Environmental Management System Framework

Tasmanian Farmed Abalone Industry

Compliance Guide and Risk Assessment for Ecologically Sustainable Development

FRDC Project 2004/096

PhycoTec Environmental Management

TAGA
TASMANIAN ABALONE GROWERS ASSOCIATION

Australian Government
Fisheries Research and Development Corporation

TFI

Tasmania

Environmental Management System Framework

Instruction for Template Use

Tasmania

Australian Government

Fisheries Research and Development Corporation

FRDC Project 2004/096

Environmental Management System Framework

Tasmanian Farmed Abalone Industry

Environmental Management System

Instruction for Template Use

Version 1.0
August 2006

FRDC Project 2004/096

Contents

INTRODUCTION 1

THE STRUCTURE OF THE TEMPLATE DOCUMENTS 2

IMPLEMENTING AN EMS 3

THE ESSENTIAL STEPS OF AN EMS 4

STEP 1: ENVIRONMENTAL POLICY. 6

STEP 2: PROCESS PLANNING. 8

STEP 3: RISK ASSESSMENT PROCESS. 9

STEP 4: SETTING OBJECTIVES AND TARGETS. 13

STEP 5: SYSTEM IMPROVEMENT REPORTS AND REGISTERS 15

STEP 6: REVIEW PROCESS 18

AUDIT AND CERTIFICATION 20

DEVELOPING THE SYSTEM FURTHER 21

The Environmental Management System Framework: Compliance Guide and Risk Assessment of Ecologically Sustainable Development for the Tasmanian Farmed Abalone Industry is a living document subject to periodic review to capture regulatory changes and Industry's adaptive management.

This document is uncontrolled, and therefore freely available to industry representatives, regulatory authorities and other stakeholders as requested.

Introduction

The Environmental Management System (EMS) Framework for the Tasmanian Aquaculture Industry is part of a national initiative to assist the seafood sector in the uptake of Environmental Management Systems. The project has been funded by the Tasmanian Abalone Growers Association (TAGA), the Tasmanian Fishing Industry Council (TFIC), Department of Primary Industries and Water (DPIW), Tasmania, and the Fisheries Research and Development Corporation (FRDC) as Project 2004/096.

The EMS Framework Templates link the Ecologically Sustainable Development (ESD) compliance documents based on the National *ESD Framework 'How To' Guide for Aquaculture, Version 1.1* (Fletcher et al. 2004) and EMS. The templates have been developed and specifically tailored to the land based farmed abalone industry. It is envisioned that by adopting the EMS in facilities or regional areas, cost savings will occur through the efficient use of resources, streamlined processes and the access to information and data useful for improving future farm management practices.

The aim of the EMS Templates is to assist the Tasmanian land based abalone industry in its move towards environmental sustainability. The templates provide the basis for the implementation of a systematic approach to environmental management. Within this framework are suggested possible actions and performance criteria for the EMS. These actions and performance criteria may give direction to how compliance with the law may be achieved; however they should not be read as a substitution for current amended law.

The EMS Templates take into account the processes developed by Seafood Services Australia (SSA) in the "Take your pick! – The Seafood EMS Chooser" (referred to as the Green Chooser) that is recommended as background reading prior to implementation of your EMS. Reference to the relevant parts of the Green Chooser is made in the introduction to each template.

Regular updating of the information in the document will take place. While the views in this document reflect the general views of the Industry, it should not be taken as the view of any individual in Industry or the Steering Committee for the project.

References.

ISO 14001:2004. Australian/New Zealand Standard. Environmental management systems – Requirements with guidance for use. Standards Australia 23pp.

SSA (2005) Take your pick! – The Seafood EMS Chooser, 2nd edition. Seafood Services Australia Ltd, Qld. Available on www.seafoodservices.com.au

Fletcher WJ, Cheeson J, Fisher M, Sainsbury KJ, Hundloe TJ (2004) National ESD Reporting Framework: The 'How To" Guide for Aquaculture. Version 1.1, FRDC, Canberra, Australia, 88pp.

Why do I Need an EMS?

The EMS aims to provide practical tools to enable land based abalone farmers to:

- Improve work practices and reap the profits
- Reduce costs by avoiding fines and making the most of resources by
    - Avoiding environmental damage and clean-up costs
    - Reducing the amount of waste generated on the lease
    - Reducing consumption of resources
    - Increasing the usage of recycled materials
- Meet environmental requirements in Federal and State laws, and council by-laws
- Reduce insurance premiums
- Implement the relevant industry standards and protocols
- Encourage confidence in the community and clients by demonstrating an ability to prevent and respond to environmental accidents
- Formalize work practices to protect workers and the environment by making it easier for the staff to know, or quickly find out, what is expected
- Reduce the risk of damage to the environment
- Demonstrate self-regulation and retain access to the marine resource.

The Structure of the Template Documents

The EMS Templates consist of 3 parts:

Part 1: Working Form Templates - for identifying the risks and the developing the objectives and targets.

- Form ABS 100: Workplace Environmental Policy
- Form ABS 200: Environmental Hazard Identification Checklist
- Form ABS 300: Environmental Risk Assessment
- Form ABS 400: Environmental Objectives and Targets
- Form ABS 500: System Improvement Report
- Form ABS 600: Environmental Management Review

Part 2: Register Templates - to maintain your system.

- Form ABS 700: Environmental Monitoring
- Form ABS 800: Chemical Register
- Form ABS 900: Legal and Other register
- Form ABS 1000: Training Register

Part 3: Manual Templates - to document how your system works and the procedures that you use. (Note: This step, although recommended, may not be necessary for small operators with few staff and simple operations)

- Systems Manual -to consolidate your EMS into one document for audit.
- Procedures Manual – to record the procedures that you have developed to reduce your environmental impact.

Implementing an EMS

The steps to implementing an environmental management system always include a commitment, a risk assessment, monitoring of progress and a review of the system on a regular basis. This provides a cycle that allows adaptive management and demonstration of environmental improvements. You may have noticed that other EMS documents have different names on the cycle (e.g. The Green Chooser has eight steps). The steps in this system have been developed to be in a logical, easy to understand sequence and provide a simple useable and effective system.

The Essential Steps of an EMS

The major elements of an auditable EMS are included as templates in this document. There are 6 Working Form Templates, each with associated notes for use and reference to other documents. The use of this EMS will not necessarily provide the user with an ISO 14001 standard 3rd party auditable system, but will provide the basis in which such a system can be based upon. It may be appropriate that consideration could be given to integrating this system into any existing system used in the management of the facility such as ISO 9001: Quality Assurance, HACCP or AS/NZS 4801: Occupation Health & Safety.

Step 1: Environmental Policy.

- Appoint a person to be responsible for the EMS
- Establish the scope of the EMS
- Develop a Workplace Environmental Policy

Covered by Template ABS100

Step 2: Process Planning.

- Develop a plan to implement the EMS
- Develop a plan to review the process

This is the outline of how the EMS will be developed and how to ensure that the EMS will continue to work in the future.
Documents like the "Green Chooser" may assist with this process

Step 3: Risk Assessment Process.

- Follow the risk assessment process to identify potential risks
- Determine current management controls and assess the need for further controls

This demonstrates that the facility/group have systematically identified the potential risks, along with the current management controls and quantified them accordingly.

Covered by Templates ABS200 & ABS300

Step 4: Setting Objectives and Targets

- Develop and document risks
- Set objectives and targets

A critical step in being able to continue onto steps 5 and 6. Will need to be feed back into the planning stage through review of the management system

Covered by Template ABS400

Step 5: System Improvement Reports and Registers

- Manage environmental incidents
- Monitor performance

The reporting of environmental incidents or ways to improve you system is the critical part of your adaptive management strategy. The System Improvement Report (SIR) form will allow all members of the workplace to have input and ownership of environmental issues. The form ensures that the business is responding to all issues and demonstrates their adaptive management.

Covered by Template ABS500 plus Register Templates

Step 6: Review Process

- Demonstrate the performance of your EMS is by:
  - Re-evaluating the high risks
  - Comparing your monitoring data to recognise change
- Report to management
- Promote the outcomes to staff and clients

A management system requires a review process to be able to demonstrate continual improvement of the system. This also allows for adaptive management of your environmental impacts

Covered by Template ABS600

Step 1: Environmental Policy.

The most import part of the EMS is to ensure that there is a commitment of all people involved or affected by the EMS. Without this commitment, the likelihood of success is limited.

Management should:

- Endorse the Environmental Policy,
- Provide and supporting all the necessary resources necessary for the business to effectively implement its environmental objectives and targets,
- Appoint a person responsible for implementing and maintaining the EMS,
- Delegate and recording each staff's responsibility towards the EMS,
- Ensure the staff are equipped, capable, trained and appropriately supervised to be able to participate in the EMS process,
- Implement procedures that ensure good practice is achieved and maintained, particularly where any work habits, facilities, equipment, systems or training are deficient.
- Observe the common practice of employees and compare what people usually do against known good practices,
- Be prepared to inform themselves, staff, contractors about the requirements of the EMS and take appropriate action to reduce any potential risk to themselves, their staff, the public or the environment.

The policy should:

- Define your framework for meeting environmental responsibilities of your company/region,
- Express an overall objective to protect the environment,
- Demonstrate commitment to continual improvement or adaptive management,
- Outline your commitment to complying with relevant environmental legislation, regulations and guidelines and apply best practice standards.

Once established, your policy should be:

- Communicated to all staff so they understand the intentions of the policy and commit themselves to working in according to tits objectives,
- Authorized by the most senior management members of the business(es) involved,
- On permanent display in clear view of clients, customers and staff,
- Freely available to anyone whom requests a copy.

Further information on policy development is provided in Steps 1, 2 and 4 of the Green Chooser.

Template ABS100_Policy is available on the accompanying CD-ROM in a word format for you to adapt to your specific requirements.

"Your Abalone Company"

Delete this picture and add your company logo using Edit – Paste Special - Picture

(your logo)

Replace with the name of your business or regional group

WORKPLACE ENVIRONMENTAL POLICY

It is the policy of this company that we manage all aspects of our operation[s] in an environmentally responsible manner, appropriate to the nature and scale of our acti[vities].

Edit text (in Word) as you feel fitting with your environmental objectives

Our aim is to ensure that our activities do not cause environmental pollution of a[ny] adverse impacts on the environment, and that we operate under the p[rinciples] of ecologically sustainable development.

Summary statement

We are committed to complying with the relevant environmental legislation and to a program of continual improvement through adaptive management.

Commitment to continual improvement

The aims of this policy will be achieved by implementing an environm[ental] management system that will include:

- Planning of environmental aspects and impacts, legislative require[ments], objectives and targets.
- Implementation and operation including specified responsibilities, appropriate training and awareness, communicated to all relevant parties and with appropriate document control.
- Monitoring and corrective action
- Structured management review
- Continual improvement through regular reviewing and revising of objectives and targets.

Objectives

This policy is applicable to the company and all its operations and functions in the land based facilities and the associated seawater reticulation.

Scope (or limits)

Policy authorized by:…… Date:……

(Managing Director)

Ensure that it is signed by the most senior management person(s). Adapt where necessary

Date of review:……

Both date of signing and date of review should be provided to demonstrate commitment to review.

Step 2: Process Planning.

Plan

1. Appoint an Environmental Representative.

The Environmental Representative must become familiar with all the procedures in the EMS. It is important that the representative has the resources and authority to organize, implement and maintain the EMS.

The responsibilities of the Environmental Representative are:

- Familiarize themselves with the requirements of the environmental management system and the ESD compliance document, and attend relevant training where necessary.
- Seek information and professional advice and assistance to maintain the environmental management system
- Lead the business through the EMS process
- Liaise with regulators, authorities or non-governmental organisations about environmental issues where necessary,
- Develop, authorize and maintain documents and records of the EMS to ensure that they are always relevant and properly controlled,
- Coordinate the process of adaptive management of the EMS over time
- Plan and conduct site reviews, environmental audits and environmental management review meetings,
- Report to senior management about the EMS

2. Develop an EMS Implementation Plan.

-Review the Environmental Policy

- What are the stated Objectives
- Identify the Scope

-Seek advice about the risk assessment process

- Who will be involved
- When will it take place

-Develop a plan to review the process

- How often will you meet to discuss the EMS
- How often will you review the EMS

At this stage you may like to assess the Systems Manual for suitability to your Company. The Systems manual is provided in an easily adaptable word format. See Systems Management Manual on the accompanying CD-ROM

Assess

Step 3: Risk Assessment Process.

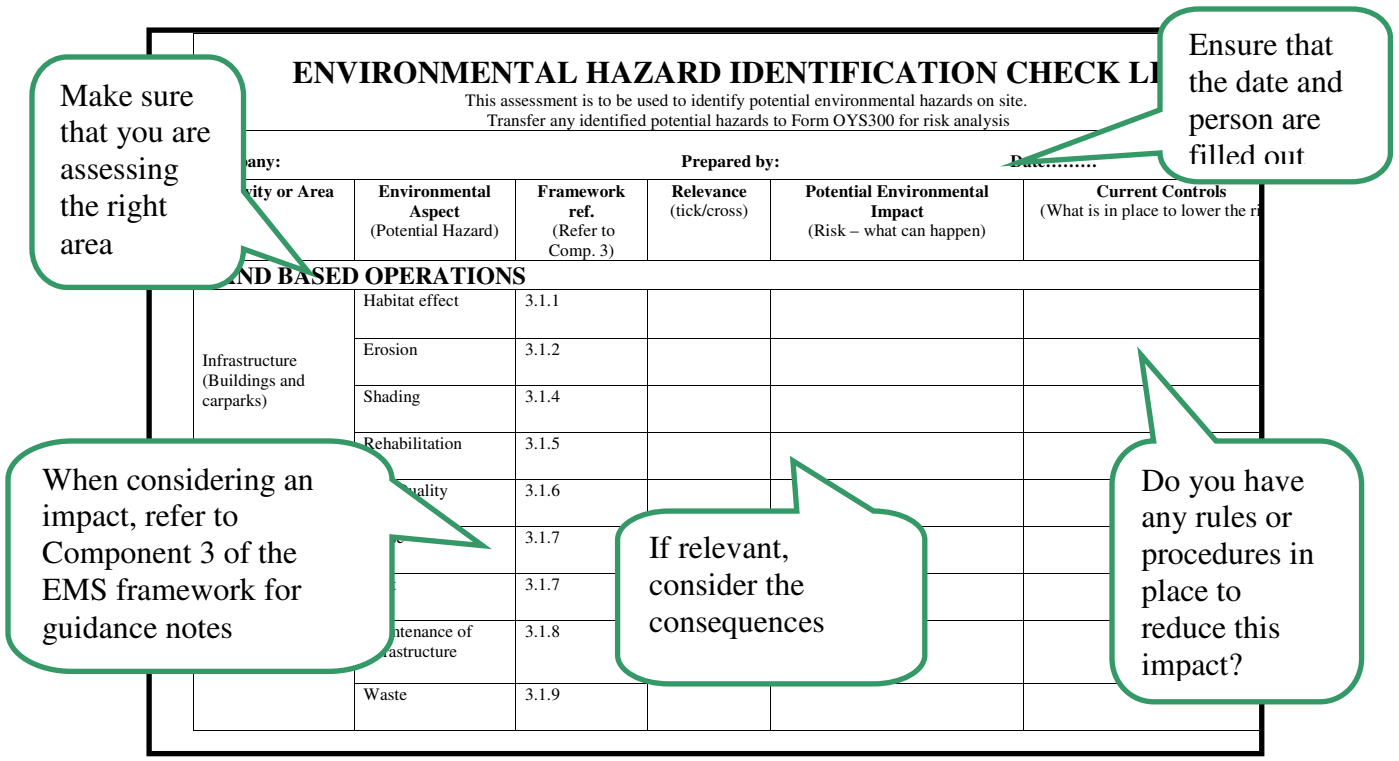
Template ABS200 is a checklist of any potential environmental impacts that may occur around your land based facility or on the marine lease. To complete the checklist you will need to refer to Component 3 of the ESD compliance document that deals with environmental impacts at a facility level.

Component 3 provides you with the possible impacts, plus the potential threat. It also gives suggested control measures that may assist in you reducing your impact if apparent.

When you initially run through the list on Template ABS200, you should consider the potential impacts of your operation as if there were no controls. Then list the control measures (rules, protocols etc.) that you already have in place. This allows you to take into consideration these controls in the risk assessment. You will be surprised at the number of impacts that become low risk solely due to the management controls that you already have in place but do not automatically think about.

The benefit of this method is to give you a list of all the controls you use that have a positive impact in reducing your environmental risk. You can use this information to demonstrate that you are already promoting good environmental practice.

Where impacts are identified, they should be transferred to Template ABS300 for the risk assessment.



The risk assessment process is described in detail in the introduction chapter of the ESD Compliance Document with extra risk tables provided in Appendix 1.0

When conducting the risk assessment, you need to be honest when considering the consequence. A high or extreme consequence does not necessarily mean a high risk. The consequence is the potential impact upon the environment.

Consequence

The consequence of an issue is the effect or outcome a particular issue will have. Consequence relates to the importance of an issue.

Consequence table for the general environment.

Consequence	Score	Definition
Negligible	**0**	Very insignificant impacts. Unlikely to be measurable at the scale of the stock/ ecosystem/community against natural background variability
Minor	**1**	Possibly detectable but minimal impact on structure/function or dynamics
Moderate	**2**	Maximum acceptable level of impact – recovery measurable in months or years
Severe	**3**	This level will result in wider and longer term impacts – recovery measurable in years
Major	**4**	Very serious impacts with relatively long time frame likely to be needed to restore to an acceptable level – recovery measurable in decades
Catastrophic	**5**	Widespread and permanent irreversible damage or loss will occur – unlikely to ever recover (e.g. causing extinctions)

The likelihood of occurrence may or may not take into account the frequency of an event.

Likelihood

The likelihood is the conditional probability of an event occurring. It relates directly to the impact of the event, not the activity surrounding the event.

Likelihood table

Likelihood	Score	Definition	Indicative frequency
Remote	**1**	Never heard of, but not impossible.	One in 1,000 years
Rare	**2**	May occur in exceptional circumstances.	Once every 100 years
Unlikely	**3**	Uncommon, but has been known to occur	Once every 30 years
Possible	**4**	Some evidence to suggest this may possibly occur	Once every 10 years
Occasional	**5**	May occur	Once every 3 years
Likely	**6**	It is expected to occur	Once a year or more

In some circumstances, only the definition may be relevant

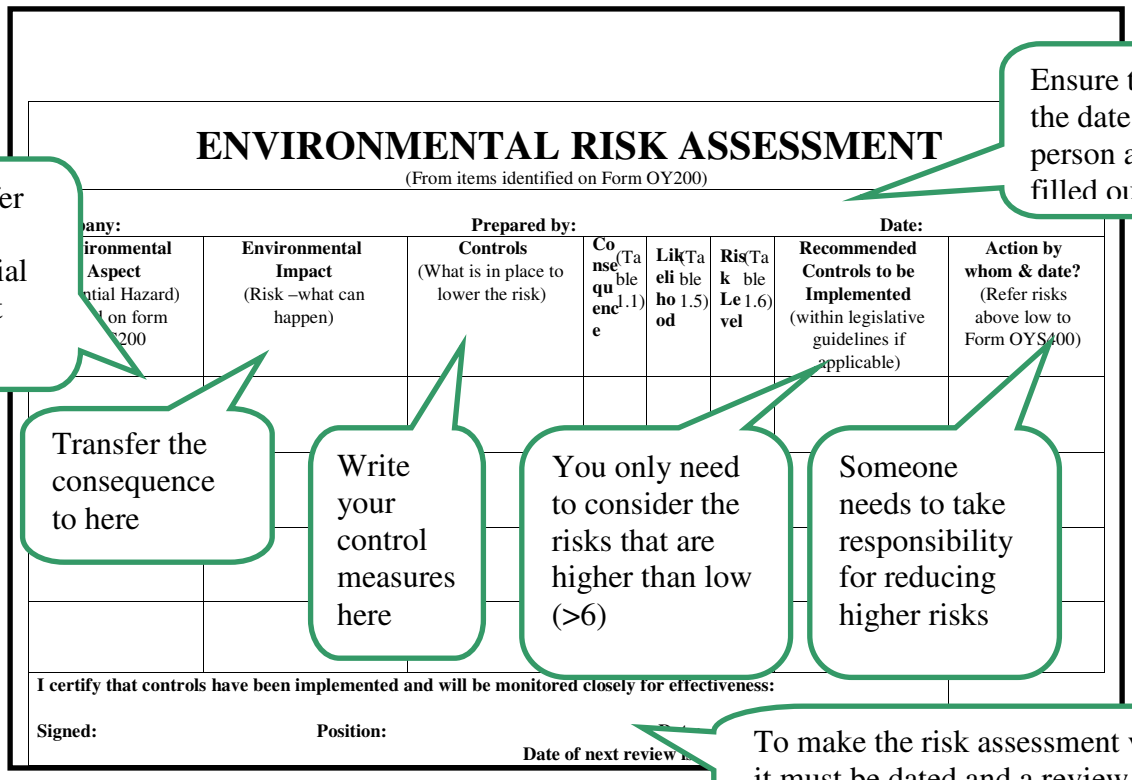
The likelihood multiplied by the consequence gives the risk value. A risk less than 6 is considered as low and requires no further action.

Risk matrix – numbers in cells indicate risk value, the shade indicates risk ranking

		Consequence					
Likelihood		**Negligible**	**Minor**	**Moderate**	**Severe**	**Major**	**Catastrophic**
Remote	**1**	0	1	2	3	4	5
Rare	**2**	0	2	4	6	8	10
Unlikely	**3**	0	3	6	9	12	15
Possible	**4**	0	4	8	12	16	20
Occasional	**5**	0	5	10	15	20	25
Likely	**6**	0	6	12	18	24	30

The risks valued within the green lines require action

For more examples of risk assessments, refer to the ESD Compliance document and examine how the risks were determined on an Industry wide basis. Keep in mind that your impacts will be more localized and therefore the risk may be greater,



ENVIRONMENTAL RISK ASSESSMENT

(From items identified on Form OY200)

Company: **Prepared by:** **Date:**

Environmental Aspect (Potential Hazard) Identified on form OY200	**Environmental Impact** (Risk –what can happen)	**Controls** (What is in place to lower the risk)	**Consequence** (Table 1.1)	**Likelihood** (Table 1.5)	**Risk Level** (Table 1.6)	**Recommended Controls to be Implemented** (within legislative guidelines if applicable)	**Action by whom & date?** (Refer risks above low to Form OYS400)

I certify that controls have been implemented and will be monitored closely for effectiveness:

Signed: **Position:** **Date of next review:**

Transfer you potential impact here

Ensure that the date and person are filled out

Transfer the consequence to here

Write your control measures here

You only need to consider the risks that are higher than low (>6)

Someone needs to take responsibility for reducing higher risks

To make the risk assessment valid, it must be dated and a review date included

Risk Ranking	Risk Value	Description	Reporting Requirements	Management Response
Negligible	**0**	Not an issue	Short justification only	Nil
Low	**1-6**	Acceptable – no specific control measures needed	Full justification needed	No specific action needed to achieve acceptable performance
Moderate	**8-12**	Specific management needed to maintain acceptable performance	Full performance report	Review current arrangements
High	**15-18**	Not desirable – continue strong management action. Further or new risk control measures may need to be introduced in the near future	Full performance report	Prod… current management needed
Extreme	**>20**	Unacceptable – major changes required to management approach in near future	Full performance report	Substantial additional management controls needed.

The risk ranking and outcomes table will provide the level of risk that you are dealing with. Refer to Table 5 (page 11) of your ESD compliance document

Further information on risk assessment is provided in the Introduction chapter of the ESD compliance document and Step 3 of the Green Chooser.

Templates ABS200 and ABS300 are available on the accompanying CD-ROM in a word format for you to adapt to your specific requirements.

Step 4: Setting Objectives and Targets.

Develop

The objectives and targets are the critical part of your environmental management system. They demonstrate a plan to achieve better environmental outcomes and improve environmental performance.

Environmental Objective

An overall environmental goal that is consistent with your environmental policy, which you wish to achieve

An environmental objective can be descriptive, without placing a value on it, or it can be a desired target that defines numerically what you wish to achieve. For example, your environmental objective may be to increase the recycling of unused materials in your operation, where as the target may be reducing your waste output by 50% by recycling wastes. Targets are sometimes referred to as key performance indices (or KPI's).

Points to take into consideration when setting objectives and targets are:

- Be realistic. It is better to try for a small improvement and demonstrate that you can achieve this rather than put forward a large improvement that will set you up for failure in the short term. You can always increase your target at the next review if your progress is good.
- If you have records, look at you past performance before setting any targets.
- It is sometimes better to work with targets based on production units (e.g. waste per kg abalone produced) rather than % waste. The greater production may lead to greater % waste, even though recycling has increased.

For each objective you also need to consider the economic feasibility of the achieving outcome. By considering the following costs, you can determine the financial benefits of the objective.

Costs and/or savings from:

- Raw materials
- Packaging
- Energy and water
- Storage of product
- Labour
- Capital costs
- Training costs
- Productivity and production disruptions.

You will need to balance the environmental and social advantages against the cost of the change and/or the potential cost savings, and the time to recoup your outlay. You may outlay a sum of money initially, but this will be recouped through savings made by the change. This is referred to as the payback period.

Payback Period

$$\text{Payback Period} = \frac{\text{Capital Investment and Production Costs}}{\text{Net Savings in Operating Costs (\$/year)}}$$

Use the information from the risk assessment (Form ABS200) to assist in developing your objectives and targets. The higher the risk, the greater the priority should be for the objective. All environmental risks greater than 6 (Low) should be investigated to determine whether you can reduce these risks through better procedures, new controls, alternative technology or just making the staff aware of the problem. There may be other non-risk objectives such as annual clean ups that may also be included in this plan.

ENVIRONMENTAL OBJECTIVES AND TARGETS

(Items identified as above low risk on Form OYS300 and through staff meetings, to be reviewed at regular intervals)

Company: **Date:**
Prepared by: **Date of next review:**

No.	**Objective:** the overall long-term objectives (big picture) that you are aiming to achieve relating to the management of this impact. **LONG TERM**	**Target**: the short-term targets (specific and measurable) that will together make sure that you meet your long-term objectives. **SHORT TERM**	**Actions required or already undertaken:** the actions you are willing to commit to doing in your business to ensure that the short and long-term objectives and targets are met. This might include actions you have already done but still need to be maintained and monitored if they are to remain effective. **HOW YOU ARE GOING TO GET THERE**	**Responsible person** **WHO IS GOING TO DO IT**
1	Maintain and Review the Environmental Management System to ensure it up to date and effective.	Review the Workplace Environmental Policy (Form OYS100) and EMS requirements. Identify objectives, targets and assign responsibilities		
2				

The first objective relating to maintaining your EMS is already added. You will need to complete this section as determined from your Process Planning (Element 2).

It is important to delegate responsibility to a willing person

Further information on Objectives and target setting is provided in Step 5. Action Plan from the Green Chooser.

Template ABS400 is available on the accompanying CD-ROM in a word format for you to fill in.

Monitor

Step 5: System Improvement Reports and Registers

The Systems Improvement Report (or SIR) is the mechanism in which your staff can participate in and take ownership of the EMS. The SIR is a simple form in which any aspect of the business can be recorded at any time.

Many successful organisations use this type of form in their EMS and it is usually considered as one of the main communication pathways for a business.

The SIR is valuable to the whole business because it:

- Provides the manager with a record of what operational problems may be present on the farm
- Gives the staff an avenue to pass on important information to the management without confrontation
- Gives the manager a record of what needs to be done, who is responsible for doing it and when it is due for completion.
- Provides information for the EMS review to update objectives and targets
- May be used as a record to demonstrate the improved environmental performance of the company.

System Improvement Reports (SIRs)

The number of SIRs produced indicates how well system is working.
A lack of SIRs raised most likely indicates that staffs are not engaged in the EMS or communicating with management, NOT that your operation is clean and green.

The form is designed so that it can be used to record ANY problems from sprained ankles or stock mortalities, customer complaints to broken storm water pipes.

Other forms for monitoring are also provided in your EMS. These are included in the Part 2: Registers on the CD-ROM:

- Form ABS 700: Environmental Monitoring Records
- Form ABS 800: Chemical Register
- Form ABS 900: Legal and Other register
- Form ABS 1000: Training Register

SYSTEM IMPROVEMENT REPORT

Company……. **Date:**……

Submitted by: ……..

These tick boxes can refer to any problem on the farm.

Issue

☐ Environmental ☐ OH&S ☐ Quality

☐ Public Complaint ☐ Customer Complaint ☐ Other

Description

……

……

……

……

Potential impact

……

……

Suggested Solution

Staff may be able to provide simple and effective suggestions for reducing your environmental impact or cost/time/labour savings

……

……

……

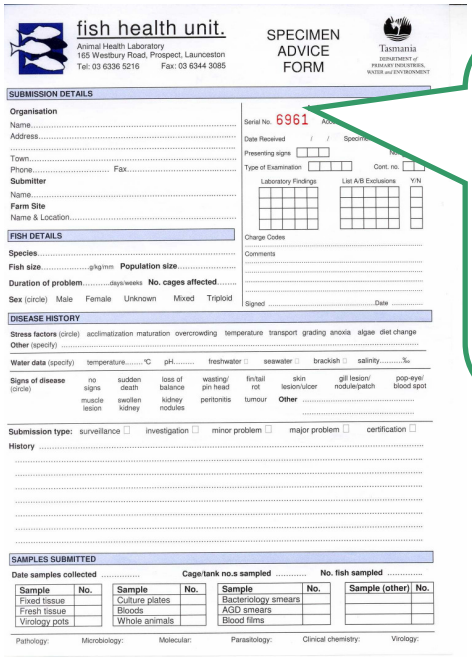
Considered by……. Date ……Addressed ☐Yes ☐No

Addressed by the following action:	**Not addressed because:**
……	……
……	……
……	……
……	……
……	……
To be completed by	……
……...(person) ☐Informed	……
……...(date of completion)	……

This part of the form is a check for management to ensure that all issues are considered and effectively dealt with if necessary

Using the Abalone Stock Monitoring Register

The Abalone Stock Monitoring Register (ABS700) has been designed to incorporate the existing DPIW Fish Health Unit monitoring forms and DPIW Analytical Services Tasmania water quality monitoring forms. To get copies of these submission forms, contact the relevant DPIW branch. The register assists you in keeping track or your compliance to the regular environmental monitoring and health surveillance requirements.



fish health unit.
Animal Health Laboratory
165 Westbury Road, Prospect, Launceston
Tel: 03 6336 5216 Fax: 03 6344 3085

SPECIMEN ADVICE FORM

Tasmania
DEPARTMENT of PRIMARY INDUSTRIES, WATER and ENVIRONMENT

SUBMISSION DETAILS
Organisation
Name
Address
Town
Phone Fax
Submitter
Name
Farm Site
Name & Location
Serial No. 6961
Date Received
Presenting signs
Type of Examination
Cont. no.
Laboratory Findings
List A/B Exclusions
Y/N
Charge Codes
Comments
Signed Date

FISH DETAILS
Species
Fish size g/kg/mm Population size
Duration of problem days/weeks No. cages affected
Sex (circle) Male Female Unknown Mixed Triploid

DISEASE HISTORY
Stress factors (circle) acclimatization maturation overcrowding temperature transport grading anoxia algae diet change
Other (specify)
Water data (specify) temperature °C pH freshwater seawater brackish salinity ‰
Signs of disease (circle) no signs sudden death loss of balance wasting/ pin head fin/tail rot skin lesion/ulcer gill lesion/ nodule/patch pop-eye/ blood spot muscle lesion swollen kidney kidney nodules peritonitis tumour Other
Submission type: surveillance investigation minor problem major problem certification
History

SAMPLES SUBMITTED
Date samples collected Cage/tank no.s sampled No. fish sampled

Sample	No.	Sample	No.	Sample	No.	Sample (other)	No.
Fixed tissue		Culture plates		Bacteriology smears			
Fresh tissue		Bloods		AGD smears			
Virology pots		Whole animals		Blood films			

Pathology: Microbiology: Molecular: Parasitology: Clinical chemistry: Virology:

You will be able to track and review your farms health surveillance program by transferring the serial number on the specimen advice form or sample submission form to the Stock Monitoring Record.

External Environmental Monitoring

External Health Monitoring

Abalone Stock Monitoring Records

				Environmental					Health						
Date	Tank No(s)	Batch Reference	Average fish size	Water Temp	DO	pH	Salinity	AST Sample Reference No.	Position of fish	Behaviour	Feed Intake	Vibrio	Mud worm	FHU Serial No.	Assessed by

Comments:

The regular monitoring and recording of the environmental conditions and health of stock demonstrates environmental compliance and assist in improving production, possibly reducing incidence of disease.

By adopting the use of this form, you will be able to track:

- If stock are being regularly assessed by staff for health and environmental wellbeing.
- If the required environmental or health surveillance samples have been collected for analysis.
- If mortalities occur, what conditions environmental or health conditions where present leading into the event.
- Determine annual and inter-annual variability relating to fish health or production issues.

Step 6: Review Process

The review process allows you to assess the performance of your EMS is by taking into account the information gathered by the system over the past period of time. The review process can be rigorous or simple, depending upon the level of credibility you are seeking. It is suggested that you review your system at least every 12 months, preferably 6 months if you have the time available.

Where to start
Gather all the information that is relevant to the EMS, especially the System Improvement Reports (SIRs) and the Registers.

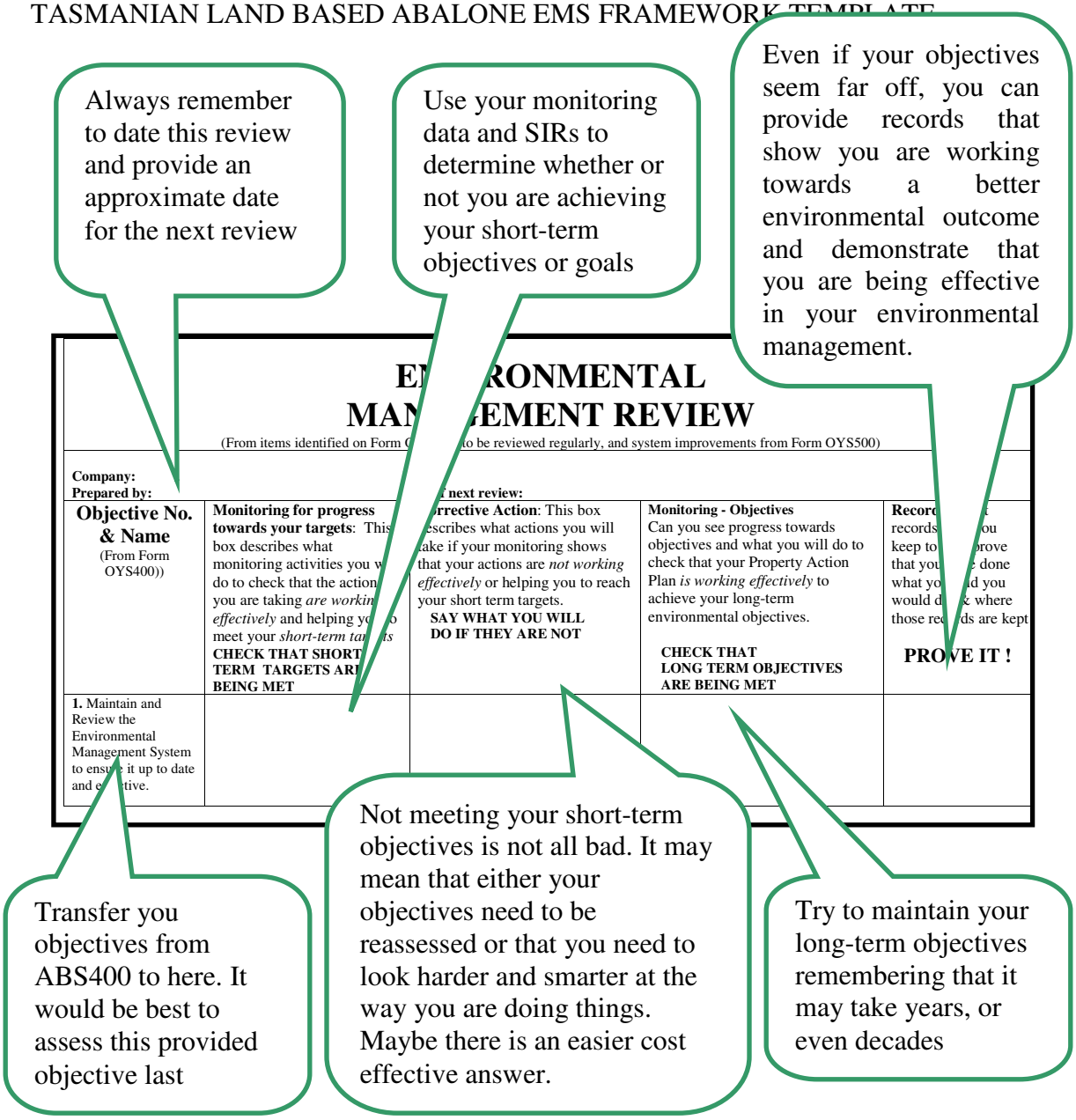
Examine the current objectives set out on Form ABS400: Environmental Objectives and Targets.

Transfer the Objectives to the Environmental Management Review Form: ABS600. (It is suggested that you review the provided Objective 1 last).

From your chosen Objective consider:

- What was the environmental risk associated with this objective?
- Are monitoring sheets available that relate to this objective?
- Are there SIRs that relate to this objective?
- Does the data provided in these sheets or from another source demonstrate any change in your environmental performance (e.g. is the number of incidences lower for the reviewed period that previous period? Has the level of waste decreased or recycling increased? How many problems reported by the SIR were responded to in an appropriate amount of time? Have you complied with the required environmental and health monitoring?)

Using this information, complete the Form ABS600 as shown below and determine whether you have reduced your risk. If so, you may then like to declare that this objective has been achieved for the short term. You may still need to monitor the progress of the short-term objective over a number of reviews before satisfied that the long-term objective is being achieved.



E RONMENTAL
MAN GEMENT REVIEW

(From items identified on Form C to be reviewed regularly, and system improvements from Form OYS500)

Company:
Prepared by:
next review:

Objective No. & Name (From Form OYS400))	**Monitoring for progress towards your targets**: This box describes what monitoring activities you w do to check that the action you are taking *are workin effectively* and helping yo to meet your *short-term tar ts* **CHECK THAT SHORT TERM TARGETS ARE BEING MET**	**rrective Action**: This box escribes what actions you will ake if your monitoring shows that your actions are *not working effectively* or helping you to reach your short term targets. **SAY WHAT YOU WILL DO IF THEY ARE NOT**	**Monitoring - Objectives** Can you see progress towards objectives and what you will do to check that your Property Action Plan *is working effectively* to achieve your long-term environmental objectives. **CHECK THAT LONG TERM OBJECTIVES ARE BEING MET**	**Record** records ou keep to rove that you done what yo d you would d & where those re ds are kept **PROVE IT !**
1. Maintain and Review the Environmental Management System to ensu it up to date and e tive.				

The results of your review should be reflected in a new set of objectives and targets. You can use Form ABS400 to record these.

The results (both positive and negative) should be reported to management, staff and shareholders and the public if desired. The most successful EMS' are those which all staff are involved in achieving the objectives and receive timely feedback on their efforts. The review may also result in development of new methods for doing things – these must be communicated back to the staff.

Further information on Audit, certification and review is provided in Step 7 of the Green Chooser.

Template ABS600 is available on the accompanying CD-ROM in a word format for you to fill in.

Audit and Certification

Congratulations! You now have a working Environmental Management System in place.

From here you have a number of options:

Maintain a simple system
Maintain the EMS as is, with regular (6-12 month) reviews. Don't forget to audit your system by making sure that staffs are aware of their environmental responsibilities and performing their duties as required by the EMS.

