufficient information to make an informed judgement. In addition to these guidelines you may also need to consider other information. You are obliged to make a referral if your action is likely to have a significant impact.

If you complete a self-assessment and you are still unsure whether the action you propose to take is likely to have a significant impact on a matter of national environmental significance then you should refer the action to the Department. In considering taking this step, you may like to discuss the matter with the Department's Referrals Section. The Referrals Section can be contacted through the Community Information Unit on 1800 803 772 or by emailing epbc.referrals@deh.gov.au.

To make a decision as to whether or not to refer an action to the Minister, persons should consider the following:

- **Location**

  Are there any matters of national environmental significance in the area of the proposed action?

- **Potential environmental impacts of aquaculture**

  Considering the proposed action at its broadest scope (that is, considering all stages and components of the action, and all related activities and infrastructure), is there potential for impacts, including indirect impacts, on matters of national environmental significance?

- **Measures to avoid or mitigate impacts on matters of national environmental significance**

  Are there any proposed measures to avoid or reduce impacts on matters of national environmental significance (and if so, is the effectiveness of these measures certain enough to reduce the level of impact below the 'significant impact' threshold)?

Each of these considerations is discussed in more detail on the following pages.

1. Location

Location is an important consideration when determining whether an aquaculture facility is likely to have a significant impact on a matter of national environmental significance. For example, an aquaculture facility may impact upon a matter of national environmental significance if it is located within, or in close proximity to, the Commonwealth marine area, a Ramsar wetland, a World Heritage property or National Heritage place, pathways for migratory species, or in an area where listed threatened species or ecological communities occur. Whether or not these impacts are significant impacts depends upon the magnitude of the impacts and the sensitivity of relevant matters of national environmental significance to impacts.

These factors are discussed further on the following pages.

The EPBC Act protected matters search tool (http://www.deh.gov.au/erin/ert/epbc/index.html) allows you to search for matters of national environmental significance in an area where you propose to take an action. The matters of national environmental significance which may be impacted by aquaculture actions are introduced below.

Listed threatened species and ecological communities

Listed threatened species are native species that are listed by the Minister because they face a risk of extinction. Listed ecological communities are assemblages of native plants and/or animals that are listed because they face a risk of extinction. There are different categories of listed threatened species and ecological communities reflecting different levels of risk of extinction.

More information about Australia's listed threatened species and ecological communities, including lists of species and ecological communities, is available at: http://www.deh.gov.au/biodiversity/threatened/index.html

The Species Profile and Threats Database contains information about individual listed threatened species and ecological communities: http://www.deh.gov.au/sprat

Copies of recovery plans and threat abatement plans for individual listed threatened species and ecological communities are available at the following web sites:

Recovery plans – http://www.deh.gov.au/biodiversity/threatened/recovery/index.html

Threat abatement plans – http://www.deh.gov.au/biodiversity/threatened/tap/index.html

Listed migratory species

The migratory species list contains species protected under international agreements for the conservation of migratory species, to which Australia is a signatory.

Further information about listed migratory species, including a list of migratory species, is available at: http://www.deh.gov.au/epbc/matters/migratory.html

Wetlands of international importance

A 'declared Ramsar wetland' is an area that has been designated under Article 2 of the Ramsar Convention or declared by the Minister to be a declared Ramsar wetland under section 16 of the EPBC Act.

The EPBC Act regulates activities occurring within a Ramsar wetland, as well as actions taken outside the boundaries of a Ramsar wetland if those actions have, will have or are likely to have a significant impact on the ecological character of the wetland.

More information about Australia's Ramsar wetlands can be found at: http://www.deh.gov.au/epbc/matters/ramsar.html

A list of Australia's Ramsar wetlands and a map showing their location can be found at: http://www.deh.gov.au/water/wetlands/publications/ramsar/index.html

Commonwealth marine area

The Commonwealth marine area is any part of the sea, including the waters, seabed, and airspace, within Australia's exclusive economic zone and/or over the continental shelf of Australia, that is not State or Northern Territory waters. Generally, the Commonwealth marine area stretches from three nautical miles to two hundred nautical miles from the coast. The area also includes the waters

surrounding the Cocos (Keeling) and Coral Sea Islands, and Christmas, Lord Howe and Norfolk Islands and extending 200 nautical miles from their coastlines.

The EPBC Act also applies to actions taken outside the Commonwealth marine area if those actions have, will have or are likely to have a significant impact on the environment in the Commonwealth marine area.

