

ABALONE AQUACULTURE IN WESTERN AUSTRALIA

Aquaculture Policy

FISHERIES MANAGEMENT PAPER NO. 242

Published by
Department of Fisheries
168 St. Georges Terrace
Perth WA 6000

June 2010
ISSN 0819-4327

Abalone Aquaculture in Western Australia
Aquaculture Policy

June 2010

Fisheries Management Paper No. 242
ISSN 0819-4327



Government of **Western Australia**
Department of **Fisheries**

CONTENTS

GLOSSARY OF ACRONYMS	iv
1.0 INTRODUCTION	1
2.0 OBJECTIVES	2
2.1 Environmental Impact.....	2
2.2 Broodstock Issues	2
2.3 Biosecurity	3
2.4 Translocation.....	4
2.5 Selective Breeding and Triploid Programs	5
3.0 POLICY	6
3.1 Hatchery Production	6
3.2 Land-based Culture.....	6
3.3 Marine-based Culture.....	7
3.4 Genetic Zones	9
4.0 REFERENCES	10
5.0 APPENDICES	11
Appendix 1 Abalone Aquaculture Genetic Zones	11

GLOSSARY OF ACRONYMS

AVG	Abalone viral ganglioneuritis
CEO	Chief Executive Officer
DEC	Department of Environment and Conservation
EDR	<i>Enzootic Diseases Regulations 1970</i>
EPA	Environmental Protection Authority
FRMA	<i>Fish Resources Management Act 1994</i>
FRMR	<i>Fish Resources Management Regulations 1995</i>
MEMP	Management and Environmental Monitoring Plan
MPG8	Ministerial Policy Guideline No. 8 “ <i>The Assessment of applications for authorisations for Aquaculture and Pearling in coastal waters of Western Australia</i> ”
PCR	Polymerase chain reaction

1.0 INTRODUCTION

The Department of Fisheries (“Department”) is committed to the development of a sustainable abalone aquaculture industry in Western Australia. As part of its commitment, the Department has developed this new Abalone Aquaculture Policy (“Policy”) to outline new arrangements for the management of the abalone aquaculture industry in the State.

The first policy on abalone aquaculture was released 10 years ago. In recognition of the industry and scientific developments over the last decade, and to cater for current industry development requirements, it was appropriate to develop a new Policy.

In November 2009, the Department convened a stakeholder meeting with the abalone industry (the wild capture and aquaculture sectors) to discuss policy changes that would support the abalone aquaculture industry in Western Australia while maintaining a robust management framework. Relevant issues included compliance, monitoring, biosecurity, genetic variation and associated management and reporting requirements.

The Department’s Research Division has started a monitoring program to gather information on the genetic diversity of greenlip abalone in Western Australia. Once the work is complete, this Policy may be revised and, if necessary, amended to incorporate any scientific outcomes relevant to the ongoing development and management of the industry.

Abalone Aquaculture in WA

The species of abalone with potential for culture in Western Australia include *Haliotis roei* (Roe’s abalone) *Haliotis laevis* (greenlip abalone) and *Haliotis conicopora* (brownlip abalone). The brownlip abalone is often regarded as being conspecific with *Haliotis rubra*, the black lip abalone from the eastern states. There is also some interest in the culture of *Haliotis asinina* (tropical or donkey’s ear abalone) and *Haliotis scalaris* (staircase abalone).

As of November 2009, the Department had issued 12 licences to culture abalone. Not all licence holders are actively culturing abalone. There is one operational commercial hatchery on the south coast and another planned in the south-west of the State.

2.0 OBJECTIVES

This policy is intended to guide proponents applying for, and the Department when assessing, applications for authorisations for aquaculture licences under Section 92 of the *Fish Resources Management Act 1994* (FRMA). It is also intended to support the development of a sustainable abalone aquaculture industry in Western Australia.

Specifically, the document provides details on some of the general issues relating to abalone aquaculture including environmental impact, broodstock and biosecurity.

The policy section provides information on the:

- manner in which abalone can be cultured in hatchery, land-based and marine-based systems;
- system requirements to prevent release of genetic material when holding “out of area” stock; and
- manner in which licensed abalone farmers can distribute and, or, sell cultured animals.

