



Department of
**Primary Industries and
Regional Development**

Aquatic Resources Management Paper No. 1

**Draft Aquatic Resource
Management Strategy:
Pinctada maxima Managed
Aquatic Resource**

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Important disclaimer

The Chief Executive Officer of the Department of Primary Industries and Regional Development and the State of Western Australia accept no liability whatsoever by reason of negligence or otherwise arising from the use or release of this information or any part of it.

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Aquatic Resources Management Act 2016

**DRAFT AQUATIC RESOURCE MANAGEMENT STRATEGY: PINCTADA MAXIMA
MANAGED AQUATIC RESOURCE**

Pursuant to section 14 of the *Aquatic Resources Management Act 2016* (ARMA), on the 4 May 2018 aquatic organisms of the species *Pinctada maxima* were declared to be a managed aquatic resource by the Minister for Fisheries.

In accordance with section 17 of the ARMA, a Draft Aquatic Resource Management Strategy (ARMS) has been prepared by the Chief Executive Officer of the Department of Primary Industries and Regional Development (Department). This Aquatic Resource Management Strategy was approved by the Minister for Fisheries on..... 2018.

The Resource to be Managed

The silver-lipped pearl oyster, *Pinctada maxima* (pearl oyster), is a filter-feeding bivalve mollusc that is found in coastal Western Australian (WA) waters north of Exmouth across northern Australia to Cooktown, Queensland (Southgate and Lucas, 2008).

Pearl oysters are a protandrous hermaphrodite, meaning that they mature first as males at approximately three to four years of age (110 – 120 mm shell length), after which they undergo a sex change and become females. Spawning occurs between September and May each year, with a peak from October to December. Annual variation in recruitment of juveniles appears to be driven primarily by environmental conditions including sea surface temperature, rainfall and wind conditions (Hart et al, 2011). For management purposes, pearl oysters in WA waters are considered a single stock. Historically pearl oysters have been utilised for decoration and cultural purposes, meat and for the production of pearls.

Background on Resource Use

The customary use of pearl oysters (including shelled species other than *P. maxima*) has an important cultural significance to the indigenous people of Australia and have been harvested for at least 20 000 years (Yu et al, 2011). Aboriginal Australians of the West Kimberley harvested pearl oyster shells from shallow waters and established traditional trading networks that extended throughout Australia (Akerman and Stanton, 1994). The pearl oyster meat was consumed and the shell used for decoration and other cultural purposes. There are still pearl oyster carvers in the Kimberley region, with pearl oysters continuing to be significant in cultural traditions (Department of Fisheries, 2016; Yu et al, 2011).

Under the *Pearling Act 1990* a person must have held a pearling licence or permit to collect pearl oysters in WA waters. No recreational fishing applications have



Figure 1. Indigenous carving on pearl oyster shell (personal-Patrick Baker © Western Australian Museum).

been made under this legislation therefore no licensed recreational fishing activity has occurred.

It is understood that dead beach-strewn pearl oyster shells (including shells of species other than *P. maxima*) are occasionally collected by the WA community.

Commercial fishing for pearl oysters in WA began in the 1860s in south Pilbara, around Cossack and Flying Foam Passage. By the 1890s pearl oysters were also commercially fished at Eighty Mile Beach and throughout the Kimberley. The introduction of the *Pearl Fishing Act 1886* and the *Pearling Act 1912* established the first statutory management framework for the WA commercial pearl oyster fishery (Southgate and Lucas, 2008; Malone et al, 1988).

Initially, the commercial industry harvested pearl oysters of all sizes but favoured the larger pearl oysters which were used for the production of Mother of Pearl (MOP) for buttons and inlays in furniture and watches. By 1910 there were nearly 400 luggers and 3500 people in the pearling industry. At its peak, approximately 2 million pearl oysters were harvested annually, supplying up to 75 % of global MOP production (Southgate and Lucas, 2008; Malone et al, 1988).

In the late 1950s the pearl culture phase of the commercial industry began to develop in Australia. By the end of the 1970s, most of the commercial industry had moved into cultured pearl production. This shift towards pearl culture saw a gradual decrease in the number of pearl oyster fishing boats.