A map showing the Commonwealth marine area can be found on the Department's website at http://www.deh.gov.au/coasts/information/marinearea.html.

World Heritage properties

A declared World Heritage property is a property included in the World Heritage List, or specified to be a World Heritage property in a declaration made by the Minister. The world heritage values of a property are the natural heritage and cultural heritage contained in the property. Each World Heritage property has its own individual world heritage values.

The EPBC Act regulates activities occurring within World Heritage properties, as well as actions taken outside a World Heritage property if those actions have, will have or are likely to have a significant impact on the World Heritage values of the World Heritage property.

More information about Australia's World Heritage properties, including a list of World Heritage places, their values, and a map showing their location, can be found at: http://www.deh.gov.au/epbc/matters/worldheritage.html

National Heritage places

The National Heritage List contains places or groups of places with outstanding heritage value to Australia – whether natural, Indigenous or historic or a combination of these. Each National Heritage property has its own individual national heritage values.

The EPBC Act regulates activities occurring within National Heritage places, as well as actions taken outside a National Heritage place if those actions have, will have or are likely to have a significant impact on the National Heritage values of the National Heritage place.

More information about Australia's National Heritage places, including a list of National Heritage places, their values, and a map showing their location, can be found at: http://www.deh.gov.au/heritage/national/index.html

2. Potential environmental impacts of aquaculture actions

As with other productive activities, the aquaculture industry inevitably results in some environmental impacts. The environmental impacts associated with aquaculture vary according to the type of species farmed, the type of production system, management practices used, location of farms, environmental carrying capacity, and condition and sensitivity of the environment. Impacts can also vary in scale and intensity. For example, nutrient inputs may result in an alteration of the benthic environment in the immediate vicinity of sea cages, however these impacts are localised and on removal of the sea cages, the environment would be expected to quickly recover (provided it is not in an area which contains slow to recover habitats such as seagrass beds, or corals). Conversely, the accidental release of an invasive species/pathogen could lead to long-term impacts on individual fisheries or the environment over large areas.

The major environmental issues for aquaculture include:

- water quality and seabed impacts from aquaculture operations;
- introduction of pest species through translocation and possible escape;
- introduction of diseases (e.g. bacterial, viral);
- genetic impacts from possible escapes;
- compromising habitat and amenity values including habitat alteration and ecosystem change;
- interactions with protected species;
- creating changes in wildlife populations associated with scavenging; and,
- shore-based impacts (e.g. impacts associated with the construction and operation of loading facilities).

A summary of the key environmental impacts that may result from offshore aquaculture activities is detailed in Tables A1–A5 on the following pages. These are initial screening tables intended to assist you in identifying potential environmental impacts of your aquaculture activity. They are not exhaustive and **should be used as a guide only**.

Impacts which are very minor or small in scale, such as localised benthic smothering (in areas which are not vulnerable and do not contain important habitat such as seagrass beds or corals), have not been included as they would be unlikely to be significant.

Only actions that are likely to have a significant impact on matters of national environmental significance need to be assessed and approved under the EPBC Act. Other impacts are assessed and managed by State agencies in accordance with their own legislation.

Once you have identified potential impacts associated with your aquaculture activity you should refer to the following section in association with the *Significant Impact Guidelines 1.1* to assist you in deciding whether or not the impacts of your aquaculture activity are likely to be significant impacts.

Indirect and off-site impacts

When considering whether or not an action requires approval under the EPBC Act, the Minister must consider all adverse impacts which result, either directly or indirectly, from the action, regardless of whether the adverse impacts are within the control of the person proposing to take the action. Consequently, when you undertake a self-assessment, any adverse impacts which can be considered to be consequences of the action must be considered in deciding whether or not the action is likely to have a significant impact on a matter of national environmental significance.

Indirect and offsite impacts include:

- 'downstream' impacts, such as impacts on wetlands or ocean reefs from sediment, waste products, or chemicals which may be transported or discharged into these systems.
- 'upstream impacts' such as impacts associated with the sourcing of wild stock (e.g. yellow-fin tuna); and
- 'facilitated impacts' which result from further actions which are made possible or facilitated by the action.