Develop the system further
Develop the EMS further to include a Systems Management Manual and a Procedures Manual which documents how the system operates. This is particularly important if you wish to invite a second party Auditor (outside your business but in the Industry) or third party Auditor (Certified Auditor) to assess your EMS. The following documents are provided on the CD-ROM to assist in the development of your system:

- Form ABS 700: Environmental Monitoring
- Form ABS 800: Chemical Register
- Form ABS 900: Legal and Other register
- Form ABS 1000: Training Register
- Systems Manual
- Procedures Manual

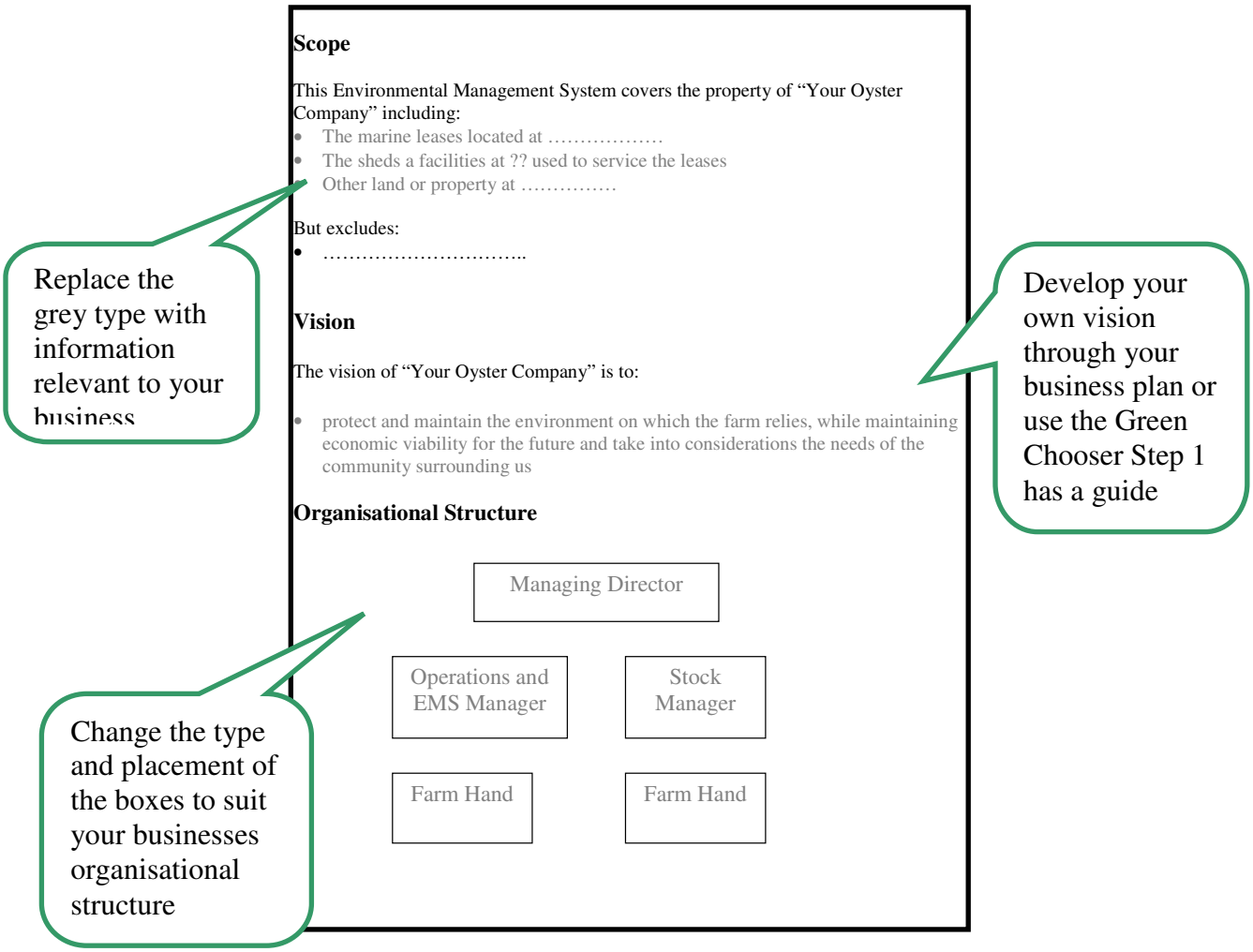
Obtain a recognised 3rd party certification
There is a substantial commitment required to produce an EMS that is ready for certification to an international standard such as ISO:14001. However, many business in many industries have found that this type of certification provides not only more efficiencies within a business but also provides financial opportunities in the form of markets, insurance premiums and protection from environmental prosecution. To take this further step is recommended that you consult with a certified Environmental Auditor/Consultant registered with the governing auditing body RABQSA International (http://www.rabqsa.com/).

The Tasmanian Aquaculture Council in collaboration with the National Aquaculture Council and Seafood Services Australia is currently working towards providing an EMS certification for the seafood industry in the future.

Developing the system further

It is recommended that the Systems Management and Procedure Manuals be adopted by those businesses wishing to develop their EMS further as a 2nd or 3rd party auditable system.

The Systems Management Manual template is designed to provide the basic criteria required for a management manual. Each business needs to adapt the manual to their requirements by replacing the grey type cues with information relevant their business.



By defining the businesses organisational structure, position descriptions and methods for system review, your business should run smoothly as each member of your team will know their role both within the EMS and the business.

The Procedure Manual records the methods that you have developed and adopted to reduce your environmental risks. It can also become a valuable training and reference tool for staff. The ability to be able to demonstrate recorded procedures provides some protection against potential environmental non-compliance fines and litigation, and may assist as a bargaining tool in reducing liability insurance premiums.

Some of the procedures have been or are in the process of being developed at a State and national Industry level as provided in the ESD Compliance document of the EMS Framework. You are encouraged to develop other protocols yourself for activities which have a high frequency or (likelihood) of risk such as refueling boats and tractors, or those which have a severe consequence.

Procedure Number	Name of Procedure or Protocol	Version number/date	Location
P001	Re-fuelling of pumps, boats or tractors		Procedure Manual/ Fuel Store
P002	Disposal and Recycling of Waste		Procedure
P003	Grading of Stock		
P004			
P005			
P006			
P007			
P008			
P009			
P0010			
P0011			
P0012			
P0013			
P0014			
P0015	Translocation of abalone stock and equipment between regions	In development	Refer to TAGA
P0016	Protocol for abalone farmers in the presence of listed threatened, marine or migratory birds		Appendix 2.2.3.1 (In development)
P0017			

This operational procedure is important to demonstrate environmental responsibility. You can adapt the document, as you need

You may wish to record other operational procedures to ensure that operation is correctly adhered to. This is important when considering emergency response procedures.

These protocols have been developed or are being developed at a State and National level and are contained in the ESD Compliance document.

It is important to develop procedures that demonstrate your emergency response and preparedness, especially to critical environmental impacts such as fuel spills, fire and disease outbreaks. These emergency responses are ideally located as their own section in the Procedure Manual.

The appropriate sections in the ESD Compliance document will assist you in developing some of these protocols. If assistance is required to develop these protocols, you may consider asking for requesting generic protocols to be developed through the Tasmanian or Australian Abalone Growers Associations (TAGA and AAGA), or engaging an Environmental Consultant.

Environmental Management System Framework

Part 1

EMS Working Form Templates

ABS100 Workplace Environmental Policy
ABS200 Environmental Hazard Identification Checklist
ABS300 Environmental Risk Assessment
ABS400 Environmental Objectives and Targets
ABS500 System Improvement Report
ABS600 Environmental Management Review

PhycoTec
Environmental Management

TAGA

Tasmania

Australian Government
Fisheries Research and Development Corporation

FRDC Project 2004/096

"Your Abalone Company"

(your logo)

WORKPLACE ENVIRONMENTAL POLICY

It is the policy of this company that we manage all aspects of our operation in an environmentally responsible manner, appropriate to the nature and scale of our activities.

Our aim is to ensure that our activities do not cause environmental pollution of any other adverse impacts on the environment, and that we operate under the principles of ecologically sustainable development.

We are committed to complying with the relevant environmental legislation and to a program of continual improvement through adaptive management.

The aims of this policy will be achieved by implementing an environmental management system that will include:

- Planning of environmental aspects and impacts, legislative requirements, objectives and targets.
- Implementation and operation including specified responsibilities, appropriate training and awareness, communicated to all relevant parties and with appropriate document control.
- Monitoring and corrective action
- Structured management review
- Continual improvement through regular reviewing and revising of objectives and targets.

This policy is applicable to the company and all its operations and functions in the land based facilities and the associated seawater reticulation.

Policy authorized by:…… Date:…….
(Managing Director)

Date of review:…….

ENVIRONMENTAL HAZARD IDENTIFICATION CHECK LIST

This assessment is to be used to identify potential environmental hazards on site.
Transfer any identified potential hazards to Form ABS300 for risk analysis

Company: **Prepared by:** **Date……**

Activity or Area	**Environmental Aspect** (Potential Hazard)	**Framework ref.** (Refer to Comp. 3)	**Relevance** (tick/cross)	**Potential Environmental Impact** (Risk – what can happen)	**Current Controls** (What is in place to lower the risk)
LAND BASED OPERATIONS					
Infrastructure (Buildings and carparks)	Habitat effect	3.1.1			
	Erosion	3.1.2			
	Seepage	3.1.3			
	Rehabilitation	3.1.4			
	Soil Quality	3.1.5			
	Noise	3.1.6			
	Dust	3.1.6			
	Maintenance of infrastructure	3.1.7			

ENVIRONMENTAL HAZARD IDENTIFICATION CHECK LIST

This assessment is to be used to identify potential environmental hazards on site.
Transfer any identified potential hazards to Form ABS300 for risk analysis

Company: **Prepared by:** **Date**

Activity or Area	**Environmental Aspect** (Potential Hazard)	**Framework ref.** (Refer to Comp. 3)	**Relevance** (tick/cross)	**Potential Environmental Impact** (Risk – what can happen)	**Current Controls** (What is in place to lower the risk)
LAND BASED OPERATIONS					
Infrastructure (Buildings and carparks)	Water Flow	3.1.9			
	Alienation of public	3.1.10			
	Proximity to Sensitive Fauna/Regions	3.1.11			
	Visual impact	3.2.2.2			
	Water table	3.1.12			
	Sewerage	3.2.3.5			
	General rubbish	3.2.3.6			

ENVIRONMENTAL HAZARD IDENTIFICATION CHECK LIST

This assessment is to be used to identify potential environmental hazards on site.
Transfer any identified potential hazards to Form ABS300 for risk analysis

Company: **Prepared by:** **Date**

Activity or Area	**Environmental Aspect** (Potential Hazard)	**Framework ref.** (Refer to Comp. 3)	**Relevance** (tick/cross)	**Potential Environmental Impact** (Risk – what can happen)	**Current Controls** (What is in place to lower the risk)
LAND BASED OPERATIONS					
Infrastructure (Buildings and carparks)	Waste	3.1.8			
	Storm water runoff	3.2.3.8			
	Fuel Storage		√	Fuel / oil spill	
	Chemical Storage	3.2.2.8		Chemical spill	

ENVIRONMENTAL HAZARD IDENTIFICATION CHECK LIST

This assessment is to be used to identify potential environmental hazards on site.
Transfer any identified potential hazards to Form ABS300 for risk analysis

Company: **Prepared by:** **Date**

Activity or Area	**Environmental Aspect** (Potential Hazard)	**Framework ref.** (Refer to Comp. 3)	**Relevance** (tick/cross)	**Potential Environmental Impact** (Risk – what can happen)	**Current Controls** (What is in place to lower the risk)
LAND BASED OPERATIONS					
Operational Activities	Health of abalone stock	3.2.1.1			
	Stocking density	3.2.1.2			
	Animal Waste	3.2.1.3			
	Fresh Water Usage	3.2.2.1			
	Energy efficiency	3.2.2.4			
	Noise	3.2.2.5			
	Light	3.2.2.5			
	Impact on sensitive habitats	3.2.2.7			

ENVIRONMENTAL HAZARD IDENTIFICATION CHECK LIST

This assessment is to be used to identify potential environmental hazards on site.
Transfer any identified potential hazards to Form ABS300 for risk analysis

Company: **Prepared by:** **Date**

Activity or Area	**Environmental Aspect** (Potential Hazard)	**Framework ref.** (Refer to Comp. 3)	**Relevance** (tick/cross)	**Potential Environmental Impact** (Risk – what can happen)	**Current Controls** (What is in place to lower the risk)
LAND BASED OPERATIONS					
Pond Cleaning	Water Quality	3.2.3.1 3.2.3.6			
Ponds	Seepage	3.1.3			
	Chemical usage	3.2.2.8			

ENVIRONMENTAL HAZARD IDENTIFICATION CHECK LIST

This assessment is to be used to identify potential environmental hazards on site.
Transfer any identified potential hazards to Form ABS300 for risk analysis

Company: **Prepared by:** **Date**

Activity or Area	**Environmental Aspect** (Potential Hazard)	**Framework ref.** (Refer to Comp. 3)	**Relevance** (tick/cross)	**Potential Environmental Impact** (Risk – what can happen)	**Current Controls** (What is in place to lower the risk)
LAND BASED OPERATIONS					

ENVIRONMENTAL RISK ASSESSMENT

(From items identified on Form ABS200)

Company: **Prepared by:** **Date:**

Environmental Aspect (Potential Hazard) Listed on form ABS200	**Environmental Impact** (Risk –what can happen)	**Controls** (What is in place to lower the risk)	**Consequence** (Table 1.1)	**Likelihood** (Table 1.5)	**Risk Level** (Table 1.6)	**Recommended Controls to be Implemented** (within legislative guidelines if applicable)	**Action by whom & date?** (Refer risks above low to Form ABS400)
Fuel Storage for pumps	Spills may cause contamination of the waterways and ground	Fuels stored in accordance with the standards and regulations					

I certify that controls have been implemented and will be monitored closely for effectiveness:

Signed: **Position:** **Date:**

Date of next review is:

ENVIRONMENTAL RISK ASSESSMENT

(From items identified on Form ABS200)

Company: **Prepared by:** **Date:**

Environmental Aspect (Potential Hazard) Listed on form ABS200	**Environmental Impact** (Risk –what can happen)	**Controls** (What is in place to lower the risk)	**Consequence** (Table 1.1)	**Likelihood** (Table 1.5)	**Risk Level** (Table 1.6)	**Recommended Controls to be Implemented** (within legislative guidelines if applicable)	**Action by whom & date?** (Refer risks above low to Form ABS400)

I certify that controls have been implemented and will be monitored closely for effectiveness:

Signed: **Position:** **Date:**

Date of next review is:

ENVIRONMENTAL OBJECTIVES AND TARGETS

(Items identified as above low risk on Form ABS300 and through staff meetings, to be reviewed at regular intervals)

Company: **Date:**
Prepared by: **Date of next review:**

No.	**Objective:** the overall long-term objectives (big picture) that you are aiming to achieve relating to the management of this impact. **LONG TERM**	**Target**: the short-term targets (specific and measurable) that will together make sure that you meet your long-term objectives. **SHORT TERM**	**Actions required or already undertaken:** the actions you are willing to commit to doing in your business to ensure that the short and long-term objectives and targets are met. This might include actions you have already done but still need to be maintained and monitored if they are to remain effective. **HOW YOU ARE GOING TO GET THERE**	**Responsible person** **WHO IS GOING TO DO IT**
1	Maintain and Review the Environmental Management System to ensure it up to date and effective.	Review the Workplace Environmental Policy (Form ABS100) and EMS requirements. Identify objectives, targets and assign responsibilities		
2				

No.	Objective	Target	Actions	Responsible Persons
3				
4				
5				
6				

No.	Objective	Target	Actions	Responsible Persons
7				
8				
9				
10				

SYSTEM IMPROVEMENT REPORT

Company……. Date:……

Submitted by: ……..

Issue

☐ Environmental ☐ OH&S ☐ Quality

☐ Public Complaint ☐ Customer Complaint ☐ Other

Description

……

……

……

……

Potential impact

……

……

Suggested Solution

……

……

……

Considered by……. Date ……Addressed ☐Yes ☐No	
Addressed by the following action: …… …… …… …… …… To be completed by ……..(person)☐ Informed ……..(date of completion)	Not addressed because: …… …… …… …… …… …… …… ……

ENVIRONMENTAL MANAGEMENT REVIEW

(From items identified on Form ABS400, to be reviewed regularly, and system improvements from Form ABS500)

Company: **Date:**
Prepared by: **Date of next review:**

Objective No. & Name (From Form ABS400))	**Monitoring for progress towards your targets**: This box describes what monitoring activities you will do to check that the actions you are taking *are working effectively* and helping you to meet your *short-term targets* **CHECK THAT SHORT TERM TARGETS ARE BEING MET**	**Corrective Action**: This box describes what actions you will take if your monitoring shows that your actions are *not working effectively* or helping you to reach your short term targets. **SAY WHAT YOU WILL DO IF THEY ARE NOT**	**Monitoring - Objectives** Can you see progress towards objectives and what you will do to check that your Property Action Plan *is working effectively* to achieve your long-term environmental objectives. **CHECK THAT LONG TERM OBJECTIVES ARE BEING MET**	**Records**: What records will you keep to help prove that you have done what you said you would do, & where those records are kept **PROVE IT !**
1. Maintain and Review the Environmental Management System to ensure it up to date and effective.				

Objective No.	Monitor	Corrective Action	Monitoring Objective	Records
2				
3				
4				
5				

Objective No.	Monitor	Corrective Action	Monitoring Objective	Records
6				
7				
8				
9				

Environmental Management System Framework

Part 2

EMS Manual Register Templates

ABS700 Abalone Stock Monitoring Register
ABS800 Chemical Register
ABS900 Legal and Other Requirements Register
ABS1000 Training Register

PhycoTec
Environmental Management

TAQA

TFC

Tasmania

Australian Government
Fisheries Research and Development Corporation

FRDC Project 2004/096

Abalone Stock Monitoring Records

				Environmental					Health						
Date	Tank No(s)	Batch Reference	Average fish size	Water Temp	DO	pH	Salinity	AST Sample Reference No.	Position of fish	Behaviour	Feed Intake	Vibrio	Mud worm	FHU Serial No.	Assessed by

Comments:

CHEMICAL REGISTER

Company: **Date:**
Prepared by: **Date of next review:**

Substance	Use	Storage and Compatibility Requirements	Reference (eg MSDS or Australian standard)
Hydrocarbons (petrol and diesel)	Boat and tractor fuel	**Outside**: 1. Liquids shall be kept at least 1 m away from any boundary, workshop, dwelling or protected place, body of water, watercourse or environmentally sensitive area. 2, The ground around the store shall be kept clear of combustible vegetation or refuse for a distance of at lease 3 m. 3. Any potential flow of spillage shall be prevented from reaching a protected place, watercourse or property boundary by such means as the use of natural ground slop, or the provision of a diversion channel, kerb or bund. **Inside:** 10L per 50m2 of floor space, but 5 L for any tenancy of less than 50m2 area.	AS 1940:2004 Dangerous goods Act 1982 www.thelaw.tas.gov.au
Cleaning Liquids	Cleaning floors and work spaces	Store in appropriate receptacle away from processing areas.	MSDS

Substance	Use	Storage and Compatibility Requirements	Reference (eg MSDS or Australian standard)

LEGAL AND OTHER REQUIREMENTS

(Relate to items identified on ABS002)

Company: **Date:**
Prepared by: **Date of next review:**

Legislative requirement	Relationship to Activity	Reference to ESD Compliance Document
Commonwealth Legislation Reference: http://www.comlaw.gov.au		
Quarantine Act 1908	Transfer of disease through import & export of abalone adults or juveniles.	Appendix 8.2.3.1 1.2.2: Transfer of disease overseas and interstate: Import and Export Appendix 1.2.2
Export Control Act 1982	Export of abalone for consumption. Registration of premises by AQIS. Transfer of IMS	Appendix 8.2.3.1 1.2.2.1: Export 1.2.3.2: Transfer of IMS
Export Control Act (Proscribed Goods) 2005	Export of abalone overseas	1.2.2.2: Transfer of Disease, Export
Export Control Act (Animal Orders) 2004	Export of abalone overseas. Disease free certification	1.2.2.2: Export
Ramsar Convention of Wetlands 1971	Protection of Ramsar lister wetlands adjacent to industry activities	2.2.5: Protected Habitats
Environmental Protection and Biodiversity Conservation Act 1999	Collection and export of native abalone for consumption. The facilities impact on and protection of migratory birds, and threatened, endangered or protected species or habitats	Appendix 8.2.3.1 1.1.1: Collection of Wild Stock 1.2.2.1: Export. 1.3.4: Behavioural Changes of and Impacts on Migratory Species 1.3.6: Sensitive Habitats 2.2.3: Listed Migratory Species 2.2.4: Threatened, Endangered and Protected Species 2.2.5: Protected Habitats 2.2.6 Behavioural Changes and Impacts on Other Species.

Legislative requirement	Relationship to Activity	Reference to ESD Compliance Document
Tasmanian Legislation **Reference: http://www.thelaw.tas.gov.au**		
Resource Management and Planning System	Promote the principles of sustainable development. Siting of marine farming zones	Appendix 8.2.3.1
Living Marine Resources Management Act 1995	Resource allocation. Broodstock collection permit	Appendix 8.2.3.1 1.1.1: Broodstock
State Policy on Water Quality Management 1997		Appendix 8.2.3.1
State Coastal Policy Validation Act 2003	Sustainable development of marine farming consistent with the State Coastal Policy.	Appendix 8.2.3.1
Marine Farming Planning Act 1995	Marine farming license conditions relating to environmental management.	Appendix 8.2.3.1
Marine Farm Environmental License Conditions and Requirements	Monitoring of environmental impact within the farm boundaries, including impact of the outfall.	Appendix 8.2.3.1 Appendix 8.3.2.2 1.3.2 Food Chain Impacts 1.3.5: Sensitive habitats 2.1.2: Sedimentation.
Land Use Planning and Approvals Act 1993	Overarching legislation which regulates the Local Government Planning Schemes for land-based facilities, taking into account natural, indigenous and historical heritage. Disposal of waste. Impacts on migratory birds and other protected species	Appendix 8.2.3.1 Component 6 2.3.2: Heritage Area Affects 2.4.2: Disposal of Unmarketable Waste 1.3.4: Behavioural Changes of and Impacts on Migratory Species
Public Health Act 1997	Harvesting and processing of abalone.	*1.2.2: Import and Export*

Legislative requirement	Relationship to Activity	Reference to ESD Compliance Document
Threatened Species Protection Act 1995	The impact of the facilities on threatened, endangered or protected species	Appendix 8.2.3.1 2.2.4: Threatened, Endangered & Protected Species. Appendix 2.2.4
Nature Conservation Act 2002	Conservation and protection of the fauna, flora and geological diversity of the State	2.2.4: Threatened, Endangered & Protected Species. 2.3.1: Terrestrial Habitat Removal 1.3.5: Sensitive habitats
Environmental Management and Pollution Control Act 1995	Noise, water and air emission controls. Registration of facility conducting Level 1 activities	Appendix 8.2.3.1 2.1.1:Nutrients 2.3.6: Noise 2.4.1: Regional Carrying Capacity
Agricultural and Veterinary Chemicals (Control of Use) Act 1995, and the Poisons Act 1971.	Supply and use of veterinary chemicals	2.1.4: Veterinary Chemicals http://www.apmva.gov.au
Crown Lands Act 1976	Protection of habitat on Crown Lands leased by the licence holder	Appendix 8.2.3.1 2.3.1: Terrestrial Habitat Removal 1.3.5: Sensitive habitats
National Parks and Reserves Management Act 2002	Development of management plans of marine farms developed within the boundaries of a National Park or reserved land.	Appendix 8.2.3.1
Aboriginal Relics Act 1975.	Protection of aboriginal relics on surrounding foreshore.	Appendix 8.2.3.1 Component 6
Workplace Health & Safety Act 1995	Protection of the worker to ensure a safe working environment	5.1.2.3: Work related injuries

Legislative requirement	Relationship to Activity	Reference to ESD Compliance Document
Other requirements		
Local or State Government Planning Schemes	Waste Disposal	Appendix 8.2.3.1 2.4.2: Disposal of unmarketable waste
Tasmanian protocol for the translocation of abalone stock and equipment between catchment areas (*In development*)	To reduce the risk of translocation of Invasive Marine Species and disease between catchments	2.2.7: Translocation between Catchments 1.2.2: Transfer of Disease
National Translocation Policy	Translocation of broodstock and juveniles between states addressing disease and IMS	1.2.2: Transfer of disease overseas and interstate: Import and Export Appendix 1.2.2 1.2.3.2: Transfer of IMS
Code of Conduct for Australian Aquaculture (*Voluntary*)	To maintain the Australian aquaculture industries clean green image	Appendix 7.2.1
Occupational Health and Safety Management Plan	Required by each business under the OH&S Act 1995	5.1.2.3: Work related injuries
Liability cover		
Insurances		

TRAINING REGISTER

Company: **Date:**
Prepared by: **Date of next review:**

Employee	EMS Induction	OH&S Induction	Manual handling														

Environmental Management System Framework

Part 3

EMS Manual Templates

Systems Manual
Procedures Manual

Tasmania

Australian Government
Fisheries Research and Development Corporation

FRDC Project 2004/096

Environmental Management System

Procedures Manual

for

"Your Abalone Company"

(Your Logo)

Version Number……..

Revision Date……..

Procedure Number	Name of Procedure or Protocol	Version number/date	Location
P001	Re-fuelling of pumps, boats or tractors		Procedure Manual/ Fuel Store
P002	Disposal and Recycling of Waste		Procedure Manual
P003	Grading of Stock		
P004			
P005			
P006			
P007			
P008			
P009			
P0010			
P0011			
P0012			
P0013			
P0014			
P0015	Translocation of abalone stock and equipment between regions	In development	Refer to TAGA
P0016	Protocol for abalone farmers in the presence of listed threatened, marine or migratory birds		Appendix 2.2.3.1 (In development)
P0017			

Procedure 001: Re-fuelling of pumps, boats or vehicles on site

1. Operators will store and use chemicals controlled under the Dangerous Goods Act in an approved manner.

2. Operators should only carry the chemicals, fuels or oils necessary for the day to day running or maintenance of the boat in for work to be undertaken in the immediate future.

3. Operators shall store chemicals, oils or fuels in appropriate containers that will not result in a discharge to the environment if containers are spilled or leak.

4. Operators will not refuel pumps, boats or vehicles in areas where a possible spill or leak will lead to contamination of the waterway.

5. If a spill occurs, the operator shall use the facilities spill control kit to contain or mop up the spill.

6. If the spill has/has potential to:
   - Contaminate the waterway
   - Cause major contamination of the land

The operator will contact the relevant agency (DPIW) for advice on remediation.

Procedure 002: Disposal and Recycling of Waste

Environmental Management System

Systems Management Manual

for

"Your Abalone Company"

TASMANIAN ABALONE GROWERS ASSOCIATION

(Your Logo)

Version Number.....

Revision Date.....

Contents

Scope	3
Vision	3
Organisational Structure	3
Workplace Environmental Policy	4
Workplace Environmental Policy	4
Responsibilities	4
Responsibilities	5
Environmental Monitoring	6
Training and Competency	6
Safety	6
System Improvements Records	7
System Review	7
Reporting	8

Scope

This Environmental Management System covers the property of "Your Abalone Company" including:

- The buildings located at .....
- The ponds and other structures located at .....
- The seawater intake and outlet pipes and their immediate surroundings .....

But excludes:

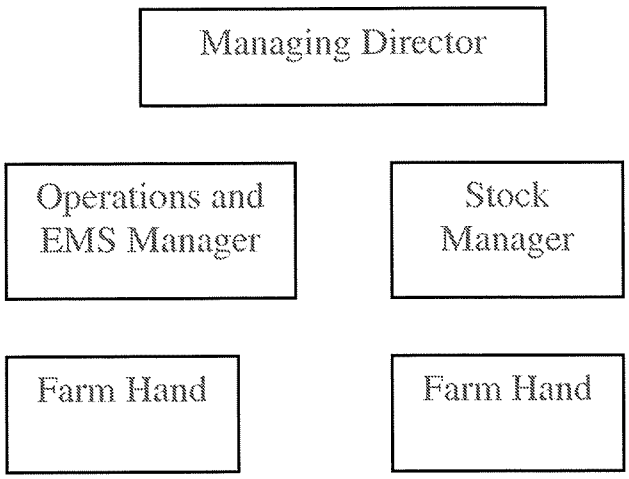
- .....

Vision

The vision of "Your Abalone Company" is to:

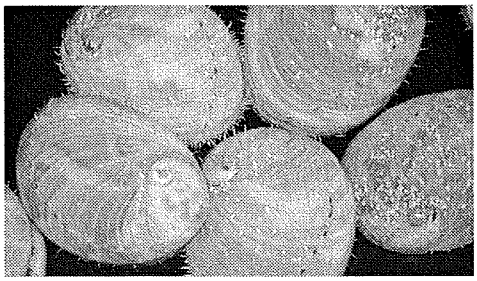
- protect and maintain the environment on which the farm relies, while maintaining economic viability for the future and take into considerations the needs of the community surrounding us

Organisational Structure



Workplace Environmental Policy

"Your Abalone Company"



(your logo)

WORKPLACE ENVIRONMENTAL POLICY

It is the policy of this company that we manage all aspects of our operation in an environmentally responsible manner, appropriate to the nature and scale of our activities.

Our aim is to ensure that our activities do not cause environmental pollution of any other adverse impacts on the environment, and that we operate under the principles of ecologically sustainable development.

We are committed to complying with the relevant environmental legislation and to a program of continual improvement through adaptive management.

The aims of this policy will be achieved by implementing an environmental management system that will include:

- Planning of environmental aspects and impacts, legislative requirements, objectives and targets.
- Implementation and operation including specified responsibilities, appropriate training and awareness, communicated to all relevant parties and with appropriate document control.
- Monitoring and corrective action
- Structured management review
- Continual improvement through regular reviewing and revising of objectives and targets.

This policy is applicable to the company and all its operations and functions in the land based facilities and the associated seawater reticulation.

Policy authorized by:..... Date:.....
(Managing Director)

Date of review:.....

Responsibilities

The Managing Director is responsible for:

- Overseeing the production for the EMS
- Providing the resources and training to implement and maintain the EMS where appropriate
- Other?

The Operations/EMS Manager is responsible for:

- regular review and maintenance of the EMS
- regular auditing of the EMS
- holding regular meetings with staff about EMS issues (or tool box meetings)
- reporting to the managing director on EMS issues
- Annual updating of the Legal and Other Requirements Register (ENV005) and reassessment of the environmental risks in conjunction with staff.
- Other?

The Stock Manager is responsible for:

- ensuring that the stock is maintained under conditions as described in the EMS
- Other?

The Farm Hands are responsible for:

- maintaining a work ethic in compliance with the EMS principles
- reporting an EMS issues to the EMS manager at regular meetings
- providing feedback to help maintain and improve the EMS
- Other?

Environmental Monitoring

The Operations/EMS Manager shall ensure that the following environmental monitoring is completed and is logged by the responsible person where necessary.

Daily
- Observing the farm is tidy and in good repair
- Ensuring stock are in good health

Weekly/Fortnightly
- Disposal of Rubbish and recycling
- Ensuring that the seawater outlet/intake pipe is in good repair

Monthly
- Stock health sampling
-

Biannual
- Servicing of vehicles and outboards
- Water quality sampling

Training and Competency

The EMS Manager/Managing Director will ensure that all staffs are inducted to EMS and OH&S procedures within one month of commencement of work. All staff will be required to provide proof of training to ensure that the Staff training Register is complete.

The EMS Manager/Managing Director will review and determine opportunities and requirements for staff training on a 6 monthly/annual basis.

Safety

All Staff are required to be familiar and comply with the safety procedures as outlined in the EMS Procedures Manual.

System Improvements Records

The system will be maintained and updated through the use of System Improvement Records (SIRs).

- The SIR forms will be available to all staff at all times and located in the office at a designated place.
- Completed SIR forms are to be handed to the Secretary/ EMS Manager for consideration.
- If the impact is of an urgent nature, the staff is directed to inform the EMS Manager/Managing Director verbally at the time, as well as providing a completed SIR.

It is the responsibility of the EMS Manager/Managing Director to review all SIR forms raised by staff within one or two week (s). All the items raised by SIRs relevant to the working staff will be discussed at regular (daily/weekly/fortnightly/monthly) workplace meetings on how the issues are to be dealt with (if at all).

System Review

The EMS will be reviewed with staff at regular intervals through:

- Routine work briefing meetings
- OH&S meetings
- Morning tea the first Monday of the month
- Other?

The information discussed at these meetings will be taken to:

- Quarterly management meetings
- 6 monthly stock review
- Other?

The EMS manager will audit the system annually/6- monthly and the outcomes reported to the Managing Director.

Reporting

The results of the annual system review, including our environmental performance and adaptive management strategies will be reported to:

- Our farm staff
- Marine farms in the regional area
- Other members of the Tasmanian abalone industry
- Annual Report
- TAGA meetings
- DPIW Marine Farming/ DTAE Environment Branch
- Members of the community through pamphlet drops
- Local member of Government
- Local/Regional/National Newspapers
- Local Natural Resource Management (NRM) Council
- Seafood Services Australia (SSA)
- Fisheries Research and Development Corporation (FRDC)

GO ON! – SPREAD THE GOOD NEWS

Complete by adding your own methods for ensuring that the EMS will be maintained.

Environmental Management System Framework

Compliance Guide and Risk Assessment for Ecologically Sustainable Development

PhycoTec
Environmental Management

TAGA

Tasmania

Australian Government
Fisheries Research and Development Corporation

FRDC Project 2004/096

Environmental Management System Framework

Tasmanian Farmed Abalone Industry

Compliance Guide and Risk Assessment for Ecologically Sustainable Development

Version 1.0
August 2006

PhycoTec Environmental Management

TAGA Tasmanian Abalone Growers Association

TFI

Tasmania

Australian Government
Fisheries Research and Development Corporation

FRDC Project 2004/096

ENVIRONMENTAL MANAGEMENT SYSTEM FRAMEWORK

Compliance Guide and Risk Assessment of Ecologically Sustainable Development for the Tasmanian Farmed Abalone Industry

Version 1.0

AUGUST 2006

This document is part of a national initiative to assist the seafood sector in the uptake of Environmental Management Systems. The document is based on the National ESD Framework 'How To' *Guide for Aquaculture, Version 1.1 (Fletcher et al. 2004). Regular updating of the information in the document will take place. While the views in this document reflect the general views of the Industry, it should not be taken as the view of any individual in Industry or the Steering Committee for the project.*

The project has been funded by the Tasmanian Abalone Growers Association (TAGA), the Tasmanian Fishing Industry Council (TFIC), the Tasmanian Department of Primary Industries and Water (DPIW) and the Fisheries Research and Development Corporation (FRDC) as Project 2004/096.

Correct Citation
Marshall JA (2006). Environmental Management System Framework: Compliance Guide and Risk Assessment of Ecologically Sustainable Development for the Tasmanian Farmed Abalone Industry. Compliance Guide and Risk Assessment. Version 1.0, FRDC, Canberra, Australia. 126pp.

Document Control

The Environmental Management System Framework: Compliance Guide and Risk Assessment of Ecologically Sustainable Development for the Tasmanian Farmed Abalone Industry is a living document subject to periodic review to capture regulatory changes and Industry's adaptive management.

This document is representative of the Industry's assessment of it's risks relating to ecologically sustainable development (ESD). The information contained in this document has been assessed by the EMS Steering Committee as being representative of the current scientific information and control measures used by the regulators.

This document is uncontrolled, and therefore freely available to industry representatives, regulatory authorities and other stakeholders as requested.

Document	Version	Date of revision	Signature
ESD Farmed Abalone Compliance and Risk Assessment	1.0	August 2006	
		August 2009	

Signed …… Date …../……/……
(Chair Tasmanian Abalone Growers Association)

Signed …… Date …../……/……
(General Manager – Primary Industries)

Copy Number ……..

Issued to ……

Date of Issue ……

Contents

EXECUTIVE SUMMARY V

ACKNOWLEDGMENTS XII

NOTE TO THE READER XIII

INTRODUCTION: ENVIRONMENTAL MANAGEMENT SYSTEM FRAMEWORK AND ESD OBJECTIVES 1

DESCRIPTION OF THE INDUSTRY 12

COMPONENT 1: IMPACT OF THE INDUSTRY ON THE ENVIRONMENT 17

COMPONENT 2: REGIONAL IMPACT OF INDUSTRY ON THE ENVIRONMENT 36

COMPONENT 3: IMPACT OF INDIVIDUAL FACILITIES ON THE ENVIRONMENT 55

COMPONENT 4: NATIONAL SOCIAL AND ECONOMIC WELLBEING 75

COMPONENT 5: COMMUNITY WELLBEING (SOCIAL AND ECONOMIC IMPACTS) 81

COMPONENT 6: INDIGENOUS COMMUNITY WELLBEING 88

COMPONENT 7: GOVERNANCE 94

COMPONENT 8: EXTERNAL IMPACTS OF THE ENVIRONMENT ON INDUSTRY 109

REFERENCES 125

LIST OF APPENDICES 129

GLOSSARY OF ACRONYMS AND TERMS 131

FIGURES

Figure i.	Generic component tree from the National ESD framework	xi
Figure ii.	The construction of the Component trees	xii
Figure 1.	Summary of the National ESD Reporting Framework	10
Figure 2.	(a) Brood stock being conditioned; (b) Abalone spat settled on a settlement plate	13
Figure 3.	(a) Abalone in a low hide; (b) Larger hides for grow out of abalone.	14
Figure 4.	Distribution of abalone farms in Tasmania.	16
Figure 1.0.	Component Tree1: Impact of the Industry on the Environment	20
Figure 2.0.	Component Tree2: Regional Impact of the Industry on the Environment	36
Figure 3.0.	Component Tree 3: Impact of individual facilities on the environment	53
Figure 4.0.	Component Tree 4: National/State Social and Economic Outcomes	70
Figure 4.1.1.	Production in tonnes of cultured abalone in Tasmania over the past 8 years	71
Figure 4.1.2.	Tasmanian exports of cultured abalone	72
Figure 5.0.	Component Tree 5: Community Wellbeing (Social and economic)	77
Figure 5.1.1.	Current and estimated farmgate and estimated gross value of farmed abalone	78
Figure 6.0.	Component Tree 6: Indigenous Community Wellbeing	84
Figure 7.0.	Component Tree 7: Governance	90
Figure 7.1.1.1.	Sub-Component 7.1.1.1: Governance of the Management Agency	92
Figure 7.1.1.1.1.7.	Regulatory framework governing land based abalone farms	93
Figure 7.2.4.	Tasmanian farmed abalone Industry Structure and Links.	100
Figure 8.0.	Component Tree 8: External Impacts of the Environment on the Industry	104
Figure 8.2.2.5.	Tasmanian farmed abalone as annual gross value (AGV)	116

TABLES

Table A.	Summary of risk assessments	vi
Table 1.	Risk assessment working group	7
Table 2.	The general consequence table	9
Table 3.	Likelihood table showing definitions	9
Table 4.	Risk matrix	10
Table 5.	Risk ranking and outcomes	11
Table 6.	Number and type of licenses in geographical location	15
Table 1.2.2.1.	Pathogens and parasites from wild stock and farmed abalone in Tasmania	22
Table 4.1.6.2.	Annual licence fees paid to the State Government	73
Table 7.2.1.2.	Planning requirements of selected Tasmanian councils	97

Executive Summary

The Environmental Management System (EMS) Framework for the Tasmanian farmed abalone Industry is a document developed after consideration of the environmental, social and economic impacts of the Industry in terms of sustainable development. This process has enabled the identification within the document of critical issues which will enable Industry, researchers and regulators to pursue and develop mitigation strategies that will ensure the long term sustainability of the Tasmanian farmed abalone industry.

The EMS Framework is an Industry initiative embraced by the Tasmanian Abalone Growers Association (TAGA) and the Tasmanian Department of Primary Industries and Water (DPIW), supported by the Tasmanian Fishing Industry Council (TFIC) and the Tasmanian Aquaculture Council (TAC) and co-funded by the Federal government through the Fisheries Research and Development Corporation (FRDC). Similar documents are being produced through the Tasmanian Oyster Research Council (TORC) and the Tasmanian Salmonid Growers Association (TSGA).

This document has been modelled on *The National ESD Framework "How To" Guide for Aquaculture Version 1.1* (Fletcher et al. 2004). The marine farming industry is committed to incorporating ESD into their management processes and the principles of sustainable development is enshrined in all to Tasmania's natural resource management legislation. A direct outcome of this commitment has been the development of the ESD framework for aquaculture that was generated by a FRDC subprogram in conjunction with the Aquaculture Committee of the Australian Fisheries Managers Forum (AFMF) working in association with the National Aquaculture Council (NAC).

Each aspect of the components from the ESD Framework for Aquaculture was assessed for relevance to the Tasmanian farmed abalone industry. Current management controls were examined in the context of valid scientific data and regulatory requirements. Qualitative risk assessments were validated, taking into account these current management practices and regulatory controls, by a local committee with relevant expertise.

The results found that the majority of the Industry's operational aspects were of low risk to the environment. Moderate risks to the Industry's sustainability were identified as:

- Maintenance of genetic diversity in farmed stock, which is being addressed through a state and national genetic improvement program:
- Import of disease, which is being addressed through the development of abalone health surveillance programs both at a state and national level.
- Access to a quality sustainable food source.
- Strategies to reduce the release of nutrients to the environment. Information from a current research project, in which results released in the near future, will allow development of better management practices to reduce this risk to a low level.

The risk of the Industry causing large scale negative social impacts to the state, local and indigenous communities was assessed as low due to the small size of the Industry at present. However, as the Industry grows, the risk of Industry's social and economic impact may increase, and Industry recognises the need for strategic business planning, the continued use of sustainable farming practices and risk management to decrease any future potential economic risk.

Governance from the Commonwealth, State and Local Government agencies and Industry self-governance were all considered to produce moderate risks to the long-term sustainability of the Industry. Recommendations to reduce the risk included effective, ongoing Government/Industry consultation, participation in the political process to ensure that Industry interests are taken into account in policy decision making, resulting in effective coordinated Industry representation and investment in development of human capital.

The majority of external environmental impacts on Industry from climate change and human induced changes were assessed as presenting a moderate to high risk to the sustainability of Industry. Sea level rise, ocean acidification, human induced changes to water quality, and exotic species introductions all ranked as a high risk. The lack of disease surveillance for Industry produces an extreme biological risk. Mitigation strategies to reduce these risks were identified including the provision of an appropriate level of expertise as part of a health surveillance program. Emergency response to a disease outbreak and the potential for disease to be translocated through the abalone wild catch sector also produced a moderate risk.