Entry into the commercial pearl oyster fishery, access to particular fishing zones and the total annual catch has been limited since 1993. Since 1979, the total annual catch has ranged between 330 000 and 830 000 pearl oysters, with the average annual catch being 530 000 pearl oysters (which includes larger shell utilised for MOP). Pearl production has also been limited through controls on first operation pearl oyster seeding since 1993.

In the early 1990s, the commercial pearling industry developed hatchery technologies for breeding pearl oysters. This has grown into a significant component of pearl oyster production.

Today's commercial pearling industry has an integrated structure across the wild capture, hatchery, seeding and culture activities. Over the last 30 years, in addition to maintaining resource sustainability, a focus for management of the pearling industry has been to regulate south sea pearl production. In 2015, the pearling industry was estimated to be worth approximately \$78 million. The commercial pearl oyster fishery was awarded Marine Stewardship Council accreditation in 2017.



Figure 2. "Hard-hat" diver (ca. 1915) (Southgate and Lucas, 2008)

Content required under section 16 of the ARMA

A declared managed aquatic resource must have an ARMS. Section 16 of the ARMA outlines that an ARMS must set out a number of things in relation to the declared managed aquatic resource. The things that must be set out in the ARMS are contained in the break-out boxes below, with the preceding text providing further background. The information within the break-out boxes is also summarised in a table at Appendix 1.

Aquatic Resource to be Managed

On 4 May 2018, aquatic organisms of the species *Pinctada maxima* were declared to be a managed aquatic resource by the Minister for Fisheries as required under s.14 of the ARMA. This is the aquatic resource that will be managed under this ARMS.

Section 16 (1) (a): *A description of the aquatic resource to be managed.*

The aquatic resource to be managed under this ARMS is aquatic organisms of the species *Pinctada maxima* in Western Australia, as declared under s.14 of the ARMA by the Minister for Fisheries on the 4 May 2018.

Objects

The objects of the ARMA are-

- (a) *to ensure the ecological sustainability of the State's aquatic resources and aquatic ecosystems for the benefit of present and future generations; and*
- (b) *to ensure that the State's aquatic resources are managed, developed and used having regard to the economic, social and other benefits that the aquatic resource may provide.*

This ARMS addresses the first object of the ARMA in terms of ensuring ecological sustainability of the pearl oyster resource by allowing a quantity of the resource to be maintained to ensure ecological sustainability under 16(1)(c), prior to establishing access and allocation to the resource.

Following on from maintaining the ecological sustainability of the pearl oyster resource, and noting the second object of the ARMA, the main objective for managing the pearl oyster resource also includes that it be managed to optimise the economic return of the resource to the benefit of the WA community.

Section 16 (1) (b): *The main objective to be achieved by managing the aquatic resource.*

Whilst ensuring ecological sustainability of the pearl oyster resource, the main objective to be achieved by managing the pearl oyster resource is to optimise the economic return to the WA community including through the production of high quality pearls and associated products.

Section 16 (1) (c): *The minimum quantity of the aquatic resource that is considered necessary to be maintained for the resource to be ecologically sustainable.*

To maintain ecological sustainability, the spawning stock (spawning potential) of this resource must be maintained above levels where future recruitment should not be materially affected by the current stock size.

Further details are available in the Western Australian Silver-Lipped Pearl Oyster (*Pinctada maxima*) Resource Harvest Strategy.

Regulated Activities

To ensure the objects of the ARMA and main objective of this ARMS are achieved, all activities that involve the take of the pearl oyster resource should be regulated.

In relation to the take of the pearl oyster resource by the commercial pearling industry, commercial fishing will be managed under the commercial Aquatic Resource Use Plan (ARUP) for this resource. The hatchery activities and integrated pearl culture activities of the commercial pearling industry will be managed under the aquaculture provisions of the ARMA, regulations made under the ARMA and any relevant Administrative Guideline.

Section 16 (1) (d): *The activities that should be regulated in respect of the aquatic resource.*

Noting the integrated nature of the pearling industry, activities that involve the commercial take of pearl oysters, pearl production and other activities involving the aquaculture and processing of pearl oysters in WA waters should be regulated.

