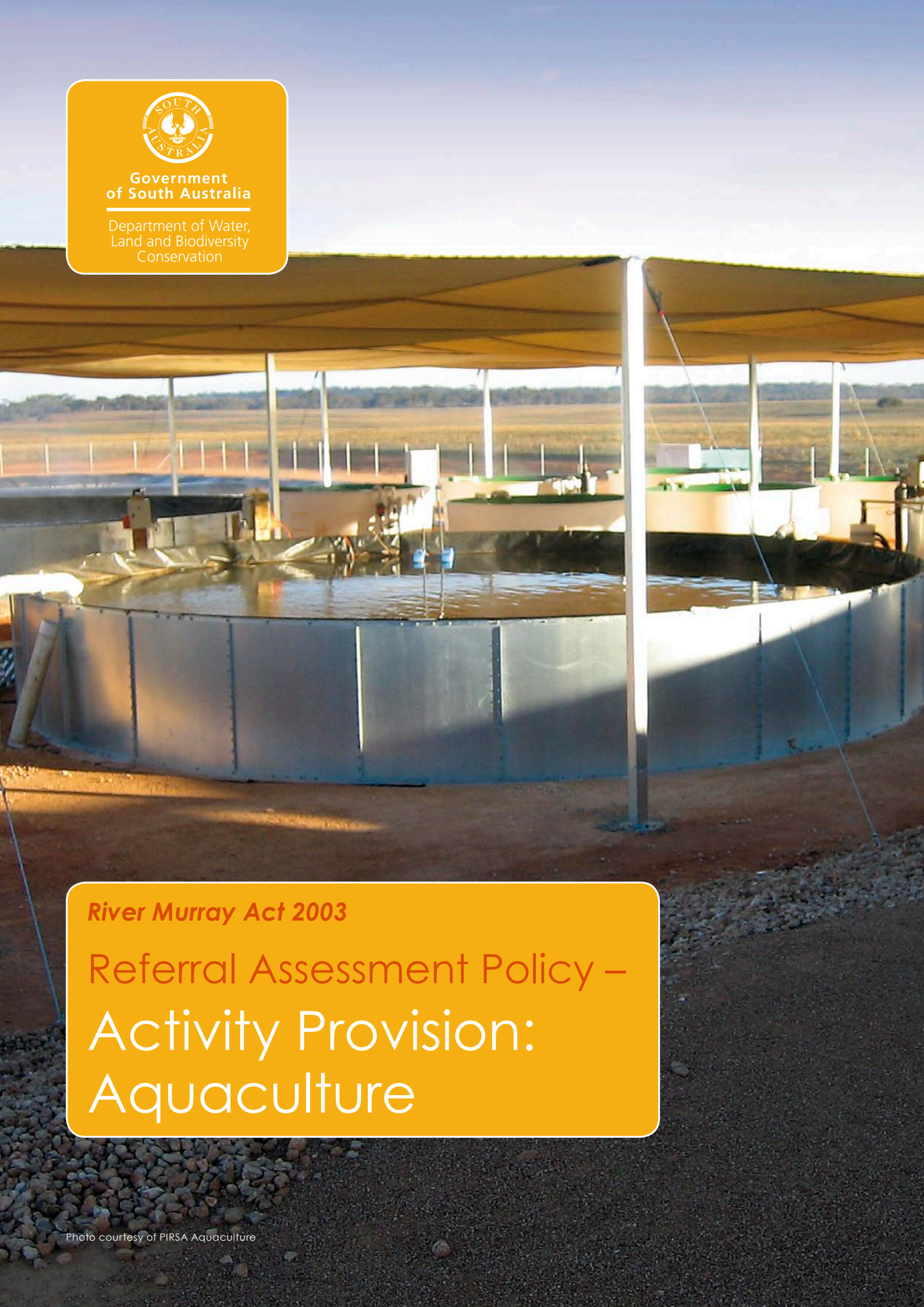
Government of South Australia

Department of Water, Land and Biodiversity Conservation



River Murray Act 2003

Referral Assessment Policy – Activity Provision: Aquaculture

Photo courtesy of PIRSA Aquaculture

River Murray Act 2003

Referral Assessment Policy – Activity Provision: Aquaculture

Photo courtesy of PIRSA Aquaculture

Purpose

The Activity Provision – Aquaculture is designed to help guide the decision-making process for the Minister for the River Murray and the Minister's delegates when assessing referred statutory instruments and applications for authorisations received under the *River Murray Act 2003* that involve aquaculture activities.

It is not intended to duplicate or replace policies administered by PIRSA Aquaculture. An assessment made by the Minister will build on assessments made by PIRSA Aquaculture to develop protection and enhancement measures tailored to the unique needs of the River Murray and to ensure that the objects and objectives of the River Murray Act are taken into account.

Background

The River Murray Referral Assessment Policy has been prepared to ensure that decisions meet the Minister's obligations under the River Murray Act, and seeks to further the objects and the Objectives for a Healthy River Murray contained in the Act. The policy includes general, special and activity provisions, as shown in figure 1.