Table A1 – Potential impacts common to all marine aquaculture

Activity and nature of causative agent	Potential impacts
Site location and/or physical structures	
Construction of on-shore facilities, such as sheds or site access that involves land clearance	• Impacts on listed flora species, and on habitat for listed fauna species.
Shore-based lighting	• Shore-based lighting adjacent to important beach nesting areas for turtles is likely to repel nesting females and disorientate hatchlings.
Artificial lighting on aquaculture structures	• Artificial lighting on aquaculture structures, such as overnight manning of pontoon structures or security lighting, in the vicinity of important roosting sites or migratory routes for listed migratory birds may cause disorientation. Turtle hatchlings in areas of important habitat may also become disoriented.

Table A2 – Sea cage aquaculture

Activity and nature of causative agent	Potential impacts
Site location and/or physical structures	
Structures located adjacent to protected area or species, within pathway of migratory species	• Interference with survival or movement of listed migratory species. • Reduction in social and visual amenity values of World Heritage and National Heritage properties.
Nets and mooring system	• Entanglement and entrapment of listed threatened species or listed migratory species with possible injury or death.
Management practices	
Supplemental feeding (nutrients from feed, faeces, uneaten food)	• Algal blooms; localised eutrophication in a World Heritage area or Ramsar wetland. • Introduction of pathogens into a World Heritage area or the Commonwealth marine environment or an important habitat for a listed threatened marine species where non-local sources of feed are used. • Increase in numbers of nuisance birds leading to impacts on listed migratory birds through egg predation and competition for nesting sites.
Inappropriate chemical usage: • prevent/treat disease (therapeutics) • biofouling (antifoulants)	• Toxic effects (lethal and non-lethal) on non-target organisms in a World Heritage area or the Commonwealth marine environment or an important habitat for a listed migratory species and/or a threatened marine species.
Generation of waste materials including from processing (blood, viscera from fish)	• Pollution of a World Heritage area or Ramsar wetland or the Commonwealth marine environment. • Altering breeding/colonising of listed threatened or migratory birds or birds in a World Heritage area or a Ramsar wetland as a result of changed feeding patterns such as attracting nuisance birds, or alteration of seal and sea lion foraging behaviour (e.g. habituation and dependency on 'artificial' food supplies). • Introduction of pathogens into a World Heritage area or a Ramsar wetland or an important habitat for a listed threatened marine species where non-local sources of feed are used.

Predator Control/Wildlife deterrents (e.g. sonar, bird nets)	• Disturbance and/or entanglement of listed threatened or migratory species or species in the Commonwealth marine environment. • Potential exclusion of species from preferred habitat.
Escapees	• In relation to aquatic fauna in the Commonwealth marine area, a World Heritage area, a Ramsar wetland or important populations of listed threatened marine species: – alteration of the genetic profile; – spread of disease; – competition for habitat and food; – predation.

Table A3 – Line and rack aquaculture

Activity and nature of causative agent	Potential impacts
Site location and/or physical structures	
Structures located adjacent to protected area or species, within pathway of migratory species	• Interference with survival or movement of listed migratory species. • Reduction in social and visual amenity values in World Heritage and National Heritage properties.
Racks, lines and mooring systems	• Entanglement and entrapment of listed threatened species or listed migratory species with possible injury or drowning. • Impediment of water flow leading to changed hydrodynamics in a World Heritage area or Ramsar wetland.
Management practices	
Inappropriate chemical usage to: • prevent / treat disease (therapeutics) • biofouling (antifoulants)	• Toxic (lethal and non-lethal) effects on marine fauna in the Commonwealth marine area or a Ramsar wetland or on a listed threatened species.
Generation of waste material including removal of biofouling	• Pollution of a World Heritage area or Ramsar wetland or the Commonwealth marine environment or habitat for a listed threatened species. • Altering bird breeding/colonising of fauna in the Commonwealth marine environment, a World Heritage area or Ramsar wetland, or listed threatened or migratory species in the vicinity as a result of changed feeding patterns such as attracting nuisance birds, or alteration of seal and sea lion foraging behaviour (e.g. habituation and dependency on 'artificial' food supplies). • Introduction of pathogens into a World Heritage area or Ramsar wetland or the Commonwealth marine environment or an important habitat for a listed threatened marine species where non-local sources of feed are used. • Ingestion of waste material, such as plastics, by listed threatened species or migratory species, causing death.
Release of non-native species through spawning	• Alteration of habitat or community dynamics in World Heritage area or Ramsar wetland or the habitat of a listed threatened species.
Walking around sub-tidal racks, driving of vehicles etc	• Disturbance of listed threatened and migratory birds and their habitat. • Disturbance of nesting beach for turtles.