Commercial fishing activities will be managed under a commercial ARUP for this resource.

All other activities will be managed by the appropriate provisions of the ARMA, as well as regulations made under the ARMA and any relevant Administrative Guidelines.

The fishing period specified within this ARMS recognises the historic commercial licensing period of the pearl oyster fishery.

Section 16 (1) (e): *The details of each period for which activities in respect of the aquatic resource are to be regulated (fishing period).*

The fishing period for the pearl oyster resource will be 1 January to 31 December annually.

Resource Access

The quantity set aside for customary fishing and public benefit use is considered prior to the calculation of the Total Allowable Catch (TAC) and will not become a tradeable right under the ARMA. While the level of customary fishing has not been formally estimated, it must be recognised within this ARMS.

Public benefit use will include the collection of dead beach strewn pearl oyster shell by the WA community. However, as the pearl oysters are dead and natural mortality is accounted for in the stock assessment process, explicitly including this take within the quantity to be available is unnecessary. In addition to the take of dead beach strewn pearl oysters, public benefit use will include a quantity required to conduct scientific monitoring and assessment that provides further information on the pearl oyster resource as considered appropriate by the Department.

The quantity below is considered appropriate to accommodate the use of the pearl oyster resource for these activities.

Section 16 (1) (f): *The quantity of the aquatic resource that is to be available in a fishing period for customary fishing and public benefit uses.*

The quantity of pearl oyster in WA waters that is to be available in a fishing period for customary and public benefit uses is up to 40,000 live pearl oysters.

Following on from the consideration of quantities required under 16 (1)(c) and (f), the TAC for the pearl oyster resource is set in proportion to overall stock abundance. The Western Australian Silver-Lipped Pearl Oyster (*Pinctada maxima*) Resource (Harvest Strategy) for this resource details the constant exploitation approach whereby the TAC is set in proportion to the overall wild stock abundance. As specified within the Harvest Strategy, it is reviewed periodically to ensure that it remains relevant.

This ARMS provides clear guidance for the Chief Executive Officer (CEO) from the Minister for Fisheries in setting a sustainable TAC level for the pearl oyster resource to meet the main objective in 16(1)(b).

Section 16 (1) (g): *The method to be used in calculating the total allowable catch (TAC) for the aquatic resource.*

Following on from the consideration of quantities required for resource sustainability, customary fishing and public benefit uses, the Harvest Strategy details the constant exploitation approach whereby the TAC is set in proportion to the overall wild stock abundance.

As detailed in the Harvest Strategy, the spawning stock population estimates and recruitment indices are compared to their reference levels and corresponding control rules to allow the Department to recommend Sustainable Harvest Levels (SHL: a range that the TAC is required to be set within). The recommended overall SHL will include particular SHLs for Zone 1, 2 and 3 of the commercial fishery, as described within the commercial ARUP for this resource. The harvest control rules enable the SHL to be adjusted on a regular basis to provide appropriate protection based on the current stock and recruitment levels. When the stock abundance is predicted to be lower, the SHL is adjusted downward. Similarly, the SHL can be raised in years when the available abundance is predicted to be higher.

The Harvest Strategy is reviewed periodically to ensure that it remains relevant, this review may include changes to the reference levels, control rules and any other relevant information.

SHL are discussed through the process outlined within the Harvest Strategy. The CEO will determine the TAC for each zone of commercial fishery for the fishing period based on the above scientific advice and having regard for any additional advice provided by:

- the Department (including any applicable co-management arrangements);
- any relevant advisory group;
- a recognised peak sector body;
- a resource share holders.

Resource Allocation

The longstanding commercial focus on fishing for pearl oysters in WA has been reflected in the allocation of the TAC for commercial fishing. There is no incidental capture of pearl oysters in the course of commercial fishing for other aquatic resources.

Section 16 (1) (h): *The proportion of the TAC that is to be available for recreational fishing for the resource.*

The proportion of the TAC that is to be available for recreational fishing is 0%.

Section 16 (1) (i) (i): *The proportion of the TAC that is to be available for commercial fishing for the resource.*

The proportion of the TAC that is to be available for commercial fishing for the resource is 100%.