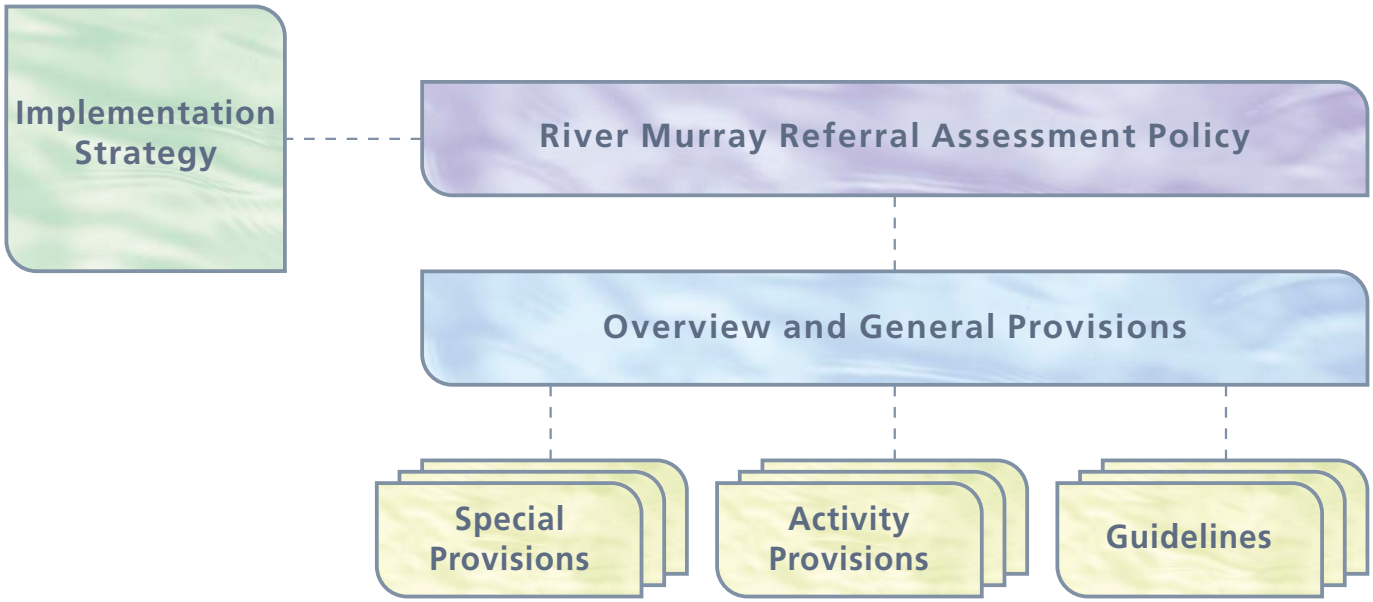


Figure 1: River Murray Referral Assessment framework

The general provisions apply to all statutory instruments and applications referred to the Minister pursuant to a related operational Act[1]. Special and activity provisions are to be applied in conjunction with the general provisions where relevant.

Expert advice should be sought to facilitate high quality responses to referred instruments and applications, and carefully considered to ensure it fulfils the Minister's obligations under the River Murray Act.

The decision-making process does not negate the requirements of any other relevant legislation, in particular for a person to:

- obtain the approval of the Native Vegetation Council to clear native vegetation in accordance with the *Native Vegetation Act 1991* or the Native Vegetation Regulations 2003
- ensure there is no disturbance, damage or interference with Aboriginal sites, objects or remains without an authorisation from the Minister for Aboriginal Affairs and Reconciliation in keeping with the *Aboriginal Heritage Act 1988*
- comply with the requirements of the *Aquaculture Act 2001*, *Development Act 1993*, *Natural Resources Management Act 2003*, *Environment Protection Act 1993*, *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth), *National Parks and Wildlife Act 1972*, *Heritage Places Act 1993*, *Harbours and Navigation Act 1993* and the *Historic Shipwrecks Act 1981*
- ensure that a right to occupy waterfront Crown land is obtained under the *Crown Lands Act 1929* for minor structures to be sited on Crown land or the bed of the River Murray, and comply with procedures under the *Native Title Act 1993* (Cwlth), and
- ensure design work and documentation of structures is in accordance with Australian Standards and Codes, SA Water Standards, and applicable South Australian and Australian Government Acts and Regulations. Designs should also conform to contemporary scientific literature and current thinking.

Provisions

On receipt of a referred application the Minister:

- will require the proponent to demonstrate that each potential impact of a proposed activity will have a **neutral** or **beneficial effect** on the River Murray
- may impose conditions to ensure that the activity will have a **neutral effect**
- may impose conditions so that the activity has a **beneficial effect**, where it is reasonable and practicable.

What is a neutral or beneficial effect?[2]

An activity has a neutral or beneficial effect on the River Murray when the impacts of the activity are known and understood, and it:

(1) has no potential for adverse impact, or

(2) will lead to an improvement consistent with the objects and objectives for a healthy River Murray, or

(3) has potential for adverse impact that would be inconsistent with one or more of the objectives for a healthy River Murray, however

- (A) the activity would avoid the adverse impact or the risk of impact because of the way it would be undertaken, or
- (B) it is impossible to avoid the adverse impact or potential impact, however
  - (i) the impact is not very high (refer to the *River Murray Neutral or Beneficial Effect Guidelines*[3]), and
  - (ii) the effects can be offset[4] by specific cost-effective actions that can be secured by the imposition of conditions, and
  - (iii) the proponent can sufficiently demonstrate (e.g. through an economic viability study and/or business case) that the activity provides:
    - (a) significant social or economic benefit to the people of the State, and/or
    - (b) a net improvement to the river (e.g. by replacing an existing activity that is having an adverse impact with one of lesser impact).