External political drivers that impact upon the Industry's sustainability include sovereign risk, competing uses under the local government's planning schemes and state government regulations. International market access was identified as a high economic risk under the current global market conditions.

The risk assessment process produced a number of key recommendations to address the identified risks in the Tasmanian farmed abalone industry. These recommendations are included as risk management options below each risk assessment box.

The key recommendations to mitigate risk (not in any priority order) relating to medium to extreme risks include:

- Continued development of the selective breeding program
- Ensuring continued access to broodstock from wild stock
- Continued development of state and national health surveillance programs
- Research into development of alternatives to fish meal and oils as a protein source for formulated diets
- Development of Industry wide environmental management controls on nutrient reduction strategies for water released into the environment
- Ongoing and effective engagement of State Government and participation in the political process to ensure that industry interests are taken into account in policy decision making

- Coordinated Industry representation to ensure effective, ongoing Government /Industry consultation
- Effective industry based strategic business planning
- Ongoing sustainable marine farming practices with continued risk management and adaptive husbandry management
- Investment in the development of Industry Codes of Practice, including translocation of juvenile abalone
- Investment in development of human capital
- Good governance practices of Industry representative groups
- Integrated and coordinated collection of baseline-farming information on which the effects of climate change can be measured to ensure targeted research of climate change impacts on the Industry
- Awareness raising of community on potential impacts and the need for change
- Effective engagement in Natural Resource Management (NRM) regional plans
- Development of appropriate field diagnostic services

In summary, by the consideration of environmental, social and economic aspects in regard to the comprehensive guidelines produced for ESD, the Industry has been able to rank the risks to it's sustainability using a qualitative risk analysis matrix. The identification of the critical issues through this process allows prioritisation of sustainability criteria to ensure the future of the Industry and the environment in which it exists.

Table A. Summary of risk assessments. * Consequences may be greater at a regional level.

Objective	Activity	Aspect	Consequence	Likelihood	Numerical Risk	Descriptive Risk	Target Risk
Component 1: Impact of Industry on the Environment							
Component 1.1: Wildstock of Farmed Species							
EO 1.1.1	1.1.1 Collection of Wild Abalone		0	1	0	NEG	
EO 1.1.2	1.1.2 Escape of farmed species		2	2	4	LOW	
Component 1.2 Farmed Stocks / Business							
EO 1.2.1	1.2.1 Genetics		4	2	8	**MOD**	**LOW**
	1.2.2 Transfer of Disease						
EO 1.2.2.1		1.2.2.1 Import of disease	4	3	12	**MOD**	**LOW**
EO 1.2.2.2		1.2.2.2 Export of disease	3	2	6	LOW	
	1.2.3 Translocation (Invasive Marine Species)						
EO 1.2.3.1		1.2.3.1 Import	3	1	3	LOW	
EO 1.2.3.2		1.2.3.2 Export	3	2	6	LOW	
EO 1.2.4	1.2.4 Veterinary Chemicals		1	1	1	LOW	
Component 1.3 Other Species/Community Processes							
EO 1.3.1	1.3.1 Disease		4	1	4	LOW	
EO 1.3.2.	1.3.2 Food composition		4	2	8	**MOD**	**LOW**
EO 1.3.3	1.3.3 Chemicals		1	2	21	LOW	
EO 1.3.4	1.3.4 Behav Changes/Migratory Spp.		4	1	4	LOW	
EO 1.3.5	1.3.5 Food Chain Impacts		4	1	4	LOW	
	1.3.6 Sensitive habitats						
EO 1.3.6.1		1.3.6.1 Seagrass beds	2	2	4	LOW	
EO 1.3.6.2		1.3.6.2 Macroalgal Communities	2	2	4	LOW	
EO 1.3.6.3		1.3.6.3 Seagrass beds	2	2	4	LOW	
Component 2: Regional Impacts on the Environment							
Component 2.1 Water Use Quality/Quantity							
	2.1.1 Nutrients						
EO 2.1.1.1		2.1.1.1 Industry Inputs	3	3	9	**MOD**	**LOW**
EO 2.1.1.2		2.1.1.2 Industry Reduction	3	3	9	**MOD**	**LOW**
EO 2.1.2	2.1.2 Sedimentation		3	2	6	LOW	
EO 2.1.3	2.1.3 Other wastes	2.1.3 Hydrocarbons	2	2	4	LOW	
EO 2.1.4	2.1.4 Flow		2	1	2	LOW	
EO 2.1.5	2.1.5 Seepage		2	3	6	LOW	

Objective	Activity	Aspect	Consequence	Likelihood	Numerical Risk	Descriptive Risk	Target Risk
Component 2.2 Ecological Community Structure and Biodiversity							
EO 2.2.1	2.2.1 Plankton (eg blooms)		2	1	2	LOW	
EO 2.2.2	2.2.2 Benthic Communities		3	1	3	LOW	
EO 2.2.3	2.2.3 Listed Migratory Birds		3	1	3	LOW	
EO 2.2.4	2.2.4 Threatened/Endangered/Protected species		3	2	6	LOW	
EO 2.2.5	2.2.5 Protected Habitats		3	2	6	LOW	
EO 2.2.6	2.2.6 Behavioural Changes		3	1	3	LOW	
EO 2.2.7	2.2.7 Translocation Between Catchments		4	2	8	**MOD**	**LOW**
Component 2.3 Physical Structures and Construction & Tenure							
EO 2.3.1	2.3.1 Number and Size of Farms		2	2	4	LOW	
EO 2.3.2	2.3.2 Terrestrial habitat removal		1	2	2	LOW	
EO 2.3.3	2.3.3 Heritage Values		1	1	1	LOW	
EO 2.3.4	2.3.4 Soil Quality		3	2	6	LOW	
EO 2.3.5	2.3.5 Infrastructure		2	2	4	LOW	
EO 2.3.6.	2.3.6 Noise		2	2	4	LOW	
Component 2.4 Production							
EO 2.4.1	2.4.1 Regional Carrying Capacity		2	2	4	LOW	
EO 2.4.2	2.4.2 Disposal of Unmarketable Waste		1	2	2	LOW	
Component 4: National Social and Economic Wellbeing							
Component 4.1: Economic							
SEO 4.1.1	4.1.1: National Economy		1	1	1	LOW	
SEO 4.1.2	4.1.2: State Economy		2	1	2	LOW	
Component 4.2: Social							
SEO 4.2	4.2: Contribution to social wellbeing		1	1	1	LOW	
Component 5: Community Wellbeing							
Component 5.1: Industry Community							
SEO 5.1	5.1 Economic & Social support		2	2	4	LOW	
Component 5.2: Dependant Communities							
SEO 5.2	5.2 Economic & Social support		1	2	2	LOW	

Objective	Activity	Aspect	Consequence	Likelihood	Numerical Risk	Descriptive Risk	Target Risk
Component 6: Indigenous Community Wellbeing							
Component 6.1 Income							
SO 6.1		6.1 Income	2	1	2	LOW	
Component 6.2 Employment							
SO 6.2		6.2 Employment	2	2	4	LOW	
Component 6.3 Community Viability							
SO 6.3		6.2 Community Viability	2	1	2	LOW	
Component 6.4 Cultural Values							
SO 6.4.1		6.4.1 Traditional Fishing	0	2	0	LOW	
SO 6.4.2		6.4.2 Access to Land	3	1	3	LOW	
SO 6.4.3		6.4.3 Heritage Sites	3	1	3	LOW	
Component 7: Governance							
Component 7.1: Intergovernmental Coordination							
SEO 7.1.1		7.1.1.1: Management Agency	3	3	9	**MOD**	**LOW**
SEO 7.1.2		7.1.2: Local Government	3	3	9	**MOD**	**LOW**
SEO 7.1.3		7.1.3: Commonwealth Government	3	3	9	**MOD**	**LOW**
Component 7.2: Industry							
SEO 7.2		7.2: Industry representation	3	3	9	**MOD**	**LOW**
Component 7.3: Others (NGOs)							
SEO 7.3		7.3: Community representation	2	3	6	LOW	
Component 8: External Impacts of the Environment on Industry							
Component 8.1: Impacts of the Environment on the Industry							
	8.1.1: Climate Induced Changes						
EO 8.1.1.1		8.1.1.1: Temperature rise*	4	4	16	**HIGH**	
EO 8.1.1.2		8.1.1.2: Rainfall*	3	4	12	**HIGH**	
EO 8.1.1.3		8.1.1.3:Sea-level Rise*	2	4	8	**MOD**	
EO 8.1.1.4		8.1.1.4: Storms	2	4	8	**MOD**	
EO 8.1.1.5		8.1.1.5: Ocean Acidification	3	4	12	**HIGH**	
	8.1.2: Human Induced Changes						
EO 8.1.2.1		8.1.2.1: Water Quality	4	4	16	**HIGH**	**LOW**
EO 8.1.2.2		8.1.2.2: Land Use Changes	3	4	12	**MOD**	**LOW**
EO 8.1.2.3		8.1.2.3: Environmental Flows*	2	4	8	**MOD**	**LOW**
EO 8.1.2.4		8.1.2.4: Air Quality (spray drift)*	2	3	6	LOW	
EO 8.1.2.5		8.1.2.5: Exotic species and weeds	4	4	16	**HIGH**	**LOW**

Objective	Activity	Aspect	Consequence	Likelihood	Numerical Risk	Descriptive Risk	Target Risk
	8.1.3: Biological Changes						
EO 8.1.3.1.1		8.1.3.1.1: Disease Surveillance	3	6	18	**EXT**	**LOW**
EO 8.1.3.1.2		8.1.3.1.2: Disease in Juveniles	3	2	6	LOW	
EO 8.1.3.1.3		8.1.3.1.3: Emergency response	4	3	12	**MOD**	**LOW**
EO 8.1.3.1.4		8.1.3.1.4: Disease Field Diagnostics	4	6	24	**EXT**	**LOW**
EO 8.1.3.1.5		8.1.3.1.5: Disease from Wild Sector	4	2	8	**MOD**	**LOW**
EO 8.1.3.2		8.1.3.2: Predators	1	6	6	LOW	
Component 8.2: Impacts of other external drivers							
	8.2.1: Politics						
SEO 8.2.1.1		8.2.1.1: Sovereign Risk	3	4	12	**HIGH**	
SEO 8.2.1.2		8.2.1.2: Competing Uses*	3	4	12	**HIGH**	
SEO 8.2.1.3		8.2.1.3: Local Government Zoning	2	3	6	LOW	
	8.2.2: Economics						
SEO 8.2.2.1		8.2.2.1: Incentives etc.	4	2	8	**MOD**	
SEO 8.2.2.2		8.2.2.2: Markets	4	4	16	**HIGH**	
SEO 8.2.3	8.2.3: Regulations	8.2.3: Regulations	4	2	8	**MOD**	

Acknowledgments

The Author wishes to thank the Environmental Management System Steering Committee and those who have been part of the Farmed Abalone Working Group. These people have freely given up their time for numerous meetings and workshops to keep the project on track. I also thank my Principal Investigator Neil Stump who took over the helm half way through the project and provided support while the Tasmanian Fishing Industry Council (TFIC) underwent changes.

This project was funded through the TFIC by the Fisheries Research and Development Corporation (FRDC) with cash contributions from the Tasmanian Abalone Growers Association (TAGA), Tasmanian Oyster Research Council (TORC) and the Tasmanian Salmonid Growers Association (TSGA), and in-kind contribution from TFIC and the Department of Primary Industries and Water (DPIW) Marine Farming Branch. Assistance for travel to meetings was also provided by the FRDC Abalone Aquaculture and ESD sub-programs, and by Seafood Services Australia (SSA).

Many people provided information for this document and reviewed relevant Sections. These people are listed below:
Drs Judith Handlinger and Stephen Pycroft, DPIW Fish Health Unit; Rod Andrewartha, Marylou Conway, Dr Kevin Ellard, DPIW Animal Health Labs; Graeme Woods, Tony Thomas, Mark Churchill, Alice Morris, Tim Paice, Rob Gott, DPIW Marine Farming Branch; Rob Green, Andrew Sharman, DPIW Wild Fisheries Branch; Craig Midgely DPIW Licensing and Administration Branch, Lynne Powell, Greg Dowson DTAE Environment Branch; Luke Maynard, Colin Hughes Tasmanian Aboriginal Land and Sea Council; Drs Graham Harris and Manuel Nunez, University of Tasmania.

Special thanks to Steve, Abbey, Anna, Andea, Liz and Tracey of DPIW Licensing for their help and good company in the office.

Lastly I would like to thank the TFIC staff of Bob Lister, Ralph Mitchell, Ann Gay, Julie Martin, Andrew Febey, Ed Smith and Mary Brewer for their support over the last 24 months.

Note to the Reader

The EMS Framework for the Tasmanian Farmed Abalone Industry has been designed to follow the structure provided by the National ESD Framework: 'How To' Guide for Aquaculture (Fletcher et al 2004). The National ESD Framework consists of a series of components structured into a **Generic Component Tree.** There are three branches on this Generic Component Tree: ecological, social wellbeing and ability to achieve. Each branch contains either 2 or 3 **Components** as shown in Figure i.

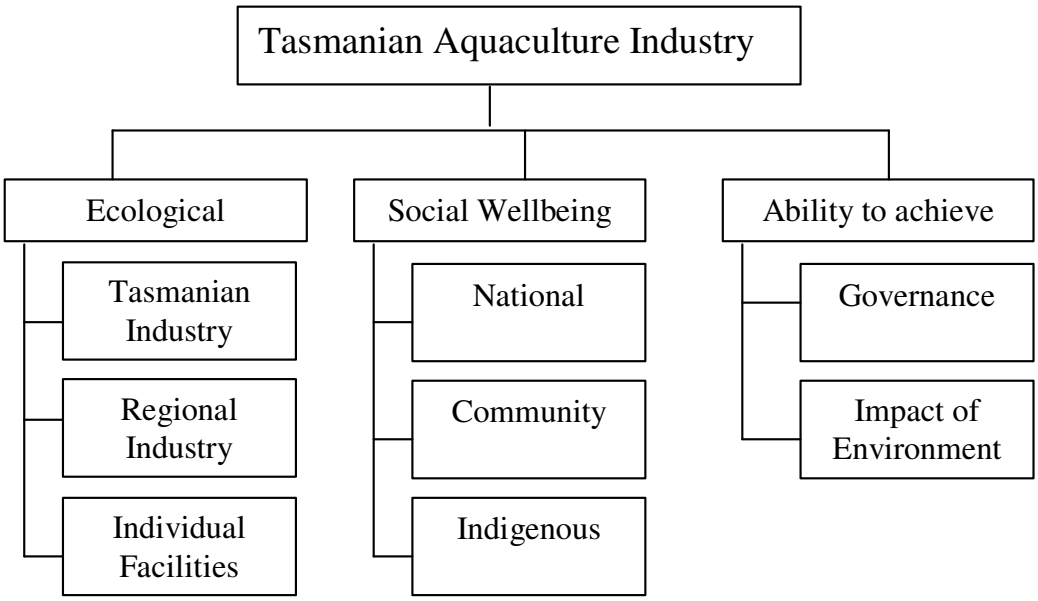


Figure i. Generic component tree from the national ESD framework (adapted from Fletcher et al 2004)

Each numbered **Component** is assessed as a chapter and has an individual **Component Tree.** Each numbered Component Tree has **Sections** (numbered 1.1, 1.2, 1.3 etc.) which describe a particular activity; each Section contains a number of relevant **issues or aspects**, as demonstrated in Figure ii.

The document will refer to the relevant Component tree as a **component**, and the numbered Sections within the component tree as **Sections, issues or aspects**.

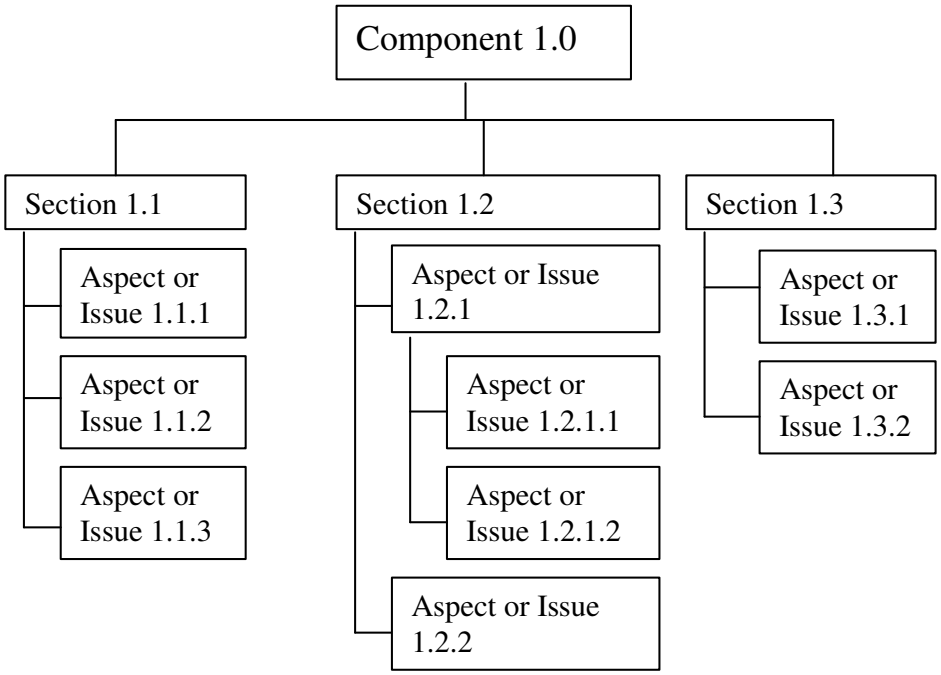


Figure ii. The construction of the component trees

The document repeatedly contains a number of acronyms. Please refer to the attached **Glossary of Acronyms and Terms** at the back of the document for clarification. Throughout the document, the Tasmanian abalone marine farming industry will be referred to as the **Industry**.

Introduction: Environmental Management System Framework and ESD Objectives

Background

The gross value of production (GVP) from Tasmanian marine farming was approximately $185 million a year in 2005 and is one of Tasmania's most significant industries. The Tasmanian farmed abalone industry is considered the new growth industry with a current annual gross production (AGP) of M$3.4 and an expected AGP of M$10 by 2010.

The Tasmanian Farmed Abalone Industry has long recognised and embraced its responsibilities in regard to "sustainable development" (as defined under the Objectives of the *Resource Management and Planning System* of Tasmania) (RMPS) of natural and physical resources for the purposes of abalone farming. The industry, through the Tasmanian Aquaculture Council (TAC) worked pro-actively with Government in the drafting of both the *Living Marine Resources Management Act 1995* (LMRMA), and the *Marine Farming Planning Act 1995* (MFPA). Simultaneously, industry worked pro-actively with the regulators and the community to develop appropriate mandatory licence conditions under the LMRMA, in compliance with the sustainable development objectives of RMPS. The Environmental Management System (EMS) Framework for the Tasmanian Industry has been developed to demonstrate the Industry's sustainability under current conditions, and to identify the external threats (those which are beyond the Industry's control) to the Industry's longer term sustainability.

The EMS Framework is a Seafood Industry initiative developed by the Fisheries Research and Development Corporation (FRDC) and Seafood Services Australia (SSA) through its publication of "The Seafood EMS Chooser". The Tasmanian Aquaculture Council (TAC) recognised the value of incorporating the newly developed National ESD Reporting Framework into the structure of emerging EMS's. TAC, through the Tasmanian Fishing Industry Council (TFIC), successfully applied to FRDC for project funding for the development of ESD/EMS templates for the oyster, abalone and salmonid aquaculture sectors at a state and regional level.

The Industry is committed to further developing environmentally sustainable management practices that reflect the requirements of sustainable use and development of natural resources, from the social, economic and environmental perspective. These practices are being achieved by basing the EMS Framework on the principles of Ecologically Sustainable Development (ESD). The EMS Framework reflects the criteria for ESD from the *National ESD Framework: 'How To' Guide for Aquaculture*, produced by FRDC (Fletcher et al. 2004), which facilitates the analysis of the Industry's environmental impacts against the principles of ESD.

The objective of this document is to demonstrate that the Industry is operating within the objectives and principles of ESD, and through the EMS is meeting community

expectations of good stewardship and environmental performance through adaptive management. The Industry has identified the relevant environmental, social/economic and governance issues, determined the appropriate level of management response using risk assessment techniques and provided a reporting structure to document the outcomes.

What are ESD and SD?

Ecologically Sustainable Development (ESD) is:

> "*Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased*" (COAG 1992).

It includes three key objectives;

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support system.

Tasmanian legislation incorporates the objectives from Schedule 1 of the Resource Management and Planning System of Tasmania, including Sustainable Development (SD).

Sustainable Development means:

> "managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural wellbeing and for their health and safety while –
>
> **(a)** sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations;
>
> **(b)** safeguarding the life-supporting capacity of air, water, soil and ecosystems; and
>
> **(c)** avoiding, remedying or mitigating any adverse effects of activities on the environment."
>
> Further information on ESD and SD can be found in Appendix 1.1: Principles and objectives of ESD and SD.

The ESD Framework consists of eight major components in a generic component tree. The generic component tree is structured into three branches; contribution to ecological wellbeing; contribution to human wellbeing; and ability to achieve; as described in the Note to the Reader (Fig i, page xi).

The ecological wellbeing branch is structured into 3 spatial levels:

- Whole of Industry issues
- Catchment and regional issues
- Within facilities issues

The document provides validation for the aspects arising in the first two levels and guidance notes for the third level. Individual facilities will need to validate their own practices for issues arising in third level (Component 3).

The social wellbeing branch is also structured into 3 social strata;

- National/State
- Community
- Indigenous

All three components are discussed, but there is limited data available for the Community social impacts.

The third branch reflects the impacts that may affect Industry's sustainability including political and environmental issues.

How the EMS/ESD Framework operates

Five key elements have been identified to demonstrate that the Industry is compliant with the principles of ESD (adapted from Fletcher et al 2004):

1. identify the issues relevant to the Industry/sector;
2. prioritise these issues;
3. complete a suitably detailed report/management strategy for each issue
4. compile a summary of background material on the Industry, the major species affected and the environments that the Industry operates within;
5. use the generated material to assist individuals or Industry to demonstrate the outcomes are being obtained through the development of EMS's, Codes of Practice or agency reports.

This document covers the first 4 elements of the ESD principles, which will assist Industry in completing the fifth element.

The Benefits of an EMS for Industry

Implementing an EMS can deliver a number of benefits to the Industry, individual businesses, the community and the environment including:

- Retained access to the marine resource
- Improved business performance and efficiency
- Potential for increased profits
- Reduced resource use and waste generation
- Improved environmental performance

- A better understanding of operations and the environment on which they rely
- Demonstrated good environmental stewardship
- Improved environmental assets
- Attitudinal and behavioural change.

THE NATIONAL ESD FRAMEWORK

Contribution to Ecological Wellbeing

1. **Impacts on the General Environment (Whole of Industry)**
   Deals with ecological impacts on a state-wide basis.

2. **Impacts within the Catchment/Region**
   Deals with the cumulative impacts that may occur from multiple facilities in one region or catchment.

3. **Impacts within Facility**
   Provides guidance notes for individual facilities to implement the principles of ESD.

Contributions to Human Wellbeing

4. **National Wellbeing**
   Deals with the contribution of the industry to the national economy, employment, supply of fish, trade deficit etc.

5. **Community Wellbeing**
   Includes the potential social and economic impacts of the industry on the local or regional community.

6. **Indigenous Wellbeing**
   How the industry affects and integrates with the indigenous community. This component also includes regional aspects.

Ability to Achieve

7. **Governance**
   Ensures that legal, institutional, economic and policy frameworks underpin the principles of ESD and allocate appropriate resources.

8. **Impacts of the Environment**
   Determines issues that may reduce or improve performance of the industry that are outside of the direct control of the management agency.

EMS FRAMEWORK: TASMANIAN FARMED ABALONE INDUSTRY

Scope of the EMS Framework

This EMS framework covers the commercially productive land based abalone farms in the Tasmanian region only. It does not include marine based abalone marine farming which is yet to be demonstrated as commercially viable in Tasmania. All environmental components defined by the National ESD Framework are covered, except those justified as not relevant for the Industry. Those components omitted from the document are explained at the beginning of each component chapter.

Issues covered by the scope of this EMS include, but are not limited to:

- Environmental quality of the growing area;
- Environmental aspects of marine farming operations;
- Actions taken by all stakeholders, including the marine farmers, who may affect the environmental quality and productivity of the catchment area used by the Industry.

Development of the EMS Framework

The EMS framework was developed by Phycotec Aquaculture Environmental Management under contract to the Tasmanian Fishing Industry Council (TFIC) with assistance from the Fishing Research Development Corporation (FRDC), the Department of Primary Industries and Water (DPIW) and Seafood Services Australia (SSA). The development of the EMS framework was directed by a steering committee of industry, research and government advisers including:

Judith-Anne Marshall (Phycotec) – Project Officer
Neil Stump (TFIC) – Project Manager –Aug 05 – June 06
Colin Dyke (Little Swanport EMS Pilot Project / TAC) - Chair
Christine Crawford (Tasmanian Aquaculture and Fisheries Institute)
Miles Cropp (Tasmanian Abalone Growers Association)
Pheroze Jungalwalla (Tasmanian Salmon Growers Association)
Andrew Febey (TFIC)
Richard Pugh (TSEC)
Barry Ryan (TORC)
Colin Shepherd (DPIW)
Ed Smith (TFIC)

Note: Although members of this committee have been involved in the development of this document, the content and risk assessments are not necessarily a reflection of the opinions of the individual members of the committee.

Risk assessment procedures as developed by Fletcher et al. 2004 (Appendix 1.0) were used to identify and assess all aspects or issues in the EMS Framework. Current management controls and evidence from the scientific literature are considered for each aspect. This information is taken into account in the risk analysis. The EMS Framework is designed to complement the large number of existing policies and regulations that the Industry already complies with, and to integrate these into the daily management regimes of an organisation.

Review Process

The EMS framework document is scheduled for initial review 3 years after release by persons designated by Industry and/or the EMS Steering Committee. After this time, periodic review will occur at the discretion of Industry.

The format of this EMS is to allow ongoing updating of the information it contains. The periodic review needs to ensure that the objectives are still relevant and should take into account:

- changing legislation/regulations;
- changes in technology and management;
- feedback from the community;
- emerging issues in environmental management.

The document may also be used as a consultation instrument with stakeholders, and to promote the Industry's environmental awareness.

Risk Assessment Process

By identifying the relative level of risk, the Industry can determine the appropriate level of management response. The risk relates to both impacts from Industry on the environment and impacts to Industry from external factors, as identified through the eight component trees. Examples may include:

- the risk associated with the Industry's ability to perform against the relevant legislation;
- the potential impacts upon the long term profitability of the Industry;
- the risk associated with possible impact on the ability of the community to enjoy the marine/coastal environment;
- the risk to the integtrity of the ecosystem in which the Industry operates.

What is Risk?

"*Risk is the chance of something happening that will have an impact on objectives*." (AS/NZS 4360 – 1999)

What is Risk Analysis?

"*Risk analysis involves consideration of the sources of risk, their consequences and the likelihood that these consequences may occur*." AS/NZS 4360-1999

The major objective of using the risk assessment technique is to separate the minor and acceptable risks from the major and unacceptable risks. This assessment requires the

determination of two factors in each issue – the potential consequence arising from the activity on an aspect, and the likelihood that this consequence will occur. A risk value is calculated by combining values from the consequence and likelihood. The risk assessments were conducted by suitably qualified persons as listed in Table 1. Please note that although the risk assessments were achieved by general consensus of opinion, the assessment does not necessarily represent the opinion of any individual.

Table 1. The Farmed Abalone Working Group for risk assessments incorporating relevant personnel from industry, research and government.

Person	Relevant experience	Component 1	Component 2	Component 4	Component 5	Component 6	Component 7	Component 8
Dr Judith-Anne Marshall PhD. Dip. Ed. BSc. MEIANZ	Tasmanian EMS Project Officer; Principal Consultant, Phycotec Environmental Management; ISO 14001 Environmental Auditor	X	X	X	X	X	X	X
Neil Stump B App Sci, (Fisheries), BSc (Hons)	Principal Investigator, Tasmanian EMS Framework project;.former President and Director, TFIC; current Chief Executive TFIC	X	X	X	X	X	X	X
Miles Cropp Dip. Agri Sci.	General Manager, Abalone Farms Australia; Industry representative on the Tasmanian EMS Steering Committee; Member TAGA	X	X	X	X	X	X	X
Michael Wing	General Manager, Cold Gold; Chair TAGA	X	X	X	X	X	X	X
Nicholas Saava BSc.	General Manager, Abtas Marketing, Member TAGA.	X	X	X	X	X	X	X
Rodney Crowther	General Manager, Abalone Aquafarms; Member TAGA.							
Sarah Fielding	Manager, Tasmanian Abalone Farms; Member TAGA.	X	X	X	X	X	X	X
Tony Thomas	Principal Marine Farming Development Officer, DPIW Marine Farming Branch.	X					X	

The risks that are assessed will differ in values depending upon current management controls. If no management controls were in place, the risk assessment would define the *potential risk*. However, the aim of this exercise is to take into account the current management controls and practices to determine the *managed* or *residual risk*. Where the risk assessment identifies issues that need the risk reduced and it is within the Industry's power to reduce the risk, a *target risk* would be incorporated. The target risk is where Industry, over a period of time, may wish to develop techniques/management options to reduce the *potential or managed risk* to the *target risk*. For the purposes of this document, unless otherwise stated, all further risk referred to will be the *managed* or *residual risk*.

Consequence and Likelihood Tables

The risk assessment methodology used for the Industry employs the use of consequence and likelihood tables. More than one consequence table is used for risk assessment due to the variety of issues, and possible outcomes, within and between the component trees. A general consequence table has been developed to assess most environmental issues (Table 2). However, a series of alternative consequence tables, each with six levels, has been developed by the National ESD Framework to assess specific issues including:

1. Protected species;
2. Habitat issues;
3. Ecosystem trophic level effects;
4. Social political issues.

All consequence tables are provided in Appendix 1.0 with notes for use. All referrals to the consequence table will mean the general consequence table (Table 1), unless otherwise specified.

Consequence

The consequence of an issue is the effect or outcome a particular issue will have. Consequence relates to the importance of an issue.

Likelihood

The likelihood is the conditional probability of an event occurring. It relates directly to the impact of the event, not the activity surrounding the event.

Table 2. The general consequence table for use in ecological risk assessments related to Industry

Consequence	Score	Definition
Negligible	**0**	Very insignificant impacts. Unlikely to be measurable at the scale of the stock/ecosystem/community against natural background variability
Minor	**1**	Possibly detectable but minimal impact on structure/function or dynamics
Moderate	**2**	Maximum acceptable level of impact – recovery measurable in months or years
Severe	**3**	This level will result in wider and longer term impacts – recovery measurable in years
Major	**4**	Very serious impacts with relatively long time frame likely to be needed to restore to an acceptable level – recovery measurable in decades
Catastrophic	**5**	Widespread and permanent irreversible damage or loss will occur – unlikely to ever recover (eg causing extinctions)

Table 3. Likelihood table showing definitions.

Likelihood	Score	Definition	Indicative frequency
Remote	**1**	Never heard of, but not impossible.	One in 1,000 years
Rare	**2**	May occur in exceptional circumstances.	Once every 100 years
Unlikely	**3**	Uncommon, but has been known to occur	Once every 30 years
Possible	**4**	Some evidence to suggest this may possibly occur	Once every 10 years
Occasional	**5**	May occur	Once every 3 years
Likely	**6**	It is expected to occur	Once a year or more

Table 4. Risk matrix – numbers in cells indicate risk value (see Table 4 for details).

		Consequence					
Likelihood		**Negligible**	**Minor**	**Moderate**	**Severe**	**Major**	**Catastrophic**
Remote	**1**	0	1	2	3	4	5
Rare	**2**	0	2	4	6	8	10
Unlikely	**3**	0	3	6	9	12	15
Possible	**4**	0	4	8	12	16	20
Occasional	**5**	0	5	10	15	20	25
Likely	**6**	0	6	12	18	24	30

There is one likelihood table only, which has qualitative criteria that range from 'remote' to 'likely' as shown in Table 2. Information from the consequence and likelihood tables are combined in a risk matrix table (Table 3) to provide an arithmetical value on the calculated risk using consequence multiplied by the likelihood. The risk values have been ranked into five risk ranking categories (Table 4). Any risk ranked greater than low (6) in the EMS Framework requires a full performance report and management plan (Figure 1).

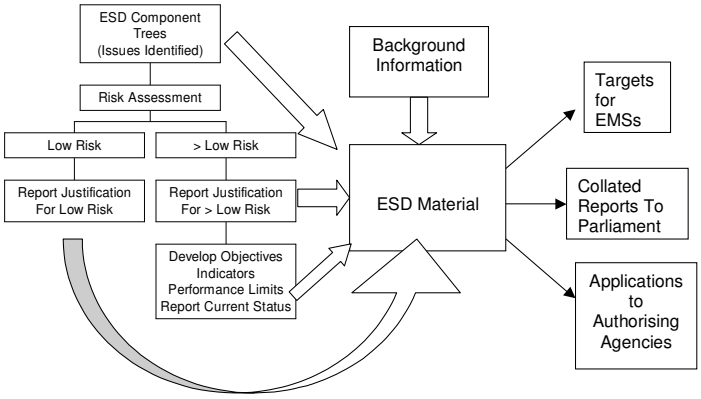


Figure 1. Summary of the National ESD Reporting Framework process for aquaculture (Adopted from Fletcher et al 2004).

Table 5. Risk Ranking and Outcomes.

Risk Ranking	Risk Value	Description	Reporting Requirements	Management Response
Negligible	**0**	Not an issue	Short justification only	Nil
Low	**1-6**	Acceptable – no specific control measures needed	Full justification needed	No specific action needed to achieve acceptable performance
Moderate	**8-12**	Specific management needed to maintain acceptable performance	Full performance report	Review current arrangements
High	**15-18**	Not desirable – continue strong management action. Further or new risk control measures may need to be introduced in the near future	Full performance report	Probable adaptation to current management needed
Extreme	**>20**	Unacceptable – major changes required to management approach in near future	Full performance report	Substantial additional management controls needed.

Document Structure

The document comprises two introductory chapters: EMS Framework and ESD Principles, and Description of the Industry.

The following eight chapters cover each of the components in the ESD generic component tree. Complementary to this document are the Appendices that contain reference material pertinent to the aspects and issues in the component trees.

Description of the Industry

Introduction

Abalone forms the basis of a valuable industry in Victoria, Tasmania, South Australia, and Western Australia. The estimated total Australian production for 2005-06 is worth $222 million. There are two main commercial species of abalone in Australia and both are endemic. Green lip abalone (*Haliotis laevigata*) is distributed from Victoria to Western Australia including Tasmania and Bass Strait. Blacklip abalone (*Haliotis rubra*) occurs in inshore waters from New South Wales around the south coast the continent to Western Australia including Bass Strait and Tasmania.

Green lip abalone inhabit inshore rocky reefs to 30 m, occasionally to 40 m and are generally associated with seagrass habitats. They occur in clusters in favourable habitat separated by patches of unsuitable habitat whereas blacklip have a nearly continuous distribution. Green lip growth rates vary with a location, maturing after three years. Drift algae dominate the diet of green lip. Black lip abalone live in crevices on reefs in up to 30 m of water, are most common in less than 15 m but can be found in up to 40 m. Black lipped abalone mature at 3 to 4 years in South Australia, and 6 to 10 yr in Tasmania. The blacklip abalone usually graze on seaweed and drift algae.

Wild harvesting of abalone.

Abalone, known initially as muttonfish, grows on the rocky sea bottom and is collected primarily by licensed commercial divers. Once collected, the fish are then held in holding systems prior to being removed from the shell, cleaned and processed. Almost the entire catch is exported to Southeast Asia with substantial markets in Japan and Hong Kong.

The availability of large quantities of wild abalone was well known as early as 1946, but trial shipments around that period failed to locate a market. During the early 1960's, interest in the product began to develop in several South-East Asian countries. The wild abalone fishery began in 1963 with minimum size limits and licenses for commercial abalone divers introduced in 1965. The ease of access to the industry together with relatively high prices for the product attracted many new divers. In 1969, as a result of consultation with industry leaders, the Government introduced a restriction on the number of licenses to 120 to ensure the sustainability of the fishery. During the 1980's there was concern about potential overfishing of Tasmania's abalone resource and in 1984 a quota system was introduced to cap the amount of fish taken (DPIW 2001). In 2005, the total allowable catch (TAC) was 2500 tonnes.

The value of the Tasmanian fishery has fluctuated due to changes in landings, but has also fluctuated markedly due to changes in the beach prices paid to fishers. However, the industry continues as an important fishing industry for the state of Tasmania that contributes substantially to Australia's export earnings (Cuthbertson 1978).

Establishment of Abalone farming

Abalone production from wild fisheries world-wide is decreasing due to overfishing and/or habitat degradation, and many countries are looking towards abalone culture to support the increasing demand for this product (DPIF 1994). It was also recognised that small fish below the legal minimum size for wild abalone harvest may have a demand in the Japanese gift pack trade (Department of Trade 1993). Tasmania began research into abalone culture in 1967. In 1977, abalone culture techniques were investigated in Japan (Grant 1977), U.S.A. and Mexico (Cuthbertson 1978). The transfer of this technology facilitated a feasible industry in Tasmania.

One abalone hatchery was established in Swansea, Tasmania in 1986 and a second in Bicheno in 1987 with the aim of producing abalone seed for culture. The first abalone farming permit was issued to a land based farm at Swansea in 1986. This farm cultured abalone in land based ponds but used cultured and drift seaweed as stock feed. The use of seaweed introduced licensing and regulatory issues and was determined to be not as efficient as using formulated feeds such as abalone pellets. In 1993, the FRDC investigated the development of formulated feeds for use in the abalone industry. The successful development of formulated feeds has allowed land based grow-out systems using ponds to became more viable than caged marine based systems.

In 1995 further land based abalone licenses were issued in Bicheno and Dunalley. The new farms imported hatchery technology from New Zealand into the state.

Culture Methods

Broodstock

Broodstock are collected from the wild and/or from farmed stock. More recently the Industry has been developing family lines which are maintained within the farm system. The broodstock are fattened and conditioned then stimulated to spawn using UV sterilised seawater or minute amounts of hydrogen peroxide.

Figure 2. (a) Brood stock being conditioned in a hatchery. (b) Abalone spat settled on a settlement plate.

Hatchery

Eggs and sperm are collected separately from spawning broodstock and mixed at an appropriate ratio to ensure fertilisation and larval development. Eggs hatch as free swimming trochophores which develop into veligers before settling on plates as spat. The spat initially start at around 300 µm (or 0.3mm) in size and feed on benthic diatoms which cover the settlement plates. When the spat achieve a size of 4-5mm after 4-6 months, they are then removed from the plates and transferred to the grow-out facility.

Grow-out

Abalone hatcheries sell spat removed from the plates, referred to as seed. Seed are grown in tanks which may or may not contain low modules (or hides) to a size of 18-25mm for approximately 1 year. They are then graded and thinned and placed in tanks with or without taller modules (hides) to grow out to harvest size. This process takes another 24-36 months and usually achieves abalone of the size of 65-150 mm. The final harvest size will depend upon the market requirements.

Figure 3. (a) Abalone in a low hide at a land based farm. (b) Larger hides for grow out of abalone.

Processing

Once harvested, the live abalone are usually trucked to the processors. The abalone are canned or frozen for the international market or sold live. The vast majority of abalone are exported. Once packed and graded, the fish are transported to the relevant markets.

Regional growing areas

There are 20 abalone licenses issued by DPIW marine farming for both land based and marine farming activities in Tasmania. However, there are only 5 established land based commercial operations in the state plus one marine based operation which has intermittent low production on Flinders Island (Table 6). Only the commercially viable land based operations are covered by this EMS Framework

Table 6. Number and type of licenses in geographical location of Tasmania as provided by DPIW Marine Farming (-*indicates only minor intermittent production)

Area	Number of licenses issued	Species on licenses			Number of Commercially Operational Farms
		Blacklip	Greenlip	Hybrids	
1. Stanley	1	1	1	1	1
2. Tamar	1	1	1	1	1
3. Bicheno	2	2	2	2	1
4. Great Oyster Bay	5	5	3	-	1
5. Blackmans	2	2	2	2	1
6. Flinders	4	1	4	1	1*
7. King Island	1	-	1	-	0
8. Channel	1	1	-	-	0
9. Esperance	3	3	1	1	0

Production and Marketing

The Australian farmed abalone industry is relatively small compared to the other nations and only equates to a small percentage of Australia's total abalone production. Farmed abalone has an advantage on the market in that they are not subject to the same size restrictions as wild caught abalone. However, they also have to compete on the same market as Chinese and Taiwanese products. The farmed abalone product is increasingly competing with the wild caught product on the overseas market as buyers and consumers are not discerning between the two products and wild caught abalone usually sets a high benchmark price (McKinna et al. 2005).

Tasmanian farmed abalone is marketed under a number of labels including AusAb and Sou'west Products (see Appendix 8.2.2.5: Markets). The Tasmanian product is sold as frozen, canned or fresh.