Table A4 – Ranching aquaculture

Activity and nature of causative agent	Potential impacts
Management practices	
Intentional release of non-sedentary organisms (indigenous and non-indigenous to area)	• For aquatic fauna in the Commonwealth marine area, or a World Heritage area, a Ramsar wetland or important populations of listed threatened marine species: – changes to genetic profile of wild population through the introduction of indigenous species. – altering community dynamics through the introduction of non-indigenous species. – competition with indigenous species for habitat and food. – predation of indigenous species by non-indigenous species. – spread of specific diseases.

Table A5 – Seeding aquaculture

Activity and nature of causative agent	Potential impacts
Management practices	
Intentional release of organisms (indigenous to area and non-indigenous to area)	• For aquatic fauna in the Commonwealth marine area, a World Heritage area, a Ramsar wetland or important populations of listed threatened marine species: – changes to genetic profile of wild population through the introduction of indigenous species. – altering community dynamics through the introduction of non-indigenous species. – competition with indigenous species for habitat and food. – predation of indigenous species by non-indigenous species. – spread of specific diseases. – alteration of community through altered predator/prey relationships. – translocation of specific diseases and non-target organisms associated with seed species.
Harvesting of stock	• Damage to habitat in the Commonwealth marine area, a World Heritage area or a Ramsar wetland, or habitat of a listed threatened species through activities such as trawling. • Removal of listed species which prey on farmed species resulting in an alteration of ecosystem functioning and predator/prey relationships.

3. Significant impacts on matters of national environmental significance

A 'significant impact' is an impact that is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. You should consider all of these factors when determining whether an action is likely to have a significant impact on the environment.

Environmental context

The context for an action is the environment in which the action will occur, including all areas or elements of the environment which may be impacted by the action. The key to determining whether or not an action is likely to have a significant impact on a matter of national environmental significance is to have a good knowledge of the environment which will be impacted by the action.

When planning an aquaculture facility it is important to thoroughly investigate the existing environmental and ecological character and condition of the site, including the presence and sensitivity of threatened species and other matters of national environmental significance.

Severity of the impacts

In judging the severity of the impacts of an action the following considerations are relevant:

- the sensitivity of the environment which will be impacted;
- the timing, duration and frequency of the action and its impacts;
- the geographic extent of the action and its impacts;
- all on-site and off-site impacts;
- all direct and indirect impacts;
- existing levels of impact from other sources; and
- the degree of confidence with which the impacts of the action are known and understood.

The severity of an action's impacts can be qualitatively assessed by considering the environmental risks of a proposal. Risk is a measure of the consequences of an action and the likelihood of the consequences occurring.

For the purposes of assessing impacts on matters of national environmental significance, environmental risk means all consequences of an action which involve impacts on the environment, including:

- continuous incremental impacts;
- possible events or accidents; and
- indirect and incidental impacts.

Actions that result in serious, large scale or long-term consequences such as the death of significant populations of a species, complete alteration of ecosystem functioning, or alteration of a species genetic profile, involve a serious or high risk, even if the likelihood of that action occurring is low. In contrast, actions with very minor or localised impacts, such as temporary damage to a small area of habitat, would generally involve a low environmental risk.

Actions which involve a serious or high risk to matters of national environmental significance would be expected to have a significant impact. Actions which involve a moderate risk to matters

of national environmental significance may be significant and require careful consideration of the individual circumstances. Actions which involve a low risk to matters of national environmental significance would not be significant, unless the relevant matters of national environmental significance are particularly vulnerable or sensitive to impacts.

Significant impact criteria

The *Significant Impact Guidelines 1.1* set out criteria for each matter of national environmental significance and help proponents determine whether their actions could be considered significant in relation to those matters of national environmental significance. These criteria can be viewed at: http://www.deh.gov.au/epbc/policy/index.html

Actions that *would not be* expected to have a significant impact on matters of national environmental significance

The following characteristics are characteristic of actions which would not be expected to have a significant impact on matters of national environmental significance:

- short-term reversible impacts (such as minor increases in sedimentation and turbidity);
- of minor consequence (such as nutrient stripping by mollusc operations);
- localised and small in scale (such as disturbance of physical habitat due to anchoring);
- located in a non-sensitive environment (seagrass beds and coral reefs are considered to be sensitive marine environments).