[1] The powers of the Minister are set out in section 22 of the River Murray Act and also in relevant provisions of the related operational Act under which an application is referred to the Minister.

[2] The concept of 'Neutral or Beneficial Effect is established in the *River Murray Referral Assessment Policy – Overview and General Provisions* (DWLBC, 2007) and addressed in detail in the *River Murray Neutral or Beneficial Effect Guidelines* (DWLBC, 2007)

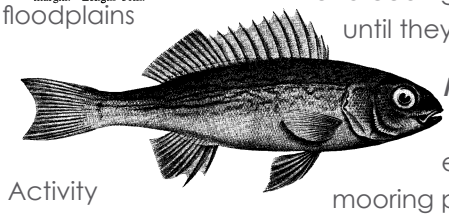
[3] *River Murray Neutral or Beneficial Effect Guidelines* (DWLBC, 2007)

[4] The concept of an offset is established in the *River Murray Act 2003* s22(8)(b) and s42(3)(b), briefly discussed in the *River Murray Referral Assessment Policy – Overview and General Provisions* (DWLBC, 2007) and will be addressed in detail in the *River Murray Offsets Guidelines* (currently under development by DWLBC)

Related Provisions

Other Provisions (some are yet to be developed) that address aquaculture issues are the:

- Vegetation Special Provision – the protection of native and other significant vegetation
- Industry Activity Provision – the impacts of industrial development, and
- Wetlands and Floodplains Special Provision – the protection of wetlands and floodplains connected with the River Murray.



Definitions

The following definitions apply to the Activity Provision – Aquaculture:

Activity[5] includes:

a) an act carried out on a single occasion, and

b) a series of acts, and

c) the storage or possession of anything (including something in liquid or gaseous form).

Aquaculture[6] includes the farming of aquatic organisms for the purposes of trade, business or research, but not activities declared by regulation not to be aquaculture.

ARI (average recurrence interval) is a measure of the rarity of a rainfall event. For example, a 100-year ARI flood is of a magnitude that is likely to occur once in 100 years on average.

Ecologically sensitive and vulnerable habitats include but are not limited to wetlands, dune areas, mudflats, remnant native vegetation and important wildlife habitats, including feeding and breeding grounds for migratory birds and native fish.

Estuarine fish spend their entire life cycle in an estuary.

Exotic means a non-native species.

Floodplain[7] means land within the:

i. 1956 River Murray flood line, and

ii. 100-year ARI flood level for the River Murray tributaries in the Eastern Mount Lofty Ranges.

Freshwater aquatic species spend their entire life cycle in inland waters, although some species are euryhaline (i.e. can live in a wide range of salinities).

Indigenous means species that are native to a specific locality (refers to both flora and fauna).

Marine aquatic species spend their entire life cycle in the ocean, although some species may use estuaries for breeding. Juveniles may live in an estuary until they are large enough to go to sea.

Minor structures include boardwalks, boat ramps, causeways, channels, erosion barriers, jetties, piers, landings, mooring posts/piles, pipelines, pontoons, irrigation pumps, pump houses, retaining walls, steps, swing moorings and other similar structures.

Precautionary principle[8] means that if there are threats of serious or irreversible damage to natural resources, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

River Murray[9] means the:

a) River Murray system – the main stem and all anabranches, tributaries, floodplains, wetlands and estuaries that are in any way connected or associated with the river and related beds, banks and shores, and

b) natural resources of the River Murray, being:

i. soil, groundwater and surface water, air, vegetation, animals and ecosystems connected or associated with the river system

ii. cultural and natural heritage, and amenity and geological values connected or associated with the river system, and

iii. minerals and other substances, and facilities, that are subject to the operation of a Mining Act and are such that activities undertaken in relation to them may have an impact on the river.

Salt interception scheme means a large-scale pumping and drainage project that intercepts saline water flows and disposes of them, generally by evaporation.

[5] *River Murray Act 2003*

[6] *Aquaculture Act 2001*

[7] Adapted from the *River Murray Act 2003*

[8] *Natural Resources Management Act 2004*

[9] *River Murray Act 2003*

Value of Aquaculture

With increasing pressure on wild fisheries and a majority of commercial seafood species being classified as fully or overexploited, the demand for cultured product is increasing.

Photo courtesy of PIRSA Aquaculture

Australian, and indeed global, wild fisheries production is static or declining and to make up for market shortfalls, significant emphasis has been place on the aquaculture industry.

Aquaculture involves the growing of marine and freshwater animals and plants for trade, business or research. The South Australian aquaculture industry has developed rapidly during the past 10 years, resulting in a significant increase in the volume of production and diversification of species. It made a direct contribution to gross state product of $277 million in 2005-06 and represents about 38 per cent of Australia's total aquaculture production value. The sector is also a significant employer in SA's regional communities, accounting for 3348 full-time equivalent positions in 2005-06.

Land-based freshwater aquaculture, such as that undertaken in the Murray-Darling Basin in South Australia, involves the culture of fish species in a variety of structures including ponds, hatcheries and holding tanks. In South Australia, freshwater aquaculture species have traditionally included barramundi, Murray cod, rainbow/brown trout, black bream and crustaceans such as yabbies and marron. There has also been a recent increase in the production of ornamental species and brine shrimp.