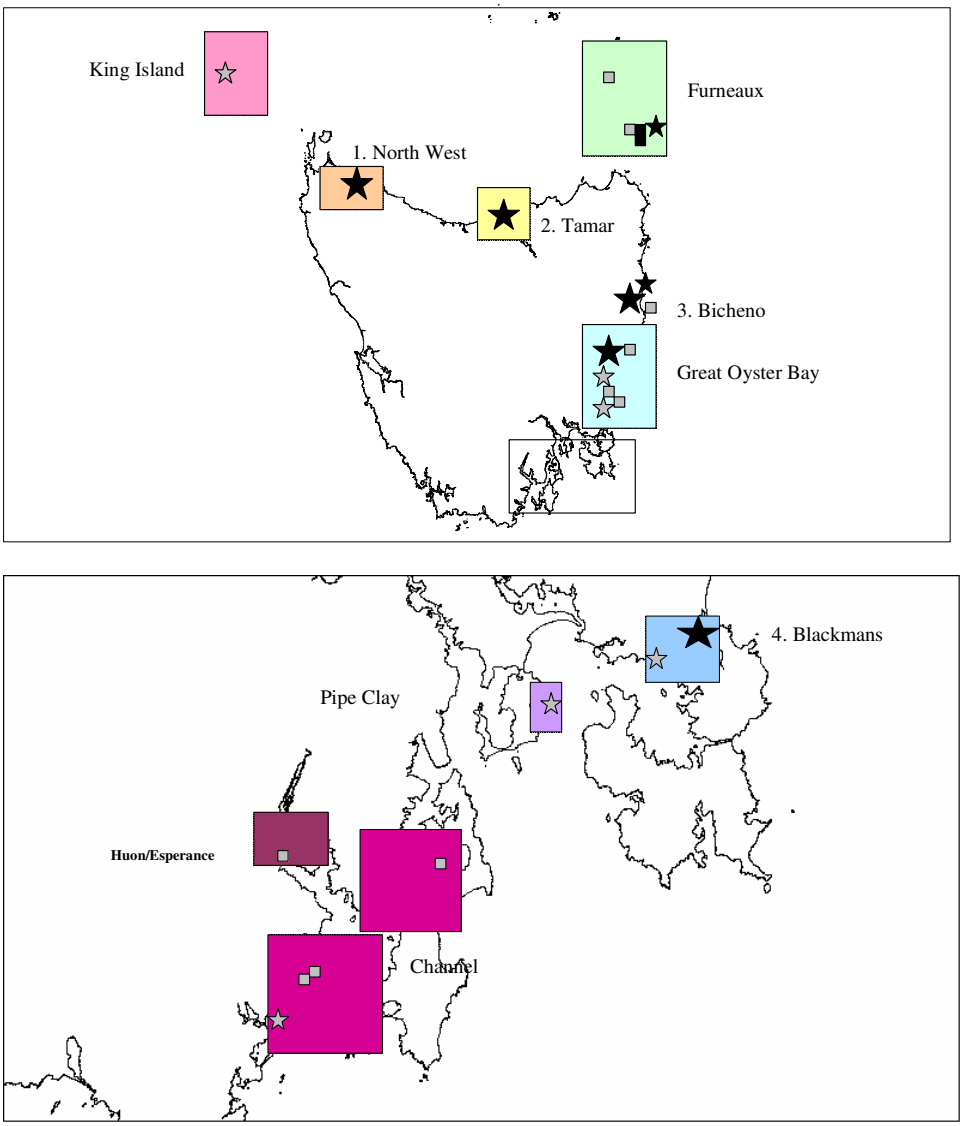


Fig 4. Distribution of abalone farms in Tasmania. Black stars = Commercially operational land-based facilities; Grey stars = Non-operational land-based licenses. Black squares = Commercially operational marine leases. Grey squares = Non-operational marine leases. Note: Only the four established land based facilities in Stanley (North West), Tamar, Bicheno and Dunalley (Blackmans Bay) are assessed in the EMS Framework. Information sourced from DPIW 2004.

Component 1: Impact of the Industry on the Environment

Introduction

This section reviews the issues or aspects covered in the first ESD generic component tree for the Tasmanian Industry (Fig 1.0) that require management outcomes at the whole of industry level.

The three areas covered by the component tree include the impact that the Industry may have on:

(i) wild stock
(ii) the husbandry of farmed species
(iii) other species that could be affected in all areas

This generic component tree looks at the impact of the whole of Industry on the general environment and has been adapted from the National ESD Framework through the addition or exclusion of issues, depending upon their relevance to the Industry.

Additional topics include:

- Transfer of Diseases (Section 1.2.2) covers the import and export of live abalone both overseas and interstate
- Translocation of Invasive Marine Species (Section 1.2.3). The issue of translocation of invasive marine species (IMS) is important on a state, national and international level
- Veterinary Chemicals (Section 1.2.4) under Husbandry.

Excluded topics:

- Seed Stock (under Section 1.1.1): Seed stock of abalone is artificially cultivated in a hatchery and not sourced from the wild
- Grow out stock (under Section 1.1.1): All grow-out stock of farmed abalone is hatchery farmed and grown in land-based facilities in Tasmania at present
- Stocking, stock enhancement, restocking (under Section 1.1): Stock enhancement of wild stock abalone does not occur in Tasmania
- Animal Welfare (Section 1.2) as there is no proscribed conditions under the *Animal Welfare Act 1993* for shellfish
- Formation of Feral Populations (Section 1.3): Abalone is a valued native species and therefore does not produce feral populations.

Transferred topics:

- Disease (under Section1.2) was considered an external impact and has been transferred to Section 8.1.3.1: Disease
- Threatened & Endangered Species (under Section 1.3) has been considered at a regional basis under Section 2.2.4: Threatened, Protected & Endangered species.

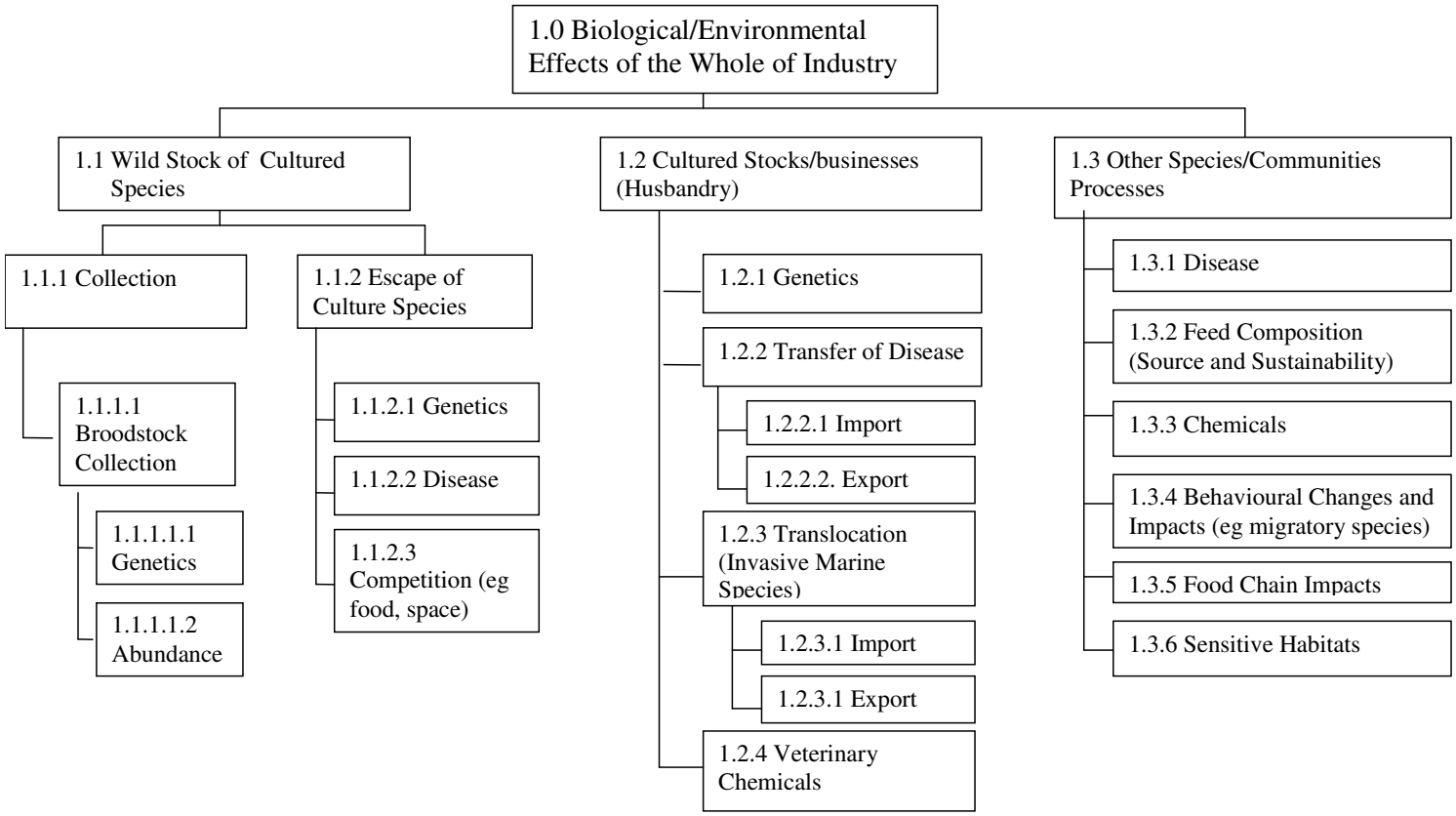


Figure 1.0. Component Tree 1: Impact of Farmed Abalone Industry on the Environment

The risk assessment for all topics or aspects have used the General Consequence Table (Appendix 1.0; Table 1.1), except for 1.3.6: Sensitive habitats which has been assessed using Table 1.4 (Appendix 1.0; Table 1.4).

The governance of land based abalone farming activities is primarily regulated under the Local Government Planning schemes, as described in Component 7, and therefore must comply with the *Land Use Planning and Approvals Act 1993* (LUPAA) and the Resource Management Planning System (RMPS). These governance systems are subject to controls of various state and Australian legislation such as the *Environmental Management and Pollution Control Act 1995*, (EMPCA) and the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBCA) amongst others.

1.1: WILD STOCK OF FARMED SPECIES

This section describes the impact on the environment of removing or enhancing wild stock of abalone species through abalone farming activities. Most abalone culture in Tasmania is based on the blacklip abalone (*Haliotis rubra*), or a hybrid abalone called the tiger abalone which is a cross between the blacklip abalone and the greenlip abalone (*Haliotis laevigata*). Both the blacklip and greenlip abalone are native to Tasmania.

1.1.1: Collection of Wild Stock

Scope

To assess the impact on wild stock of Industry collecting abalone from the wild.

Current Management Controls

1.1.1.1: Broodstock collection

The permit conditions for commercial taking of wild stock of abalone stipulate wild stocks of abalone are commercially collected for the export market, or occasionally as broodstock for genetic enhancement in abalone farms. Collection of abalone is undertaken through a species dependent permit issued under Section 14 of the *Living Marine Resources Management Act* 1995 (LMRMA).

The permit conditions for commercial taking of wild abalone require the fishers to be licensed. Marine farmers may seek special arrangements with commercial abalone divers for the collection of broodstock. Monthly harvest audits for all abalone taken must be forwarded to the Marine Farming Branch of DPIW. The permit conditions stipulate the species, the method and area of collection, sale conditions and audit controls. A Department of Environment and Heritage (DEH) certificate demonstrating environmental compliance under the EPBCA approves the taking of wild abalone.

The Industry is mostly self sufficient and does not rely on broodstock from the wild but must retain access to wild broodstock indefinitely for future genetic programs.

1.1.1.1.1: Genetics

The removal of abalone for broodstock from the wild is miniscule compared to the wild fishing sector and would not affect the genetic diversity of the wild stock. The Industry is aiming for self sufficiency for broodstock as described in Section 1.2.1: Genetics.

1.1.1.1.2: Abundance

The DPIW Wild Fisheries Management Branch manages the wild stock of abalone. The removal of abalone for broodstock from the wild (potentially up to one thousand individual abalone per year) compared to the 2,500 tonne (approx) per annum taken by the wild catch sector is considered inconsequential on total numbers of wild abalone. Therefore the taking of broodstock would have minimal affect on the abundance of the wild stock.

Environmental Objective 1.1.1: To ensure to collection of abalone from the wild for use in the Industry does not impact upon the native populations of abalone.			
Consequence C=0	**Likelihood L=1**	**Risk Rating CxL =0 Low**	**Target Risk Rating N/A**
Risk Management Options • Continuing management of the abalone wild populations by DPIW			
Suggested Performance Measures • Sustainable management of abalone populations by DPIW			

1.1.2: Escape of Farmed Species

Scope

To assess the impact of the accidental escape of farmed adults, juveniles or progeny from Industry on the natural stocks of the species.

Current Management Controls

The potential for farmed abalone to escape from a farm environment and survive to establish viable populations is very low (Hawkins & Jones 2002). Abalone stocks occasionally release gametes in grow out tanks, leading to a reasonable chance of fertilisation. The chance of these domestic fertilised gametes reaching the ocean and surviving to compete on a wild diet is remote. The numbers of abalone which discharge from a farm could potentially have an impact on an area immediately adjacent to the farm. However, it is not known if selectively bred farmed animals would be capable of surviving outside the farm environment.

Regular inspections by industry of the hatchery outfall have not determined any increases in abalone abundances (Miles Cropp personal communication). Broodstock spawning events occur under controlled conditions to ensure maximum recovery of abalone larvae, with the likelihood of accidental escape of larvae being minimal.

1.1.2.1: Genetics

All abalone broodstock used in Tasmanian are sourced from Tasmanian waters. Some broodstock are selected from areas outside the area in which a farm occurs.

While Tasmanian populations of blacklip abalone are isolated from the mainland, they remain fairly homogenous within Tasmania with limited genetic population structure (Conad et al 2002). Hybridisation occurs naturally, occurring in several regions in Bass Straight. These hybrids are fertile and naturally cross hybridize with other species (Brown 1995).

1.1.2.2: Disease

The potential risk of disease from abalone aquaculture facilities has been assessed through a national survey of abalone funded through the Fisheries Research and Development Corporation (FRDC Project 2002/201). A one-round survey of all Australian commercial abalone farms and representative wild sites in the five states of Australia with commercial abalone industries was conducted in 2004. There was no evidence of the OIE listed disease, Rickettsial withering syndrome, or any other parasites regarded of clinical significance in Tasmanian stocks of wild or farmed abalone. Parasite ranges and levels were significantly less in farmed abalone than wild stock (Handlinger et al 2005) as demonstrated in Table 1.2.2.1. No *Perkinsus* organisms were detected in any of the 226 Tasmanian abalone examined (80 farmed, 186 wild). The Tasmanian Industry is currently investigating developing a health surveillance program with the abalone industries in other Australian states and state governments.

Table 1.2.2.1. Pathogens and parasites from wild stock and farmed abalone in Tasmania (adapted from Handlinger et al 2005). Negative (never found); Positive (disease noted but not quantified); 0 (not found in survey); Rare = (<11%); Uncommon (< 27%); Common (<48%).

Diseases in Tasmania	Wild Stock	Farmed abalone
Perkinsus	Negative	Negative
Virus –like inclusions I -	Uncommon	0
Virus –like inclusions II	Rare	0
GIT Rickettssia-like organism	Rare	Rare
Gill Rikettsia like organism	0	0
Vibrio harveyii **type bacterial abscessess**	0	Positive
***Vibrio* type bacteria NOS**	Rare	Positive
***Flavobacterial* disease**	Rare	Rare
Holotrich cilliates	Common	Rare
Peritrich attached ciliates	V Rare	0
Intracellular parasite of digestive gland	Rare	V Rare
Cryptosporidia-like parasite	Rare	Positive
GIT Epithelial parasite NOS	Rare	Rare
Oesophageal pouch epithelial parasite	Uncommon	Positive
Haemocyte apicomplexan	Restricted	
Nematopsis-like Gregarines in interstitium	Rare	Rare
Renal coccidia	Rare	0
Surface associated parasite NOS	Rare	V Rare
Gonad & kidney fluke	0	0
Foot and interstitium fluke	Rare	Rare
Nematodes	0	0

1.1.2.3: Competition (eg food, space)

The selection of genetic traits of abalone suitable for a farmed environment rather than a wild environment is likely to result in any escaped farmed species having a lower potential for competing on a macroalgal diet in the wild. Therefore any escapement of farmed abalone that may occur is unlikely to form a population which will impact on the wild populations.

Environmental Objective 1.1.2: To ensure that escape of farmed abalone does not impact upon the wild stock of abalone through genetics, disease or competition.			
Consequence C=2	**Likelihood L=2**	**Risk Rating CxL=4 Low**	**Target Risk Rating N/A**
Risk Management Options • Develop and implement a translocation policy for the intrastate movement of farmed abalone • Develop and implement a health surveillance program			
Suggested Performance Measures • Reporting of diseases from the Health Surveillance Program			

1.2: FARMED STOCKS / BUSINESSES (HUSBANDRY)

This section describes the issues that may affect the status of the stocks being farmed within the regulated marine farms.

1.2.1: Genetics

Scope

To assess the risk of Industry losing access to an appropriate level of genetic diversity of abalone, which allows the continued improvement of abalone stock.

Current Management Controls

A selective breeding program based on the establishment of family lines is being developed by a number of Industry representatives in collaboration with the CSIRO. The basis of this program is to select abalone families with heritable traits including growth rate, weight for given length, colour, natural hybrids, selective green hybrids, and disease resistance.

Individual abalone farms not involved with the family lines project use their own selective breeding programs using selected broodstock which have been developed over a number of years, or source abalone spat from an Industry farm which has a similar genetic program. Each batch of abalone is usually spawned from a large number of individuals and a tracked history can be provided.

Environmental Objective 1.2.1: To ensure that the Industry has access to an appropriate level of genetic diversity of abalone, that allows the continued improvement of abalone stock.			
Consequence C=4	**Likelihood L=2**	**Risk Rating CxL=8 Mod**	**Target Risk Rating Low**
Risk Management Options • Continued development of a family lines project • Continued access to broodstock from the wild			
Suggested Performance Measures • Genetic diversity in farmed abalone stocks as indicated through regular research results is improved and maintained			

1.2.2 Transfer of Disease Overseas and Interstate

Scope

To assess the risk of aquatic disease on Industry through import and export of live farmed abalone overseas and interstate.

Current Management Controls

1.2.2.1: Import

Import into Australia of live abalone is controlled by Biosecurity Australia (DAFF) and would require a permit under the *Quarantine Act* 1908 and the *EPBCA*. At present import of live shellfish into the country for marine farming purposes is not allowed. A policy, including an import risk assessment complying with the OIE *International Aquatic Health Code 2004*, would need to be developed at a national level before imports could occur.

The Standing Committee on Fisheries and Aquaculture has endorsed a National Translocation Policy for Live Aquatic Organisms. This policy paper does not oblige State Governments to impose any regulatory controls on the translocation of live aquatic organisms. Nonetheless, State Governments are bound by the *Mutual Recognition Act* 1992, which provides for recognition of regulatory standards between the states. Schedule 2 of the Act permits trade restrictions on the grounds of quarantine. All exemptions must meet the following criteria:

1. A law of the importing State, or direction administered under that law, prohibits the importation of specified goods;
2. The State is substantially free of the disease;
3. It is reasonably likely that the goods would introduce the disease; and
4. It is reasonably likely that that introduction would have a long-term and substantially detrimental effect on the State.

Import of live abalone into Tasmania from other Australian states does not occur. The Tasmanian government has placed import restrictions to protect the State's *Perkinsus* free status. The Tasmanian industry is unlikely to allow import of abalone due to the threat of introducing Perkinsus into Tasmania. A translocation policy is currently being developed for the Australian Industry. Details of the national translocation risk assessment for abalone are provided in Appendix 1.2.2.

1.2.2.2: Export

The export of live Tasmanian abalone for consumption overseas is regulated by the *Export Control Act* 1982 (ECA) under the *Proscribed Goods Act* 2005. Shellfish for export must be processed and packed in registered export premises, which operate under a quality based system audited by AQIS. Export to certain countries may also require a Health Certificate issued by AQIS under the ECA.

The export of live abalone to be reinstated into the marine environment is covered by the ECA 1982 under the *Animal Orders Act* 2004, which requires the animals to be certified disease free, and to comply with the health program and translocation policies of importing countries. The translocation interstate of live abalone for ongrowing or as broodstock is currently being assessed.

Live wild abalone are also transported between states for commercial processing purposes. Jones & Stephens (2006) have reported that this poses a risk of pathogen

transfer and there needs to be a risk assessment for this practice. The Tasmanian Industry has assessed this external risk in Section 8.1.3.1: Disease.

Environmental Objective 1.2.2.1: To ensure that a disease, which may impact upon the Industry or other aquaculture stock, does not enter the state.			
Consequence **C= 4**	**Likelihood** **L= 3**	**Risk Rating** **C x L = 12** **Moderate**	**Target Risk Rating** **Low**
Environmental Objective 1.2.2.2: To ensure that diseases are not translocated from the state through abalone farming activities.			
Consequence **C= 3**	**Likelihood** **L= 2**	**Risk Rating** **C x L = 6** **Low**	**Target Risk Rating** **N/A**
Risk Management Options • Following import guidelines as set out by the OIE, AQIS and relevant State Agencies • Compliance with risk management protocols • Following export guidelines as set out by the OIE, AQIS and relevant State Agencies • Development of a state and national health surveillance program			
Suggested Performance Measures • Annual reports of disease outbreaks from the Chief Veterinary Officer			

1.2.3: Translocation of Invasive Marine Species Overseas & Interstate

Scope

To assess the impact of invasive marine species being translocated overseas and interstate through Industry activities.

Current Management Controls

1.2.3.1: Import

Import into Australia is controlled by Biosecurity Australia (DAFF). Import of live abalone from overseas does not occur as described in Section 1.2.2.1.

Import of live abalone into Tasmania from Australian states currently does not occur, but is being addressed through the draft discussion paper discussed in Section 1.2.2. Under the OIE requirements Tasmania is declared as a separate zone. The National Introduced Marine Pest Co-ordination Group (NIMPCG) is addressing the translocation of introduced marine pests between states through a risk assessment that will result in an Industry Code of Practice to minimise translocation risk. Marine farming is only one vector for translocation of IMS identified by NIMPCG. The other vectors include shipping, recreational and commercial vessels, and natural dispersal.

1.2.3.2: Export

There is a small risk of exporting juvenile Pacific oysters (*Crassostrea gigas)*, dinoflagellate spores (*Gymnodinium catenatum* and *Alexandrium* spp.) and macroalgal spores (*Undaria pinnatifida*) on live abalone. The export of live abalone overseas is regulated through the ECA by AQIS who require for live fish to be practically free from mud, weed, parasites or injury, which reduces the likelihood of abalone being contaminated with IMS. It is not possible to successfully expose abalone to freshwater treatments for the removal of IMS, as occurs with bivalve shellfish, as abalone are not tolerant to reductions in water salinity. All abalone for consumption is inspected for IMS before dispatch.

The export of live Tasmanian abalone interstate for ongrowing or as broodstock does not occur but is being addressed through a national translocation policy (Section 1.2.2.2: Transfer of disease – export).

Environmental Objective 1.2.3.1: To ensure that invasive marine species which may impact upon the Industry do not enter the state.			
Consequence **C= 3**	**Likelihood** **L= 1**	**Risk Rating** **C x L = 3** **Low**	**Target Risk Rating** **N/A**
Environmental Objective 1.2.3.2: To ensure that invasive marine species are not translocated from the state through abalone farming activities.			
Consequence **C= 3**	**Likelihood** **L= 2**	**Risk Rating** **C x L = 6** **Low**	**Target Risk Rating** **N/A**
Risk Management Options • Following import guidelines as set out by the OIE, AQIS and currently being developed through NIMPCG • Following export guidelines as set out by the OIE, AQIS and relevant State Agencies • Development and implementation of an Industry code of practice			
Suggested Performance Measures • Surveys through research and DPIW surveys on introduced marine pest range and abundance • Monitor compliance to code of practice (in development)			

1.2.4: Veterinary Chemicals

Scope

To assess the impact of veterinary chemical use from Industry on the entire catchment/region.

Current Management Controls

Veterinary chemical use in the Industry is regulated by the *Veterinary Surgeons Act* 1987, the *Agricultural and Veterinary Chemicals (Control of Use) Act* 1995, and the *Poisons Act* 1971.

The supply and use of veterinary chemicals in Australia is controlled by the *Australian Pesticides and Veterinary Medicines Authority* (APVMA) who registers products for use only if they meet the following 4 criteria:

- human and animal health and safety;
- efficacy – that the product works;
- environmental safety; and
- that it will not affect international trade.

In Tasmanian abalone farms, two types of veterinary chemicals may be used:

- anaesthetics; and
- antibiotics.

The anaesthetics magnesium sulfate, Aqui-S®, benzocaine and 2-phenoxy ethanol (2PE) are used to facilitate moving and grading juveniles and adults. Magnesium sulfate, bought as Epson Salts, is the most commonly used anaesthetic in the industry. Benzocaine may be used at low levels (100ppm) on spat. The non-residual anaesthetic Aqui-S® is also used by some of the Industry.

The only use of antibiotics is under the guidance of veterinary practitioners in the case of disease outbreak. To induce spawning in adult abalone, the Industry uses water temperature manipulation UV treated seawater and to a lesser extent hydrogen peroxide.

Disposal of any veterinary chemicals is into the domestic sewerage. Further information on veterinary chemicals can be found at http://www.apvma.gov.au.

Environmental Objective 1.2.4: To ensure that the use of veterinary chemicals in abalone farms does not impact upon the marine environment.			
Consequence C= 1	**Likelihood L= 1**	**Risk Rating C x L = 1 Low**	**Target Risk Rating NA**
Risk Management Options • Use veterinary chemicals only as directed • Compliance with MSDS • Register of veterinary chemicals on site • Use of proscribed treatments under the supervision of a veterinary surgeon • Keep a register of chemical use • Use of probiotics			
Suggested Performance Measures • Comparison of veterinary chemical usage over time			

COMPONENT 1.3; OTHER SPECIES / COMMUNITY / PROCESS

The impact of farmed abalone on marine ecosystem processes is minimal due to the use of land based systems. The following topics cover the impacts of farmed abalone on ecological community processes and species within the marine community and relate mainly to the effects of the farms' effluent water.

1.3.1 Disease

Scope

To assess the risk of disease from the farmed abalone being passed to other fauna in the region, whether by the passage of pathogens through the water, from intermediary hosts or from escapees.

Current Management Controls

Of the known diseases that occur in farmed abalone, the majority are endemic to Australia and provide little threat to other marine fauna. The mudworm species *Boccardia knoxi* and *Polydora hoplura* are known to impact upon the native flat oyster (*Ostrea angasi*) and has been associated with the historical decline of farming of this species (Crawford 2003). Industry is vigilant in monitoring and treating mudworm in farmed stock through a developed protocol (Lleonart 2001).

Environmental Objective 1.3.1: To ensure that disease from farmed abalone is not passed to wild marine fauna.			
Consequence C= 4	**Likelihood L= 1**	**Risk Rating C x L = 4 Low**	**Target Risk Rating N/A**
Risk Management Options • Monitoring health of abalone stock			
Suggested Performance Measures • Changes in marine fauna population or disease status at outfall			

1.3.2: Feed Composition (Source and Sustainability)

Scope

To assess the risk of competition for food resources by Industry with native species.

Current Management Controls

The Industry uses farmed native phytoplankton for the rearing of abalone post-settlement spat. When abalone are of an appropriate size (8-15mm), they are

weaned onto an artificial diet of pellets. At present the pellets are sourced from 3 sources: two South Australian companies and one Taiwanese company. The pellets typically consist of protein (≈ 27%), fat (≈ 2%), ash (≈ 17%), fibre (≈ 5%) and moisture (≈ 13%). Approximate ingredients are shown in Table 1.3.2.

Table 1.3.2. Approximate percentage composition of pellets used as abalone feed.

Ingredient	Percentage Composition	Possible source
Semolina	40	Agriculture
Soya Flour	20	Agriculture
Lupin Flour	10	Agriculture
Wheat gluten	5	Agriculture
Fish meal	5	Wild Fisheries
Caesin	5	Dairy
Fish Oil	2	Wild Fisheries
Sodium alginate binder	1	Kelp
Vitamins and Minerals	trace	Pharmaceutical
Total percentage	87	

Although fish meal is used by the Industry, only very small amounts are currently required (approximately 250 tonnes x 0.05 = 12.5 tonne per annum). This annual tonnage is minimal compared to other marine farming industries.

Environmental Objective 1.3.2: To ensure that Industry has a sustainable food source.			
Consequence C= 4	**Likelihood L= 2**	**Risk Rating C x L = 8 Moderate**	**Target Risk Rating Low**
Risk Management Options • Development of alternatives to fish meal and oils			
Suggested Performance Measures • Availability, output and quality control of food sources			

1.3.3: Chemicals

Scope

To assess the risk of chemical contamination of the marine environment from Industry activities.

Current Management Controls

The industry uses minimal chemicals for hygiene maintenance on the farm. These chemicals include iodine-based disinfectants for footbaths and chlorine for cleaning.

Only very small quantities of these chemicals, similar to domestic use, are used in the Industry.

1.3.3.1: Iodine And Iodophor Disinfectants

Iodine and iodophors (eg Vetadine®) are well established chemical disinfectants. These compounds are bactericidal, sporicidal, virucidal and fungicidal but require a prolonged contact time. The disinfective ability of iodine, like chlorine, is neutralized in the presence of organic material and hence frequent applications are needed for thorough disinfection. The Industry uses these compounds in footbaths to prevent spread of pathogens around the farms. Disposal occurs into the sewerage system when the iodine solutions lose their disinfective affect.

1.3.3.2: Chlorination/Dechlorination

Chlorination/dechlorination is a widely used, cheap, effective and acceptable method of disinfecting surfaces and equipment in the marine farming industry. Sodium hyporchorite (NaOCl), used as a common drinking water and pool water treatment, is available as commercial bleach. The chlorine is nutralised by adding a sulfite salt such as Sodium Thiosulphate ($Na_2S_2O_3$), to prevent the discharge of residual chlorine into the environment where necessary. The advantage of this technique is that it protects aquatic life from the toxic effects of residual chlorine (EPA 2000). The majority of Tasmanian land-based abalone farms have settlement ponds (Section 2.1.1.2: Nutrient Removal) which allows for the natural dissipation of chlorine before release into the marine environment.

Environmental Objective 1.3.3. To ensure that any chemicals used within Industry land based facilities do not impact upon the environment.			
Consequence C= 1	**Likelihood L= 2**	**Risk Rating C x L = 2 Low**	**Target Risk Rating NA**
Risk Management Options • Following manufacturers instructions • Maintaining a register of chemical usage • Monitor settlement ponds • Reference to a Material Safety Data Sheet (MSDS)			
Suggested Performance Measures • Monitoring the increase or decrease in chemical usage			

1.3.4: Behavioural Changes of and Impacts on Migratory Species

Scope

To assess the impact of Industry in causing "large-scale" changes to the behaviour of other species.

Current Management Controls

The activity and location of land based abalone farms are controlled primarily through local government under LUPAA. If in close proximity to significant environmental sites, an application may be made to the Department of Environment and Heritage (DEH) for consideration. DEH considers applications under the EPBCA, whose objectives are to protect native species (and in particular prevent the extinction, and promote the recovery, of threatened species) and to ensure the conservation of migratory species. Land based farms are also controlled by Local Government under planning schemes and subject to the various acts under the *Resource Management Planning System* (RMPS). The RMPS comprises of a number of Acts that ensure the Industry is not located in sensitive areas, and has the appropriate management controls to ensure that the impact upon sensitive species is minimal (Section 8.2.3: Regulations).

Migratory birds listed under the EPBCA are comprehensively covered in Section 2.2.3: Listed Migratory Birds.

Environmental Objective 1.3.4: To identify and prevent any large-scale impact of farmed abalone activities on the behaviour of marine and terrestrial species, including migratory species.			
Consequence **C= 4**	**Likelihood** **L= 1**	**Risk Rating** **C x L = 4** **Low**	**Target Risk Rating** **N/A**
Risk Management Options • Regular surveys of migratory species by stakeholder groups			
Suggested Performance Measures • Monitor any long term changes in the numbers of migratory species, where directly related to abalone culture			

1.3.5: Food Chain Impacts

Scope

To assess the impact of Industry in causing significant shifts in the food chain through consumption of algae

Current Management Controls

The Industry does not harvest macroalgae (seaweed) as a food source for farmed abalone. The Industry is permitted to collect drift algae from the shoreline, but this is generally not practiced in Tasmania. Farmers will utilise macroalgae that grows in the farm system as food source for their stock.

Environmental Objective 1.3.5: To have minimal impact on the marine food chain..			
Consequence C= 2	**Likelihood L= 1**	**Risk Rating C x L = 2 Low**	**Target Risk Rating N/A**
Risk Management Options • Maintain current practices			
Suggested Performance Measures • TAFI mapping of macroalgal communities around outfalls and ongoing assessment against the original baseline studies where applicable			

1.3.6: Sensitive Habitats

Scope

To assess the impact of the Industry on sensitive habitats.

Current Management Controls

The outfall and water uptake pipes of a land based farm may be in locations where subtidal seagrass and macroalgal communities occur, but operate to maintain minimal localised impact on the marine environment.

1.3.6.1: Seagrass beds

Seagrass beds are considered to be critical to the marine environment in providing food, protection from predators for marine species and contributing to shoreline stabilisation. Subtidal benthic communities of seagrass such as *Amphioblis antarctica* and *Posidona spp*. are known to occur around outfalls from Industry farms. DTAE Environment Division and Local government set Industry outfalls are assessed in the planning stage by the DPIW Environment Branch to ensure minimal physical and chemical impact to the seagrass beds from the outflow water. The Industry is aware of the importance of seagrass for the productivity of the marine environment and is pro-active in managing seagrass areas for minimal loss.

Environmental Objective 1.3.6.1: To ensure that abalone farming does not cause a long-term impact on seagrass beds from outfalls.			
Consequence C=2 (Table 1.3)	**Likelihood L=2**	**Risk Rating C x L =4 Low**	**Target Risk Rating N/A**
Risk Management Options • Minimising physical contact with seagrass, including avoiding substrate compression • Reducing the potential for scouring to occur outside a localised area • Monitoring outflow for nutrients			
Suggested Performance Measures • TAFI mapping of seagrass beds around outfalls and ongoing assessment against the original baseline studies			

1.3.6.2: Macroalgal Communities

Macroalgal communities provide a complex habitat that supports important fish and large invertebrate communities. Barrett et al (2001) identified key macroagal habitats that have been placed into bioregions. This research allows regulators and scientists to identify and implement ecologically important areas for Marine Protected Areas (MPAs) or reserves. No Industry farm outlets are located in these areas. Where farms outfalls are associated with macroalgal beds, no long term impact or decrease in macroalgal diversity has been noted (Miles Cropp personal communication).

Environmental Objective 1.3.6.2: To ensure that abalone farming does not cause a long-term impact on macroalgal beds from outfalls.			
Consequence C=2 (Table 1.3)	**Likelihood L=2**	**Risk Rating C x L =4 Low**	**Target Risk Rating N/a**
Risk Management Options • Minimising physical contact with macroalgal communities			
Suggested Performance Measures • TAFI mapping of macroalgal communities around outfalls and ongoing assessment against the original baseline studies where applicable			

1.3.6.3: Saltmarsh communities

Saltmarsh areas in Tasmania are generally poorly protected through regulation. Loss of saltmarsh from Industry activities is marginal. Land based farms that occupy areas adjacent to saltmarsh zones are careful to maintain the integrity of the environment by minimising operational activities in these areas.

The vascular plants of saltmarshes are referred to as halophytes (salt-loving plants). Saltmarshes around Tasmania occupy the upper intertidal zone that is not subjected to daily flooding by tides and are commonly dominated by the plant *Sarcocornia quinqueflora*. Saltmarsh is highly productive and has been reported to play a major role in cycling organic nitrogenous substances from coastal sediments (Boon and Cain 1988).

Threatened animals that live in the saltmarsh environment include the chevron looper moth *(Amelora acontistica*) and the saltmarsh looper moth (*Dasybela achroa*). Many coastal birds utilise the saltmarsh habitat for feeding and secure high tide roosts in these areas (Section 2.3.3).

Further information on saltmarsh communities is provided in Appendix 1.3.6.3.

Environmental Objective 1.3.6.3: To ensure that abalone land based farms do not cause a long-term impact on saltmarsh.			
Consequence **C= 2** **(Table 1.3)**	**Likelihood** **L= 2**	**Risk Rating** **C x L = 4** **Low**	**Target Risk Rating** **N/A**
Risk Management Options • Education program for employees • Maintain clearly marked access points through saltmarsh areas • Direct any freshwater run off from land based facilities to clearly defined channels • Removal of invasive weeds (eg Rice grass, *Spartinia anglica*)			
Suggested Performance Measures • Monitoring the loss of saltmarsh vegetation at a regional level			

Component 2: Regional Impact of Industry on the Environment

Introduction

The combination of a number of marine farming facilities may cause localised impacts on a catchment area or growing region. This component examines the potential cumulative impacts of all facilities in a region, taking into account the objectives that the Industry has to comply with, which are set by local and state authorities.

The regional areas defined in this document reflect those set by the DPIW Marine Farming Plans where applicable. An extra region "Bicheno" has been added to incorporate land based facilities which occur outside the marine farming plans. Each region is numbered in a consistent manner in the tables, figures and appendices, as shown in Figure 4. Page 16.

The Regional Effect of Industry component tree (Figure 2.0) identifies the potential impact that Industry may have:
(i) on water quality/quantity
(ii) on ecological community structure and biodiversity
(iii) from physical structures, construction and tenure
(iv) from production

This component tree has been adapted from the National ESD Framework for Aquaculture to be relevant to the Industry by additions, exclusions or combinations of topics, as follows;

Combinations:
- Behavioural Changes and Impacts from Component 1.3 and Scavengers from Component 2.2 have been incorporated into Section 2.2.6: Behavioural Changes and Impacts on Other Species (Migratory & Scavengers).
- World Heritage Areas, Marine Protected Areas and Ramsar sites have all been combined in Section 2.2.5 Protected Sites.

Exclusions:
- Water extraction (ground or freshwater: under Section 2.1 Water Quality/Quantity). Tasmanian abalone farms do not currently extract freshwater from groundwater sources. Freshwater usage in the Industry is only at domestic levels.
- Sensitive habitats (under Section 2.2: Ecological Community Structure and Biodiversity) has previously been covered under Section 1.3.8: Sensitive habitats.
- Water Table (under Section 2.3: Physical Structure and Construction & Tenure) is considered to be a local aspect and therefore delivered as guidance notes in Component 3.

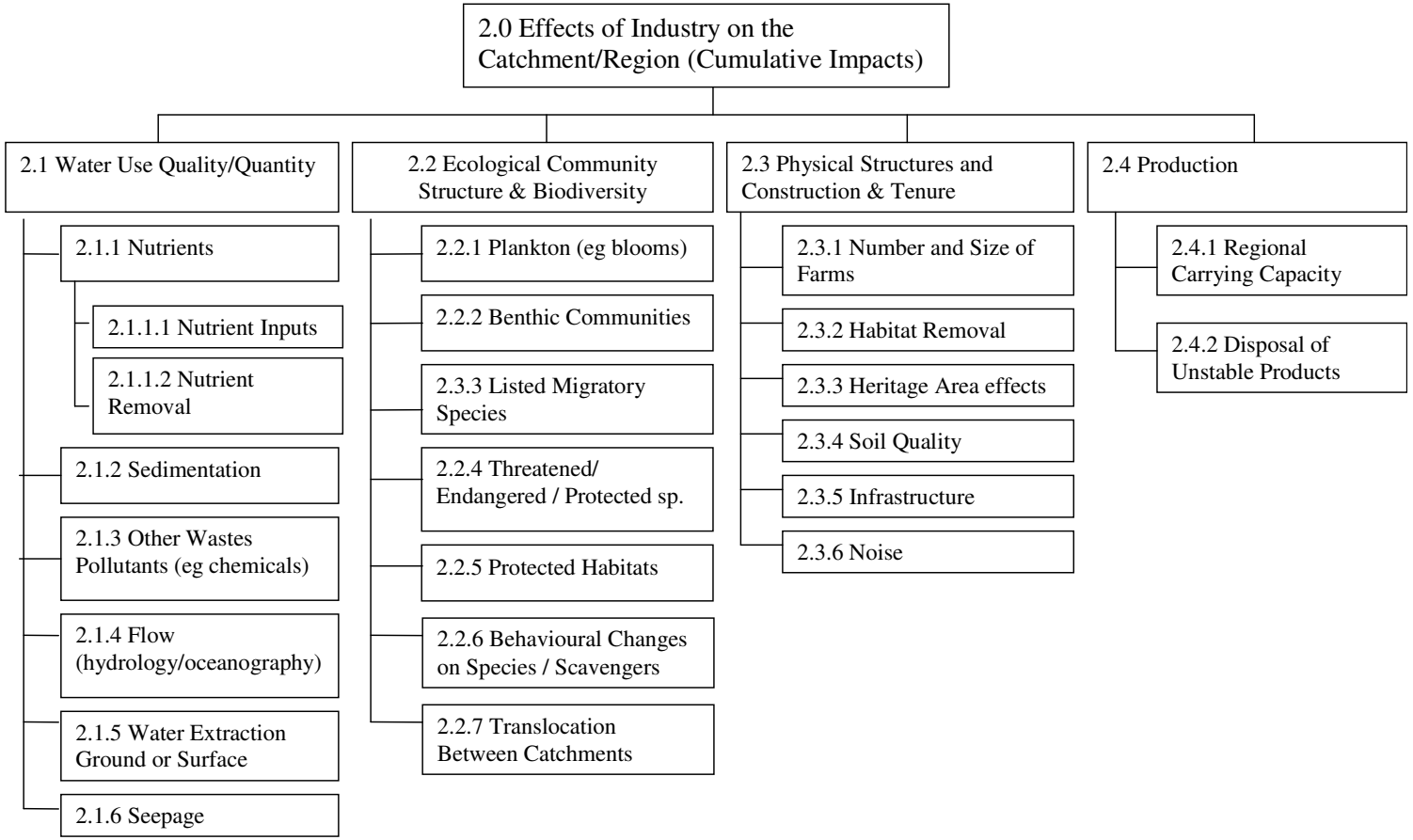


Figure 2.0. Component Tree 2: Regional Impact of the Farmed Abalone Industry on the Environment

- Navigation (under Section 2.3: Physical Structure and Construction & Tenure) is not considered to be an issue for land based facilities.
- Site Constraints (under Section 2.3: Physical Structure and Construction & Tenure) has been incorporated into Section 2.3.4: Soil Quality.
- Aspect 2.4.2: Disease is covered on a whole of Industry basis in Component 1 (see Sections 1.1.2.2, 1.2.2, and 1.3.1 on Disease). Tasmania is considered a single region under OIE guidelines; therefore the risk assessment is the same as for 1.2.2 Disease of Farmed Stocks.