Section 16 (1) (i) (ii): *The proportion of the TAC that is to be available for taking incidentally in the course of commercial fishing for other aquatic resources.*

The proportion of the TAC that is to be available for taking incidentally in the course of commercial fishing for other aquatic resources is 0%.

The integrated nature of the commercial activities of the pearling industry across fishing, seeding, culturing pearls and hatchery activities has been recognised in development the management structure under the ARMA. This structure ensures that the commercially fished pearl oyster resource is considered with its complementary aquaculture activities. Commercial fishing will be managed under a commercial ARUP for this resource and pearl culture and hatchery activities will be managed under the aquaculture provisions of the ARMA, regulations made under the ARMA and any relevant Administrative Guideline.

When the commercial ARUP for this resources commences, the number of resource shares to be made available to the commercial sector will equate to the permanent wildstock unit structure of the 2018 *Pearling (Wildstock) Licences* issued under the *Pearling Act 1990*.

Section 16 (1) (j): *The number of shares in the resource that are to be available to the commercial sector.*

The number of resource shares that are to be available to the commercial sector in this resource will be 572.

Resource shares will be available in the relevant zone as defined by the commercial ARUP for this resource. The number of resource shares available in Zone 1 will be 115, Zone 2 will be 457 and Zone 3 will be 0.

Monitoring effectiveness of the management of the pearl oyster resource

It is vital within any natural resource management regime to monitor and evaluate the effectiveness of management arrangements to ensure the ongoing ecological sustainability of the resource.

Noting the commercial focus on fishing for pearl oysters, the scientific monitoring parameters for pearl oyster resource are utilised within the TAC setting process outlined in 16 (1)(g) and documented in the Harvest Strategy. This includes spawning stock population estimates and recruitment indices, as well as comparisons between forecasted and actual commercial catch rates. Catch rates, pearl production and any other required information may also be utilised to assess the economic return to the WA community.

In addition to assessing impacts on the pearl oysters resource, a risk-based resource management framework is utilised to assess the impacts of resource use on all parts of the marine environment. This includes bycatch, endangered threatened and protected species, habitats and the ecosystem. In line with this framework, the Department completes periodic risk assessments on the activities that involve the use of the pearl oyster resource.

Together the outcomes of these assessments are considered against the reference levels within the Harvest Strategy. This will determine if any additional management action is required to ensure the resource is managed sustainably and efficiently to meet the main objective, as well as minimising the impact of fishing on the marine environment.

Independent audits and assessments of the pearl oyster resource also occur through the Marine Stewardship Council accreditation and Commonwealth export approvals processes.

Section 16 (1) (k):

The scientific parameters to be used to assess how effectively the aquatic resource is being managed.

The scientific parameters that are used to assess stock status of the pearl oyster resource are the spawning stock population estimates and recruitment indices which are compared to their reference levels detailed within the Harvest Strategy.

The performance levels used to assess commercial fishery performance when targeting the pearl oyster resource include a comparison of the quantity of pearl oyster taken to the TAC in previous years and the effort needed to obtain the catch compared to the catch-rate tolerance ranges, as defined in the Harvest Strategy. This process is also utilised to set an appropriate TAC.

Catch rates, pearl production and any other required information may also be utilised to assess the economic return to the WA community.

Changes within these parameters will be assessed by the Department and will determine if any additional management action is required to ensure the resource is managed effectively.

Consultation in respect of the ARUP

Pursuant to section 24 of the ARMA, the Minister must make one, or more than one, ARUP to implement this ARMS. The Minister is not to make an ARUP until the consultation required below is completed. This consultation will be completed by the CEO of the Department.

Section 16 (1) (l): *The consultation to be carried out in relation to the making, amendment or revocation of an aquatic resource use plan (ARUP) to implement the ARMS.*

In respect to making an ARUP(s) to implement this ARMS, the CEO will provide notice in any manner that the CEO considers appropriate. This must contain information about the draft ARUP, specify where copies of the draft ARUP may be obtained, invite interested persons to make submissions to the CEO on the draft ARUP within a specified period and specify how those submissions may be made.