The Minister for the River Murray recently commissioned a research and development centre to investigate growing mulloway using water from salt interception schemes, which is presently considered waste and pumped to a disposal basin to evaporate.

The *Aquaculture Act 2001* provides a framework for the sustainable development and management of aquaculture in the State. It has imposed greater controls on the industry through licensing and environmental monitoring, which has resulted in improved management in some sectors. It is particularly important that due care is taken to protect the River Murray Protection Areas – the areas to which this policy applies – from any adverse impacts. In particular, aquaculture activities should not occur in any natural water bodies due to the significant risks of irreversible damage to the river system.

Provisions and Principles

The provisions below have been designed to result in a neutral impact on the natural and cultural resources of the River Murray. They represent the minimum standards required to achieve the objectives of the *River Murray Act*. Proponents are strongly encouraged to undertake actions above and beyond these principles to achieve a beneficial effect for the river environs.

Provision 1 (General)

An activity involving the aquaculture should not harm the River Murray in any of the following ways:

- loss/decline of protected, threatened and endangered species[10]
- loss/decline of ecologically valuable habitat
- loss/decline of key vegetation associations
- incursions of exotic plants and animals (including aquatic pests)
- erosion
- rising groundwater and dryland salinity
- adverse interruption of physical and ecological processes
- decline in water quality
- degraded landscape or amenity values, and
- damage to, disturbance of or interference with Aboriginal sites, objects or remains without authorisation of the Minister for Aboriginal Affairs and Reconciliation.

[10] Listed under the *National Parks and Wildlife Act 1972*

Principles (Summarised in Figure 2)

1.1 Activities involving aquaculture activities that may lead to actual or likely Very High Adverse Impact[11] on the River Murray should be avoided and may be refused.

1.2 Activities involving aquaculture activities that may lead to actual or likely Low-High Adverse Impact[11] on the River Murray should be avoided through negotiation and modification of the proposal and the imposition of relevant conditions.

1.3 Activities involving aquaculture activities that may lead to actual or likely Adverse Impact on the River Murray that is unavoidable should only proceed where:

a. the activity will not lead to actual or likely Very High Adverse Impact on the River Murray; and

b. the adverse effects of the activity can be offset[12] by specific cost effective actions that will benefit the river and can be secured by the imposition of conditions; and

c. the proponent can sufficiently demonstrate (e.g. via the results of an economic viability study and/or business case) that the activity provides:

i. significant social or economic benefit to the people of the State; and/or

ii. a net improvement to the River Murray. (For example, where a net improvement will be gained by replacing an existing activity that is having an adverse impact, with an activity of lesser impact).

Provision 2 (Aquaculture development and management – general)

Aquaculture activities should protect, restore and enhance the natural resources of the River Murray.

Principles

2.1 The precautionary principle applies to avoiding activities that might cause harm to the river.

2.2 Regulation of aquaculture activities under the *River Murray Act* must comply with the requirements of the *Aquaculture Act 2001* and policies developed under this Act, however the Minister for the River Murray is not limited by those requirements.

2.3 Individual and cumulative impacts of an activity should be considered when assessing a statutory instrument or application for authorisation that involves aquaculture activities.

2.4 Management agreements (under the *River Murray Act*) should be used where appropriate to protect, conserve, manage or enhance the River Murray.

2.5 Farming of indigenous aquatic organisms (see Appendix 1) is preferred unless the farming method is a closed system with no links to natural water sources.

2.6 Aquaculture developments must be isolated from any natural water bodies (i.e. the river channel, tributaries, creeks, etc).