The risk assessment for all issues (or aspects) have used the General Consequence Table (Appendix 1.0; Table 1.1)

2.1: WATER USE QUALITY/QUANTITY

Good water quality is a crucial factor in successful abalone farming. This component assesses the potential water quality issues from the cumulative impact of abalone culture within a region.

2.1.1: Nutrients

Scope

To assess the impact on water quality from excessive nutrients discharged by Industry at a regional scale.

Current Management Controls

A study to determine the Industry's long-term sustainability through the investigation of environmental impacts from land based abalone farming was conducted by Ho (unpublished). The study both intensively studied a single farm, and extensively studied a number of farms to gain perspective on the environmental impact of the Industry relative to other industries that input nutrients into the marine environment. Additionally detailed characterisation of the abalone farming effluent and the subsequent environmental impacts of that effluent was determined. Suggestions for the environmental management of the industry were also provided. The results of this study will be released to the public in the near future.

2.1.1.1: Industry Inputs

The study by Ho (unpublished) found that daily feed rate could be used as a predicitve tool for dissolved nitrogen and phosphate loads in wastewater. A relationship between daily feed rate and nutrient export was found at three abalone farms around Tasmania. These relationships will assist in the environmental management of the Industry and provide a consistent basis to judge the impact of abalone farming relation to other sources of nutrient inputs into our coastal environment.

2.1.1.2: Nutrient Removal

Discharge of low quality water is of major concern to the Industry. Ho (unpublished) highlighted the importance of Solid Separation Devices (SSDs), or outfall settlement ponds, in the study. Outputs of particulates from farms without SSDs are likely to be significantly greater than farms with SSD's. The composition of the particulates in the discharge is likely to change from farm to farm.

The use of settlement ponds with low mean fluid velocity are effective in improving the clarity of the water (Henderson 1988) and over half the waste nitrogen can be converted to algal biomass through natural phytoplankton biomass that may occur in a pond ecosystem (Neori et al 2004).

Environmental Objective 2.1.1.1: To minimise nutrient input into designated water bodies from abalone farming activities.			
Consequence C= 3	**Likelihood L= 3**	**Risk Rating C x L = 9 Moderate**	**Target Risk Rating Low**
Environmental Objective 2.1.1.2: To enhance nutrient reduction of outfalls from abalone farming activities.			
Consequence C= 3	**Likelihood* L= 3**	**Risk Rating C x L = 9 Moderate**	**Target Risk Rating Low**
Risk Management Options • Adherence to the DPIW and local government nutrient discharge licence management controls on carrying capacity • Development of environmental management controls from data to be provided by Ho et al. (unpublished)			
Suggested Performance Measures • Recording of effluent nutrient levels			

* May vary regionally dependant on the installation of settlement ponds

2.1.2: Sedimentation

Scope

To assess the impact from industry within a region of sediments from erosion or biodeposition.

Current Management Controls

The impact of sedimentation from the outfall pipes of land based abalone farms is currently assessed by the local and state governments through the planning process (Section 7.1: Intergovernmental coordination). The Environment Branch of DPIW encourages minimal impact practices by the Industry through regulating the location, depth and size of the outfall pipes. Most sediment released from farms are sand particles which enter the farm through the intake. The use of SSDs reduces the impact of particulate sediment.

Environmental Objective 2.1.2: To minimise contributions to significant or excessive sedimentation or biodeposition from abalone farming activities.			
Consequence C= 3	**Likelihood L= 2**	**Risk Rating C x L = 6 Low**	**Target Risk Rating N/A**
Risk Management Options • Use of a SSD or settlement pond			
Suggested Performance Measures • Monitoring of outfall sediment and surrounding area for impacts			

2.1.3: Other wastes/pollutants

2.1.3.1: Hydrocarbons

Scope

To assess the impact from Industry of pollutants (eg. Hydrocarbons, chemicals) at the regional scale.

Current Management Controls

The Industry uses petroleum operated machinery on rare occasions. The minor use of this equipment provides a low risk.

Environmental Objective 2.1.3.1: To ensure that hydrocarbon pollution does not occur from abalone farming activities.			
Consequence C= 2	**Likelihood L= 2**	**Risk Rating C x L = 4 Low**	**Target Risk Rating N/A**
Risk Management Options • Maintenance of machinery • Provision of Hydrocarbon Spill kits			
Suggested Performance Measures • Notification of reportable events			

2.1.4 Flow: (hydrology / oceanography)

Scope

To assess the impact of abalone facilities on the flow of water within the region.

Current Management Controls

The impact of hydrology changes from uptake and outfall pipes of land based abalone farms is currently assessed by the local and state governments through the planning process (Section 7.1: Intergovernmental coordination). The Environment Branch of DPIW encourages minimal impact practices by the Industry through regulating the location, depth and size of the pipes. Generally, the uptake of water is from high exchange areas or open coastal environments where the impact is minimal.

Environmental Objective 2.1.4: To ensure that abalone farms do not impact upon the natural hydrology of the region.			
Consequence C= 2	**Likelihood L= 1**	**Risk Rating C x L = 2 Low**	**Target Risk Rating N/A**
Risk Management Options • Observe outfall and uptake pipes			
Suggested Performance Measures • Monitoring for significant changes in hydrology around marine leases			

2.1.5 Seepage

Scope

To assess the impact of seepage from Industry on the environment.

Current Management Controls

The construction of ponds that hold seawater is regulated by the local government through LUPAA with significant controls on the soil quality, engineering and pond lining to prevent contamination of the water table and surrounding environment. Any seepage concerns would be addressed as part of the development approval process.

Environmental Objective 2.1.5: To ensure that ponds in Industry facilities do not impact upon the environment through seepage.			
Consequence C= 2	**Likelihood L= 3**	**Risk Rating C x L = 6 Low**	**Target Risk Rating N/A**
Risk Management Options • Regular inspection of ponds			
Suggested Performance Measures • Non-compliance with LUPAA controls			

2.2: ECOLOGICAL COMMUNITY STRUCTURE AND BIODIVERSITY

This component addresses the potential direct and indirect impacts on the regional ecosystem from the operation of Industry. In many cases, this could be an ecological manifestation of the effects identified in the previous component (Component 2.1)

2.2.1: Plankton Blooms

Scope

To assess the impact of Industry in changing the frequency, intensity or composition of plankton blooms (algal, zooplankton or both, including toxic species) in a region.

Current Management Controls

Farming of abalone has minimal nutrient input to a region (Section 2.1.1.1: Industry Inputs) and therefore is unlikely to be associated with any increase in plankton bloom frequency, intensity or changed composition.

Environmental Objective 2.2.1: To ensure that abalone farms in a region do not significantly impact plankton bloom frequency, intensity or composition.			
Consequence C= 2	**Likelihood L= 1**	**Risk Rating C x L = 2 Low**	**Target Risk Rating N/A**
Risk Management Options • Monitoring of phytoplankton and zooplankton species			
Suggested Performance Measures • Reduced productivity of local waters			

2.2.2: Benthic Communities

Scope

To assess the impact of the Industry on catchment-wide changes to the benthic community.

Current Management Controls

Farm sites are selected to ensure minimal impact of abalone farm intakes and outfalls on the on the benthic environment. Farms are located in areas of high current flow to ensure uptake of clean water for the farm. Where farms are located in areas where seagrass occurs, controls are provide by the DTAE Environment Branch to ensure the benthos is not significantly degraded through the setting of environmental guidelines for effluent water.

Environmental Objective 2.2.2: To ensure that the Industry does not result in catchment wide changes to the benthic community.			
Consequence C= 3	**Likelihood L= 1**	**Risk Rating C x L = 3 Low**	**Target Risk Rating NA**
Risk Management Options • Annual surveys as conducted by DPIW			
Suggested Performance Measures • Observed changes in the benthic ecology around water outfall and water uptake pipes			

2.2.3: Listed Migratory Birds

Scope

To assess the impact of Industry activities on migratory birds protected under international agreements and the EPBCA.

Current Management Controls

Abalone farms are located in coastal areas for access to seawater. The location of land based farms is carefully considered by DPIW and local government through LUPAA to ensure that abalone farming activities have minimal impact upon migratory bird species (Section 1.3.4: Behavioural Changes of and Impacts on Migratory Species; Section 2.2.4: Threatened/ Endangered / Protected sp; Section 8.2.3.1: Regulations).

The Industry recognises the importance of protecting migratory bird species, inclusive of their nesting sites and their feeding and roosting areas. Protected and listed migratory shorebird species are listed in Appendix 2.2.3: Table 2.2.3.

Environmental Objective 2.2.3: To ensure that the abalone farming activities do not negatively impact upon listed migratory bird species in a detectable or significant manner.			
Consequence **C= 3**	**Likelihood** **L= 1**	**Risk Rating** **C x L =3** **Low**	**Target Risk Rating** **N/A**
Risk Management Options • Observations of birds on farm sites			
Suggested Performance Measures • Use of a migratory bird species diary to record sightings in the area surrounding the lease, developed in association with Birds Tasmania			

2.2.4: Threatened, Endangered & Protected Species

Scope

To assess the impact of the Industry on threatened endangered or protected species.

Current Management Controls

The location of abalone farms is subject to an environmental impact assessment prior to approval being given through the State Planning Process, (Section 1.3.7). If on Crown Land, an assessment is required by DPIW. If on private land, and EIS is required through the local government planning schemes regulated by LUPAA. The process ensures that farms are placed away from threatened species populations and do not encroach upon sensitive habitats.

Many abalone farms are located in areas rich in species diversity which include species that are closely associated with the marine environment. A number of these species are protected under the LMRMA and have also been listed as rare, endangered, threatened or vulnerable under the *Tasmanian Species Protection Act* 1995 (TSPA) and the EPBCA. These species are listed in Appendix 2.2.4: Table 2.2.4.

Fig 2.2.4. Nesting sites for fairy penguins provided by an abalone farm on the northwest coast of Tasmania (Source R Crowther).

The Industry recognises the importance of species diversity in the ecosystem and has an awareness regarding the need for appropriate management strategies for threatened species. Coastal or shore birds are regarded as the species most 'at threat' from marine farming activities through their use of coastal zones. Some farms are known to include penguin burrows within their (see Fig 2.2.4). More information on shorebirds can be found in Section 1.3.6: Behavioural Changes and Impacts, and in Section 2.3.3: Listed Migratory Birds.

The largest potential impact on threatened species probably results from habitat disturbance including the loss of native vegetation. Threatened, protected and endangered species that occur in regions where land based abalone farms are located are listed in Appendix 2.2.4: Table 2.2.4 with environmental management protocols suggested by Bryant et al (1999).

Environmental Objective 2.2.4: To ensure that the Industry maintains minimal interaction with any threatened, endangered or protected species.			
Consequence **C= 3**	**Likelihood** **L=2**	**Risk Rating** **C x L = 6** **Low**	**Target Risk Rating** **N/A**
Risk Management Options • Development of a protocol for reducing the impact of abalone farming activities on migratory bird species developed in association with Birds Tasmania, documented in Appendix 2.3.3.1			
Suggested Performance Measures • Use of a rare and endangered species diary to record sightings in the area surrounding the lease, developed in association with Birds Tasmania • DPIW surveys for threatened and endangered species			

2.2.5: Protected Habitats

This aspect also considers whether the development is a referable action under the *EPBC Act* 1999. Detail on specific sensitive habitat such as seagrass beds and macroalgal communities are provided in Section 1.3.9: Sensitive Habitats.

Scope

To assess the impact of Industry on protected habitats e.g. designated zones that may be classified as a World Heritage Area, Ramsar-listed wetlands, Marine Protected Area, or sensitive habitat.

Current Management Controls

One land based abalone farm in Tasmania is located adjacent to a listed Ramsar site (*Ramsar Convention on Wetlands 1971*). The broad aim of the Ramsar Convention on Wetlands is to halt the worldwide loss of wetlands and to conserve those that remain through wise use and management.

Impacts to Ramsar wetlands are controlled under the EPBCA's assessment and approval provisions. Under this Act, a person must not take an action that has, will have, or is likely to have, a significant impact on the ecological character of a Ramsar wetland, without approval from the Commonwealth Environment Minister. To obtain approval, the action must undergo a rigorous environmental assessment and approval process. Management plans for Ramsar wetlands must be consistent with Australia's obligations under the Ramsar Convention and with the Australian Ramsar Management Principles.

Protected habitats are listed in Appendix 2.2.5: Protected Areas.

Environmental Objective 2.2.5: To ensure that the Industry does not impact upon any protected area.			
Consequence C= 3	**Likelihood L= 2**	**Risk Rating C x L =6 Low**	**Target Risk Rating N/A**
Risk Management Options • Proponents assessment of requirement for EPBCA assessment			
Suggested Performance Measures •			

2.2.6: Behavioural Changes and Impacts on Other Species (Migratory & Scavengers)

Scope

To determine the impact of Industry causing "large-scale" changes to the behaviour of other species.

Current Management Controls

The presence of feed on the farm may attract birds to the area. Similarly, the presence of people, land and marine structures may alter some behaviour of wild populations of birds.

The activity and location of the farms are controlled under the EPBCA, whose objectives are to protect native species (and in particular prevent the extinction, and promote the recovery, of threatened species) and to ensure the conservation of migratory species (Section 2.2.5: Protected Habitats). Abalone farms are also controlled under the *Resource Management Planning System* (RMPS). The RMPS comprises of a number of Acts that ensure the Industry is not located in sensitive areas, and has the appropriate management controls to ensure that the impact upon sensitive species is minimal (Section 8.2.3 Regulations). To date, there is no evidence that abalone farms have positive or negative impacts on the behaviour of any animal species in Tasmania. Local seal populations do not appear to be attracted to the farms. Migratory species covered by the EPBCA are listed in Table 2.2.6, excluding birds, dolphins, porpoises and turtles (from the *Cheloniidae* family).

Table 2.2.6. Migratory species listed in the EPBA, excluding birds (Covered in Section 2.2.3). E = endangered, V = vulnerable, + = present, - = absent.

Common name	Scientific name	Status	Region				
			1. North West	2. Tamar	3. Bicheno	4. Great Oyster Bay	5. Blackman
Marine Mammals							
Blue whale	*Balaenoptera musculus*	E	-	-	+	+	-
Humpback whale	*Megaptera novaengliae*	E	-	-	+	+	-
Southern right whale	*Eubalaeba australis*	E	-	-	+	+	-
Reptiles							
Leatherback turtle	*Dermochelys coriacea*	V	+	+	+	-	-

Environmental Objective 2.2.6: To prevent any large-scale impact of abalone farming activities on the behaviour of other species.			
Consequence C= 3	**Likelihood L= 1**	**Risk Rating C x L = 3 Low**	**Target Risk Rating N/A**
Risk Management Options • Regular surveys of migratory species by stakeholder groups • Observation of animal behaviour by farm workers			
Suggested Performance Measures • Observing long term changes in the numbers of migratory species, where these changes are directly related to abalone farming • Changes in animal behaviour noted by farm workers or local wildlife authorities. • Participating in regular surveys of birds by assisting Birds Tasmania, Comparison with historical data with the aim of separating natural viability in populations from human-induced changes			

2.2.7: Translocation between Catchments

National and State requirements are described in Section 1.2.3: Translocation of Invasive Marine Species (Export & Import).

Scope

To assess the impact of the Industry on the translocation of invasive marine species between regions.

Current Management Controls

The Industry translocates abalone juveniles for restocking farms. These juveniles are farmed in land-based systems and therefore they are generally not exposed to any invasive marine species. Juveniles are translocated using the same disease protocol for adult broodstock (Section 1.2.2). The Industry are in the process of developing a translocation policy for transfer of juveniles between Tasmanian farms.

Numerous marine species have been introduced into Tasmanian waters accidentally through vectors such as ballast water from shipping, and movement of commercial fishing and recreational vessels, as well as natural dispersal (Appendix 2.2.7: Table 2.2.7). Only a small percentage of the introduced species are considered to be invasive species.

Environmental Objective 2.2.7: To ensure that the Industry does not contribute to the spread between regions of invasive marine species.			
Consequence C= 4	**Likelihood L= 2**	**Risk Rating C x L = 8 Moderate**	**Target Risk Rating Low**
Risk Management Options • Education of Industry staff on Invasive Marine Species (IMS) protocols • Spot checks of stock for IMS by Industry during translocation • Production of an Industry code of practice for transfer of stock between farms.			
Suggested Performance Measures • DPIW surveys for IMP			

2.3: PHYSICAL STRUCTURES, CONSTRUCTION & TENURE

This component describes issues relating to the impacts from the physical structures that are associated with marine farming. The impacts assessments are based on the intake and outfall pipes on the marine environment and the infrastructure associated with the land based facilities.

2.3.1: Number and Size of Farms

Scope

This aspect assesses the impact of the total number of Industry farms in a region, including public and visual amenity, and alienation of other activities.

Current Management Controls

The Local Government under the RMPS controls the area, size and number of abalone farms. The aim of the RMPS is to facilitate sustainable and integrated industry development in Tasmania taking into account the *State Coastal Policy 2003*. Planning Schemes almost always requires the preparation of an Environmental Impact Statement (EIS). Local government planning schemes take into account the potential impact of public and visual amenity and alienation of other activities. Further information on planning schemes is provided in Section 7.1.2.1: Local Government.

Environmental Objective 2.3.1: To ensure that the number and size of abalone farms in one region does not significantly impact upon other users within that region.			
Consequence C= 2	**Likelihood L= 2**	**Risk Rating C x L = 4 Low**	**Target Risk Rating N/A**
Risk Management Options • Adherence to local government controls			
Suggested Performance Measures • Monitoring for non-conformance with licence conditions			

2.3.2: Habitat Removal (Terrestrial)

Scope

To assess the impact of Industry on the surrounding terrestrial habitat in a region.

Current Management Controls

The Local Government or DPIW regulates the removal of terrestrial habitat associated with a land based abalone facility. Approval from these bodies should be sought prior to the construction of any marine farming facility under the local planning scheme. In the course of this approval, aspects relating to the preservation of sensitive habitats would be identified and appropriately dealt with. Guidance notes on Habitat Effects relating to individual facilities are covered in Section 3.1.1.

Environmental Objective 2.3.2: To ensure that abalone farms do not cause significant impact to terrestrial habitat.			
Consequence C= 1	**Likelihood L= 2**	**Risk Rating C x L = 2 Negligible**	**Target Risk Rating NA**
Risk Management Options • Adherence to local planning scheme			
Suggested Performance Measures • Monitoring for non-conformance with licence conditions			

2.3.3: Heritage Area Effects

The protection of indigenous heritage values is covered in detail in Component 6 of this document.

Scope

To assesses the impact of Industry on heritage values that may be affected by the construction of Industry facilities.

Current Management Controls

Significant heritage areas and buildings are protected by the *Australian Heritage Commission Act* 1975. A register of heritage buildings or areas of state significance is listed and protected by the *Historic Cultural Act* 1995 and administered by the Tasmanian Heritage Council. All considerations of heritage buildings and areas are dealt with by the council and address the objectives of the RMPS and LUPAA. Local Governments usually carry a schedule of heritage buildings with their municipal boundaries for each area.

Environmental Objective 2.3.3: To ensure that the Industry does not cause significant impact to heritage areas or buildings.			
Consequence C= 1	**Likelihood L=1**	**Risk Rating C x L = 1 Low**	**Target Risk Rating NA**
Risk Management Options • Adherence planning scheme guidelines			
Suggested Performance Measures • Non compliance records			

2.3.4: Soil Quality

Scope

This aspect assesses the impact of Industry on the quality of the soils in an area, particularly acid sulfate soils.

Current Management Controls

Soils in Tasmania are protected by regional planning schemes to ensure that development does not occur on prime agricultural land or impact on problem soils such as potential acid sulfate soils (PASS). The impact of a land based facility on soils is assessed by the local government under the local planning scheme, when building approval is sought prior to the construction of facility. In the course of this approval, soil tests and engineering reports are usually provided.

Environmental Objective 2.3.4: To ensure that the presence of Industry in a region does not significantly impact upon soil quality, particularly acid sulfate soils.			
Consequence C= 3	**Likelihood L= 2**	**Risk Rating C x L = 6 Low**	**Target Risk Rating NA**
Risk Management Options • Seeking local government approvals prior to any construction of buildings or ponds • Adherence to DPIW controls			

2.3.5: Infrastructure

Scope

To assess the impact on the environment from the infrastructure of the Industry, such as roads, power, intake and outfall structures etc., including the impacts of construction of these items if required.

Current Management Controls

The local council is the jurisdiction that controls infrastructure development under the local planning scheme. The provision of appropriate infrastructure is usually assessed in the planning application. Crown lands may also regulate impacts on the foreshore if a Crown Lands reserve is present. Land based facilities often produce extra benefit for local communities through negotiation of the provision of additional infrastructure such as power, refrigeration and roads. Guidance notes on infrastructure for individual facilities are provided in Section 3.1.8. Infrastructure.

Environmental objective 2.3.5: To ensure that Industry infrastructure is not adversely impacting upon the environment.			
Consequence C= 2	**Likelihood L= 2**	**Risk Rating C x L = 4 Low**	**Target Risk Rating NA**
Risk Management Options • Compliance with planning schemes			
Suggested Performance Measures • Local and State Government assessments			

2.3.6: Noise

Scope

To assess the impact of noise pollution from the Industry on the environment.

Current Management Controls

The main source of noise pollution from a land based facility is pumps, compressors, forklifts and other motorised equipment. Noise emissions in Tasmania are controlled by guidelines and regulations from the EMPCA. Local government may stipulate noise level controls for land based facilities under EMPCA. All marine farmers are aware of the responsibility of noise control, particularly when working outside normal daytime hours.

Environmental Objective 2.3.6: To ensure that noise levels from the Industry do not impact upon the local environment.			
Consequence C= 2	**Likelihood L= 2**	**Risk Rating C x L = 4 Low**	**Target Risk Rating N/A**
Risk Management Options • Adherence to controls stipulated by EMPCA, DPIW and local government • Sound insulation for noisy equipment			
Suggested Performance Measures • Monitoring and non-conformance notices or complaints			

2.4: PRODUCTION

The optimal production of the farmed species for the region is an important part of environmental management. Environmental management on a region-wide basis reduces the potential for collective impacts of the individual operations. This component looks at regional aspects which are directly affected by production levels in the region.

2.4.1: Regional Carrying Capacity

Scope

To assess the impact of stocking density from Industry on other marine fauna or flora within the catchment or region.

Current Management Controls

The carrying capacity of a land based facility is controlled through EMPCA. Facilities producing over 100 tonnes per annum of product are considered as Level 2 activities and are regulated by the DPIW Environment Branch. At present, all Tasmanian facilities produce less than 100 tonnes per annum (Level 1 activities), and are regulated by the local government. There is no evidence that Industry negatively impacts upon other marine flora or fauna.

Environmental Objective 2.4.1: To ensure that maximum carrying capacity of a catchment is sustainable with no adverse impacts on other marine fauna or flora.			
Consequence C= 2	**Likelihood L= 2**	**Risk Rating C x L = 4 Low**	**Target Risk Rating N/A**
Risk Management Options • Adherence to controls stipulated by DPIW or local government			
Suggested Performance Measures • Non-conformance notices from DPIW			

2.4.2: Disposal of Unstable Products

Scope

To assess the impact of the Industry producing significant quantities of unmarketable waste.

Current Management Controls

Dead abalone shell and meats are disposed of according to the Local or State Government regulations. The low level of abalone waste, usually shell from dead abalone, allows for its disposal in compost or burial in landfill. Disposal of generated waste is regulated by EMPCA (for less than 100 tonne per annum).

Plastic waste from packaging and feed bags is disposed of through council waste management systems or recycled.

Environmental Objective 2.4.2: To ensure that disposal of unmarketable waste does not impact upon the region.			
Consequence C= 1	**Likelihood L= 2**	**Risk Rating C x L = 2 Low**	**Target Risk Rating N/A**
Risk Management Options • Disposal as under licence conditions • Research alternative markets for recycling			
Suggested Performance Measures • Monitoring for non-conformance with licence conditions			

Environmental Management System Framework

Component 3 : Impact of Individual Facilities on the Environment

PhycoTec
Environmental Management

TAGA

Tasmania

Australian Government
Fisheries Research and Development Corporation

FRDC Project 2004/096

Component 3: Impact of Individual Facilities on the Environment

Introduction

The following component outlines potential issues an operator (and any consent authority) needs to consider when assessing environmental issues related to a specific facility. These issues include the construction phase/site selection and the operation of the facility once it is in production. A facility includes the building or complex of buildings, plus the associated ponds and water channels built for the specific purpose of farming abalone.

This component provides guidance notes only for each issue. Individual facilities will have to assess the potential risk of each issue. Some issues will be influenced by objectives developed in Components 1 and 2. The Component Tree 3 (Fig 3.0) is not guaranteed to be comprehensive or inclusive and it is recommended that each individual facility review and identify its own set of issues. This component is linked into the EMS Framework Templates, which are designed to assist operators determine their environmental risk.

The areas covered by Component Tree 3 include the potential impact of an individual facility during:
(i) Site Construction; and
(ii) Operation

The Individual Facility component tree has been adapted from the National ESD framework to be relevant to the industry by the following means.

Exclusions:
- Entanglement Interactions (under Section 3.2.2). Land-based abalone farms are unlikely to result in an entanglement of marine organisms
- Proximity to Users (under Section 3.1). This aspect refers to the proximity of the facility to the end markets and would be considered to part of a business plan analysis rather than an environmental risk analysis
- Animal Welfare (under Section 3.2.1) as there is no proscribed conditions for shellfish under the *Animal Welfare Act* 1993
- Shading (under Section 3.1): land based abalone facilities are unlikely to cause shading of the marine environment
- Navigation (under Section 3.1): land based abalone facilities are unlikely to cause navigational problems

The current management controls that may occur and relate to the aspects can be found tabulated in Appendix 3.1 (Commonwealth and Tasmanian legislation matrix relevant to Component 3.1) and Appendix 3.2 (Commonwealth and Tasmanian legislation matrix relevant to Component 3.2). These matrixes are only a guide, and while comprehensive, may not be inclusive.

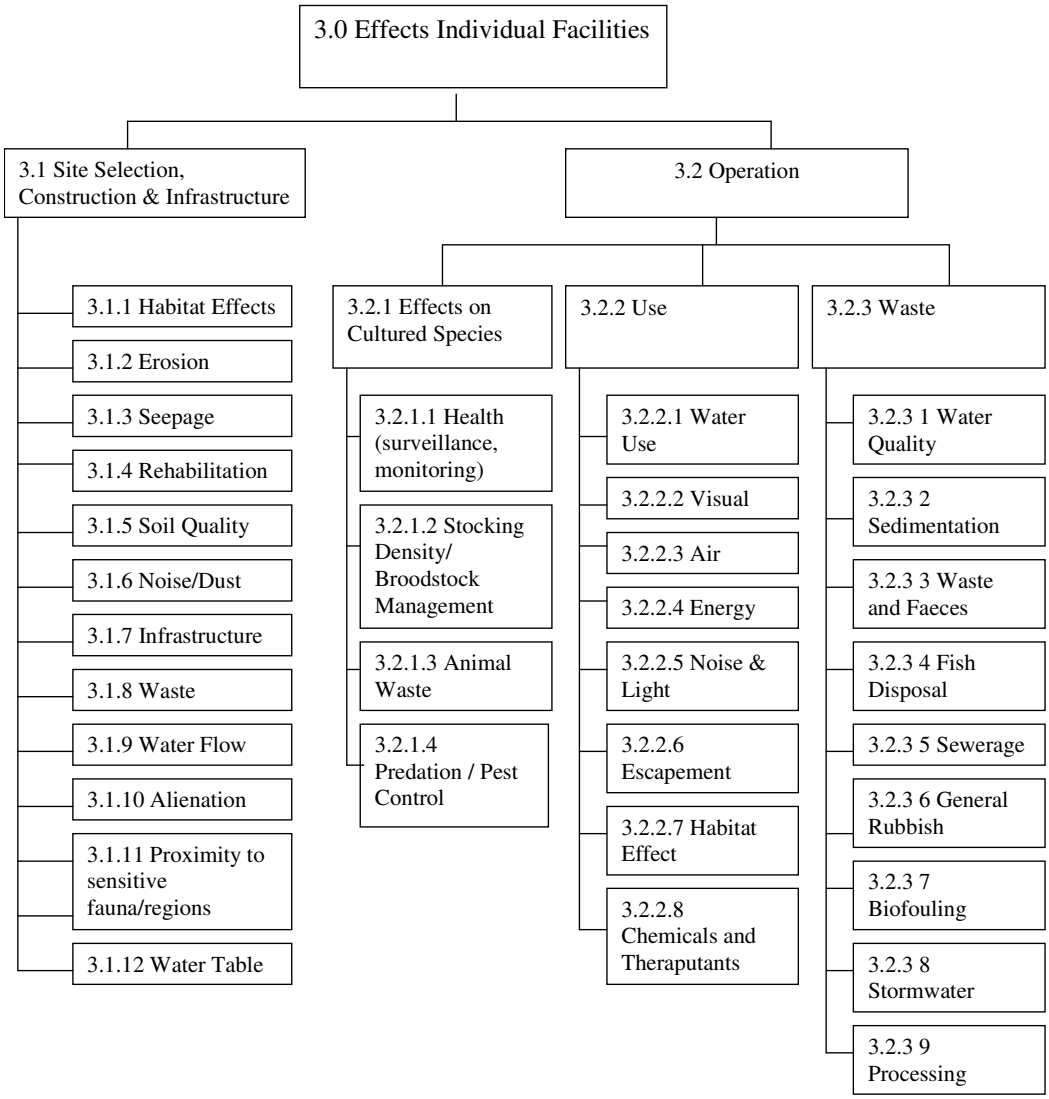


Figure 3.0. Component Tree 3: Impact of individual facilities on the environment

3.1: SITE SELECTION, CONSTRUCTION AND INFRASTRUCTURE

This component covers the issues of the initial building, construction and development of a land based marine farming facility. It can also be used as a check-list for proponents (and assessors) in their submission for approvals when determining the suitability for a potential site. Some of these aspects should be addressed co-operatively with the contractor responsible for the construction works. A guide to some of the legislative requirements for these aspects is provided in Appendix 3.1.

3.1.1: Habitat Effects

Scope

To assess the impact of construction and use of land based abalone marine farming on the surrounding habitat.

Environmental Objective 3.1.1: To reduce the impact of the facilities on the habitat.
Potential Impact: Degradation of the surrounding environment. Disturbance to flora. Displacement of fauna.
Suggested Control Measures • Environmental Management Plan (EMP) for the construction, development, or expansion of the facilities to include ponds, cages, buildings, roads, offices, labs, workspaces, car parks etc • Identification of ecologically important or protected, endangered or threatened flora or fauna • Assessment of removal of vegetation for the facility on a catchment/regional scale • Replanting disturbed areas with native plants • Minimisation of run-off from roads and work areas into waterways
Related Aspects: • 1.3.8: Sensitive Habitats • 2.2.4 Threatened/Endangered/Protected species • 2.2.5: Protected Areas • 2.3.1: Habitat Removal

3.1.2: Erosion

Scope

To assess the impact of erosion on the environment as a result of the construction and use of a land based abalone marine farming facility.

Environmental Objective 3.1.2: To reduce the impact of erosion, where practicable, in the construction and use of facilities.
Potential Impact: Erosion of the surrounding environment. Decreased water quality.
Suggested Control Measures • Identify potential erosion problems prior to the construction of the facility • Environmental Management Plan for erosion • Ensure rainwater catchment devices are installed and pipe work is effective at directing effluent into stormwater systems or tanks • Use of bunding system designed to trap potential leaks or flooding which may result in erosion • Gravel installed in areas likely to experience water overflow, allowing drainage into open drainage system
Related Aspects: • 1.3.8: Sensitive Habitats • 2.3.3: Acid Sulfate Soils

3.1.3: Seepage

Scope

To assess the potential impact of seepage from a land based abalone marine farming facility.

Environmental Objective 3.1.3: To prevent seepage from Industry facilities.
Potential Impact: Contamination of the water table.
Suggested Control Measures • Local Government approval for construction of ponds • Monitoring and measurement of any seepage from ponds • Regular monitoring and maintenance of water/waste storage tanks, drains, gutters, downpipes etc. for leakage
Related Aspects: • 2.1.6: Seepage • 1.3.8: Sensitive Habitats • 2.3.4: Acid Sulfate Soils • 2.3.5: Water table

3.1.4: Rehabilitation

Scope

To assess the requirement for environmental rehabilitation after construction of a land based abalone marine farming facility.

Environmental Objective 3.1.4: To plan rehabilitation of the site to remove ongoing impacts when construction or production is ended.
Potential Impact: Degradation of the surrounding environment.
Suggested Control Measures • Removal of uncommissioned equipment including building equipment and unused moorings • Removal of any construction waste • EMP for rehabilitation of degraded areas
Related Aspects: • 8.2.3: Regulations

3.1.5: Soil Quality

Scope

To assess the impact a land based abalone marine farming on soil quality from a land based abalone marine farming facility..

Environmental Objective 3.1.5: To ensure that problems with soils are managed to reduce impact on the environment.
Potential Impact: Activation of acid sulfate soils. Contamination of the waterways.
Suggested Control Measures • Identify any potential acid sulfate soils (PASS). • Environmental Management Plans to ensure that PASS do not get activated when construction occurs • Reduce potential erosion
Related Aspects: • 8.1.2.6; Land Use Changes • 2.3.4: Acid Sulphate Soils • 3.1.3: Seepage

3.1.6: Noise /Dust

Scope

To assess the impact of noise and dust on the environment from a land based abalone marine farming facility.

Environmental Objective 3.1.6: To maintain minimal dust and noise impact where practicable.
Potential Impact: Local wildlife, decreased public amenity.
Suggested Control Measures • Identify and measure potentially unacceptable levels of noise and dust to surrounding areas • Identify sensitive habitats in the surrounding area that may be impacted on by increased noise/dust levels eg. bird nesting sites • Identify procedures for operating machinery outside normal working hours or in condition of high wind
Related Aspects: • 2.2.3: Listed Migratory Birds • 2.2.5: Protected Habitats • 2.3.8: Noise • 5.2.7: Public Amenity

3.1.7: Infrastructure

Scope

To assess the impacts of the construction of from a land based abalone marine farming facility on the environment.

Environmental Objective 3.1.7: To reduce the impact of construction of facility infrastructure on the environment.
Potential Impact: Decreased public amenity. Erosion.
Suggested Control Measures • Adherence to regulatory requirements in the construction and maintenance of infrastructure such as sheds and ponds • Plan control measures for foreshore disturbance in the installation and maintenance of inflow and outflow pipes • Back fill any pits dug for ponds and pumps etc as soon as practically possible
Related Aspects: • 2.3.6: Infrastructure

3.1.8: Waste

Scope

To assess the environmental impact of waste from the construction of a land based abalone marine farming.

Environmental Objective 3.1.8: To ensure that waste produced from the construction of the facility is dealt with in an appropriate manner.
Potential Impact: Degradation of the surrounding environment. Wildlife entanglements.
Suggested Control Measures • No dumping of any waste • Recycle material generated through the construction of the facility eg. plastic wraps, package casing, and landfill • Environmental Management Plans for construction waste
Related Aspects: •

3.1.9: Water Flow

Scope

To assess the environmental impact a facility in diverting water flow.

Environmental Objective 3.1.9: To ensure water flow is not significantly changed through the construction or use of a facility.
Potential Impact: Changed environmental conditions for flora/fauna. Contamination of the waterways.
Suggested Control Measures • Consideration must be given to both the effects on the flow of seawater as well as the flow of freshwater • Ensure flushing/tidal exchange rates around farm infrastructure are not impacted upon • Seawater systems to have an emergency diversion system to foreshore to prevent impacts on the terrestrial habitat • Maintain guttering and silt traps to prevent uncontrolled stormwater run-off • Ensure appropriate guttering/drains to collect water from car parks and roadways. Install silt traps to remove solids • Divert excess water into storage tank for reuse/recycling or constructed wetlands
Related Aspects: • 2.1.4: Flow (hydrology/oceanography) • 2.1.5: Water Extraction, Ground or Surface • 2.3.9; Site Constraints • 2.3.4: Acid Sulphate Soils

3.1.10: Alienation

Scope

To assess the impact of alienation of other users in the area from a land based abalone marine farming facility.

Environmental Objective 3.1.10: To ensure that other users of an area are not alienated by the facility.
Potential Impact: Alienation of local community.
Environmental Considerations • Maintain relationship and involvement with community and local groups • Maintain a clean and tidy farm • Public education program • Ensure operation meets with ESD guidelines • Ensure access to the public is available between lease sites and access to foreshore
Related Aspects: • 5.2.7: Public amenity

3.1.11: Proximity to Sensitive Fauna/Regions

Scope

To assess the impact of construction and use of a land based abalone marine farming facility on nearby sensitive fauna or regions.

Environmental Objective 3.1.11: To ensure that sensitive fauna/regions are not impacted upon by the construction and use of the facility.
Potential Impact: Impact on wildlife breeding and feeding areas.
Environmental Considerations • Identify sensitive fauna, habitat or other regions of particular value in the area • Production of an Environmental Management Plan for sensitive fauna relating to the construction and use of the facility
Related Aspects: • 2.2.4: Threatened/Endangered/Protected Species • 2.2.5: Protected Habitats

3.1.12: Water Table

Scope

To assess the impact on the water table from a land based abalone marine farming facility.

Environmental Objective 3.1.12: To ensure that construction and use of the facility does not impact upon the water table.
Potential Impact: Contamination or significant reduction of the water table.
Suggested Control Measures • Assess the use of water drawn from the water table and determine whether the use is sustainable • Develop alternative water use strategies if necessary • Identify potential contamination of the water table (eg seepage from ponds)
Related Aspects: • 3.1.3: Seepage

3.2: OPERATION

This component is a set of three branches designed to identify the issues that may occur during the operation of a land based abalone marine farming facility; effect on farmed species; Use and Waste. A guide to some of the legislative requirements for these aspects is provided in Appendix 3.2.

3.2.1: Effect on Farmed Species

These issues relate to the impacts on stocks being cultivated within an individual facility.

3.2.1.1: Health (surveillance, monitoring)

Scope

To assess the impact of fish health impacts within a land based abalone marine farming facility.

Environmental Objective 3.2.1.1: To monitor and respond to fish health issues within the facility.
Potential Impact: Loss of stock. Spread of disease within Industry.

Suggested Control Measures
• Participation and knowledge of
  • AQUAVETPLAN
  • *Quarantine Act 1908*
• Protocols, schedules and staff training for fish health related issues

Related Aspects: • 1.1.2.2: Disease (Wild populations) • 1.2.2: Disease (Industry fish) • 1.3.1: Disease (Other species/communities/processes)

3.2.1.2: Stocking Density / Broodstock Management

Scope

To assess the impact of inappropriate stocking density from a land based abalone marine farming facility on the environment

Environmental Objective 3.2.1.2: To ensure that an appropriate stocking density is maintained within the facility.
Potential Impact: Reduced productivity. Increased nutrient output.
Suggested Control Measures • Monitoring stocking density or biomass on the lease/facility • Monitoring growth and health of stock • Monitoring outfall water
Related Aspects: • 1.3.5: Food Chain Impacts

3.2.1.3: Animal Waste

Scope

To assess the impact of animal waste from a land based abalone marine farming facility on the environment.

Environmental Objective 3.2.1.3: To ensure that animal waste from the facility does not impact on the environment.
Potential Impact: Contamination of the water. Stock losses.
Suggested Control Measures • Monitoring of outfall water • Waste disposal protocols • Staff training • Use of outfall ponds
Related Aspects: •

3.2.1.4: Predation/Pest Control

Scope

To assess the impact of predators/pests on the facility.