Examples of actions that *would be* expected to have a significant impact on matters of national environmental significance

Table B below lists examples of actions that would be expected to have a significant impact on matters of national environmental significance. The examples should be read in conjunction with the significant impact criteria for relevant matters of national environmental significance and should not be taken to be exhaustive or conclusive. The nature and level of impacts will depend upon the environmental context and the presence and sensitivity of matters of national environmental significance. You should take into account all of the relevant considerations outlined above. **You may also be able to avoid or reduce impacts on matters of national environmental significance if appropriate mitigation measures are in place** (see Section 4).

The following characteristics are indicative of actions which are likely to have significant impacts:

- long-term or irreversible impacts (such as the disruption of the ecosystem dynamics or species lifecycles, or permanent decreases in species numbers);
- medium or large scale impacts (such as the spread of disease or pollution);
- intensive impacts (such as the destruction of seagrass beds, the release of toxic chemicals, or the release of high concentrations of nutrients, waste or pollutants).

Table B – Actions which would be expected to have a significant impact

Matter of National Environmental Significance	Examples of actions which would be expected to have a significant impact
World Heritage and National Heritage properties	Whether an action is likely to have a significant impact on the values of a World Heritage property or Natural Heritage place will depend on the values associated with the particular World Heritage or National Heritage property or area. Aquaculture activities located within or close to a World Heritage or National Heritage property which may result in significant impacts on World Heritage or National Heritage include: • Natural values – discharge of processing waste directly into water. – husbandry techniques that lead to accumulation of nutrients in key habitats, increased sedimentation and turbidity. – inappropriate practices in place to handle predators which are part of the natural values of the World Heritage property or National Heritage place. • Cultural and aesthetic values – structures or activities that notably diminish cultural and aesthetic values.
Wetlands of international importance	• Location of activity in or near a wetland of international importance and with impacts such as substantial accumulation of wastes; increase in nutrient loads that would be harmful to the ecological function of the wetland; introduction or incubation of disease that will impact upon wetland species. • Intensive feeding resulting in changes in the lifecycle of resident species dependant upon the wetland. For example, increased numbers of birds competing with resident bird populations for food and nesting sites. • Introduction of brood stock resulting in the establishment of an invasive species that is harmful to the ecological character of the wetland (e.g. sabellid worms in an estuary).
Listed threatened marine species and ecological communities, and listed migratory species	• Predator nets that are poorly designed or positioned leading to entanglement of listed threatened marine species or migratory species; • Sea cages located within approximately 30m of habitat for threatened or migratory marine species (based on Tasmanian Aquaculture and Fisheries Institute monitoring as reported in Crawford, 2003) resulting in adverse impacts, such as smothering from solid waste, and increased epiphytic algal growth upon seagrass beds that are feeding habitat for species such as turtles and dugongs; • Inappropriate practices in place to handle predators which are listed threatened species such as seals; • Introduction of exotic diseases and parasites to the environment from introduced species; • Oyster farm long lines which substantially obstruct listed migratory species pathways.

Listed threatened terrestrial and bird species and ecological communities, and migratory species	• Feeding regimes or pen configuration that result in increased populations of predator bird species displacing populations of listed threatened species in local habitats. • Land clearance for associated facilities resulting in removal of important habitat for listed threatened or migratory species. • Frequent or prolonged noise from boats etc near sensitive breeding or nesting areas for listed threatened or listed migratory bird species.
Commonwealth marine area	Impacts within the Commonwealth marine area include potential impacts on all components of the environment (i.e. includes non-listed species and ecological communities as well as matters of national environmental significance). • Poorly designed structures and location of facilities which increases the risk of escapees into the marine environment. • Introduced species resulting in the introduction of exotic diseases and parasites to environment. • Intensive feeding or waste disposal (e.g. farm located in shallow areas around islands) leading to the accumulation of nutrients in key habitats. • Use of agricultural and veterinary chemicals or antifoulants leading to accumulation of persistent organic chemicals, heavy metals, or other potentially harmful chemicals. Also see impacts described above for **Listed Threatened Species** and **Listed Migratory Species**.

4. Avoidance or mitigation of impacts on matters of national environmental significance

Mitigation measures

Examples of mitigation measures are described in Table C on the following page in relation to some actions that could have a significant impact on matters of national environmental significance.

The ideal is to design your project so that significant impacts are avoided. Proposed mitigation measures need to be well designed and rigorous.

If you are unsure whether mitigation measures will reduce the significance of the impact sufficiently, or if you are unsure of the certainty of the mitigation measures, you should make a referral.