2.7 Aquaculture facilities and associated infrastructure must protect and maintain navigation of waterways.

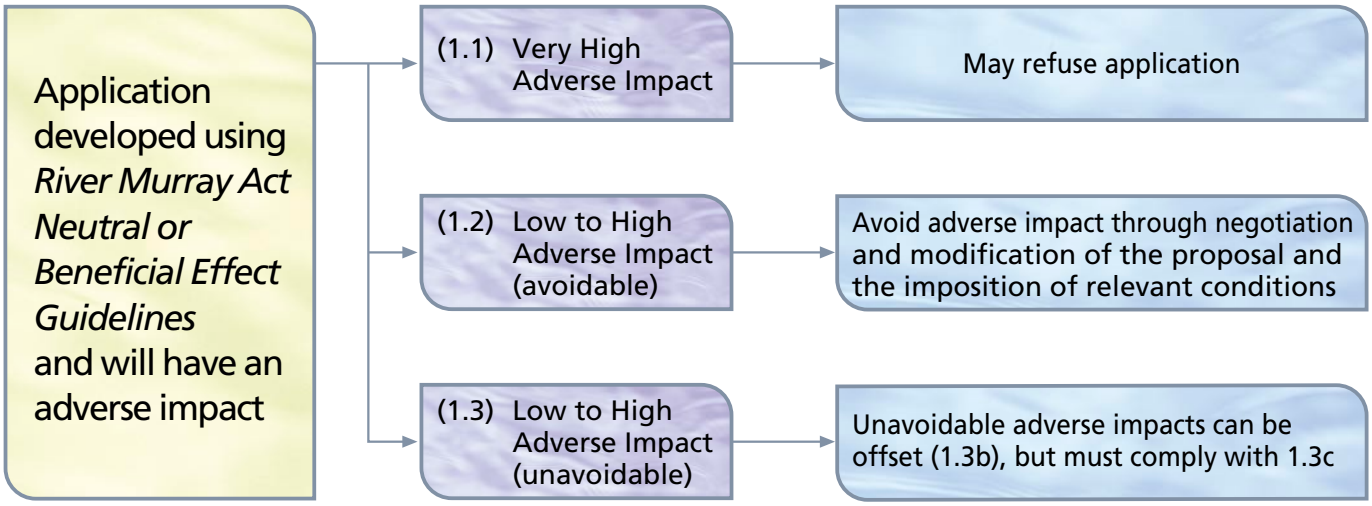


Figure 2: Principles 1.1–1.3 flow diagram

[11] Refer to the *River Murray Act Neutral-Beneficial Effect Guidelines*

[12] Refer to the *River Murray Offsets Framework* (Refer to the General Provisions until the Offsets Framework is available)

Provision 3 (Location and siting)

Aquaculture operations should be located to protect the biodiversity and cultural values of the River Murray, while providing for the economic, social and physical wellbeing of the community.

The principles are:

i. development, where possible, should be sited on cleared areas of the allotment

ii. local indigenous vegetation species should be retained, maintained and restored

Principles

3.1 The location of aquaculture facilities should not have an adverse impact on the integrity of the landscape. This includes minimising cut and fill to the landscape, avoiding dune areas and not increasing natural erosion rates.

3.2 Aquaculture developments should be located where the biodiversity and ecological values of the River Murray will be protected and/or enhanced. As a guide:

a) developments should avoid any location that may result in the disturbance, disruption or harm of a State or nationally listed threatened species, threatened ecological community or migratory bird (this includes the breeding, nesting and feeding grounds of these species/ communities)

b) developments should not result in the displacement of endemic flora or fauna species

c) protection of indigenous vegetation communities should be a primary consideration in determining the siting of aquaculture facilities due to the importance of native vegetation in maintaining river health (e.g. through bank stabilisation, maintaining habitat for flora and fauna, and conserving genetic biodiversity).

iii. aquaculture facilities and other structures should be located as far away as possible from large trees and not beneath tree canopies

iv. impervious materials such as paving should not be located beneath tree canopies

d) fragmentation of habitat and corridors should be avoided

e) vegetated buffer zones and/or habitat corridors should be incorporated where appropriate and necessary

f) any clearance of native vegetation must comply with the *Native Vegetation Act 1991* and the *Native Vegetation Regulations 2003*, and

g) aquaculture farming of exotic species within the 1956 flood line must be in a fully enclosed system (see Appendix 2).

3.3 The siting of aquaculture activities should not lead to any changes in the hydrological regime of the River Murray, particularly avoiding:

a) wind funnelling and stormwater channelling, and

b) the restriction of the movement of water, including floodwaters and groundwater.

3.4 Aquaculture facilities should be sited to protect or enhance the water quality of the River Murray. As a guide:

a) ponds and dams in flood-prone areas should be able to withstand a 100-year ARI flood with a duration of 24 hours without overflowing

b) all aquaculture facilities should be located off-river, as far back as practicable from the river channel, and

c) unless a beneficial effect[13] can be demonstrated, aquaculture should not occur:

i. in seasonal or ephemeral drainage pathways

ii. in man-made drains that enter natural systems

iii. within the 1956 flood line, or

iv. within 100m of any natural watercourse, drainage line, floodplain, lake or wetland.

3.5 Aquaculture activities should be located to avoid hazard risks, including flood, fire, erosion, contaminated soils and acid sulfate soils. As a guide, aquaculture facilities should not be situated:

a) on contaminated or potentially contaminated land unless the site has been made suitable and safe for the intended use

b) in flood-prone areas

c) in erosion-prone areas

d) in areas that contain acid sulfate soils or potential acid sulfate soils, and

e) on low-lying or swampy land.

3.6 Aquaculture developments should be sited to maintain or enhance the amenity of the River Murray.

At a minimum, facilities should be sited to:

a) avoid being visible from public vantage points (such as roads, walking trails, river banks, etc)

b) preserve areas of high amenity values, including stands of vegetation, exposed cliffs, headlands, islands, hilltops and areas that form an attractive background to urban and tourist developments, and

c) avoid obstructing views from the River Murray, its banks, prominent public locations and existing developments.

3.7 Aquaculture developments should be sited to avoid damage to, disturbance of or interference with Aboriginal sites, objects or remains as required by the *Aboriginal Heritage Act 1988*.

3.8 Aquaculture development should be sited to avoid materially affecting the heritage value of a place, noting that the heritage provisions of the *Development Act 1993*, the *Heritage Places Act 1993* and the *Historic Shipwrecks Act 1981* extend to the impacts on the wider setting of a State heritage place, on undiscovered archaeological deposits and within 500m of a historic shipwreck including any shipwreck of 75 years of age or more.

3.9 If an aquaculture development can be sited on private land, the right to occupy waterfront Crown land would not normally be granted.

[13] Refer to the *River Murray Neutral or Beneficial Effect Guidelines* (DWLBC, 2007)

Provision 4 (Design)

Aquaculture activities should be designed to protect, enhance and restore the natural resources of the River Murray.