Environmental Objective 3.2.1.4: To ensure that predators/pests are dealt with in an appropriate manner in the facility.
Potential Impact: Wildlife injuries or mortalities. Stock losses. Contamination.
Suggested Control Measures • Identification of problematic predators/pests such as birds or crabs on the farm • Identification and management plan for potential predators that are also protected species • Development of a protocol for management and disposal of Invasive Marine Species or pests • Implementation of a protocols for dealing with vermin baits and deceased vermin • Staff training
Related Aspects: • 1.3.6 Behavioural Changes and Impacts (Migratory Species) • 1.3.7 Threatened and Endangered Species • 2.2.4 Threatened, Endangered and Protected Species • 2.2.6 Behavioural Changes on Species (Scavengers) • 2.2.7 Translocation between Catchments

3.2.2: Use

This issue looks at the use of resources whilst the facility is operational.

3.2.2.1: Water Use

Scope

To assess the impact on the environment of water usage from the facility.

Environmental Objective 3.2.2.1: To maintain water usage in the facility at an environmentally responsible and sustainable level.
Potential Impact: Low water availability. Fouling of intake line causing a change in marine flora. Flooding.
Suggested Control Measures • Identify risks to the availability of water (seawater, fresh water, river water, ground water), eg seasonal variation • Produce a water budget • Reduce, reuse, and recycle where practicable • Monitor intake lines • Open drain system that allows overflow volumes to be channelled to foreshore • Regular inspection and maintenance of water delivery pipes and drainage channels
Related Aspects: • 2.1.4 Flow (hydrology/oceanography) • 2.1.5 Water Extraction, Ground or Surface • 2.3.8: Site constraints (waves, currents)

3.2.2.2: Visual

Scope

To assess the visual impact of facility structures on the surrounding environment.

Environmental Objective 3.2.2.2: To ensure that the visual impacts and aesthetics are acceptable.
Potential Impact: Decreased amenity value of the surrounding environment.
Control Measures • Use of appropriate and subdued building materials • Well maintained grounds and facilities • Replant disturbed areas with native plants • Bury intake line across foreshore to below low water mark
Related Aspects: • 8.32.3: Regulations • 5.2.1.7 Public Amenity

3.2.2.3: Air

Scope

To assess the impact of air emissions from facility equipment.

Environmental Objective 3.2.2.3: To ensure that the appropriate air pollution environmental controls are in place.
Potential Impact: Poor air quality.
Suggested Control Measures If a facility is classed as having Level I activity (produces less than 100 tonnes of processed meat annually), air pollution is regulated under the Local Government Act 1993. However, if the local government deems that a facility is producing excessive air pollution, they may prosecute the facility under the EMPCA. • Produce a greenhouse gases budget • Ensure emissions from tractors or vessels have been tested to comply with legislative requirements • Regular maintenance of equipment • Plan to replace equipment through attrition with the most affordable environmentally friendly technology
Related Aspects: • 2.1.3: Other Waste/Pollutants • 5.2.7: Public Amenity

3.2.2.4: Energy

Scope

To assess the energy reduction potential or conversion to more environmentally friendly energy technology.

Environmental Objective 3.2.2.4: Reduce energy consumption where possible and/or convert to environmentally friendly technology, where affordable.
Potential Impact: Use of non-renewable energy sources.
Environmental Considerations • Produce an energy budget. • Assess the energy efficiency rating of equipment and plan for replacement through natural attrition where needed. • Develop protocols to ensure energy use is minimised eg. last out turns the lights off, Outside lights switched to sensors rather than on all night. • Identify environmentally friendly energy efficient fuels and technology?
Related Aspects: • 2.1.3: Other Waste/Pollutants

3.2.2.5: Noise & Light

Scope

To assess the impact of excessive noise or bright light from a facility on the environment.

Environmental Objective 3.2.2.5: To ensure that the appropriate controls are in place to minimise noise and light.
Potential Impact: Impact on bird life and other users. Loss of local amenity.
Suggested Control Measures • Protocol for the use of noisy machinery (eg pumps) to include times and place of appropriate use. • Muffler system installed on motors. • Placement of machinery in insulated zones (eg. Sand banks, away from public areas. • Regular maintenance program for machinery. • Orientation of lights to cause minimal impact to neighbours and wildlife. • Staff education, especially for night workers.
Related Aspects: • 2.3.6: Noise • 2.3.3: Listed Migratory Birds • 2.2.4: Threatened/Endangered/Protected sp. • 5.2.7: Public Amenity

3.2.2.6: Escapement

Scope

To assess the impact of escapement of farmed stock from the facility.

Environmental Objective 3.2.2.6: To ensure that farmed stock does not escape from the facility.
Potential Impact: Genetic and disease transfer to the native population.
Suggested Control Measures • Regular inspections of outfall raceways for potential escapees. • Installation of settlement ponds. • Maintenance schedule for outfall traps.
Related Aspects: • 3.1.1: Habitat Effects • 2.2.4: Threatened/Endangered/Protected sp.

3.2.2.7: Habitat Effect

Scope

To assess the impact of the facility on the surrounding habitat, including marine and terrestrial.

Environmental Objective 3.2.2.7: To ensure that the facility has appropriate environmental controls to reduce habitat impacts.
Potential Impact: Degradation of the surrounding environment.
Suggested Control Measures • Identification of nearby conservation areas or species listed under the EPBCA • EMP for surrounding habitat, including riparian zone • Protocols or codes of conduct to reduce habitat impacts • Clearly planned access routes to farm lease sites from foreshore areas • Controlled driving on beaches • Staff training
Related Aspects: • 3.1.1: Habitat Effects • 2.3.3: Listed Migratory Birds • 2.2.4: Threatened/Endangered/Protected sp. • 5.2.7: Public Amenity

3.2.2.8: Chemicals and Theraputants (including hydrocarbons)

Scope

To assess the impact on the environment from the use of chemicals and theraputants in the facility.

Environmental Objective 3.2.2.8: To ensure that the facility has appropriate controls on chemicals and theraputants.
Potential Impact: Contamination of the water and decreased water quality. Contamination of the environment.
Suggested Control Measures • Appropriate bunded chemical storage systems • Appropriate disposal protocols of chemicals and theraputants • Material Safety Data Sheets available for all chemicals in the facility • Fuel/Oil and chemical containment kits at all storage areas • Staff training on fuel/oil spill response • Regular maintenance program for machinery and vehicles • Use of biodegradable detergents for cleaning • Minimise use of fertilisers, pesticides and chemicals on facility gardens • Minimise chemical use on site generally • Closed drainage system for the transfer of cleaning chemical wastes from tanks to drains to ensure no contact with the open ground • Neutralise chlorine treated water with Sodium Thiosulphate where appropriate

• Disposal in sewerage system rather than seawater outfall system
Related Aspects: • 2.1.3: Other wastes, pollutants eg chemicals • 1.3.3: Chemicals

3.2.3: Waste

This activity looks at the waste products generated by the facility and how they are dealt with.

3.2.3.1: Water Quality

Scope

To assess the impact of the facility on water quality.

Environmental Objective 3.2.3.1: To ensure that wastewater from the facility does not exceed Australian Water Quality Guidelines.
Potential Impact: Contamination of the water. Excess nutrients being expelled into the environment.
Suggested Control Measures • Compliance with regulatory requirements of water released from a facility (including storm water) • Water treatment or recycling where appropriate • Schedule for water quality monitoring • Controlled and measure the amounts of nutrients added to the system and develop a nutrient budget
Related Aspects: • 2.1.1: Nutrients (water quality) • 2.1.3: Other Waste/Pollutants (chemicals)

3.2.3.2: Sedimentation

Scope

To assess the impact of the facility on sedimentation in the area.

Environmental Objective 3.2.3.2: To ensure the facility has sedimentation minimisation strategies, if required.
Potential Impact: Degradation of the marine environment.
Environmental Considerations • Identify actions that result in sedimentation of the local marine habitat or physical environment • Develop management plans or alternative strategies such as silt traps to deal with sedimentation
Related Aspects: • 2.1.2: Sedimentation • 2.4.1: Regional Carrying Capacity

3.2.3.3: Waste & Faeces

Scope

To assess the impact of fish waste & faeces generated from a facility.

Environmental Objective 3.2.3.3: To ensure fish waste and faeces do not enter the environment.
Potential Impact: Contamination of the water and surrounding environment.
Suggested Control Measures • Protocol for disposal of fish waste and faeces • Regular cleaning schedule • Use of a settlement pond • Collect all pellet waste • Storage tanks if necessary
Related Aspects: • 2.4.2: Disposal of Unstable Products • 2.1.3: Other Waste/Pollutants (chemicals)

3.2.3.4: Fish Disposal

Scope

To assess the impact of fish waste generated from a facility.

Environmental Objective 3.2.3.4: To ensure fish waste disposal by product does not enter the environment.
Potential Impact: Contamination of the water and surrounding environment.
Suggested Control Measures • Adequate disposal facilities for mortalities of the farmed species • Emergency disposal management plan for mass mortality • Self draining shed floors with settlement traps and appropriate runoff disposal
Related Aspects: • 2.4.2: Disposal of Unstable Products • 2.1.3: Other Waste/Pollutants (chemicals)

3.2.3.5: Sewerage

Scope

To assess the impact on the environment of sewerage generated from a facility.

Environmental Objective 3.2.3.5: To ensure that sewerage is adequately managed at the facility.
Potential Impact: Contamination of water with coliforms
Suggested Control Measures • Ensure the facility has appropriate sewerage treatment that complies with license conditions • On site treatment plant • All grey water effluent to be directed via a closed pipe system to disposal system • Regular maintenance program
Related Aspects: • 2.4.2 Disposal of Unstable Products • 2.1.3 Other wastes/Pollutants (chemicals)

3.2.3.6: General Rubbish

Scope

To assess the impact of general rubbish generated from a facility on the environment.

Environmental Objective 3.2.3.6: To reduce, reuse, recycle where possible, and dispose of rubbish in an appropriate manner.
Potential Impact: Degradation of the surrounding environment. Habitat disturbance. Wildlife entanglement.
Suggested Control Measures • Protocols for management of general rubbish within the facility • Recycling policy and facility • Daily inspection of rubbish on site • Annual regional foreshore cleanups
Related Aspects: • 2.4.2: Disposal of Unstable Products • 2.1.3: Other Waste/Pollutants (chemicals)

3.2.3.7: Biofouling

Scope

To assess the impact of biofouling from the facility on the environment.

Environmental Objective 3.2.3.7: To ensure that biofouling removal from facility structures does not impact upon the environment.
Potential Impact: Decreased water quality. Concentration of waste during cleaning of equipment.
Suggested Control Measures • Use of a settlement pond • Cleaning equipment onshore where practicable • Monitor waste levels after cleaning
Related Aspects: • 2.1.1: Nutrients • 3.2.3.1: Water Quality

3.2.3.8: Storm Water Runoff

Scope

To assess the impact of storm water runoff from the facility on the environment.

Environmental Objective 3.2.3.8: To ensure that storm water from facility structures does not contaminate waterways.
Potential Impact: Decrease in water quality. Erosion.
Control Measures • Maintain guttering and silt traps • Collection tanks, where applicable • Plumb gutters and drains into stormwater system where available • Recycle if possible
Related Aspects: • 2.1.4: Flow (hydrology/oceanography) • 1.3.8: Sensitive habitats • 5.1.2.7: Public amenity

3.2.3.9: Processing

Scope

To assess the impact of processing from the facility on the environment.

Environmental Objective 3.2.3.8: To ensure that processing activities from facility does not impact on the environment.
Potential Impact: Environmental contamination. Noise, Air and water pollution.
Control Measures • Assess processing are for potential impacts such discharges into the marine environment, potential escape of packaging, disposal of fish meat wastes.
Related Aspects: • 2.4.2: Disposal of Unstable Products

Component 4: National Social and Economic Wellbeing

Introduction

The National Social and Economic Wellbeing Component Tree (Fig 4.0) looks at the broader, non-regional, social and economic costs and/or benefits associated with the Industry.

The risk assessments of the Social and Economic Wellbeing aspects have been undertaken on a preliminary basis only due to the lack of detailed information for the Industry. What is reported in this component reflects what information is available. Industry bodies such as the Tasmanian Abalone Growers Association (TAGA) will periodically revise the following information to provide updated risk assessments for the Industry.

Risk assessment of these components have used the social/political consequence Table (Table 1.4; Appendix 1.0)

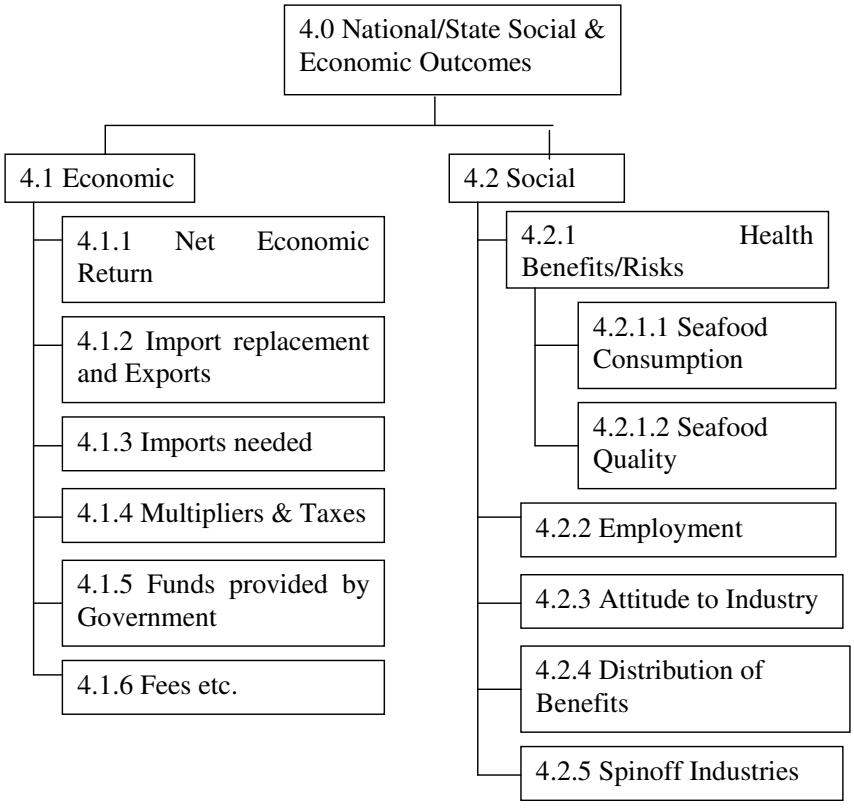


Figure 4.0. Component Tree 4: Impacts of the Industry on National/State and Economic Outcomes

COMPONENT 4.1: ECONOMIC OUTCOMES

This aspect covers economic issues including the value and contribution of the Industry to the national economy.

Scope

To assess the impact of the Industry on national economic outcomes

4.1.1: Net Economic Return

The Tasmanian abalone marine farming industry produced over 21% of the total Australian production of farmed abalone in 2003-2004. Production in Tasmania has increased at an average rate of 30 percent per annum over the last 8 years (Fig 4.1.1). The economic return of abalone has yet to be assessed in this fledgling industry.

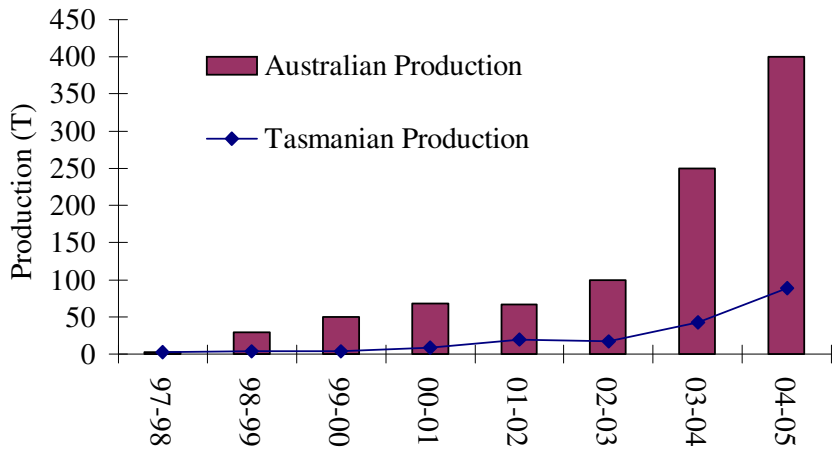


Figure 4.1.1. Production in tonnes of farmed abalone in Tasmania over the past 8 years (Source: FRDC Abalone Aquaculture Subprogram personal communication and ABARE 2005).

4.1.2: Import replacement and exports

Farmed abalone is exported to many Asian countries, with over 70% sold to Japan, 12% to Taiwan, 10% to Hong Kong and 7% to Singapore (Ausab personal communication). Tasmania currently has over 20% of the Australian export market (Fig 4.1.2).

There is little demand for abalone products on the domestic market. This unique product does not replace any imports into the country.

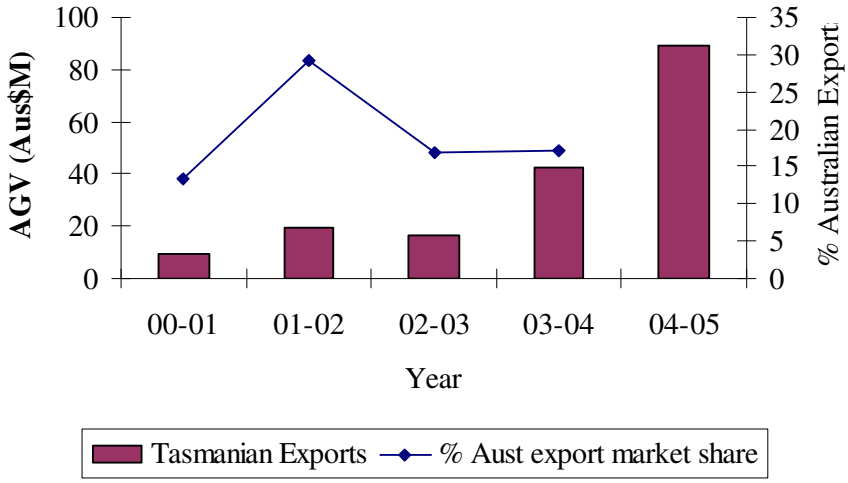


Figure 4.1.2. Tasmanian exports of farmed abalone in value (Aus$M) and as percentage of the Australian market share (Source: FRDC Abalone Aquacuture Subprogram personal communication and ABARE 2005).

4.1.3: Imports needed

The industry does not have to specifically source imports to operate over and above general consumables and some feeds.

4.1.4: Multiplier and taxes

Aquaculture generally has a high "economic multiplier" effect. The multiplier effect for farmed abalone has not yet been determined. However, the income generated from the aquaculture Industry in Tasmania may be considered to be 5.2 times the farm gate value (TFIC personal communication).

4.1.5. Funds Provided by Government

The Commonwealth Government provides matched financial support to the Industry through the Fisheries Research and Development Corporation (FRDC). The maximum matchable contribution that the Commonwealth Government will provide is capped at 0.25% of average gross value production (GVP). Since 2000, the FRDC has provided a mean annual contribution of over $360,000 to national abalone research, with the Australian abalone industry contributing $227,000 per annum which includes Tasmanian Industry contributions. Assistance is also provided by FRDC to fund the Environmental Management System Framework.

The State Government provides limited services to the Industry in the form of governmental regulators and developmental funds through a number of agencies including the DPIW Marine Farming Branch, Biosecurity and Environment Branch, and the Department of Economic Development. Only a small percentage of the M$1.45 in 2004/2005 provided for all sectors would have been directed towards the farmed abalone industry.

4.1.6: Fees etc

Fees paid to the Commonwealth and State Governments are adjusted over time and dependant on social and economic factors. Contributions by Industry to the FRDC are

by jurisdiction in the form of memoranda of understanding. The FRDC provides policy and advice to Government and stakeholders, and distributes the funding to relevant research providers. The Commonwealth Government matches this investment to a maximum of 0.25% of average GVP. The Australian Industry contributions to FRDC are $190,400 from 2000-2003 for broodstock conditioning and $132,300 in 2003-2005 for the national survey of diseases of commercially exploited abalone species to support trade and translocation issues and the development of health surveillance programs.

Licence fees are paid to the State Government by abalone leaseholders and industry participants. There are 20 licence holders for abalone farming in Tasmania who provided fees in 2005, as shown in Table 4.1.6.2. The State Government collected M$1.09 from the aquaculture industry in the financial year 2004-2005, of which an estimated $87,780 came from the abalone sector.

The industry also supports the national Australian Abalone Growers Association (AAGA) through a subscription fee and a voluntary contribution of $0.05 per kg of feed (approximately $12,500 per annum) plus $5,000 per farm per annum. This subscription is used to support the Industry at a national level and provide funds to run workshops, meetings and research contributions to FRDC.

Table 4.1.6.2. Annual licence fees paid to the State Government by the Tasmanian abalone industry.

Licence	Fees abalone
Tasmanian Fishing Industry Council (TFIC) Compulsory Levy	$350.00
Univalve Species farmed – first species	$1,720.50
Univalve Species farmed – additional species	$111.00
Total fees for one species	$2,420.50

Economic Objective 4.1.1: To ensure that the Industry continues to contribute to the national economies.			
Consequence C= 1 (Table 1.4)	**Likelihood L= 1**	**Risk Rating C x L = 1 Low**	**Target Risk Rating N/A**
Economic Objective 4.1.2: To ensure that the industry continues to contribute to the state economies.			
Consequence (Table 1.4) C=2	**Likelihood L= 1**	**Risk Rating C x L = 2 Low**	**Target Risk Rating N/A**
Risk Management Options • Strategic business planning • Sustainable farming practices • Risk Management			
Suggested Performance Measures • Evaluating industry profitability and sustainability.			

COMPONENT 4.2: SOCIAL OUTCOMES

This aspect covers social issues important at a national level such as the provision of seafood for the community. Generally there is a high level of support for Industry at a national level.

Scope

To assess the impact of Industry on the social wellbeing of the Australian community.

4.2.1: Health Benefits and Risks

Seafood is known to contain omega-3-fatty acids, which have beneficial effects when included in the human diet. The best source of the most beneficial "long-chain" omega-3-fatty acids occurs in seafood, including shellfish.

Having insufficient omega-3 fatty acids in the diet is associated with a wide range of health problems which include cardiovascular disease, diabetes, certain cancers, osteoporosis; and disorders of the central nervous system, which include depression in some instances, and impaired cognition (leading to dementia).

Seafood is also the best food source of iodine; saltwater seafood contains about twice the iodine found in freshwater varieties. It also provides an excellent source of selenium and fluoride. Other minerals which are provided in moderate amounts are iron, zinc and magnesium. The iron content of seafood is about a third to a half that in red meat.

4.2.1.1: Seafood Consumption

There is minimal consumption of farmed abalone in Australia, with most production being absorbed by the export market.

With consumption of seafood increasing 12.7% between 1991 and 1999 in Sydney (Ruello 2002) and similar trends in Melbourne, farmed abalone provides a niche market in Australia's restaurant trade. The increase in seafood consumption has led to seafood production becoming Australia's fourth most valuable food-based industry after beef, wheat and milk (FRDC 2004).

4.2.1.2: Seafood Quality

The Tasmanian Industry produces a premium product and with other Australian product is always assumed to be of a high quality. Part of the recognition of high quality can be attributed to the high standard required by AQIS. Quality is usually customer driven, with the Industry working towards a Code of Practice to ensure quality is maintained.

4.2.2: Employment

The Tasmanian marine farming industry directly employs 846 people representing 472 permanent and 204 part-time employees. A further 176 full time and 419 people are employed in the processing sector (incorporating wild fisheries and aquaculture;

FRDC 2004). The five Tasmanian farmed abalone producers directly employ 32 full time equivalent staff at present (Industry personnel communication 2005).

4.2.3: Attitude to Industry

The Australian public recognises the socio-economic benefits of marine farming, especially its contribution to local economies in rural and remote regions. The public rate environmental impacts as the most important issue facing marine farming, followed by the industries' economic contribution and its impacts on other users of coastal and marine resources. The public believe that information about marine farming should be accessible and credible and the community values the chance to participate in marine farming planning management decisions (Mazur et al 2005). The Industry works to closely align itself with the communities social and economic requirements.

4.2.4: Distribution of Benefits

Tasmanian farmed abalone is a rapidly growing industry that is providing income into regional communities through the provision of employment and purchases of resources and services.

4.2.5: Spinoff Industries

The Industry supports a number of spin-off industries including seafood processing, local restaurants, concrete industry, polyethylene products, feed suppliers, hardware, air and road freight and transport.

Social Objective 4.2: To ensure that the industry continues to contribute to the social wellbeing of the community.			
Consequence **C= 1**	**Likelihood** **L= 1**	**Risk Rating** **C x L = 1** **Low**	**Target Risk Rating** **N/A**
Risk Management Options • Strategic business planning • Sustainable farming practices • Risk Management			
Suggested Performance Measures • Industry profitability and sustainability.			

Component 5: Community Wellbeing (Social and Economic Impacts)

Introduction

There has been a growing recognition of the importance of local industries to rural communities. The Community Wellbeing component considers the local importance of the Industry to the social and financial viability of communities located near the Industry. While the role of income and employment opportunities to local communities is obvious, other impacts could include attracting or maintaining services and contributions to social capital. Other values such as the contributions of the Industry to the broader community and the attitudes and beliefs of the community associated with the Industry are taken into consideration.

The risk assessments of the Community Wellbeing aspects have been undertaken on a preliminary basis only due to the absence of suitable detailed information for the Industry. What is reported in this component reflects what information is available.

Industry bodies such as the Tasmanian Abalone Growers Association (TAGA) will periodically revise the following information to provide updated risk assessments for the Industry.

The Community Wellbeing Tree (Fig 5.0) represents the potential economic impacts of the Industry on the wellbeing of local or regional communities associated with the Industry. The tree is divided into two main branches; one dealing with the Industry community; and the other dealing with local communities affected by the Industry.

Dependant communities were considered as a collective, not individual in the risk assessment, as most communities were considered to have a low dependency on the Industry.

Risk assessments of these components have used the social/political consequence Table (Table 1.5; Appendix 1.0).

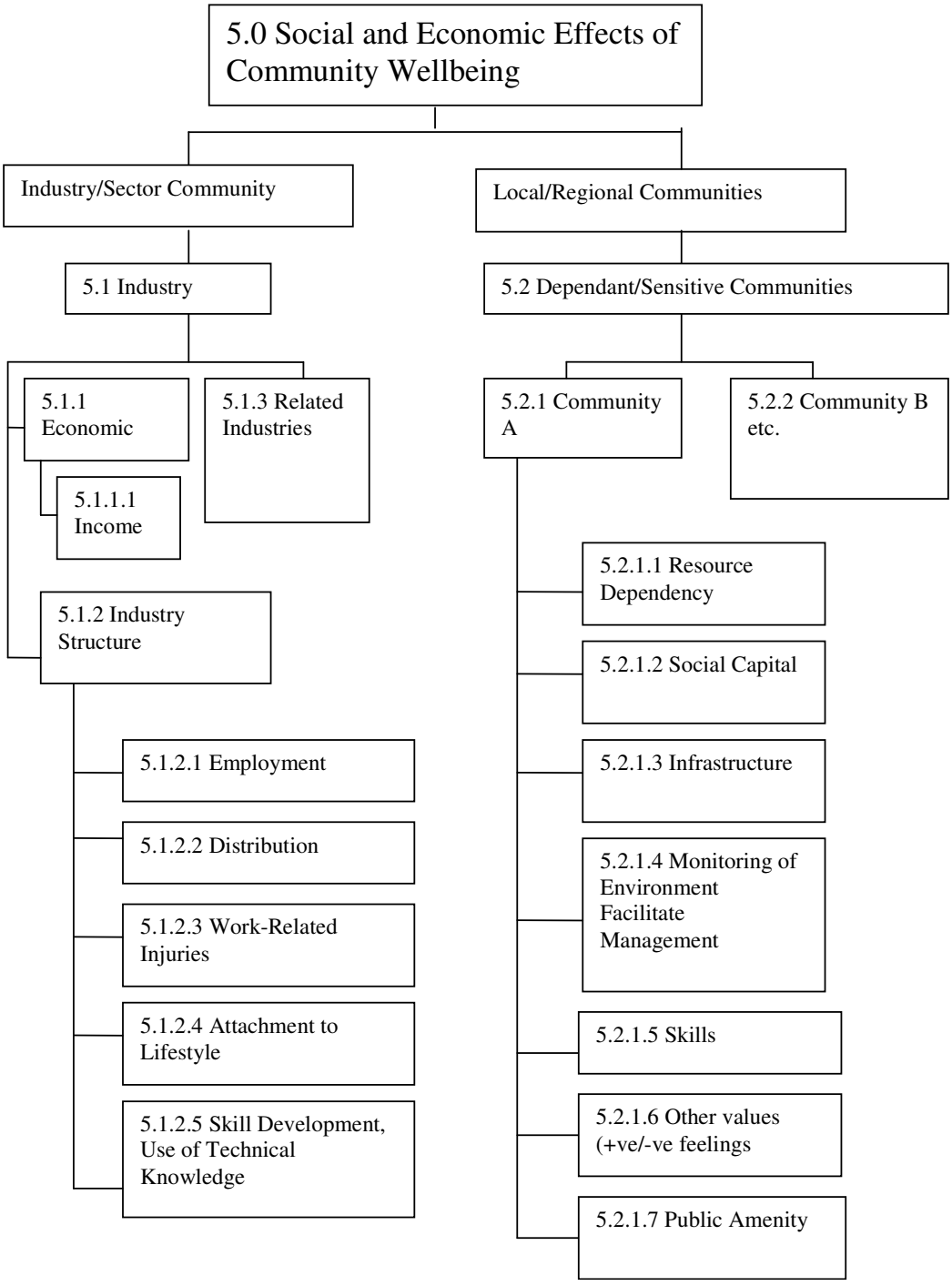


Figure 5.0. Component Tree 5: Contribution of Industry to social and economics effects of community wellbeing.

COMPONENT 5.1: INDUSTRY/SECTOR COMMUNITY

The Industry community component adressess a range of issues that affect the people directly employed by the Industry or their families. The issues are covered on a state wide basis and look at income, employment, locally based processing, contribution to lifestyle, family involvement to industry and occupational health and safety. Regional and/or local groups will need to collect appropriate information on their own local community. Both social and economic vectors are considered.

5.1.1: Economic

Scope

To assess the economic benefits and costs to the Industry community from regional abalone farming.

5.1.1.1: Income

The abalone industry is the third most valuable marine farming industry in Tasmania. The Australian average gross value (AGV) of farmed abalone at market was approximately M$16.8 in 2005. Much of this value is returned to the community in the form of employment, and support of local businesses. Based on the estimated Gross Value predicted for the Australian industry, the Tasmanian Industry would expect to have an AGV of M$10 by 2010 if it maintains 20% of the market share (Fig 5.1.1).

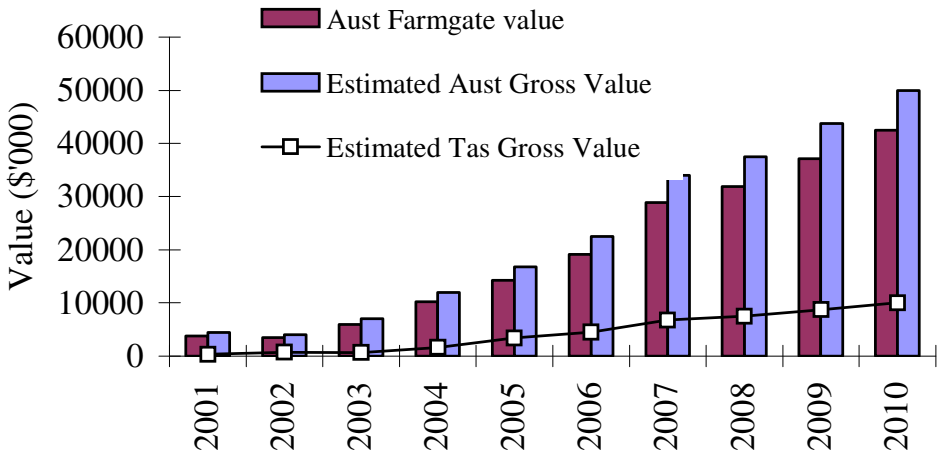


Figure 5.1.1. Current and estimated farmgate and gross value of farmed abalone for the Australian and Tasmanian Industries. Tasmanian figures are based on a 20% market share.

5.1.2: Industry Structure

Private companies own most abalone farming enterprises. These businesses employ on average 6 to 7 people full-time. The Industry commenced in the 1980's and is managed by young, vibrant and progressive professionals who have been instrumental in development of the Industry.

5.1.2.1: Employment

The Industry is an important regional employer, with around 32 full-time employees in 2005. All abalone farms are located in regional remote locations meaning that the employment is often vital for the local community.

5.1.2.2: Distribution

The distribution of abalone marine farms is controlled through regional planning schemes, under the Resource Management Planning Scheme (RMPS). A key objective of the RMPS is that the developments operate in an environmentally sustainable manner. The current distribution of the Industry is shown in Figure 5 in the Industry description (page 16).

5.1.2.3: Work-related Injuries

The Industry operates under the *Workplace Health and Safety Act* 1995 and each business is required to have its own Occupation Health and Safety (OH&S) management plan. The agriculture, fishing and hunting sector (which incorporates marine farming) has average workplace accident rates when compared to all other industries. Of all workers compensation claims in the sector, none were related to marine farming for the year ending June 2003 (DIER 2004). Individual statistics for industry injuries are not available but marine farming has not been classified as a high health risk industry.

5.1.2.4: Attachment to Lifestyle

Marine farming, being a primary industry, has been recognised as a socio-cultural practice rather than just a technical activity (Vanclay 2004). Farming is a way of life as well as a way of earning a living and acquires a meaning far deeper than almost any other occupational identity. Many abalone farmers are attracted to the regional lifestyle, marine environment, ability to participate in a new exiting sunrise industry and new challenges to develop the industry with adaptation and improvisation. Sustainability is recognised as a major factor in being able to stay in the Industry and maintain the current lifestyle.

5.1.2.5: Skill Development, Use of Technical Knowledge

A number of sectors provide training for the Industry, including Seafood Training Tasmania, the University of Tasmania and the Australian Maritime College. Seafood Training Tasmania delivers training to the catching, marine farming and processing sectors of the Tasmanian seafood industry and the marine operations sector of the transport industry. The University of Tasmania provides training and research expertise through the School of Aquaculture and TAFI. The Australian Maritime College provides a variety of marine-based courses from Certificate II to post-graduate studies. The Industry is actively engaged in industry development.

5.1.3: Related Industries

Related industries that support abalone farming include equipment supplies, concrete suppliers, air and road transport companies, feed suppliers, engineering companies, EMS consultancies, electricity suppliers, earthwork contractors, plumbing and piping services and suppliers, packing industry, insurance and research and development, wholesale and retail seafood outlets, restaurants, chandleries and fuel depots.

The industry is reliant on these industries to maintain production and will often support businesses in the local/regional area.

Social and Economic Objective 5.1: To ensure that industry provides economic and social support to the industry sector/community.			
Consequence C= 2	**Likelihood L= 2**	**Risk Rating C x L = 4 Low**	**Target Risk Rating N/A**
Risk Management Options • Strategic business planning • Sustainable farming practices • Risk Management • Training • Minimum wages and conditions are maintained in accordance with enterprise agreements or state awards			
Suggested Performance Measures • Evaluating industry profitability and sustainability • Monitoring staff turnover and Industry's ability to attract suitably qualified personnel • Maintaining communication between the Tasmanian abalone industry and community			

LOCAL/REGIONAL COMMUNITY

COMPONENT 5.2: DEPENDANT/SENSITIVE COMMUNITIES

Dependant communities are communities that the Industry contributes to economically as measured in terms of jobs and added value. Any reduction in the Industry sector would result in less economic contribution (eg. job losses) which could seriously undermine the socio-economic fabric of the community. However, dependant communities may also be seen as those that rely on Industry to maintain community bonds, values, knowledge and language in which traditions are established, confirmed and passed on (Brookfield et al 2005). There is little information available for Industry-dependant communities in Tasmania.

Scope

To assess the impact of Industry on the welfare of (regional) communities reliant upon the Industry.

Current Evaluation

5.2.1 Resource Dependency

The Tasmanian abalone Industry is reliant on good quality seawater and occasional access to the wild stock to ensure genetic viability.

5.2.2 Social Capital

Social capital represents the degree of social cohesion that exists in communities. It includes mechanisms such as networks, shared trust, norms and values. Many Industry businesses have a high level of social capital in the community; all Industry businesses are members of the Tasmanian Abalone Growers Association (TAGA). There is little information reported on social capital in the Tasmania marine farming industry.

5.2.3 Infrastructure

The infrastructure installed to support the Industry provides benefits to local communities through increased power supply for the rural community, increased freshwater infrastructure, increased transportation and increased freezing capacity.

5.2.4 Monitoring of the environment

Abalone is considered to be sensitive to changes in the marine environment, therefore a decline in the health of farmed abalone may present an early warning system of problems in the marine environment. Both chemical and physical parameters of oceanic water taken into abalone farms are monitored on a regular basis. The Industry plays an important role in monitoring the environment of our coastlines through their very existence.

5.2.5 Skills

Skills taught to Industry employees are often transferable through the community and to other occupations. These skills include stock husbandry and management, food handling, construction, machinery operations and maintenance, time management, environmental management, and occupational health and safety. Activities in the Industry often teach employees multi-tasking skills.

5.2.6 Other values (feelings)

The Industry provides an identity in regional communities, with some communities regarding abalone farming as progressive and futuristic. The community rarely expresses any negative perceptions about the Industry.

5.2.7 Public Amenity

The aspect of public amenity is difficult to quantify, as attitudes, perceptions and expectations vary considerably between people. The local government planning approval process takes into account issues of public amenity through the public consultation process (Section 2.3: Physical Structures, Construction and Tenure).

These issues include visual impacts, foreshore amenity, navigation, commercial and recreational fishing, aboriginal heritage, recreation, noise, odour and tourism.

Social and Economic Objective 5.2: To ensure that industry provides economic and social support to the dependant community.			
Consequence C= 1	**Likelihood L= 2**	**Risk Rating C x L = 2 Low**	**Target Risk Rating N/A**
Risk Management Options • Strategic business planning • Sustainable farming practices • Compliance with management controls • Risk Management • Community education through EMS • Participation of community business organisations • Providing mechanisms to address community concerns			
Suggested Performance Measures • Evaluating industry profitability and sustainability • Communication between the Tasmanian abalone industry and community			

Component 6: Indigenous Community Wellbeing

Introduction

The indigenous community wellbeing component looks at the contribution of the Industry to Tasmanian Aboriginal communities that may be affected, either positively or negatively, by the operations of the Industry.

The Industry is located on coastal land, which may co-occur in areas where the Aboriginal community or their artefacts exist.

The Indigenous Community Wellbeing Component Tree (Fig. 6.0) demonstrates the issues that have been covered in regard to sustainability involving Aboriginal communities. Aboriginal people's relationships with the marine environment could be defined in terms of culture, site protection, access and usage, and sustainable distribution of resources. Spiritual understanding underpins this relationship. Cultural ceremonies, for example, were held to protect and secure food and food resources (National Oceans Office 2002).

These issues have been reviewed by sectors of Tasmanian Aboriginal community, and all care has been taken to incorporate the Tasmanian Aboriginal community's views and cultural beliefs. It must be recognised that there are many different Aboriginal groups with different backgrounds and perspectives in Tasmania. These views may not incorporate the beliefs of all groups.

The risk assessment for the Indigenous Community Wellbeing component utilises the Social/Political Consequence table as provided in Appendix 1 (Table 1.4). The understanding of the social impacts of management decisions does not assume that management decisions will be made to minimise the social impacts at the expense of ecological considerations.

All abalone farm leases have been assessed through the *Marine Farming Planning Act 1995*, which takes into account the *Aboriginal Relics Act 1975*. This act states that to damage, destroy, remove, conceal or interfere with an Aboriginal relic requires a permit from the Minister of National Parks and Wildlife. Relics need not have been formally identified in order to be covered by the provisions of this Act, which apply to all land tenures.

A relic includes:
(a) any artefact, painting, carving, engraving, arrangement of stones, midden, or other object made or created by any of the original inhabitants or descendants of any such inhabitants
(b) any object, site or place that nears signs of the activities of any such original inhabitants or their descendants.

In addition, the *State Coastal Policy (1996)* states that:

1.2.1. Areas within which Aboriginal sites and relics are identified will be legally protected and conserved where appropriate.

1.2.2. All Aboriginal sites and relics in the coastal zone are protected and will be identified and managed in consultation with Tasmanian Aboriginal people in accordance with relevant State and Commonwealth legislation.

2.6.3. Agreements between landowners, landholders and councils or State Government to grant public access to the coast, and Aboriginal access to Aboriginal sites and relics in the coastal zone over private and public land will be encouraged and shall be considered when preparing plans or approving development proposals.