Table C – Examples of mitigation measures

Actions with the potential to have a significant impact on matters of National Environmental Significance	Examples of mitigation measures
Feeding fish	• Improve feeding practices to maximise food conversion ratios and minimise waste. – Use appropriate quality feeds to maximise efficiency of feed utilisation. – Use feeding management to minimise potential of overfeeding and reduce feed wastes. – Use fallowing practices to facilitate sediment recovery. • Site cages at appropriate distance from protected areas (seagrass etc). • Monitor and fallow for appropriate time. • Regular monitoring of seabed characteristics and water quality and have an appropriate response plan in place if monitoring indicates a decline in quality.
Use of chemicals (e.g. antifoulants, therapeutics)	• Comply with ANZECC Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance 1997. • Clean equipment coated with antifoulant in a dry dock, above the high water mark of any waters, or below the high water mark of any waters when the tide is out to such an extent that there is no tidal water coming into contact with the vessel, structure or equipment. • Ensure antifoulant residues do not enter any waters or come in contact with land below the high water mark of any waters. • Ensure only approved antifoulants are used (i.e. registered by the Australian Pesticides and Veterinary Medicines Authority). • Use of therapeutics and other chemicals (anaesthetics, dietary pigments, antifoulants, cleansers, disinfectants) on farms should be kept to a minimum through the implementation of appropriate farming practices and use should be strictly controlled.
Operation located in vicinity of listed migratory and listed threatened species	• Discourage predators from eating fish. Do not feed fish to predators. • Design and implement a non-lethal predator control strategy, particularly where predators could be listed migratory or threatened species. • Minimise and routinely remove biological debris that could attract wildlife or predators. • Design and implement predator nets to avoid entanglement (e.g. steel mesh in areas where sharks and crocodiles are present). Ensure nets are taut and mesh size is appropriate to limit risk of entanglement. • Minimise risk of fish escape, particularly during handling procedures, as a result of predator attacks, or equipment failure, through the establishment of emergency procedures. • Regularly inspect and maintain nets and cages.
Introduction of stock from source outside area of operation	• Minimise risk of introducing diseases and marine pests through good farm hygiene practices. • Use hatchery protocols designed to reduce risk of genetic pollution. • Clean equipment before moving from one farm site to another. • Source health-certified stock. • Monitor health of stock and have an appropriate response plan in place if monitoring indicates a decline in health.

Translocation of non-indigenous species	• House species in a secure facility. • Use sterile stock. • Conduct an import risk analysis based on the Australian Standard for Risk Analysis (AS/NZ 4360).
Disposal of waste	• Minimise discharge of waste into the marine environment. • Prevent disposal of dead fish in the marine environment and instead dispose at an appropriate disposal site on-shore.

The Australian aquaculture industry and government agencies are actively working to ensure that the industry is sustainable and that environmental impacts are minimised. All State governments have in place either legislation, regulations, guidelines or policies that regulate the aquaculture industry.

The Primary Industry Ministerial Council has also endorsed a draft *Best Practice Framework for Regulatory Arrangements for Aquaculture in Australia* and this paper recommends facilitating environmental best practice by supporting industry in the development of environmental management systems (EMS) and the realisation of eco-efficiency opportunities.

>> **Examples include:**

- Australian Seafood Industry Council – Code of Conduct for a Responsible Seafood Industry – http://www.seafoodsite.com.au/sustainable/code.php
- Draft Code of Practice – Tuna. Contact Tuna Boat Owners Association.
- Australian Aquaculture Forum (AAF) (now known as National Aquaculture Council) Code of Conduct (2000) – http://www.pir.sa.gov.au/pages/aquaculture/farm_practice/code_of_conduct.pdf
- Gippsland Aquaculture Industry Network (GAIN) Code of Conduct http://www.growfish.com.au/Grow/Pages/Site/Conduct.htm
- Tasmanian Salmonid Farming Industry Draft Code of Practice. Contact Tasmanian Salmonid Growers Association on (03) 6214 0550.
- South Australian Oyster Growers Association Inc. Operational Code of Practice. Contact South Australian Oyster Growers Association on (08) 8682 1831.
- New South Wales Oyster Growers Draft Code of Practice
- Draft Environmental Monitoring Guidelines for Marine Farming
- South Australian Marine Finfish Farmers Association Code of Practice. Contact South Australian Marine Finfish Farmers Association on (08) 8303 2574.
- Amwing Pearl Producers Association Environmental Code of Practice http://www.australian-aquacultureportal.com/ems/AMWINGfinalcop.doc
- Western Australian Mussel Industry Environmental Code of Practice and Management Framework. Contact Aquaculture Council of Western Australia.
- Pearl Producers Association 2004 Environmental Risk and Impact Assessment of the Pearling Industry. Contact Fisheries Research and Development Corporation bookshop on (02) 6285 4485.