Principles

4.1 Facilities should be designed to protect the integrity of the River Murray landscapes, including:

a) minimising the proportion of the covered site

b) following the form of the existing landscape, which in turn minimises cut and fill

c) minimising soil erosion that can lead to inflow of sediment to estuaries, tributaries and the River Murray (this could include using hay bales or sediment traps), and

d) avoiding adverse changes to the geomorphology of the river bank or to wetlands.

4.2 Facilities should be designed to preserve or enhance the river's biodiversity values. As a minimum:

a) facilities should be designed to prevent interaction between farmed species and native species or migratory birds (i.e. via covers or bird scaring devices)

b) facilities must be adequately secure to avoid vandalism that might result in the release of farmed species into the environment

c) facilities (i.e. ponds and cages) should be designed to avoid escapes by farmed organisms, parasites and diseases, with a level of security commensurate to the level of irreversible risk

d) organisms and their gametes must be prevented from entering natural watercourses through pond discharge, waste and other means

e) walls, fences and other structures are to be kept low (1m or less) with an open design to facilitate the movement of fauna

f) only locally indigenous flora species should be planted within 50m of the river

g) known or potential pest[14] plant species should not be planted

h) activities should not restrict the natural movement of native species within or between the river channels, floodplains and the coastal area, and

i) the percentage of indigenous vegetation cover after development should remain at least equal to the level of cover before development.

4.3 Aquaculture facilities should be designed to protect or enhance the water quality of the River Murray. As a guide:

a) where indigenous species are farmed, water discharged from aquaculture facilities (other than inland saline) should be used for irrigation purposes, at a rate that does not cause ponding and runoff from the aquaculture site, and at a rate that ensures full uptake of nutrients by the vegetation. Contaminated water must not flow into catchment areas, nearby waterways or soak into underlying groundwater. Wastewater used for irrigation must meet Department of Health guidelines for reclaimed water

b) aquaculture facilities must protect and maintain water quality, including drinking water quality objectives

[14] as declared in the Government Gazette

c) the use of salinised water for aquaculture resources is encouraged where its use will not result in greater ecological damage. For example, salinised water made available through salt interception schemes could potentially be used to grow marine finfish, microalgae, halophytes or other saltwater dependent organisms

Photo courtesy of PIRSA Aquaculture

d) all point source discharges of pollutants should be eliminated

e) pollution from runoff should be eliminated before it leaves an allotment and enters a water body

f) ponds need to be designed to avoid seepage of water into the groundwater or contamination of surrounding soils, e.g. including adequate pond sealing and/or buffer distances from the water table, and

g) transport routes and roads should be designed to minimise the risk of pollution reaching the River Murray, including ensuring that runoff from roads, parking areas and other polluted surfaces should be diverted to treatment filters capable of removing litter, sediment, grease and oil.

4.4 Development should incorporate stormwater management techniques to contain the quantity, velocity, variability and quality of the runoff to as near pre-development levels as practical. Techniques include, but are not limited to:

a) directing roof stormwater overflow from rainwater tanks to soakage trenches or to retention/overflow wells or sumps

b) utilising grassed swales or natural drainage lines to accommodate the major flows from the land development, and

c) incorporating stormwater systems designed to minimise entry of pollutants such as sediment, pesticides and herbicides, bacteria, animal wastes and oil and grease into drainage systems or the marine environment.

Photo courtesy of PIRSA Aquaculture

4.5 Aquaculture activities must be designed to avoid hazard risks, including flood, fire, erosion, contaminated soils and acid sulfate soils. As a guide:

a) ponds should incorporate effective freeboard[15], flood diversion and overflow/spillway outlets to cater for at least a 100-year ARI flood with a duration of 24 hours, and

b) facilities must be designed to avoid possible storm damage that could result in the release of cultured species into the environment.

4.6 Aquaculture activities should not lead to any changes in the River Murray's hydrological regime. In particular:

a) the design of facilities should not restrict the movement of water, including floodwaters and groundwater, in the river system

b) impervious surfaces (including roofs of buildings, verandas, concrete slabs and paving) should not cover more than 35 per cent of an allotment

c) facilities should be designed so that energy from runoff is dissipated before it leaves an allotment and before it enters a water body

d) facilities should be designed to encourage integration, recycling and reuse of effluents. A water recirculation system should be used where possible, and

[15] distance between the top of the pond wall and the surface of the pond

e) facilities should be designed to minimise overland flows entering ponds.

4.7 Aquaculture developments should be designed to maintain or enhance the amenity of the River Murray. At a minimum:

a) the facilities' size, form and appearance should complement the surrounding environment and maintain the character of the landscape

b) the facilities' external materials should reflect little light and blend with the natural environment (i.e. colours of cream, grey, brown or dull green)

c) buildings, landscaping, paving and signage should be coordinated to maintain and enhance the amenity of the area

d) buildings should be low in profile, complementing the natural form of the land

e) facilities should not impair views from the River Murray, its banks, prominent public locations and existing buildings, and

f) landscaping with indigenous local species should be used to visually integrate buildings into a site and screen buildings from public view.

Provision 5 (Construction)

Aquaculture facilities should be constructed to protect, enhance and restore the natural resources of the River Murray.

Principles

5.1 Construction techniques should protect or enhance the River Murray landscape, including:

a) selecting techniques and methods that minimise disruption or alteration of the natural landscape

b) not adversely altering the geomorphology of the river bank or wetlands through construction or otherwise

c) minimising excavation and filling or alteration to the existing natural land form

d) minimising areas of unstabilised, de-vegetated surfaces, and

e) ensuring the land form is stabilised and erosion controlled during construction in line with the Environment Protection Authority's (EPA) *Stormwater Pollution Prevention: Code of Practice for the Building and Construction Industry* (1999).