2.1 Environmental Impact

This document is not intended to provide a comprehensive account of the impacts an abalone farm could have on the surrounding environment. Environmental impact has been, and will continue to be, dealt with on a case-by-case basis in accordance with the relevant assessment processes and the maintenance of an approved Management and Environmental Monitoring Plan (MEMP). Some possible major environmental impacts of abalone aquaculture are summarised below.

- **Trophic Effects.** As for any aquaculture operation, there is potential for uneaten feed and metabolic waste products (soluble and particulate) to enrich the water column and substrate of the surrounding environment and, in extreme cases, have eutrophic effects. On the release of nitrogen from an abalone farm, Maguire (1998) reported that, from an environmental perspective, abalone aquaculture should have a relatively low impact provided that efficient feeding and solids removal from discharge water occurs. This issue will continue to be informed by monitoring results reported by operational abalone farms.
- **Shading from Marine-Based Farms.** The structures used to farm abalone in a marine-based farming system could shade the seabed, possibly affecting key ecological systems. While this is considered unlikely, it is a possible impact so must be considered.
- **Impact on Geomorphology.** The use of artificial substrates to culture abalone could affect sand and water movement in the area, resulting in a change in geomorphology. Feed may also be ‘trapped’, thereby possibly altering nutrient levels in the water. These effects, however, would be localised.

Generally, these impacts would only eventuate at facilities that are not operated using best-practice techniques.

2.2 Broodstock Issues

This Policy does not specifically deal with the collection and use of broodstock. The Department expects legislative amendments over the next few years will enable it to authorise the take of broodstock for aquaculture purposes using a permit. Until that time, broodstock must be either purchased from licensed commercial fishers or taken under the authority of a Ministerial exemption issued under Part 7 of the FRMA.

2.3 Biosecurity

The unintentional introduction of disease can also have significant environmental and economic costs. Under the FRMA, the Department has a statutory responsibility to, *inter alia*, protect the environment and sustainably develop the State's resources. In accordance with these responsibilities, the Department is developing a policy on translocation and biosecurity. The principles on which this abalone policy is based are consistent with those in the wider biosecurity and translocation policy.

In late December 2005, a significant disease incident was reported in Victoria on land-based and offshore abalone aquaculture farms. Subsequently, in May 2006, the presence of the disease abalone viral ganglioneuritis (AVG) was confirmed in wild abalone on a reef near Port Fairy, Victoria. AVG is characterised by significant mortality (up to 90 per cent) of greenlip, blacklip and hybrid abalone. The virus has infected reefs along 200 km of the Victorian coastline and been confirmed in close proximity to the Victorian-South Australian border.

Following the outbreak of AVG in Victoria, the Department held workshops with commercial abalone fisherman and abalone aquaculture licensees to develop proactive strategies to manage the potential risk to Western Australian abalone stocks. The biosecurity management arrangements implemented since these workshops are set out below.

- AVG has been listed in Schedule 1 Division 2 and Schedule 2 Division 2 of the *Enzootic Diseases Regulations 1970* (EDR), which prevents the import of live abalone from other states.
- Having AVG listed under Schedule 1 Division 2 of the EDR also activates Regulations 66(d) (i), 69(d)(i) and 177 2(a) of the *Fish Resources Management Regulations 1995* (FRMR). These regulations provide for:
 - i. abalone processors and aquaculturists notifying the Department of any abalone infected with, or suspected to be infected with, AVG and taking steps to prevent the spread of the disease; and
 - ii. the Department requiring abalone processors and aquaculturists to carry out certain treatment on their premises, to destroy infected abalone or take other action to prevent the spread of the virus from abalone infected with, or suspected to be infected with, AVG.
- No application to translocate live abalone from interstate will be considered by the Department.
- All abalone farms are now required to provide a biosecurity plan, either developed by the proponent or using the Department's template, for approval by the Chief Executive Officer (CEO) of the Department. The biosecurity plan must be implemented at all times.
- The Department, in consultation with aquaculture licensees and through approved biosecurity plans, will regulate the type and source of feed being brought into Western Australia. No live, organic feeds that may carry the virus will be permitted into the State.
- The Department, in consultation with aquaculture licensees, is reviewing aquaculture licence conditions to ensure they are clear, transparent and enforceable to regulate these disease mitigation measures.
- The Department's Fish Health Unit now has the capacity to carry out a polymerase chain reaction (PCR) test for the presence of AVG.