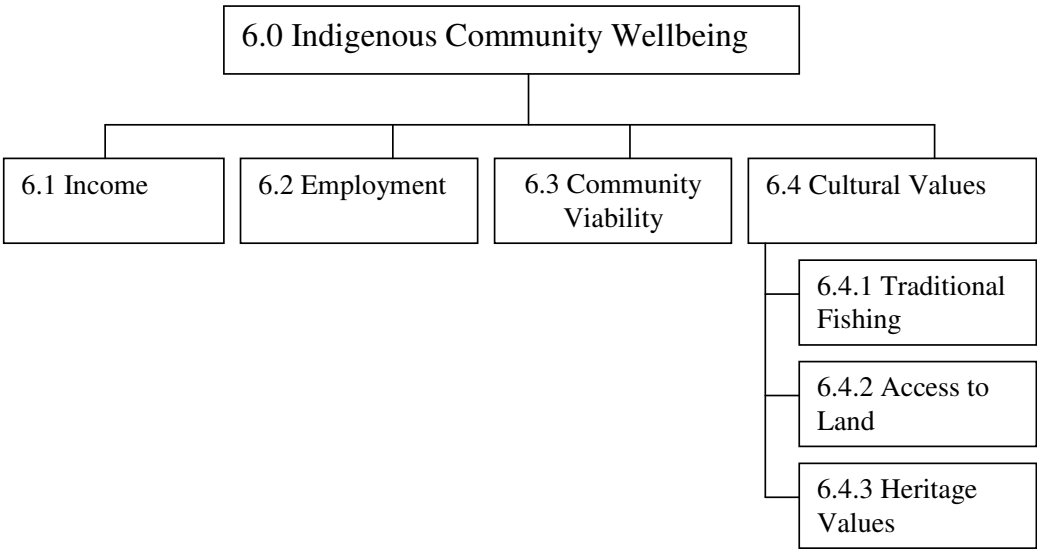


Figure 6.0. Component Tree 6.0: Indigenous Community Wellbeing in relation to the Abalone Marine farming Industry.

6.1: INCOME

This component looks at the opportunities provided by the industry in terms of income to the Tasmanian Aboriginal community.

Scope

To assess the potential impact of industry on the Tasmanian Aboriginal community by providing impartial access to income.

Current Management Controls

The Tasmanian abalone industry operates successfully on a competitive free market and provides stable investment return for the community as a whole, including the Tasmanian Aboriginal community. State and Federal regulations, including the Resource Management and Planning System (RMPS), which is based on the principles of sustainable development, govern the industry.

Socio-economic Objective 6.1: To ensure that the Tasmanian Aboriginal community has access to ongoing stable investment return from the Industry, as part of the wider community.			
Consequence C= 2	**Likelihood L= 1**	**Risk Rating C x L = 2 Low**	**Target Risk Rating N/A**
Risk Management Options • Continue current sustainability practices, marketing and cost competitiveness			
Suggested Performance Measures • Economic market			

6.2: EMPLOYMENT

The Tasmanian Aboriginal community has the opportunity for investment in the Industry that may provide an avenue for Aboriginal people to source employment in this area.

Scope

To assess the potential contribution of Industry in providing employment to the Tasmanian Aboriginal community, as part of the wider community.

Current Management Controls

The Industry is bound by the *Anti-Discrimination Act* 1998, Section 14 and 15, to not discriminate either directly or indirectly against any person, including Aboriginal people. The industry must provide stable and continuing employment for all employees, based on the employee's willingness to work and competence rather than other attributes, which may be considered discriminatory.

Social Objective 6.2: To ensure that the Aboriginal community has equal opportunity and continuity of employment in Tasmanian land based abalone farming industry.			
Consequence C= 2	**Likelihood L= 2**	**Risk Rating C x L = 4 Low**	**Target Risk Rating N/A**
Risk Management Options • Providing an equal opportunity employment environment			
Suggested Performance Measures • Monitoring employment statistics			

6.3: COMMUNITY VIABILITY

Scope

To assess the potential contribution of Industry to Tasmanian Aboriginal community viability.

Current Management Controls

Initiatives by the National Aquaculture Council recognise the interests of Aboriginal communities within the National Aquaculture Strategy, leading to the development of the AFFA funded National Framework for Aboriginal Aquaculture Development (DAFF 2001). The opportunity for the Tasmanian Aboriginal community to participate in marine farming is governed by the DPIW under the LMRMA 1995 and the MFPA 1995

Social Objective 6.3: To ensure that the Aboriginal community has local opportunities for participating in the industry.			
Consequence C= 2	**Likelihood L= 1**	**Risk Rating C x L = 2 Low**	**Target Risk Rating N/A**

6.4: CULTURAL VALUES

This component covers the contribution of the Industry in maintaining cultural values of the Tasmanian Aboriginal community and to identify whether the cultural values of the Aboriginal community are positively or negatively impacted by operations of the Industry.

6.4.1: Traditional Fishing

Scope

To assess the potential impact of the Industry on the traditional fishing rights of the Tasmanian Aboriginal community.

Current Management Controls

The Tasmanian Aboriginal community has strong links with the fishing of wild abalone. The collection of wild abalone is a method in which the community passes down cultural skills and stories to the younger generation. The land based farming of abalone does not impact upon these cultural values.

Social Objective 6.4.1: To ensure those traditional fishing rights of the Tasmanian Aboriginal community is not negatively impacted on by operations of the industry.			
Consequence C= 0	**Likelihood L= 2**	**Risk Rating C x L = 0 Negligible**	**Target Risk Rating**

6.4.2: Access to Land

Scope

To assess the potential impact of the industry on the Tasmanian Aboriginal community through the restriction of access to land for cultural activities.

Current Management Controls

The Marine Farming Planning process through the development of MFDP consult with the Tasmanian Aboriginal community and private land stakeholders in relation to the siting and activities of a marine farming lease in the marine environment to ensure that access to culturally sensitive sites is not impeded. The local council consults with the Tasmanian Aboriginal community for land based facilities under the LUPAA. This process does not identify middens or artefacts significant to the Aboriginal community or ensure the integrity of the sites is maintained. Land based facilities related to abalone marine farming industry undertake a similar process through the local Council bodies in each respective area.

Social Objective 6.4.2: To ensure that activities of the Tasmanian Aboriginal community are not negatively impacted on through restricted access to land caused by the operations of the industry.			
Consequence C= 3	**Likelihood L= 1**	**Risk Rating C x L = 3 Low**	**Target Risk Rating N/A**
Risk Management Options • Compliance with appropriate regulations			

6.4.3: Continuation of Activities

Scope

To assess the potential impact of the Industry on the Tasmanian Aboriginal community's ability to continue culturally important activities.

Current Management Controls

The Tasmanian Aboriginal people place a high level of importance on continuing to use the coast and the sea for food collection as a means of maintaining cultural links. Areas where the Tasmanian Aboriginal community conduct cultural ceremonies have been identified by consultation with the Tasmanian Aboriginal

community through the Marine Farming Planning process. Permits for collection of seafood for cultural programs are issued by DPIW through the LMRMA 1995.

Social Objective 6.4.3: To ensure that the Tasmanian Aboriginal community, where affected by land based abalone industry activities, have the ability to continue cultural activities in the future.			
Consequence C= 3	**Likelihood L= 1**	**Risk Rating C x L = 3 Low**	**Target Risk Rating N/A**

6.4.4: Heritage Sites

Scope

To assess the potential impact of the Industry on Tasmanian Aboriginal heritage sites.

Current Management Controls

Heritage sites are viewed by Aboriginal people as a link between land, sea and resources over time. The shell middens dotted along the Tasmanian coast tell of the unbroken temporal connection between people and marine resources. The *Historical Cultural Heritage* Act 1995, *National Parks and Wildlife* Act 1970, and *Aboriginal Relics* Act 1975 govern access and preservation of Aboriginal heritage sites in Tasmania.

Social Objective 6.4.4: To ensure that Tasmanian Aboriginal heritage sites are not impacted upon by the industry.			
Consequence C= 3	**Likelihood L= 1**	**Risk Rating C x L = 3 Low**	**Target Risk Rating N/A**

Component 7: Governance

Introduction

The Governance tree covers the legislative, administrative and bureaucratic processes that influence many of the issues in the previous six component trees. These issues are influenced at three levels:

- Government, including the responsible management agency, be it either Federal, State or Local;
- Industry; and
- Other interest groups (Non-Governmental Organisations)

All Australian Governments have commited to working in partnership with the marine farming industry to achieve maximum sustainable growth, whilst also meeting national and international expectations for environmental, social and economic performance (DAFF). The Tasmanian Government has been a leader nationally and internationally in facilitation of effective, efficient, timely and transparent planning processes for marine farming. The State Government also supports and recognises the continual improvement of ecologically sustainable marine farming practices within the Industry. The Industry has taken a proactive role in regulatory and compliance issues, to ensure that cost effective and practicable processes are in place.

Additions and exclusions from Fletcher et al (2004) ESD tree are:

Exclusions

- OCS (offshore commonwealth sector) arrangements: the Industry does not operate in offshore waters.
- Economic Instruments (under Section 7.1.2.3. Australian Governments) is covered adequately in Component 8, Section 8.2.2: Impacts of Other External Drivers, Economic).
- Participation (inc MAC's) (under 7.1.1.1 Management Agency). This is not considered relevant for the Industry.

Additions

- Seafood Health. Seafood Safety is considered under Section 7.2: Industry.

Transfers

- Plans. Transferred from 7.1.1.1: Management Agency to 7.1.2.1 Local Government.
- Legal Framework. Transferred from 7.1.1.1: Management Agency to 7.1.2.1 Local Government and includes Regulation, Resource Access & Allocation and Liability.
- Management Agency has been simplified removing all sub headings.

All risk assessments refer to the social/political consequence table in Appendix 1.

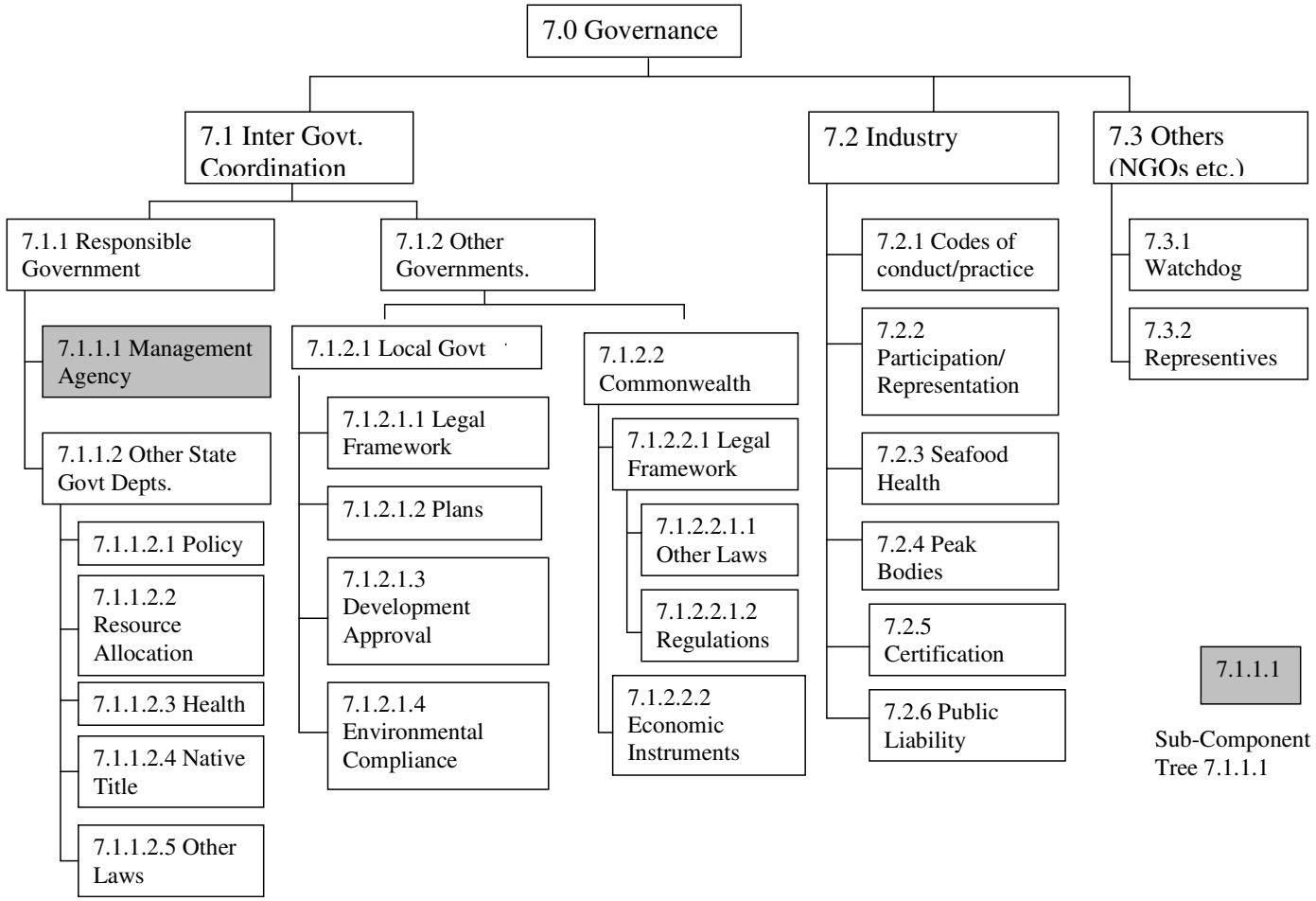


Figure 7. Component Tree 7: Governance (inclusive of Sub-Component Tree 7.1.1.1)

COMPONENT 7.1: INTERGOVERNMENTAL COORDINATION

The information in this component has been completed through consultation with the DPIW Marine Farming Branch, as the responsible management agency and the DTAE Environment Branch, with assistance from Industry. A sub-component (Fig. 7.1.1.1) covering the responsibilities of the management agency is included in this component.

This framework address only land based abalone farms. Sub-tidal abalone farming has yet to be proven commercially viable in Tasmania.

7.1.1: RESPONSIBLE GOVERNMENT

Scope

To assess the impact of the State Government's regulatory framework on the sustainability of Industry.

7.1.1.1: Management Agency

The governance structure of the management agency responsible for marine farming is complex. While the DPIW Marine Farming Branch has ultimate responsibility for licensing the farming of native species, much of the regulatory responsibility for land based marine farms rests with the local government authority, with assistance from DPIW Marine Farming Branch and DTAE Environment Division. The structure is presented in Sub-Component Tree 7.1.1.1: Governance of the Management Agency (Figure 7.1.1.1). This sub-component tree should be interpreted as part of Component Tree 7: Governance.

7.1.1.1.1: Management

7.1.1.1.1.1: Effectiveness

The activity of land based abalone marine farming is regulated under the LMRMA. The DPIW Marine Farming Branch issues licenses with conditions that authorise farmers to engage in abalone farming activities on land. The Marine Farming Branch has issued approximately 20 licenses endorsed for the production of abalone in Tasmania (both land and sea based), with only 5 of these license holders producing stock for commercial sale. The DPIW does not play a role in the planning and environmental regulation of land based farming, which is addressed in Section 7.1.2.1: Local Government.

7.1.1.1.1.2: Compliance

The DPIW employs two full-time Marine Farming Inspectors. These inspectors, as part of their duties, monitor licence holder compliance with license conditions under the LMRMA. The DPIW inspectors play no role in environmental monitoring under EMPCA (see Section 7.1.2.1: Local Government).

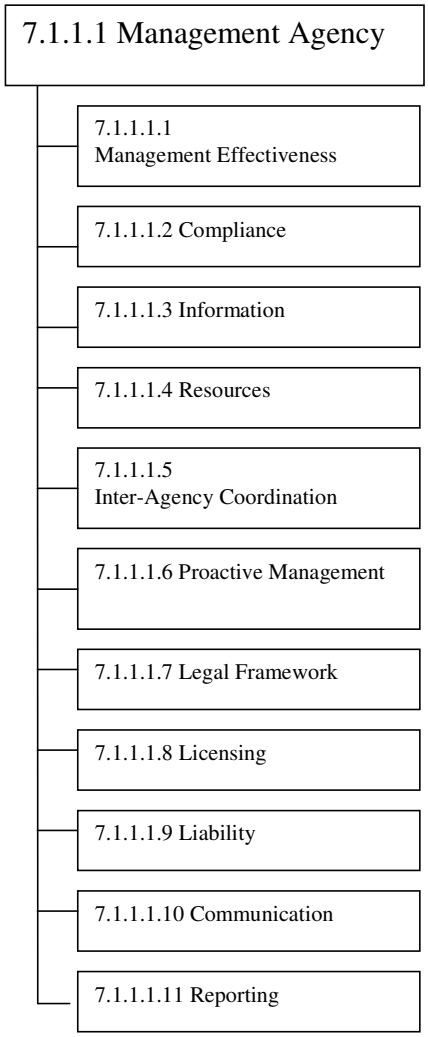


Figure 7.1.1.1. Sub-Component 7.1.1.1: Governance of the Management Agency

7.1.1.1.1.3: Information

The dissemination of information from the management agency to the Industry is through routine inspection reports, correspondence and contact with licence holders.

7.1.1.1.1.4: Resources

The DPIW Marine Farming Branch consists of a Branch Manager and two Senior Managers. One Senior Manager is responsible for Planning and Operations with 6 staff including the Marine Farming Inspectors. The other Senior Manager is responsible for the Marine Environment with a staff of 4 including Environmental

Officers. These personnel deal with all sectors of the marine farming industry in Tasmania.

7.1.1.1.1.5: Inter-agency coordination

The Marine Farming Branch consults as required with other parts of DPIW, DTAE and Local Government before the granting of a license endorsing the culture of abalone.

7.1.1.1.1.6: Proactive Management

The Marine Farming Branch consults with Industry peak bodies which includes the Tasmanian Abalone Growers Association (TAGA), Tasmanian Fishing Industry Council (TFIC), Tasmanian Abalone Council (TAC) and the Tasmanian Aquaculture Council (TAC) on matters of policy.

7.1.1.1.1.7: Legal Framework

The activity of abalone marine farming is regulated by the LMRMA, EMPCA, LUPAA and the Crown Lands Act through the processes described in Fig 7.1.1.1.1.7 and Appendix 7.1.1.1. Policy may change with the State and Local Government of the day.

7.1.1.1.1.8: Liability

The Crown accepts no liability that the seawater extracted by land based abalone farms will be suitable for the purposes of marine farming. Persons considering marine farming are solely responsible for establishing the suitability or otherwise of the farming location. The local government is also excluded from liability if it has acted responsibly to enforce its planning scheme in complying with the RMPS and the State Coastal Policy.

7.1.1.1.1.9: Licensing

Land based abalone marine farming activities are authorised through the granting/renewal of a marine farming licence, pursuant to the provisions of the LMRMA.

7.1.1.1.1.10: Communication

Prior to the issue of a license under the LMRMA, the DPIW consults as necessary with the relevant Local Government authority, Crown lands Service and the Environment Division of DTAE.

7.1.1.1.1.11: Reporting

The Marine Farming Branch can review license conditions as part of the adaptive management framework. These processes may result in the variation of licence conditions in response to changing circumstances. The DPIW consults with the licence holder in this process. Licence holders have the rights of review or appeal to the licence variation or a licence condition.

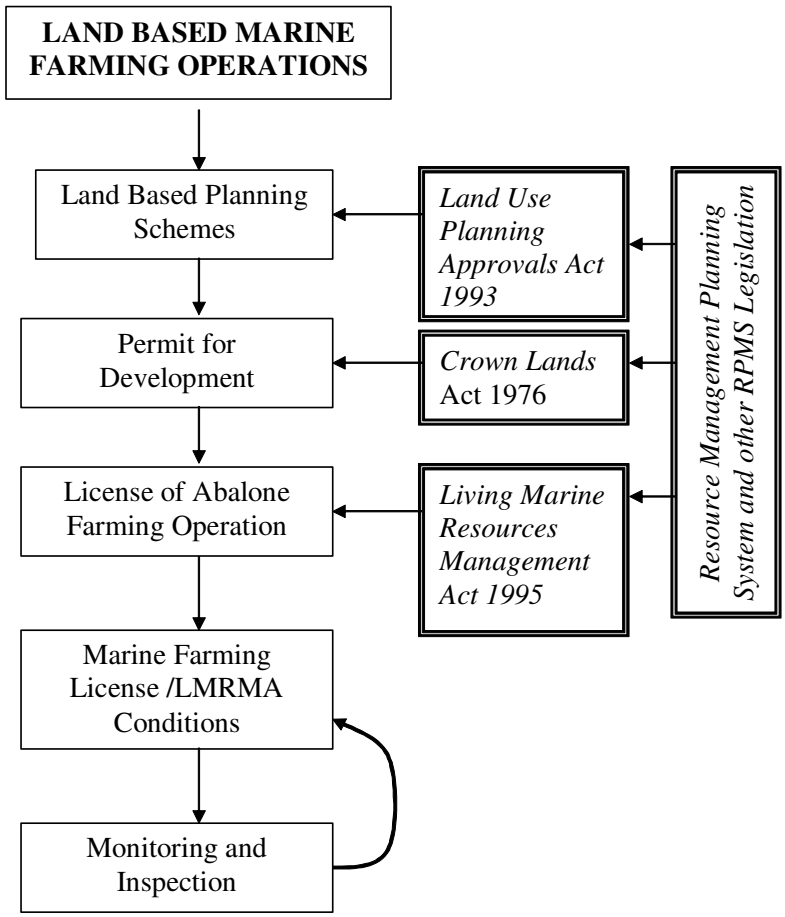


Figure 7.1.1.1.1.7. Regulatory framework governing the establishment of land based abalone farming operation.

7.1.1.2: Other State Government Departments

The other State Government Departments who has regulatory responsibilities in regard to the Industry includes the DTAE Environment Division and Crown Land Services.

7.1.1.2.1: Policy

The Environment Division requires the operation of an abalone farm to comply with the requirements of EMPCA. If production is more than 100 tonnes per annum, the activity is considered as a Level II activity under Section 4(c) of Schedule 2 in the EMPCA and is regulated by the Environment Division of DTAE.

The definitions under Schedule 2 of EMPCA are as follows:

4. Food Production and Animal and Plant Product Processing

> **(c)** Fish Processing: the conduct of works for scaling, gilling, gutting, filleting, freezing, chilling, packing or otherwise processing fish for sale and in which 100 tonnes or more of product per year are produced.

At present, most land based abalone farms process but operate under 100 tonnes production per annum and are regulated under LUPAA by the Local Government (see Section 7.1.2.1.3: Environmental Compliance).

7.1.1.2.2: Resource Allocation

Land use planning for land-based marine farming activities falls within the jurisdiction of Local Government under LUPAA (Section 7.1.2.1.2: Plans). Authority to occupy Crown Land to locate seawater uptake and outlet service pipes is considered by the Applications and Assessments Panel, which consists of representatives from the DPIW Marine Resources, Coastal, Environment Branches, Forestry Tasmania and Mineral Resources Tasmania. The main concern of the panel is to ensure that the pipes are low impact environmentally, appropriately located in the context of competing values, and will not produce a safety hazard for other coastal users. An application is also considered by the Public Benefits Assessment Committee (PBAC) who has the ability for the Crown Land Services to make a decision outside EMPCA and LUPAA processes.

If the Crown Land is proclaimed as a Nature Conservation Area under *the Nature Conservation Act* 1992, approval needs to be sought through a Resource Activity Assessment and is governed by the *National Parks and Wildlife Service Act 1992*.

7.1.1.2.3: Health

There are no legislative requirements to regulate the health of farmed abalone. However, fish health is monitored as deemed necessary by industry at the Fish Health Unit at Mount Pleasant (Section 2.4.2: Disease). Marine farming licences endorsed for abalone contain conditions requiring those licence holders to report significant stock mortality or disease.

7.1.1.2.4: Native Title

Native title claims reviewed through Local Government approval process under LUPAA or by Crown Land Services.

Socio-economic Objective 7.1.1.1: To ensure that State Government policies and processes do not negatively impact on the sustainability of Industry			
Consequence (Table 1.4) C= 3	**Likelihood L= 3**	**Risk Rating C x L = 9 Moderate**	**Target Risk Rating Low**
Risk Management Options • Ensure effective, ongoing Government/Industry consultation • Effectively engaging State Government and participating in the political process to ensure that industry interests are taken into account in policy decision making			
Suggested Performance Measures • Regular evaluation of the Industry profitability and sustainability			

7.1.2: OTHER GOVERNMENTS

Scope

To assess the impact of the Local and Australian Government's management on the sustainability of Industry.

7.1.2.1: Local Government

Local Government is responsible for the planning and approval of land based marine farming operations. A marine farming licence for a land based abalone farm will not be granted unless the applicant can provide evidence of the necessary planning and development approval from the relevant local government authority.

7.1.2.1.1: Legal Framework

Any application for land based facilities is considered by the relevant Local Government authority in accordance with the local planning scheme and pursuant to the provisions of the LUPAA as shown in Fig 7.1.1.1.1.7.

7.1.2.1.2: Plans

Local Governments in Tasmania vary in their type and application of planning schemes. Many Local Governments use a prescriptive planning scheme but include marine farming as a discretionary development that allows Council to relax or modify any provisions of their scheme. Some councils use a performance based criteria for planning approvals in which each development proposal is assessed on its own merits. A synopisis of the different types of planning schemes in areas considered suitable for land-based abalone farming are presented in Table 7.1.2.1.2.

7.1.2.1.3: Development Approvals

Each Local Government has the responsibility to ensure that a development complies with LUPAA and other relevant State legislation and local bylaws. Local Government also usually ensures that an applicant has approached the relevant State Government authorities for assessment under EMPCA, obtaining access to Crown

Land Services, marine farming licenses etc. The proponent is responsible for assessing the development against the provisions of the EPBCA. More information on these requirements is provided on the Aquaculture Business Approvals website at www.bap.tas.gov.au. Refer to Appendix 7.1.2.1.3.

7.1.2.1.4: Environmental Compliance

Industry are obliged to comply with the requirements of EMPCA and subordinate legislation including the *State Policy on Water Quality Management 1997*, the *State Coastal Policy 1996* and the Australian Water Quality Guidelines. These guidelines are measure the success of impact reduction outside the area of assimilation and are based upon the background environment, type of activity and technology used. The guidelines are produced through consultation between the Local and State Government authorities (Environment Division). Industry must also comply with the provisions of EMPCA as they relate to water discharge and relevant Quality Assurance Programs as required by the *Export Control Act 1982* (Section 1.2.5)

7.1.2.2: Australian Government

7.1.2.2.1: Legal Framework

Industry proponents must consider their developments against the provisions of the Commonwealth Government EPBCA, which is triggered when a matter of "national environmental significance" is involved. For more information see http://www.deh.gov.au/epbc/about/index/html. The Industry must demonstrate environmental sustainability to export a native species (described in Section 1.1.1:Wildstock of Species).

For farms which export the fish that they process, the premise must be registered with the Australian Quarantine and Inspection Service and meet certain prescribed standards in the areas of construction, equipment, hygiene and security etc. The legislation in this area changed in 2005. More information is available at http://www.affa.gov.au/content/output.cfm?ObjectID=352A779A-CA09-4B22-97C05AB1EE57CF9C.

Table 7.1.2.1.2. Planning requirements of selected Tasmanian councils for land based abalone activities. *GI = General Industry; LI = Light Industry; CI = Controlled Industry; HI = Heavy Industry; CI = Controlled Industry; EI = Extractive Industry; SR = Semi-residential; B&S = Business and Shopping; B&C(W) = Business and Commercial (Warehouse); RR= Rural Residential; RvdRR = Reserved Rural Residential.

Local Government	Planning Act or Scheme and type of scheme	Usage Classification	Zones*
All	*Local Government Act 1993* Perscriptive	Light Industry	Permissible in LI, CI, HI, EI Permissible only with the consent of the Council in SR, B&S, B&C(W)
Clarence City Council	Eastern Shore PS 1963 Prescriptive	NIL	Generally not considered
	Eastern Shore PS (Area 2) 1986 Prescriptive	Discretionary	RR, RvdRR, GI, CI, Passive and Active recreation, Non-urban, Intensive agriculture
	Richmond PS 1993 Prescriptive	Discretionary	
Sorell Council	Sorell PS 1993. Prescriptive	Discretionary	
Glamorgan Spring Bay Council	Glamorgan Spring Bay PS 1994 Prescriptive	Discretionary	Open space zone including Rural and Coastal Rural
Break O'Day Council	Break O'Day PS 1996 Performance based		
West Tamar	Municipality of Beaconsfield PS 1986 Prescriptive but working towards performance based	Discretionary Permitted	Recreational and rural zone Port & Marine zone
Circular Head	Circular Head Planning Scheme 1995 Prescriptive	Permitted Discretionary	Maritime Industrial Open Space, Rural

Socio-economic Objective 7.1.2.1: To ensure that Local Government's policy and processes do not negatively impact on the sustainability of Industry			
Consequence C= 3 (Table 1.4)	**Likelihood L= 3**	**Risk Rating C x L = 9 Moderate**	**Target Risk Rating Low**
Socio-economic Objective 7.1.2.1: To ensure that the Commonwealth Government's policy and processes do not negatively impact on the sustainability of Industry			
Consequence C= 3 (Table 1.4)	**Likelihood L= 3**	**Risk Rating C x L = 9 Moderate**	**Target Risk Rating Low**
Risk Management Options • Ensure effective, ongoing Government/Industry consultation • Effectively engaging State, Local and Commonwealth Governments and participating in the political process to ensure that industry interests are taken into account in policy decision making			
Suggested Performance Measures • Regular evaluation of the Industry profitability and sustainability			

COMPONENT 7.2: INDUSTRY

The information in this branch of the component tree has been completed by Industry representatives

Scope

To assess the impact of the Industry's management on the sustainability of the Industry.

7.2.1: Codes of Conduct/Codes of Practice

The Industry is presently developing an EMS Framework that incorporates codes of practice (COP) such as one for Invasive Marine Species (Appendix 2.2.7). Industry is working towards using management systems which allow for adaptive management rather than prescriptive regimes. The Industry has adopted the Code of Conduct for Australian Aquaculture developed by the National Aquaculture Council (NAC) as shown in Appendix 7.2.1.

7.2.2: Participation & Representation

The Industry's peak representative bodies are Tasmanian Abalone Growers Association (TAGA), Australian Abalone Growers Association (AAGA) and Tasmanian Aquaculture Council (TAC) in liaising with Government at both a National and State level.

7.2.3: Seafood Safety

The post-harvest regime includes a food safety program based on time/temperature protocols under Section 16 of the Primary Producers Processing Standard (PPPs

2006). More information is provided on the website: http://www.foodstandards.gov.au/_srcfiles/Standard_4_2_1_Seafood_PPP_v78.doc

7.2.4: Peak Bodies

The peak representative body for the Industry is the Tasmanian Abalone Growers association (TAGA). A number of other bodies play vital roles in the representation and promotion of the Industry and have direct links to TFIC and TAC including the Australian Abalone Growers Association (AAGA) as shown in Figure 7.2.4.

TAGA was first established in August 1994 and formed as an Association by 19 initial participants. The aims and objects of TAGA are to further the interests of abalone growers and, without limiting the generality of the foregoing shall include:

- promotion of the development of an abalone growing industry in Tasmania and after the establishment of the industry, the promotion and enhancement of the image of the industry to members of the general public in Tasmania and elsewhere;
- representation of the interests of Tasmanian abalone growers in Tasmania and elsewhere;
- the support and encouragement of efforts to eliminate the illegal taking of wild abalone from Tasmanian waters;
- the encouragement of fair and honourable practices amongst abalone growers;
- the promotion of such reforms of the law as affect the interests of Tasmanian abalone growers;
- the support and promotion of abalone growers in Tasmania;
- the nomination of persons to statutory and advisory bodies engaged in or impacting upon the conduct. Administration or promotion of abalone growing and its products;
- the making of representations on behalf of Tasmanian abalone growers generally and especially to the media, government, parliament and the organs of government administration whether in Tasmania or elsewhere;
- the doing of all such other lawful things as are incidental or conductive to the attainment of the basis objects of the Association as set out in the foregoing sub-rules of this rule 3.1.

TAGA has representation of two seats on TAC, but only one vote. Individual farms are representatives on AAGA.

The AAGA represent the national abalone growers and the objects of the Association are the successful development of the Australian Abalone Aquaculture Industry under the following portfolios:

1. Inter Farm Collaboration
2. Applied R&D
3. Industry Promotion
4. Generic Marketing
5. Communications
6. Regulatory Framework
7. Administration & Finance

The AAGA supports itself through a combination of a voluntary contribution attached to feed and subscriptions.

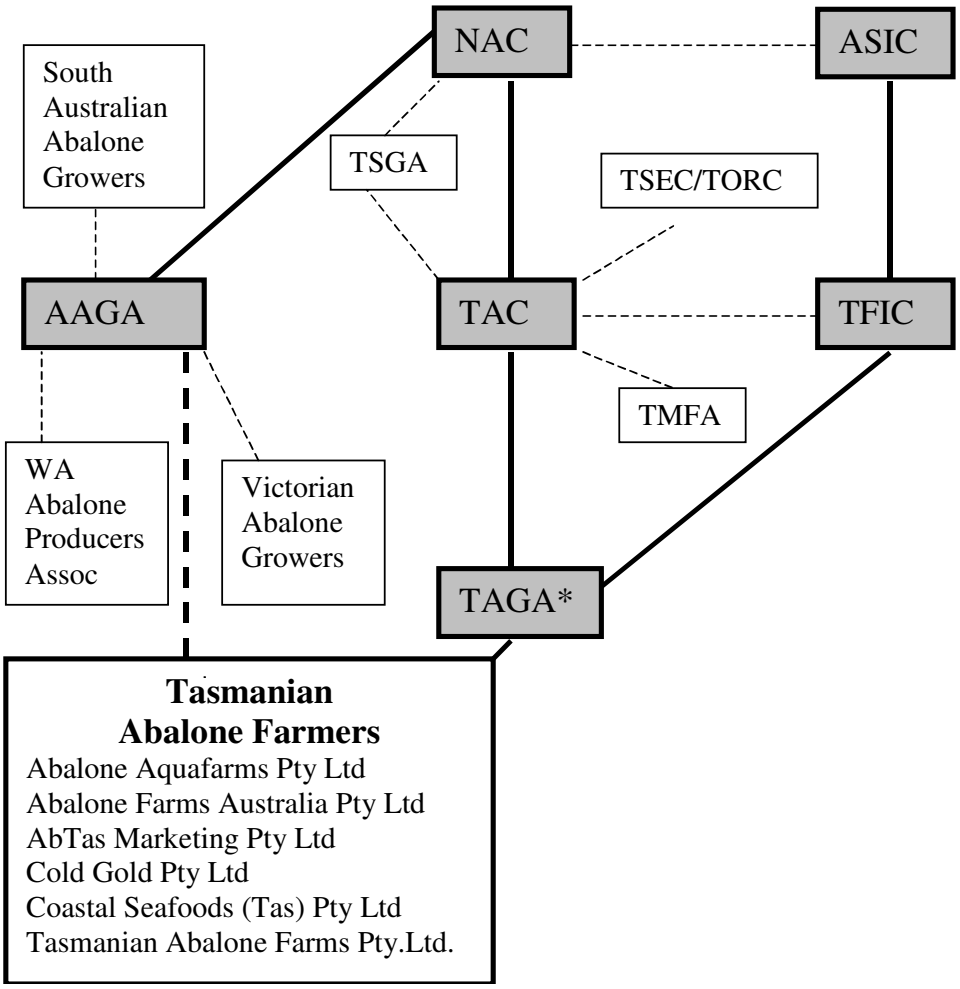


Figure 7.2.4. Tasmanian farmed abalone industry structure and links. See Glossary for acronyms. Solid lines represent structured methods of communication. * associations not yet incorporated.

In addition there are a number of marine farming bodies associated with the Industry, interstate. See the Glossary for the acronyms.

7.2.5: Certification

The Industry is subject to disease free certification by AQIS if involved in the export market, as covered in Section 1.2.2.2: Export. Facilities with processing licenses require further AQIS certification. Parts of the Industry are also working towards EMS certification.

7.2.6: Public Liability

Land based abalone farmers are responsible for their own public liability on freehold land. The Crown Land Services requires public liability insurance of $M20 where crown land is leased to access seawater.

Socio-economic Objective 7.2: That Industry has effective representation to ensure the sustainability of Industry.			
Consequence C= 3 (Table 1.4)	**Likelihood L= 3**	**Risk Rating C x L = 9 Moderate**	**Target Risk Rating Low**
Risk Management Options • Effective, coordinated Industry representation • Ensure effective, ongoing Government/Industry consultation • Effectively engaging all tiers of Government and participating in the political process to ensure that industry interests are taken into account in policy decision making • Identify needs for Industry Codes of Practice • Investment in development of human capital • Good governance practices of Industry representative groups			
Suggested Performance Measures • Regular evaluation of the Industry's profitability and sustainability			

COMPONENT 7.3: NON-GOVERNMENTAL ORGANISATIONS

Industry and management agencies take account of concerns of non-governmental organisations (NGOs) in addressing issues. Often, NGOs play an important role in representing the community. However, it is important to ensure that these influences do not override the sustainable practices already used by the Industry.

Scope

To assess the impact of the Non-Governmental Organisations (NGOs) on the sustainability of Industry.

7.3.1: Watchdog Role

Any individual or group can make representation in relation to development proposals through the Local Government planning process. Local Government is required to consider written representations received in response to the public advertising of a land based abalone marine farming development proposal. This report requires an assessment of the issues raised in representations.

7.3.2: Representiveness

The public concerns are addressed through local government planning schemes and planning processes.

Socio-economic Objective 7.3: To ensure that legitimate community environmental interests are addressed in the management of a sustainable Industry.			
Consequence C= 2 (Table 1.4)	**Likelihood L= 3**	**Risk Rating C x L = 6 Low**	**Target Risk Rating N/A**
Risk Management Options • Participation in transparent and open planning process • Effective consultation between Industry, State Government and NGOs • Effective communication between Industry and community interest groups • Effective promotion of the Industry EMS to the wider community			
Suggested Performance Measures • Absence of unnecessary delays in the planning process			

Component 8: External Impacts of the Environment on Industry

Introduction

Threats to the sustainability of Industry include external impacts that are not a result of land based marine farming activities and occur outside Industry's control. These are impacts that may affect the performance of Industry, but are generally beyond the scope of the relevant legislation of the main management agencies. The analysis of Component 8 allows Industry to identify the issues most likely to impact upon them, and provide a mechanism to assist the Industry in mitigating potential risk.

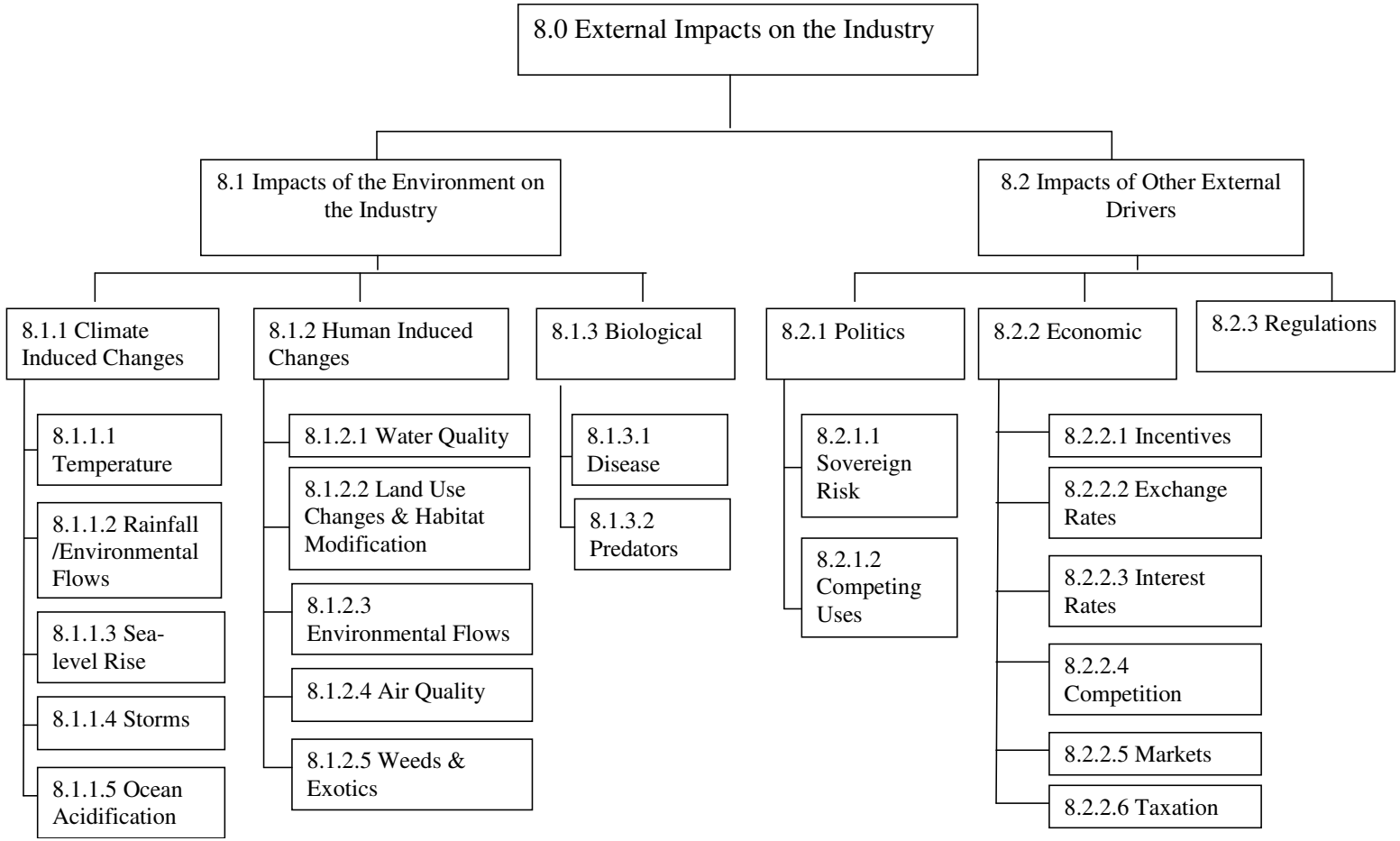
There are two major branches in Component Tree 8 (see Fig. 8.0). The first branch show the impacts that arise from environmental changes, including natural, anthropogenic and biological changes. The second branch covers the impact of other external drivers such as political and economic activities on the performance of Industry. Some aspects of the second branch are also covered in Components 4 and 5.