5.2 Construction of aquaculture facilities should not have an adverse impact on the biodiversity and ecological values of the River Murray. As a guide:

a) construction should not increase the potential for, or result in, the spread of pest plants, animals or any non-indigenous species into areas of indigenous vegetation or water bodies

b) construction traffic and equipment should operate during the day only and within the EPA's legal noise limits, and

c) construction vehicles should not deviate from defined routes.

5.3 Construction should not increase soil or water salinity.

5.4 Construction and related activities must not damage, disturb or interfere with Aboriginal sites, objects or remains as required by the *Aboriginal Heritage Act 1988*.

5.5 Overland flow must be prevented from entering the site during construction, through using methods such as perimeter bunds.

5.6 Aquaculture activities should be designed to avoid hazard risks. As a guide:

a) any onsite waste (solid, liquid or gaseous) should be contained, stored and disposed of in a manner that has no adverse impacts on the river

Photo courtesy of PIRSA Aquaculture

b) external litter bins should have a wildlife proof and windproof lid

c) liquid waste storage areas should incorporate a bund to prevent spills and leakages, and protect from overland flow *(EPA Guidelines: Bunding and Spill Management 2004)*

d) waste should be stored securely onsite, avoiding environmentally sensitive areas, and

e) waste should not be allowed to enter the stormwater system.

5.7 All applications are legally obliged to report any sites, objects or places of heritage significance that are found during development.

Provision 6 (Management)

Aquaculture activities should be managed to protect, enhance and restore the natural resources of the River Murray.

Principles

6.1 Aquaculture facilities should be managed to preserve the landscape of the River Murray, including:

a) minimising the presence and impact of vehicles, and

b) maintaining facilities and operations in a clean and orderly manner to avoid further damage to the landscape after site development.

6.2 Aquaculture facilities should be managed to preserve or enhance the biodiversity values of the river. As a minimum:

a) where indigenous species are being farmed, local broodstock should be used to avoid genetic contamination

b) broodstock should be screened for known pathogens and parasites before entering the aquaculture facilities

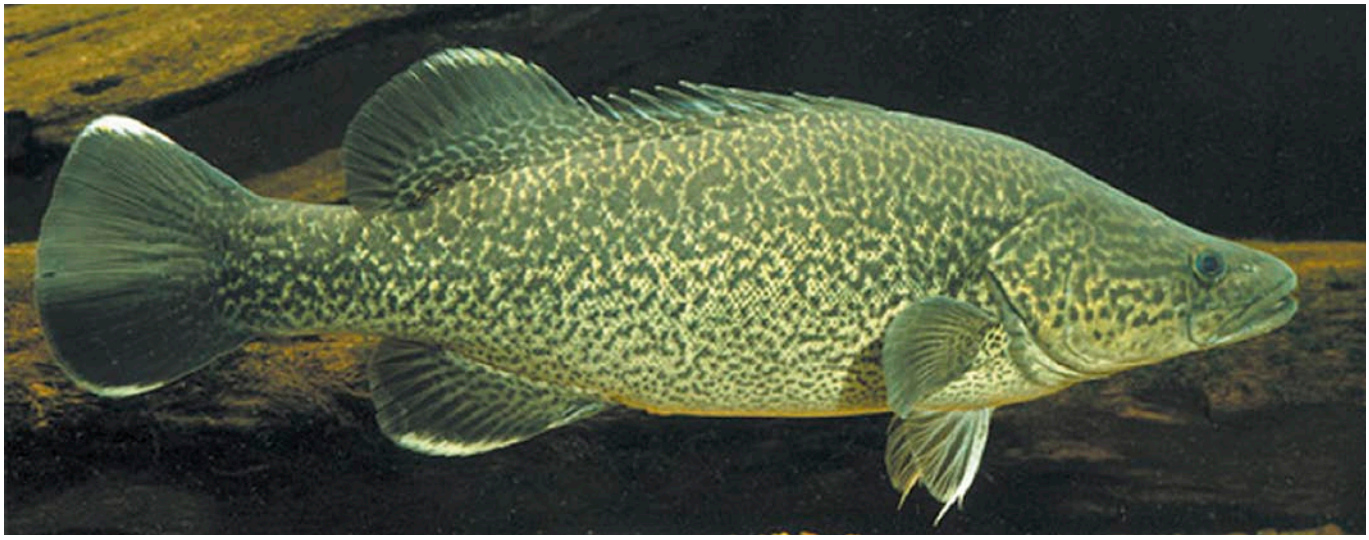
c) noise levels from activities must be minimised to avoid affecting sensitive fauna and must comply with the *Environment Protection (Industrial Noise) Policy 1994*

d) lighting should be minimised between dusk and dawn to avoid affecting fauna

e) farmed aquatic organisms, their parasites and pathogens should not be released from their confinements, and

f) risk of escape must be minimised when transporting organisms.