Further information

From an industry perspective, Environmental Risk Assessments (ERAs) and Codes of Practice (many of which use ERA to identify issues) have been developed or are in the process of being developed by various sectors within the industry to promote environmentally responsible management practices. These Codes of Practices and ERAs should be considered by any person considering undertaking an aquaculture activity as a means of mitigating any significant impacts of their activity.

Proposals for the development of aquaculture facilities within the Great Barrier Reef Marine Park should refer to the Great Barrier Reef Marine Park Authority's position statement on marine aquaculture for further guidance (www.gbrmpa.gov.au/fisheries)

In addition to EPBC Act policy statements, the Department's web site contains a range of information about protected places, species and communities to assist you in determining whether your action is likely to have a significant impact on a matter of national environmental significance.

The EPBC Act referral, assessment and approval processes are outlined on the following page in Figure 1. For further information about the EPBC Act, including information about the referral, assessment and approvals processes, please contact the Department's Community Information Unit on 1800 803 772, or access the web site at: http://www.deh.gov.au/epbc

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The EPBC Act and State and Territory legislation

The EPBC Act is Australian Government legislation. The assessment and approval provisions of the EPBC Act focus on matters of national environmental significance, Commonwealth areas, and actions by Commonwealth agencies. If your action requires approval under both State or Territory, and Australian Government legislation, you will need to submit a separate referral or application for each approval.

In some States, bilateral agreements between the Australian Government and a State or Territory, that minimise duplication in the environmental assessment and approval process, enable the Australian Government to rely on State or Territory assessment processes. This means that, in some cases, an action can be assessed under the EPBC Act by State agencies (see Figure 1). Bilateral agreements for assessment of actions under the EPBC Act are in place in Tasmania, Western Australia, Queensland and the Northern Territory.

State agencies have considerable experience and information regarding the management of marine aquaculture activities. For further information the proponent should contact their relevant State agency.

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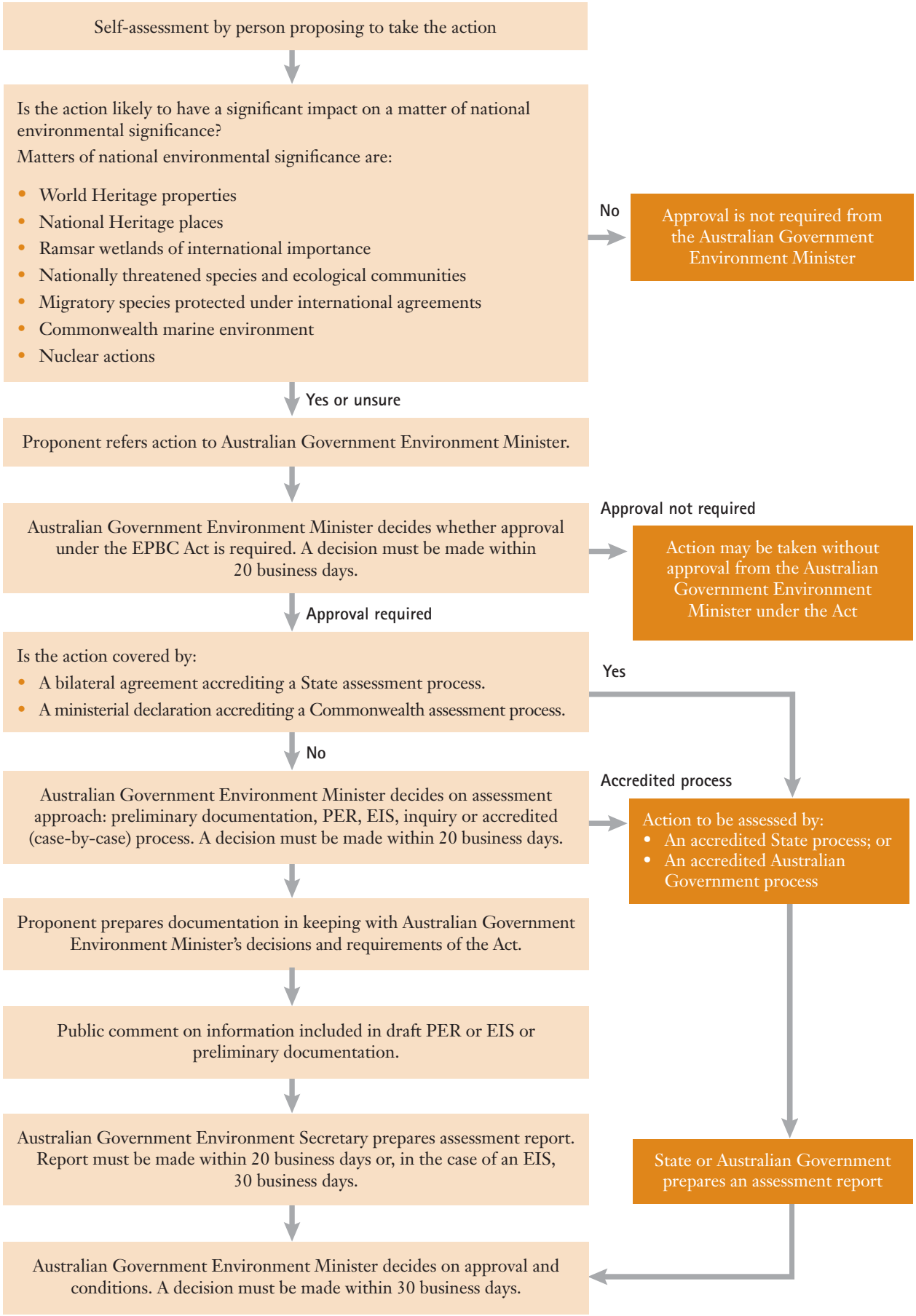
Figure 1 – EPBC Act referral, assessment and approval processes