2.4 Translocation

The translocation of abalone into and within Western Australia has the potential to:

- impact upon the genetic diversity of existing stocks;
- introduce pathogens and disease; and
- impact on the natural environment and the biodiversity of native aquatic species.

The requirement for abalone farms to maintain an approved biosecurity plan will ensure the impacts associated with abalone translocation and farming described above are minimised.

There exists little information on the genetic structure of wild greenlip and brownlip abalone populations off the Western Australian coast. Genetic zones established in 1999 for abalone aquaculture were supported by limited research and based on six historical commercial catch zones.

This Policy reduces the original genetic zones from six to three. This zoning, which is consistent with current management arrangements for the wild capture sector, is detailed in the following policy section (Section 3.0) of this document.

The Department's Research Division has started a study into genetic differentiation in greenlip abalone along the WA south coast. The results from this study, which is due for completion in 18 – 24 months, will provide information on the genetic variation between populations. Until the outcome of the study is known, the genetic zones identified in this Policy will be maintained as a precautionary measure against any possible impact from the mixing of genetic stocks. If necessary, the three genetic zones identified in this Policy may be amended according to the outcome of the study.

In Western Australia, Roe's abalone *H. roei* occurs naturally in the surf zone from Shark Bay to the South Australian border. Information on the genetic stock structure of *H. roei* based on research conducted by the Department indicates there are only relatively small genetic differences between populations within the natural distribution of the species (Hancock, 2000). Based on this information, the Department has determined there is no need to establish genetic zones for the species.

The tropical abalone *H. asinina* occurs naturally in the north of Western Australia. Given the lack of knowledge available on the population genetics for tropical abalone, it is suggested that the species has its own genetic zone along the northern coastline of Western Australia. Any request to move *H. asinina* outside of the area to which it is endemic will therefore be assessed through the translocation process on a case-by-case basis.

For the translocation of other abalone species, three circumstances may arise:

- i. translocation of abalone from interstate;
- ii. translocation of abalone (other than *H. roei*) between different genetic zones; and
- iii. translocation of abalone (other than *H. roei*) within the same genetic zone.

This Policy does not deal with the translocation of abalone into Western Australia. Through the assessment procedure developed by the Department and the Environmental Protection Authority (EPA), in accordance with Regulation 176 of the FRMR, applications to translocate abalone from interstate will not be considered at present. This is a response strategy to deal with the risk posed to local abalone stocks by the potential introduction of AVG found in live abalone imported into Western Australia.

Applications to translocate abalone (other than *H. roei*) between genetic zones will be considered for approval on a case-by-case basis, subject to the conditions and requirements detailed in the following section of this Policy. Written approval from the Department must be obtained before any movement of abalone (other than *H. roei*) between genetic zones.

The translocation of abalone between sites within the same genetic zone is considered low risk and, subject to other relevant approvals being obtained, there is no requirement for prior written approval. The requirement for health certification remains and must be obtained before the movement of any stock.

2.5 Selective Breeding and Triploid Programs

The culture of triploid or selectively-bred abalone derived from broodstock collected from the same genetic zone as the system in which they are destined for grow-out is permitted in hatchery, land-based and marine-based culture systems.

The culture of triploid or selectively-bred abalone derived from ‘out-of-zone’ broodstock is permitted in hatchery and land-based systems that have a water discharge system that prevents the release of genetic material (see below), but is unlikely to be permitted in marine-based systems unless the applicant can provide evidence to substantiate the stock is unlikely to successfully reproduce in the culture environment.

3.0 POLICY

In making a determination to grant an aquaculture licence for abalone and in specifying conditions for abalone aquaculture licences, the Chief Executive Officer of the Department should take into account the policy statements set out below.

For clarity, this Policy deals with different elements of abalone aquaculture separately: sections 3.1, 3.2 and 3.3 deal with, respectively, hatchery, land-based and marine-based production.