Photo courtesy Murray Darling Basin Commission. Copyright Gunther Schmida



6.3 Aquaculture facilities should be managed to protect or enhance the water quality of the River Murray. As a guide:

a) the use of a substance for therapeutic or prophylactic purposes or as an antifoulant should be eliminated where practicable and otherwise limited. Approval from the Minister for Agriculture, Food and Fisheries is required for off-label use of chemicals (under the *Aquaculture Regulations 2005*) if the facility does not already have an Australian Pesticides and Veterinary Medicines Authority minor use permit or registration

b) fertilisers, pesticides and herbicides should not be applied within 50m[16] of the River Murray or its tributaries

c) any chemical use must be compliant with the *Environment Protection (Water Quality) Policy 2003* and the *Agricultural and Veterinary Products (Control of Use) Act 2002* and associated legislation

d) sediment removed from ponds should be stored or disposed of in a manner that will minimise any impacts from erosion and leachate

e) activities should not result in an increase of groundwater recharge

f) overflow from ponds must not discharge into drainage lines, floodplains, watercourses, lakes or wetlands

g) effluent disposal systems incorporating soakage trenches or a similar system must be located at least 100m from the river and outside the 1956 floodlevel

h) aquaculture chemicals, feed, waste, bio-sediment and dead organisms must be stored in a covered, bunded area and disposed of in a lawful manner outside the floodplain

i) the use of wastewater for irrigation is encouraged if allowed under licensing and permit conditions[17], and

j) wastewater discharged from aquaculture activities must not compromise the quality of receiving waters (including groundwater) as specified in schedule 2 of the *Environment Protection (Water Quality) Policy 2003*.

6.4 The management of aquaculture activities should not lead to any further changes in the hydrological regime of the River Murray system. In particular:

a) activities should not further stress water resources – further alteration of the hydrological regime of the River Murray may require an authorisation under the *Natural Resources Management Act 2004*

b) activities should not adversely interfere with the wetting and drying regime of natural wetlands or water-dependent ecosystems, and

c) activities should preserve natural drainage systems and associated vegetation. This includes, but is not limited to:

i. runoff and groundwater recharge should not be significantly increased

ii. groundwater must not be reduced or prevented from flowing to the river, and

iii. appropriate stormwater management.

[16] *Water Notes: Advisory Notes for Land Managers on River and Wetland Restoration* (Water and Rivers Commission, Western Australia, 2000)

[17] *Environmental Protection Act 1994*

APPENDIX 1 – Native freshwater fish in the Murray-Darling drainage division of South Australia

Family	Taxon	Common Name
Geotriidae	*Geotria australias*	Pouched lamprey
Mordaciidae	*Moracia morax*	Shortheaded lamprey
Anguillidae	*Anguilla australis*	Shortfinned eel
Plotosidae	*Tandanus tandanus*	Freshwater catfish
Clupeidae	*Nematalosa erebi*	Bony herring
Retropinnidae	*Retropinna semoni*	Australian smelt
Galaxiidae	*Galaxias brevipinnis*	Climbing galaxias
	Galaxias maculatus	Common galaxias
	Galaxias olidus	Mountain galaxias
	Galaxias rostratus	Murray galaxias
Melanotaeniidae	*Melanotaenia fluviatilis*	Murray rainbowfish
Atherinidae	*Atherinosoma microstoma*	Small-mouthed hardyhead
	Craterocephalus fluviatilis	Murray hardyhead
	Craterocephalus stercusnuscarum fulvus	Unspecked hardyhead
Ambassidae	*Ambassis agassizii*	Chanda perch
Percichthyidae	*Gadopsis marmoratus*	River blackfish
	Maccullochella macquariensis	Trout cod
	Maccullochella peelii peelii	Murray cod
	Macquaria ambiqua ambiqua	Murray-Darling golden perch
	Macquaria australasica	Macquarie perch
	Macquaria colonorum	Estuary perch
	Nannoperca australis	Southern pygmy perch
	Nannoperca obscura	Yarra pygmy perch
Terapntidae	*Bidyanus bidyanus*	Silver perch
	Leiopotherapon unicolour	Spangled grunter
Pseudaphritidae	*Pseudaphritis urvillii*	Congolli
Eleotridae	*Hypseleotris klunzingeri*	Western carp gudgeon
	Hypseleotris sp. 1	Midgley's carp gudgeon
	Hypseleotris sp. 3	Murray Darling carp gudgeon
	Mogurnda adspersa	Hybrid forms
	Mogurnda clivicola	Southern purple-spotted gudgeon
	Philypnodon grandiceps	Flathead gudgeon
	Philypnodon sp.	Dwarf flathead gudgeon
Gobiidae	*Pseudogobius olorum*	Western bluespot goby
	Tasmanogobius lasti	Lagoon goby

Source: Hammer MP & Walker KF (2004) A catalogue of South Australian freshwater fishes including new records, range extensions and translocations. *Transactions for the Royal Society of South Australia*, 128, 85-97.

Other native aquatic freshwater species

Shrimps	*Parataya australiense*
	Macrobrachium australiense
Yabby	*Cherax destructor*
RM crayfish	*Euastacus armatus*
Freshwater river mussel	*Alathyria jacksoni*
Freshwater floodplain mussel	*Velesunio ambiguus*
Brine shrimp	*Genus Artemia*

APPENDIX 2 – Exotic aquatic species in the South Australian Murray-Darling Basin

For exotic fish species for the SA Murray-Darling Basin region, refer to the Noxious Species List under the *Fisheries Management Act 2007*.

All crustaceans and invertebrates other than those listed in Appendix 1 are deemed to be exotic for the purpose of this policy.

APPENDIX 3