Glossary

Adverse change	A change that results in negative impacts.
Adverse impact	An action or event that has an unfavourable influence (or effect) on the environment.
Algal bloom	A sudden growth of algae in an aquatic ecosystem, either natural or induced by nutrient enrichment of waters.
Amenity value	Natural or physical qualities and characteristics of an area that contribute to an appreciation of its aesthetic, cultural and recreational attributes.
Aquaculture	Farming and culturing of aquatic organisms, such as fish, crustaceans and molluscs.
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 environmental impacts.
Biodiversity	The variety of all life forms, including genetic, species and ecosystem diversity.
Biosecurity	Exclusion of pests and disease-causing organisms from the environment.
Broodstock	Parent stock used in hatcheries for producing offspring.
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 including crabs, lobsters, shrimps, yabbies, red claw, marron and barnacles.
Culture stock	Fish, prawn or other culture species that are withheld in a given farming system.
Diffuse pollution	Pollution for which it is difficult to identify the precise source, such as that linked to runoff from agricultural land.
Direct impacts	A change (physical, chemical or biological) to the environment because of an activity (e.g. localised benthic smothering).
Ecosystem	A community of organisms and the physical environment with which they interact.
Endemic	Native 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.
Exotic pests	Introduced or non-native flora or fauna that cause harm, or have the potential to cause harm to the environment.
Habitat	The place or type of site where an organism or population normally occurs (UNCED).
Indirect impacts	Changes flowing from the activity will affect the environment in the future or 'downstream' (e.g. impacts on wetlands or reefs from sediment).
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 in open sea or ocean 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.
On-site impacts	Changes occurring to the environment within the site of an activity (e.g. localised benthic smothering).
Off-site impacts	Changes occurring to the environment outside the site of an activity (e.g. alteration of protected bird communities through attraction of nuisance birds).
PER	Public Environment Report
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.
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.
Recovery plans	Set out management actions necessary to stop the decline of, and support to recovery of, listed threatened species or threatened ecological communities.
Runoff	Materials carried by water discharged from land that enters a body of water.
Salmonid fish	Salmon and trout.

Seagrass	Flowering plants which 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 volume of water.
Substantial change	A change that is more than a minor or trivial effect.
Threat abatement plans	Provide for the research, management and any other actions necessary to reduce the impact of listed Key Threatening Process on a threatened species or ecological community.
Translocation	The movement of organisms (and transport media) beyond their natural range and/or to areas within their natural range that have genetic stocks and/or populations that are distinct from those in the source area.
Water quality	The chemical, physical and biological condition of water.