3.1 Hatchery Production

All hatcheries must prepare and implement a MEMP and Biosecurity Plan approved by the CEO. Hatcheries may maintain *H. laevigata*, *H. conicopora* and *H. scalaris* stock from any genetic zone in Western Australia, provided that stock obtained from outside the genetic zone in which the hatchery is located (so-called ‘out-of-zone’ stock) are kept separately and the water discharge system from the facility holding the out-of-zone stock incorporates a mechanism to filter used water to 200 micrometres (μm) (nominal), to prevent the release of eggs or larvae into the wild. The release of sperm into the wild is considered inconsequential because abalone eggs need to be less than one hour old for fertilisation to occur and, since sperm is only viable for a short period, the probability of it interacting with a viable wild egg is negligible (Hahn, 1989).

Hatcheries may maintain *H. roei* stock from anywhere within Western Australia without the need for specific size water filtration, provided that the hatchery is located in an area in which *H. roei* is endemic. If *H. roei* is not endemic to the area in which the hatchery is located, the specific approval of the CEO is required.

Spat or juveniles of *H. laevigata*, *H. conicopora* and *H. scalaris* to be sold to, or used in, marine based systems must be progeny of broodstock originating from the same genetic zone in which they are destined for grow-out.

Mortality rates for each batch will be recorded and 150 spat per batch must be submitted for health certification prior to any sale or movement of animals from the hatchery.

A hatchery must supply a declaration with every sale or movement of animals, setting out the source and number of broodstock and the health status of the batch.

A batch is defined as a group of animals that are, or have been, kept in the same environment (for example, a tank). This could include animals from a single spawning or animals pooled from multiple spawnings.

Any abalone leaving the licensed site must be accompanied by one copy of a consignment note, stating the number, species and size (average) of abalone consigned. A duplicate copy of the consignment note shall be forwarded to the local office of the Department within 24 hours of the consignment. The licence holder shall retain a third copy of the consignment note at the site.

3.2 Land-based Culture

All land-based systems must prepare and implement a MEMP and Biosecurity Plan approved by the CEO.

Land-based systems may use spat derived from any number of broodstock from any Western Australian genetic zone provided that the stock bred from out-of-zone broodstock are kept separately and have a water treatment system that filters discharged water to 200 μm (nominal) to prevent the release of genetic material.

Land-based systems may maintain *H. roei* stock originating from anywhere within Western Australia without the need for specific size water filtration, provided that the hatchery is located in an area in which *H. roei* is endemic. If *H. roei* is not endemic to the area in which the hatchery is located, the specific approval of the CEO is required.

Licence holders may be required to submit animals for health certification at the discretion of the Senior Fish Pathologist.

A declaration, setting out the source and the batch's health status must be provided with every sale or movement of animals.

Any abalone to be processed at a site other than the licensed aquaculture site must be sent to the processor 'in-shell'.

Any abalone leaving the licensed site must be accompanied by one copy of a consignment note, stating the number, species and size (average) of abalone consigned. A duplicate copy of the consignment note shall be forwarded to the local office of the Department within 24 hours of the consignment. The licence holder shall retain a third copy of the consignment note at the site.

Licencees wishing to use wild seaweed as a supplementary feed must designate the amount and source, and have separate approval for harvesting from the Department. Approval from local shires and the Department of Environment and Conservation (DEC) may also be required, depending on the source and the amount required.

3.3 Marine-based Culture

All marine-based systems must prepare and implement a MEMP and Biosecurity Plan approved by the CEO.

(i) Cages and Barrels

The Department will assess applications for licences for culture in cages or barrels under Section 92 of the FRMA, taking into consideration Ministerial Policy Guideline No. 8 "The Assessment of applications for authorisations for Aquaculture and Pearling in coastal waters of Western Australia" (MPG8).

The maximum size of a licence site will be 20 hectares. Operators wishing to expand beyond 20 hectares must clearly demonstrate why they require a larger site by way of a business or development plan.

Marine-based systems farming *H. laevisgata*, *H. conicopora* and *H. scalaris* may only use stock derived from broodstock collected from the same genetic zone in which the system is located. No out-of-zone stock may be stocked into marine based systems.

Marine based systems farming *H. roei* may use stock from anywhere within Western Australia provided that the aquaculture site is located in an area in which *H. roei* is endemic. If *H. roei* is not endemic to the area in which the marine site is located, the specific approval of the CEO is required.

Licence holders may be required to submit animals for health certification at the discretion of the Senior Fish Pathologist.

Licence holders who wish to move stock from a land-based facility to the marine environment, regardless of whether the movement is across or within genetic zones, may be required to submit animals for health certification at the discretion of the Senior Fish Pathologist.