In respect to amending or revoking an ARUP(s) made under this ARMS, the CEO will provide written notice to any affected stakeholders specifying the proposed change, invite interested persons to make submissions and specify the consultation period and how those submissions may be made.

Consultation on the making, amending or revoking of commercial ARUP(s) for this resource must include all 2018 *Pearling (Wildstock) Licence* holders under the *Pearling Act 1990* or all current *P. maxima* pearl oyster resource share holders.

The consultation to be carried out in regards to the making, amending or revoking ARUP(s) under this ARMS may include any additional affected stakeholders that the CEO determines appropriate to consult.

Hon Dave Kelly MLA
Minister for Fisheries

Appendix 1: Summary of Ministerial decisions, under Section 16(1) of the ARMA.

Section 16 (1)		
(a)	<i>a description of the aquatic resource that is to be managed;</i>	The aquatic resource to be managed under this ARMS is aquatic organisms of the species <i>Pinctada maxima</i> in Western Australia, as declared under s.14 of the ARMA by the Minister for Fisheries on the 4 May 2018.
(b)	<i>the main objective to be achieved by managing the aquatic resource;</i>	Whilst ensuring ecological sustainability of the pearl oyster resource, the main objective to be achieved by managing the pearl oyster resource is to optimise the economic return to the WA community including through the production of high quality pearls and associated products.
(c)	<i>the minimum quantity of the aquatic resource that is considered necessary to be maintained for the resource to be ecologically sustainable;</i>	To maintain ecological sustainability, the spawning stock (spawning potential) of this resource must be maintained above levels where future recruitment should not be materially affected by the current stock size. Further details are available in the Western Australian Silver-Lipped Pearl Oyster (<i>Pinctada maxima</i>) Resource Harvest Strategy.
(d)	<i>the activities that should be regulated in respect of the aquatic resource;</i>	Noting the integrated nature of the pearling industry, activities that involve the commercial take of pearl oysters, pearl production and other activities involving the aquaculture and processing of pearl oysters in WA waters should be regulated. Commercial fishing activities will be managed under a commercial ARUP for this resource. All other activities will be managed by the appropriate provisions of the ARMA, as well as regulations made under the ARMA and any relevant Administrative Guidelines.
(e)	<i>the details of each period for which activities in respect of the aquatic resource are to be regulated (fishing period);</i>	The fishing period for the pearl oyster resource will be 1 January to 31 December annually.

Section 16 (1)

(f)	the quantity of the aquatic resource that is to be available in a fishing period for customary fishing and public benefit uses;	The quantity of pearl oyster in WA waters that is to be available in a fishing period for customary and public benefit uses is up to 40,000 live pearl oysters.
(g)	the method to be used in calculating the total allowable catch (TAC) for the aquatic resource;	<p>Following on from the consideration of quantities required for resource sustainability, customary fishing and public benefit uses, the Harvest Strategy details the constant exploitation approach whereby the TAC is set in proportion to the overall wild stock abundance.</p> <p>As detailed in the Harvest Strategy, the spawning stock population estimates and recruitment indices are compared to their reference levels and corresponding control rules to allow the Department to recommend Sustainable Harvest Levels (SHL: a range that the TAC is required to be set within). The recommended overall SHL will include particular SHLs for Zone 1, 2 and 3 of the commercial fishery, as described within the commercial ARUP for this resource.</p> <p>The harvest control rules enable the SHL to be adjusted on a regular basis to provide appropriate protection based on the current stock and recruitment levels. When the stock abundance is predicted to be lower, the SHL is adjusted downward. Similarly, the SHL can be raised in years when the available abundance is predicted to be higher.</p> <p>The Harvest Strategy is reviewed periodically to ensure that it remains relevant, this review may include changes to the reference levels, control rules and any other relevant information.</p> <p>SHL are discussed through the process outlined within the Harvest Strategy. The CEO will determine the TAC for each zone of commercial fishery for the fishing period based on the above scientific advice and having regard for any additional advice provided by:</p> <ul style="list-style-type: none"> • the Department (including any applicable co-management arrangements); • any relevant advisory group; • a recognised peak sector body; • a resource share holders.