A declaration, setting out the source and the batch's health status must be provided with every sale or movement of animals.

Any abalone to be processed at a site other than the licensed aquaculture site must be sent to the processor 'in-shell'.

Any abalone leaving the licensed site must be accompanied by one copy of a consignment note, stating the number, species and size (average) of abalone consigned. A duplicate copy of the consignment note shall be forwarded to the local office of the Department within 24 hours of the consignment. The licence holder shall retain a third copy of the consignment note at the site.

Licencees wishing to use wild seaweed as a supplementary feed must designate the amount and source, and have separate approval for harvesting from the Department. Approval from local shires and the DEC may also be required depending on the source and the amount required.

(ii) Purpose-built Artificial Substrate

The Department will assess applications for licences for culture on artificial substrate on a case-by-case basis under Section 92 of the FRMA, taking into consideration MPG8.

The effect of the artificial substrate operation on the geomorphology and ecology of the area will be an important consideration in the assessment process. Any proposal for operations in locations where there is a likelihood of adverse impact on local wild abalone populations is unlikely to be approved.

Any operation approved to culture *H. laevigata*, *H. conicopora* and *H. scalaris* abalone on marine-based, purpose-built artificial substrate may only use stock derived from broodstock from the same genetic zone as that in which the system is located.

Any operation approved to culture *H. roei* abalone on marine-based, purpose-built artificial substrate may use stock derived from broodstock from anywhere in Western Australia provided that the system is located in an area in which *H. roei* is endemic. If *H. roei* is not endemic to the area in which the hatchery is located, the specific approval of the CEO is required.

Licence holders may be required to submit animals for health certification at the discretion of the Senior Fish Pathologist.

Licence holders who wish to move stock from a land-based facility to the marine environment, regardless of whether the movement is across or within genetic zones, may be required to submit animals for health certification at the discretion of the Senior Fish Pathologist.

A declaration, setting out the source and the batch's health status, must be provided with every sale or movement of animals.

Any abalone to be processed at a site other than the licensed aquaculture site must be sent to the processor 'in-shell'.

Any abalone leaving the licensed site must be accompanied by one copy of a consignment note, stating the number, species and size (average) of abalone consigned. A duplicate copy of the consignment note shall, within 24 hours of the consignment, be forwarded to the local office of the Department. The licence holder shall retain a third copy of the consignment note at the site.

(iii) Seeding and Reseeding

Proposals for the seeding or reseeded of reefs, whether or not abalone occur on those reefs, would ordinarily be for the purposes of:

- commercial aquaculture; or
- commercial and, or, recreational fishery stock enhancement.

The Department is developing policies and processes to support reseeding and restocking activities. Any activity in this field will need to be assessed against these policies: this policy does not provide any policy statements in this area.

3.4 Genetic Zones

Pending further research on the population genetics of abalone, the genetic zones for southern abalone species *H. laevigata*, *H. conicopora* and *H. scalaris* for the purpose of this policy are:

1. Busselton Jetty to Shoal Cape
2. Shoal Cape to Point Culver
3. Point Culver to the South Australian Border

(See Attachment 1 for map of genetic zones.)

Genetic zoning does not apply to the culture of *H. roei* (see explanation on page 4).

Only one genetic zone exists for *H. asinina* (see explanation on page 4).

4.0 REFERENCES

- Commonwealth of Australia, 1998. *Australia's Oceans Policy*. Environment Australia, Canberra.
- Hahn, K.O., 1989. *Handbook of Culture of Abalone and other Marine Gastropods*. CRC Press, Boca Raton, Florida, 348 pp.
- Hancock, B. Genetic subdivision of Roe's abalone, *Haliotis roei* Grey (Mollusca: Gastropoda), in south-western Australia, *Marine and Freshwater Research*, 51: pp 679-687 (2000)
- Hone, P.W., Madigan, S.M. and Fleming, A.E., 1997. *Abalone hatchery manual for Australia*. South Australian Research and Development Institute, Adelaide. 33pp.
- Maguire, G.B., 1998. *Nitrogen budgets for land-based abalone farms - a discussion document*. Proceedings of the 5th Annual Abalone Aquaculture Workshop, July, 1998, Hobart.

5.0 APPENDICES

Appendix 1 Abalone Aquaculture Genetic Zones