Section 16 (1)

(h)	the proportion of the TAC that is to be available for recreational fishing for the resource;	The proportion of the TAC that is to be available for recreational fishing is 0%.
(i)	<i>the proportion of the TAC that is to be available for commercial purposes, including- the proportion of the TAC that is to be available for commercial fishing for the resource; and</i>	The proportion of the TAC that is to be available for commercial fishing for the resource is 100%.
	<i>the proportion of the TAC that is to be available for taking incidentally in the course of commercial fishing for other aquatic resources;</i>	The proportion of the TAC that is to be available for taking incidentally in the course of commercial fishing for other aquatic resources is 0%.
(j)	<i>the number of shares in the resource that are to be available to the commercial sector;</i>	<p>The number of resource shares that are to be available to the commercial sector in this resource will be 572.</p> <p>Resource shares will be available in the relevant zone as defined by the commercial ARUP for this resource. The number of resource shares available in Zone 1 will be 115, Zone 2 will be 457 and Zone 3 will be 0.</p>
(k)	<i>the scientific parameters to be used to assess how effectively the aquatic resource is being managed;</i>	<p>The scientific parameters that are used to assess stock status of the pearl oyster resource are the spawning stock population estimates and recruitment indices which are compared to their reference levels detailed within the Harvest Strategy.</p> <p>The performance levels used to assess commercial fishery performance when targeting the pearl oyster resource include a comparison of the quantity of pearl oyster taken to the TAC in previous years and the effort needed to obtain the catch compared to the catch-rate tolerance ranges, as defined in the Harvest Strategy. This process is also utilised to set an appropriate TAC.</p>

Section 16 (1)

		<p>Catch rates, pearl production and any other required information may also be utilised to assess the economic return to the WA community.</p> <p>Changes within these parameters will be assessed by the Department and will determine if any additional management action is required to ensure the resource is managed effectively.</p>
(I)	<p><i>the consultation to be carried out in relation to the making, amendment or revocation of an aquatic resource use plan (ARUP) to implement the ARMS.</i></p>	<p>In respect to making an ARUP(s) to implement this ARMS, the CEO will provide notice in any manner that the CEO considers appropriate. This must contain information about the draft ARUP, specify where copies of the draft ARUP may be obtained, invite interested persons to make submissions to the CEO on the draft ARUP within a specified period and specify how those submissions may be made.</p> <p>In respect to amending or revoking an ARUP(s) made under this ARMS, the CEO will provide written notice to any affected stakeholders specifying the proposed change, invite interested persons to make submissions and specify the consultation period and how those submissions may be made.</p> <p>Consultation on the making, amending or revoking of commercial ARUP(s) for this resource must include all 2018 <i>Pearling (Wildstock) Licence</i> holders under the <i>Pearling Act 1990</i> or all current <i>P. maxima</i> pearl oyster resource share holders.</p> <p>The consultation to be carried out in regards to the making, amending or revoking ARUP(s) under this ARMS may include any additional affected stakeholders that the CEO determines appropriate to consult.</p>

References

- Akerman, K., and Stanton, J.E. (1994). Riji and Jakuli: Kimberley pearl shell in Aboriginal Australia. Northern Territory Museum of Arts and Sciences. 73 pp.
- Baker, P. personal photo (2017). Western Australian Museum.
- Department of Fisheries (2016). Integrated Fisheries Management Resource Report: Pearl Oyster (*Pinctada maxima*) Resource. Fisheries Management Paper 281, Department of Fisheries, Western Australia.
- Hart, A.M., Thomson, A.W. and Murphy, D. (2011). Environmental influences on stock abundance and fishing power in the silver-lipped pearl oyster fishery. *ICES Journal of Marine Science* 68(3): 444-453.
- Malone, F.J., Hancock, D.A. and Jeffriess, B. (1988). Final report of the Pearling Industry Review Committee. Fisheries Management Paper No. 17, Fisheries Department WA, 216 pp.
- Southgate, P.C., and Lucas, J.S. (2008). *The Pearl Oyster*. Elsevier Science, Amsterdam; London.
- Yu, S and Brisbout, J. with Tigan, A. (2011). In Mayala country with Aubrey Tigan. Report to Department of Sustainability Energy Water Populations and Communities