Component Tree 8 has been modified from Fletcher et al (2004) ESD Framework by the following means:

Additions:
- Sea Level Rise under Section 8.1.1: Climate Induced Change
- Ocean Acidification under Section 8.1.1: Climate Induced Change
- Sovereign Risk under Section 8.2.1: Politics

Combinations:
- Rainfall and Flows (under Section 8.1.1: Climate Induced Changes) were combined as they are inter-related
- Land Use Changes with Habitat Modification (under Section 8.1.2: Human Induced Changes) as one results in the other
- Exotics with Weeds (under Section 8.1.2: Human Induced Changes)

The risk assessments covered by this chapter use a number of consequence tables, as described in each risk assessment and shown in Appendix 1.0



Component Tree 8: External Impacts of the Environment on the Industry

COMPONENT 8.1: IMPACTS OF THE ENVIRONMENT ON THE INDUSTRY

Impacts from the environment may occur from broad scale ecosystem changes such as climate change. Industry has no influence over climatic change and therefore has to demonstrate mechanisms to cope with these phenomena. Human induced changes, such as activities of upstream users, cannot be controlled by industry. If these risks are high, the Industry may be able to influence conditions surrounding these activities to reduce their impact through research and sound management practices.

8.1.1: CLIMATE INDUCED CHANGES

Climate change is comprised of primary effects such as higher air temperatures and carbon dioxide concentrations, secondary effects such as sea temperature warming and lower-order effects such as sea-level rise. The ecological consequences of these changes are uncertain, but will involve changes to the structure and function of biological populations and assemblages. The Industry needs to consider future management options regarding changes to environment.

Scope

To assess the impact of climate change on the sustainability of Industry.

8.1.1.1: Temperature

The sea temperature of Tasmanian coastal waters has been reported to increase 0.6 to 3 °C per 100 years (Crawford et al 2004). The impact of temperature rise on abalone has not been determined; therefore the long-term impact on the survivability of the Industry is unknown. Summer water temperatures may have adverse impacts on some species of farmed abalone. Greenlip abalone commonly grows in warmer waters and may be less impacted by a marginal increase in sea temperature than blacklip abalone.

There is some evidence of southward extension in the ranges of some native and introduced invasive marine species, possibly related to climatic warming. The range extension for the European shore crab, *Carcinus maenus,* from Victoria to Tasmania in the early 1990s has been linked to a series of unusually warm years and a stronger than usual East Australian Current (EAC) (Thresher et al 2003). An indirect effect of sea temperature rise may be the introduction of species or diseases that may become problematic for Industry (Section 8.1.3.2).

8.1.1.2: Rainfall and Environmental Flows

Rainfall on the East Coast of Tasmania has declined substantially in the last 20 years (Graham Harris, University of Tasmania, personal communication). Winter rainfall in Tasmania is predicted to increase by up to 20% by 2030. Spring, summer and autumn rainfall are predicted to decrease by up to 10% by 2030 (DPIW 2005).

The north and east of the state are more likely to experience less rain in summer months, with a slight increase in winter. The west of the State is likely to receive more rain. However, evapotranspiration is expected to significantly increase across the state during summer and autumn, leading to a maximum of 12.2% decrease in soil moisture (Nunez 2005). Climate change may result in decreased riverine run-off and increased major storm events affecting the biological dynamics of estuarine and coastal ecosystems and hence may impact upon the Industry.

Climate change may also result in altered flow regimes, leading to changes in rainfall patterns, temperature, precipitation, evaporation, water salinity and seasonal cycles. Decreased water availability from natural sources may also lead to increased water extraction, resulting in human induced changes to flow regimes (Section 8.1.2.4). These changes are unlikely to impact on Industry significantly in coastal areas.

8.1.1.3: Sea-Level Rise

Sea-level is presently increasing at about 1.8mm per year. Physical changes resulting from sea-level rises on soft sandy shores and in low-lying coastal areas are likely to be significant in some areas over future decades, causing changes to coastal landform process systems and biological communities (Sharples 2004).

Most land based abalone farms are located above sea level and may not be adversely affected. However, infrastructure such as pump houses that are situated below or at sea level may need to be relocated in the long term.

8.1.1.4: Storms etc.

If, as predicted, storms become more intense and frequent, enhanced erosion and siltation of inlet and outlet pipes may become a significant problem for the industry. Storm surges may result in increased maintenance of water transport pipes. The Industry may need to adapt their culture techniques to accommodate increased storm frequency.

8.1.1.5: Ocean Acidification

The oceans are absorbing carbon dioxide (CO_2) from the atmosphere, causing chemical changes and making the oceans more acidic (The Royal Society 2005). This is likely to cause a reduction in the availability of the chemical compounds needed for calcified shells and plates. It is unknown if increasing ocean acidification will significantly impact upon the development of farmed abalone.

Environmental Objective 8.1.1.1: To ensure that the Industry has mechanisms to adapt to sea temperature rise.		
Consequence* C= 4	**Likelihood L= 4**	**Risk Rating C x L = 16 High**
Environmental Objective 8.1.1.2: To ensure that the Industry has mechanisms to adapt to changes in rainfall patterns.		
Consequence* C= 3	**Likelihood L= 4**	**Risk Rating C x L = 12 High**
Environmental Objective 8.1.1.3: To ensure that the Industry has mechanisms to adapt to sea-level rise.		
Consequence* C= 2	**Likelihood L= 4**	**Risk Rating C x L = 8 Moderate**
Environmental Objective 8.1.1.4: To ensure that the Industry has mechanisms to deal with storm events.		
Consequence C= 2	**Likelihood L= 4**	**Risk Rating C x L = 8 Moderate**
Environmental Objective 8.1.1.5: To ensure that the Industry has mechanisms to adapt to ocean acidification.		
Consequence C= 3	**Likelihood L= 4**	**Risk Rating C x L = 12 High**

* Consequence may vary regionally

Risk Management Options

Monitoring for environmental change
Variable systems for abalone culture
Adaptive husbandry management
Farming of triploid abalone
Selective breeding of abalone for temperature tolerance
Industry representation at legislative and policy review levels of Government
Targeted research of climate change impacts on the Industry
Collect baseline farming information on which the effects of climate change can be measured.

Suggested Performance Measures

- Obtain comparative information to determine impacts of climate change on productivity

8.1.2: HUMAN INDUCED CHANGE

Scope

To assess the impact of human induced change to the environment and on the sustainability of Industry.

8.1.2.1: Water Quality

Water quality is regarded as one of the most significant issues in determining the sustainability of the Industry. Threats to abalone farming may include contamination of water quality by faecal contamination, turbidity, marine biotoxins, agricultural and industrial pollutants, and prolonged freshwater flooding.

The location of land based marine farms is currently regulated by local government. The siting of adjacent land based facilities and upstream users that have an impact upon the water quality are of concern to the Industry. Industry representatives (TAGA, TAC, TFIC) maintain communication with local and state governments on issues relating to water quality.

Commercial and recreational marine activities may impact on water quality through the release of waste from vessels, resuspension of bottom sediments in the water column by movement of large vessels, potential oil (or hydrocarbon) spills, introduction of exotic species (Section 8.1.2.3) and the use of toxic antifoulants.

8.1.2.2: Land Use Changes & Habitat Modification

Modification of the upstream habitat through primary production activities such as agriculture and forestry can lead to large-scale habitat and ecosystem changes and result in elevated chemical inputs from fertilisers and pesticides. Catchment disturbance, such as urban development, is known to affect turbidity and suspended sediment concentration of estuarine waters (Paterson et al 2003). Urban development has been associated with higher water run-off leading to lower salinities and higher seston loads (Paterson et al 2003).

No integrated catchment management legislation exists in Tasmania. There is very limited monitoring of the downstream impacts of land use changes. Water Management Plans developed by DPIW are principally involved in water allocation, with no management controls or license conditions able to be applied to the secondary or tertiary use of the water. The most significant issue affecting water quality at a state and national level is diffuse pollution sources from land based primary production systems. (State of the Environment Report, RPDC 2003; State of the Marine Environment Report, Rees 1996), National Resource Management Framework, NRM 2005).

8.1.2.3: Human Induced Changes to Environmental Flows

Changes in environmental flows can be caused by upstream land use changes or habitat modification (as covered in Section 8.1.2.2), or through extraction of water

for use in irrigation. The reduction of environmental flows has the potential to impact upon the Industry when located at the mouth of an estuary.

8.1.2.4: Air Quality (spray drift)

Concerns are held by the Industry about the use of aerial spraying in forestry coups and agricultural chemical spraying in general, especially over catchments that drain into the marine environment where intake pipes are located.

8.1.2.5: Weeds & Exotics

Activities such as commercial vessel movement and recreational boating have been identified as some of the vectors that can lead to the introduction or spread of invasive marine species (IMS). Management systems are currently being developed at a national level to address the problems of translocation of exotic species. (NIMPCOG). Further information can be found in Section 2.2.7 and Appendix 2.2.7.

Environmental Objective 8.1.2.1: To ensure that declining water quality does not impact upon the Industry.			
Consequence C= 4	**Likelihood L= 4**	**Risk Rating C x L = 16 High**	**Target Risk Rating Low**
Environmental Objective 8.1.2.2: To ensure that land use change does not impact upon the Industry.			
Consequence C= 3	**Likelihood L= 4**	**Risk Rating C x L = 12 Moderate**	**Target Risk Rating Low**
Environmental Objective 8.1.2.3: To ensure that human induced changes to environmental flows do not impact upon the Industry.			
Consequence C= 2	**Likelihood L= 4***	**Risk Rating C x L = 8 Moderate**	**Target Risk Rating Low**
Environmental Objective 8.1.2.4: To ensure that chemical spray drift does not impact upon the Industry.			
Consequence C= 2	**Likelihood L= 3***	**Risk Rating C x L = 6 Low**	**Target Risk Rating N/A**
Environmental Objective 8.1.2.5: To ensure that exotic species do not impact upon the Industry.			
Consequence C= 4	**Likelihood L= 4**	**Risk Rating C x L = 16 High**	**Target Risk Rating Low**
Risk Management Options • Determination of toxic potential of agroforestry chemicals to farmed abalone • Monitoring of environmental and chemical parameters in the water • Monitoring land use change • Monitoring for exotic species • Targeted research • Raising awareness within the community on potential impacts and the need for change • Industry representation at legislative and policy review levels of Government • Input into Natural Resource Management (NRM) regional plans			
Suggested Performance Measures • Assessment of presence of exotic species by DPIW • Monitoring of abalone health			

* May vary regionally

8.1.3: BIOLOGICAL

8.1.3.1: Disease

Scope

To assess the risk of disease in farmed abalone.

Current Management Controls

8.1.3.1.1: Identification of Disease in Adults

At present there is no abalone health surveillance program; however, the Industry does submit samples to the DPIW Fish Health Unit on an 'as needs' basis. The Industry is investigating the possibility of FRDC funding for National Health Surveillance Program and addressing the issue of providing a state abalone health program in collaboration with the DPIW Animal Health Laboratories.

In addition, marine farmers are aware of their obligations in the event of a Fish Health Emergency which may be triggered by any event that indicates serious existing or potential aquatic animal illness or mortality; may be due to infectious causes (disease outbreak) or an environmental hazard. Under the Tasmanian *Animal Health Act* (1995) and the marine farming license conditions, a grower who suspects that an undiagnosed disease is causing unusual mortality or illness in his/her abalone stocks is obliged to:

- engage a veterinary surgeon to investigate the disease and its cause: or
- notify a Departmental inspector of the presence or possible presence of an unknown disease; and if possible
- isolate that group of animals.

Adult stocks of abalone are being translocated around the state and held in live holding facilities by the wild catch sector. This form of translocation could potentially assist in the uncontrolled spread of disease without monitoring the health of the wild stocks and leads to a high risk situation for disease in the land based farmed abalone industry.

Abalone meat from the wild fishery being brought into the state for processing does potentially present a disease risk.

8.1.3.1.2: Identification of Disease in juveniles

Under the current interstate translocation agreement, abalone hatchery facilities are required to submit juveniles for disease certification by DPIW Fish Health Unit prior to the juveniles being sent interstate. Tasmanian abalone hatcheries are required to include a current general health certificate with all juvenile shipments.

8.1.3.1.3: Response

Emergency response to aquatic marine disease is difficult to make, due to the difficulty in containment of water on marine farms. Effective responses to

emergency disease outbreaks require emergency disease planning at National, State/Territory and district level, and the involvement of both animal health authorities and emergency management organisations. The basis for this planning is contained in the AQUAVETPLAN being developed by the Aquatic Animal Health Unit of the Department of Agriculture, Fisheries and Forestry (DAFF). The AQUAVETPLAN comprises a series of manuals outlining national emergency preparedness and response and control strategies for aquatic animal disease emergencies in Australia. The manuals provide guidance based on sound analysis, linking policy, strategies, implementation, coordination and emergency management plans. AQUAVETPLAN manuals are working documents and will be updated as required, to take account of research, experience and field trials, and to cover emerging disease threats.

These documents are available at http://www.affa.gov.au/content/publications. The Tasmanian Operational Plans and Logistics Manual (TOM manual) is the Tasmanian response manual for AQUAVETPLAN and is available from http://tod.DPIW.tas.gov.au/tod.nsf/WebPages/CPAS-5VL3YA?open.

The Tasmanian Fish Health Advisory Group (TFHAG) has been established to be a central group in the development and implementation of fish health emergency plans. The TFHAG consist of representation from Government departments and Industry groups. The terms of reference for the TFHAG are:

- To assist the Chief Veterinary Officer (CVO) in relation to fish health emergencies by the provision of technical, practical, management and commercial advice,
- To plan for fish health emergencies,
- To provide a forum for information exchange on fish health issues.

The DPIW Fish Health Unit is an integral part of the AQUVETPLAN, the TOM Manual, and provides veterinary pathology and fish microbiology diagnostic services for marine farming and wild fish, including shellfish. To contact the Fish Health Unit at Mt Pleasant Laboratories phone: 03 6336 5216 E-mail: specimenreception@DPIW.tas.gov.au.

The Industry's response to National and Statewide emergency incursions of disease is well planned and documented. However, non-emergency disease events have no developed responses and limited service. Lack of field diagnosis services lead to an extreme-risk situation. To ensure that the Industry has non-emergency disease response capabilities, the industry needs to have available:

- added field diagnosis;
- sampling protocols; and
- Industry access to a specialised diagnostician.

Environmental Objective 8.1.3.1.1: To ensure that an appropriate disease surveillance program is in place to reduce the disease risk in the Industry.			
Consequence C= 3	**Likelihood L= 6**	**Risk Rating C x L = 18 Extreme**	**Target Risk Rating Low**
Environmental Objective 8.1.3.1.2: To ensure that disease does not impact upon the Industry through juvenile translocation.			
Consequence C= 3	**Likelihood L= 2**	**Risk Rating C x L = 6 Low**	**Target Risk Rating N/A**
Environmental Objective 8.1.3.1.3: To ensure that appropriate emergency response mechanisms are effective in reducing the impact of disease outbreaks in the Industry.			
Consequence C= 4	**Likelihood L= 3**	**Risk Rating C x L = 12 Moderate**	**Target Risk Rating Low**
Environmental Objective 8.1.3.1.4: To ensure that field diagnostic services are in place to reduce the impact of disease outbreaks in the Industry.			
Consequence C= 4	**Likelihood L= 6**	**Risk Rating C x L = 24 Extreme**	**Target Risk Rating Low**
Environmental Objective 8.1.3.1.5: To ensure that the Industry is not impacted upon by spread of disease through the wild catch sector.			
Consequence C= 4	**Likelihood L= 2**	**Risk Rating C x L = 8 Moderate**	**Target Risk Rating Low**
Risk Management Options Maintenance of a Health Program (possibly in compliance with the OIE) Provision of staff by DPIW with the appropriate level of expertise to ensure the health program is effective Added field diagnosis, sampling protocols Provision of a protocol for juvenile translocation			
Suggested Performance Measures Annual reports of disease outbreaks from the Chief Veterinary Officer			

8.1.3.2: Predators

Scope

To assess the risk of predators impacting on the Industry

Current Management Controls

Land-based abalone farming does not provide significant opportunities for predators. Occasionally crabs may enter the system including the native blue swimmer crab (*Portunus pelagicus*) and the introduced European crab (*Carcinus*

maenas) which are either liberated or dispatched. Some abalone farms may have trouble with seabirds such as silver gulls and rodents that are attracted to the pelleted feeds.

Environmental Objective 8.1.3.2: To ensure that the Industry can remain sustainable in the presence of predators.			
Consequence **C= 1**	**Likelihood** **L= 6**	**Risk Rating** **C x L = 6** **Low**	**Target Risk Rating** **N/A**
Risk Management Options Exclusion of predators through appropriate equipment Liberation or dispatch of predators in an appropriate manner			
Suggested Performance Measures Noted increase or decrease in predator numbers			

COMPONENT 8.2: IMPACTS OF OTHER EXTERNAL DRIVERS

Political, economic and regulatory drivers may influence an industries capacity to compete in the market place. This component assesses those risks and their influence upon industry sustainability.

8.2.1: POLITICS

Scope

To assess the impact of political influences on the sustainability of the Industry.

8.2.1.1: Sovereign Risk

The sovereign risk is the capacity of the Government of the day to be able to develop and promote policies which are not in keeping with the concept of sustainability. This is a risk for which the industry cannot be insured against. However, the EPBCA provides the overarching legal requirements for environmental impact assessment of development proposals in Australia.

8.2.1.2: Competing Uses

The Industry's opportunity to expand is subject to local government policy. There is risk under some local governments current planning schemes that zoning may be changed. The rezoning of a local area may impact on the viability of a farm if other uses are not compatible. However, any changes to local government planning schemes must comply with the principles of the RPDC and the State Coastal Policy.

8.2.1.3: Zoning

Local governments in Tasmania vary in their type and application of planning schemes including zoning. A synopsis of the different types of local government planning schemes, along with zoning in which land-based marine farming may occur are presented in Section 7.1.2.1.2: Planning, Table 7.1.2.1.2.

Socio-Economic Objective 8.2.1.1: To ensure that the Industry can remain sustainable with the current sovereign risk.			
Consequence C= 3	**Likelihood L= 4***	**Risk Rating C x L = 12 High**	**Target Risk Rating**
Socio-Economic Objective 8.2.1.2: To ensure that the Industry can remain sustainable with the current competing uses.			
Consequence C= 3	**Likelihood L= 4***	**Risk Rating C x L = 12 High**	**Target Risk Rating**
Socio-Economic Objective 8.2.1.3: To ensure that the Industry can remain sustainable with the current local government zoning.			
Consequence C= 2	**Likelihood L= 3**	**Risk Rating C x L = 6 Low**	**Target Risk Rating N/A**
Risk Management Options Industry representation at legislative and policy review at all levels of Government Raising community awareness of potential negative impacts of zoning changes			
Suggested Performance Measures Monitoring proposed changes to present legislation			

* May vary on a regional basis

8.2.2: ECONOMICS

Scope

To assess the impact of economics on the sustainability of the Industry.

8.2.2.1: Incentives

The Australian Government has become a signatory to the International agreement AGENDA 21, which includes economic incentives as part of determining ecological sustainability. There are limited incentives that have been developed for the Industry at this stage; those that have been developed include Envirofund, FarmBis, Landcare and Seafood Services Australia. However, accessibility to incentives, level of detail and number of supporting documentation required from the stakeholder often make these applications prohibitive.

8.2.2.2: Exchange Rates

Free market trade is a part of the Australian Government policy which has resulted in the Australian market competing against countries with trade barriers still in existence. The availability of non-subsidised assistance for the Industry would assist its ability to compete in the existing market.

8.2.2.3: Interest Rates

As the Industry is relatively new, access to competitive interest rates has been historically difficult. However, as the Industry develops it is expected that confidence will provide lower interest rates.

8.2.2.4: Competition

The introduction of the Competition Policy in Australia has allowed for more equitable competition between market players within the Industry. The Australian Competition & Consumer Commission (ACCC) administers the *Trade Practices Act 1974* (TPA) to ensure that cartels that cause high prices, high costs, inefficiency and unfairness in all parts of Australia do not become established.

8.2.2.5: Markets

The Tasmanian Industry currently has around 17% of the Australian production (Figure 8.2.2.5: ABARE 2005). Marketing problems for the Industry occur in remaining competitive on the open markets. The high standards developed for export by AQIS allows access of the Tasmanian Industry to overseas markets (Section 1.2.2.2: Export). A portion of Tasmanian farmed abalone are marketed under a single desk marketing arrangement which exports premium products (as shown in Appendix 8.2.2.5). Further information on exports can be found in Section 4.2.1: Import replacements/exports.

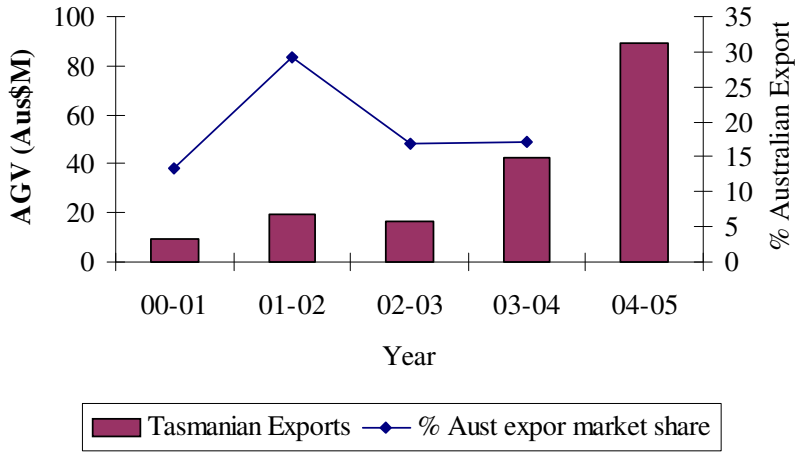


Figure 8.2.2.5. Tasmanian farmed abalone production demonstrating increased growth of the Industry over the last 5 years expressed as annual gross value (AGV) and the competitiveness on the Australian market. Tasmania has a 17% stake in the market in 2003-04.

8.2.2.6: Taxation

The Industry receives tax incentives similar to other primary industries.

Economic Objective 8.2.2.1: To ensure that the Industry can remain sustainable with the current economic incentives, exchange rates, interest rates, competition policy and taxation.			
Consequence C= 4	**Likelihood L= 2**	**Risk Rating C x L = 8 Moderate**	**Target Risk Rating**
Economic Objective 8.2.2.2: To ensure that the Industry can remain sustainable with the current market share.			
Consequence C= 4	**Likelihood L= 4**	**Risk Rating C x L = 16 High**	**Target Risk Rating**
Risk Management Options • Diversity of product • Industry marketing strategy • Industry training • Quality assurance • Supply chain assurance • Increased market intelligence • Reference to Industry strategic plan			
Suggested Performance Measures • Evaluation of industry profitability • Growth of present export market			

8.2.3: REGULATIONS

Scope

To assess the potential impact of regulations on the sustainability of the Industry.

Current Regulatory Controls

The industry is principally governed by the *Living Marine Resources Management Act* 1995 (LMRMA), but is expected to comply with a suite of associated Acts and controls listed in Appendix 8.2.3.1.

Socio-economic Objective 8.2.3: To ensure that the Industry can remain sustainable within the current regulatory framework.			
Consequence C= 4	**Likelihood L= 2**	**Risk Rating C x L = 8 Moderate**	**Target Risk Rating**
Risk Management Options • Industry representation at legislative and policy review levels of Government			
Suggested Performance Measures • Monitoring proposed changes to present legislation			

References

Anon (2000). Tasmanian Farmed Aquaculture Survey 2000. Consultancy report for the Tasmanian Aquaculture Council, October 2000. Deloitte Touche Tohmatsu.

ABARE (2005). Australian Fisheries Statistics 2004, Australian Bureau of Agricultural and Resource Economics and Fisheries Research and Development Corporation, Canberra.

Anon (2000). Tasmanian Farmed Aquaculture Survey 2000. Consultancy report for the Tasmanian Aquaculture Council, October 2000. Deloitte Touche Tohmatsu.

AQUAVETPLAN (2004) Tasmanian Operational Plans and Logistics Manual, Parts 1 & 2. Department of Primary Industries, Water and Environment, Tasmania.http://tod.DPIW.tas.gov.au/tod.nsf/WebPages/CPAS-5VL3YA?open. June 2005.

AS/NZS 4360:1999. Australian/New Zealand Standard Risk Management. Standards Australia. 30pp.

Barrett G, Silcocks A, Barry S, Cunningham R, Poulter R (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union. 824pp.

Barrett N, Sanderson JC, Lawler M, Halley V, Jordan A (2001). Mapping of inshore marine habitats in south-eastern Tasmania for marine protected area planning and marine management. Tasmanian Aquaculture and Fisheries Institute, Technical report No. 7. 74pp.

Beaumont AR, Hoare K (2003) Biotechnology and Genetics in Fisheries and Aquaculture. Blackwell Science Ltd, Oxford.

Boon PI, Cain S (1988) Nitrogen cycling in salt-marsh and mangrove sediments at West Victoria. Aust J Mar Freshwat Res 39: 607-623.

Brookfield K, Gray T, Hatchard J (2005). The concept of fisheries-dependant communities. A comparative analysis of four UK cases studies: Shetland, Peterhead, Northshields and Lowestoft. Fisheries Research, 72: 55-69.

Bryant SL, Jackson J (1999). Tasmania's Threatened Fauna Handbook 1999: What, where and how to protect Tasmania's threatened species. Threatened Species Unit, Parks and Wildlife Service, Hobart.

COAG (1992) Intergovernmental Agreement on the Environment (May 1992).

Conod, N., Bartlett, J.P., Evans, B., Elliot N.G. (2002). Comparison of mitochondrial and nuclear DNA analysis of population structure in the blacklip abalone *Haliotis rubra* Leach. *Marine Freshwater Research* 53: 711-718.

Cuthbertson A (1978). The abalone culture handbook. Report for the Churchill Fellowship. Tasmanian Fisheries Development Authority.,Tasmania. 38pp.

Crawford C, Macleod CKA, Mitchell IM (2003). Effects of shellfish farming on the benthic environment. Aquaculture, 224: 117-140.

DAFF. National Aquaculture Policy Statement. Department of Agriculture, Fisheries and Forestry, Australia

Department of Agriculture, Fisheries and Forestry (2001). A national marine farming development strategy for Aboriginal communities in Australia. Final report March 2001, Canberra, Australia.

DIER (2004). Workers compensation statistical report 1999-00 to 2003-04. Workplace Standards Tasmania. Department of Infrastructure, Energy and Resources, Tasmania.

DPIWE (2001). Assessing the ecological sustainability of the Tasmanian abalone fishery. Report for the Department of Environment and Heritage, May 2001. 50pp.

DPIWE (1998). Marine Farming Development Plan. Great Oyster Bay and Mercury Passage, Department of Primary Industries, Water and Environment, Tasmania. 118pp.

DPIWE (1999). Marine Farming Development Plan. Far North West, Department of Primary Industries, Water and Environment, Tasmania. 64pp.

DPIWE (2000). Marine Farming Development Plan. Tamar Estuary, Department of Primary Industries, Water and Environment, Tasmania. 44pp.

DPIWE (2000). Marine Farming Development Plan. Blackman Bay, Department of Primary Industries, Water and Environment, Tasmania. 60pp.

DPIWE (2005) Tasmanian Climate Change Projections. http://www.DPIW.gov.au/inter.nsf/WebPages/MACLE-5X88FU?open Accessed Mar 2006.

Department of Trade (1983). Australian abalone industry trade mission Japan. Report for the Australian Department of Trade, September 1983. 22pp.

EPA (2000). Wastewater Technology Fact Sheet: Dechlorination. United States Environmental Protection Agency, Washinton DC, USA Sept 2000. 7pp.

Explanatory Guide, Gene Technology Bill 2000 can be viewed at http://scaleplus.law.gov.au/html/ems/0/2000/0/0642438692.htm June 2005

Fletcher WJ, Cheeson J, Fisher M, Sainsbury KJ, Hundloe TJ (2004) National ESD Reporting Framework: The 'How To" Guide for Aquaculture. Version 1.1, FRDC, Canberra, Australia, 88pp.

Food Standards Australia New Zealand. The Australia New Zealand Food Standard Code, up to Amendment 68.

FRDC (2004). What's so healthy about seafood? – a guide for seafood marketers. 2nd edition. Fisheries
Research and Development Corporation, Canberra, Australia.

Grant (1977) Abalone culture in Japan: Development and current commercial practice. Tasmanian Fisheries Development Authority, Tasmania. p2-17.

Gurung S (2001). Tasmanian acid sulfate soil reconnaissance. Report 2: Distribution of acid sulfate soils in Tasmania. Tasmanian Geological Survey Record. 2001/06. 29pp.

Handley S (2000). Larval development of Boccardia knoxi, a shell-infesting spinoid Polychaete. New Zealand Journal of Marine and Freshwater Research 34: 681-687.

Handlinger J (2005). Protocol framework for surveillance programs for the abalone aquaculture industry. In: proceedings of the 12th Annual Abalone aquaculture Workshop, 1st - 3rd August 2005, McLaren Vale, Australia. Flemming, AE (Editor). Abalone Aquaculture Subprogram, Fisheries research and Development Corporation, Canberra, Australia. pp73-80.

Handlinger J, Bastianello S, Carson J, Callinan R, Creeper J, Deveney M, Freeman K, Forsyth M, Hooper C, Jones B, Lancaster M, Landos M, Loh R, Oyay BS, Phillips P, Pyecroft S, Stephens F (2005). Findings from the national survey of diseases of commercially exploited

abalone species. In: proceedings of the 12th Annual Abalone aquaculture Workshop, 1st - 3rd August 2005, McLaren Vale, Australia. Flemming, AE (Editor). Abalone Aquaculture Subprogram, Fisheries Research and Development Corporation, Canberra, Australia. pp 43-72.

Harris JO, Burke CM, Edwards SJ, Johns DR (2000) Effects of oxygen supersaturation and temperature on juvenile greenlip, *Haliotis laevigata*, and blacklip, *Haliotis rubra*, abalone. J Shellfish Res, 19:518.

Hawkins, C.D., Jones, J.B. (2002): Larval escape through abalone culture effluent systems an analysis of the risk. Journal of Shellfish Research 21: 805-809.

Henderson JP, Bromage NR (1988). Optimising the removal of suspended solids from aquaculture effluents in settlement lakes. Aquaculture Engineering, 3:176-188.

ISO 14001:2004. Australian/new Zealand Standard. Environmental management systems – Requirements with guidance for use. Standards Australia 23pp.

Jones B, Stephens F (2006). Aquatic Animal health Subprogram: development of a national translocation policy using abalone and prawns as templates for other aquatic species. Fisheries Research and Development Corporation, Canberra, Australia. 90pp (in draft).

Lleonart M (2001). Australian abalone mudworms: avoidance and identification. A farm manual. Fisheries Research and Development Corporation, Canberra

Mazur N, Aslin, Byron I (2005). Community perceptions of aquaculture: Final report. Social Sciences Program, Bureau of Rural Sciences, Canberra.

McKinna et al (2005). Development of a marketing and market development strategy for the Australian abalone industry. Commercial in confidence document for the Abalone Council Australia Limited. David McKinna et al Pty Ltd Strategic Insights, Melbourne. 193pp.

Murphy RJ, Crawford CM, Barmuta L (2003) Estuarine health in Tasmania, status and indicators: Water Quality. Tasmanian Aquaculture & Fisheries Institute Technical Report Series Number 16. University of Tasmania.

National Oceans Office (2002). Sea Country - an Indigenous perspective. The South-east regional marine plan assessment reports. 186 pp.

Neori A, Chopin T, Troell M, Buschmann AH, Halling GP, Shpigel M, Yarish C (2004). Integrated aquaculture: rationale, evolution and state of the art emphasizing seaweed biofiltration in modern mariculture. Aquaculture 231: 361-391.

Nichols et al (1999). In: Australian Seafood Handbook: an identification guide to domestic species. GK Yearsly, PR Last, RD Ward (eds) CSIRO, Hobart.

NRM (2003). National Framework for Natural Resource Management (NRM) Standards and Targets. Natural Resource Management Ministerial Council, Department of Environment and Heritage, October 2002.

Nunez M (2004). Tasmanian future water environments using a climate model. Research undertaken for the Department of Primary Industries, Water and Environment, Tasmania, May 2004. 27pp.

PPPs (2006). Standard 4.2.1. Primary production and processing standard for seafood. Food Standards Australia New Zealand. Accessed June 2005. http://www.foodstandards.gov.au/_srcfiles/Standard_4_2_1_Seafood_PPP_v78.doc .

Ramsar 1971 http://www.deh.gov.au/water/wetlands/ramsar/ramaust.html or http://www.ramsar.org June 2005.

Rees C (1996). Issues in the Tasmanian Marine Environment. In*:* Zann LP and Sutton D (eds). *State of the Marine Environment Report for Australia: State and Territory Issues - Technical Annex 3.* Department of the Environment, Sport and Territories, Canberra.

Resource Planning and Development Commission (2003). *State of the Environment Tasmania 2003*, http//www.rpdc.tas.gov.au/soer, accessed July 2005.

Ruello et al (2002). Retail sale and consumption of seafood. Revised edition. Consultancy report prepared for the Fisheries Research and Development Corporation, September 2002, by Ruello and Associates Pty Ltd.

Sharples C (2004) Indicative mapping of Tasmanian coastal vulnerability to climate change and sea level rise: Explanatory report. Report to Department of Primary Industries, Water & Environment (Tasmania) December 2004. 126pp.

Shoobridge D (2000). Tasmanian Farmed Aquaculture Survey 2000. Consultancy report for the Tasmanian Aquaculture Council October 2000. Deloitte Touche Tohmatsu. Hobart.

State of Growth (2003) Department of Primary Industries, Water and Environment, Tasmania. http://tod.DPIW.tas.gov.au/tod.nsf/WebPages/CART-65V6VW?open. Accessed Oct 2006.

Tasmanian Government (2001) Tasmanian Natural Resource Management Framework. Department of Primary Industries, Water and Environment, Hobart. 36pp.

The Royal Society (2005). Ocean acidification due to increasing atmospheric carbon dioxide. Policy Document 12/05 June 2005.

Threatened Species List: Accessed June 2005. http://www.DPIW.tas.gov.au/inter.nsf/WebPages/SJON-58E2VD?open#ThreatenedSpeciesList .

Thresher R, Proctor C, Ruiz G, Gurney R, MacKinnon C, Watton W, Rodriguez L, Bax N (2003). Invasion dynamics of the European shore crab, *Carcinus maenas*, in Australia. Mar Biol, 142:867-876.

Vanclay F (2004). Social principles for agricultural extension to assist in the promotion of natural resource management. Australian Journal of Experimental Agriculture. 44: 213-222.

List of Appendices

Provided as extra references in folder

APPENDIX 1.0: RISK ASSESSMENT TABLES FOR AQUACULTURE ESD COMPLIANCE: 1

APPENDIX 1.1:PRINCIPLES AND OBJECTIVES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD) AND SUSTAINABLE DEVELOPMENT (SD). By Colin Dyke. 7

APPENDIX 1.2.2: RISK OF TRANSFER OF DISEASE FROM INTERSTATE 10

APPENDIX 1.3.6.3: SALTMARSH HABITAT 17

APPENDIX 2.2.3: THREATENED, MARINE OR MIGRATORY BIRDS ASSOCIATED WITH ABALONE GROWING REGIONS. 19

APPENDIX 2.2.3.1: PROTOCOL FOR LAND-BASED ABALONE FARMING ACTIVITIES IN THE PRESENCE OF LISTED THREATENED, MARINE OR MIGRATORY BIRDS. 21

APPENDIX 2.2.4: NOTES ON THREATENED, ENDANGERED AND PROTECTED SPECIES: 22

APPENDIX 2.2.5: PROTECTED AREAS: WORLD HERITAGE, RAMSAR, MARINE PARKS AND SENSITIVE HABITATS. 24

APPENDIX 2.2.5.1: PROTECTED AREAS: WORLD HERITAGE, RAMSAR, MARINE PARKS AND SENSITIVE HABITATS. 25

APPENDIX 3.1: COMMONWEALTH AND TASMANIAN LEGISLATION MATRIX RELEVANT TO COMPONENT 3.1: SITE SELECTION, CONSTRUCTION AND INFRASTRUCTURE ASPECTS. 33

APPENDIX 3.2: COMMONWEALTH AND TASMANIAN LEGISLATION MATRIX RELEVANT TO COMPONENT 3.2: OPERATIONAL ASPECTS. 36

APPENDIX 6.0: BACKGROUND FOR INDIGENOUS COMMUNITY WELLBEING 38

APPENDIX 7.1.1.1: STATUTORY PLANNING PROCESSES UNDER THE MARINE FARMING PLANNING ACT 1995 FOR A PLAN PREPARED BY THE DPIWE OR AN APPROVED PERSON 40

MARINE FARMING PLANNING APPROACH 42

APPENDIX 7.1.2.1.2: REQUIREMENTS FOR ABALONE FARMING AS LISTED BY THE AQUACULTURE BUSINESS APPROVALS (BAP) WEBSITE 43

APPENDIX 7.2.1: CODE OF CONDUCT FOR AUSTRALIAN AQUACULTURE 47

APPENDIX 8.2.2.5: MARKETING OF TASMANIAN FARMED ABALONE 53

APPENDIX 8.2.3.1: REGULATORY IMPACTS ON THE TASMANIAN FARMED ABALONE INDUSTRY. 57

APPENDIX 8.2.3.2: MARINE FARM LICENCE CONDITIONS & REQUIREMENTS RELATING TO ENVIRONMENTAL MANAGEMENT: SUMMARY OF SCHEDULES & PROCEDURES 63

Glossary of Acronyms and Terms

Acronyms

AQIS	Australian Quarantine Inspection Service
ASI	Australian Seafood Industries Pty. Ltd.
AUSVETPLAN	Australian Veterinary Emergency Plan
AWA	*Animal Welfare Act 1993*
CAMBA	China-Australia Migratory Bird Agreement
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVO	Chief Veterinary Officer
DAFF	Department of Agriculture, Fisheries and Forestry, Australia
DPIF	Department of Primary Industry and Fisheries
DPIW	Department of Primary Industry Water and Environment, Tasmania
DSF	Department of Sea Fisheries, Tasmania
ECA	*Export Control Act 1982*
EIS	Environmental Impact Statement
EPBCA	*Environmental Protection and Biodiversity Conservation Act 1999*
FHU	Fish Health Unit
FRDC	Fisheries Research and Development Corporation
FSANZ	Food Standards Australia and New Zealand
JAMBA	Japan-Australia Migratory Bird Agreement
LMRMA	*Living Marine Resources Management Act 1995*
LUPAA	*Land Use Planning and Approvals Act 1993*
MFPA	*Marine Farming Planning Act 1995*
MFDP	Marine Farming Development Plans
NAC	National Aquaculture Council
NIMPCG	National Introduced Marine Pests Co-ordination Group
NPRMA	*National Parks and Reserves Management Act 2002*
OIE	Office International des Epizooties
PEV	Protected Environmental Values
Ramsar	Convention on Wetlands (Ramsar, Iran, 1971)
RMPS	Resource Management Planning System
SPWQM	State Policy on Water Quality Management 1997
SSD	Solid Separation Device
TAC	Tasmanian Aquaculture Council
TAFI	Tasmanian Aquaculture and Fisheries Institute
TFHAG	Tasmanian Fish Health Advisory Group
TMFA	Tasmanian Marine Farmers Association
TORC	Tasmanian Oyster Research Council
TPAA	Timber Preservation Association Australia
TSEC	Tasmanian Shellfish Executive Council
TSGA	Tasmanian Salmonid Growers Association
TSPA	*Threatened Species Protection Act 1995*
TSQAP	Tasmanian Shellfish Quality Assurance Program
USFDA	United States Food and Drug Administration

Terms

Aspect
Elements of an organisation's activities or products or services that can interact with the environment. (ISO 14001:2004).

Broodstock
Animal collected and maintained for the purpose of breeding.

Carrying capacity
The stock density at which production levels are maximised without negatively affecting growth rates. (Carver and Mallet 1990).

Community
Groups of people who share particular social characteristics such as occupation or place of residence.

Component
A module or constituent part of the EMS Framework that describes an affect on the environmental, (social, political or economic) sustainability of the Industry.

Component Tree
The structure on which aspects or issues involving impacts on Industry or from Industry is described for each component (see Note to the Reader).

Consequence
The consequence of an issue is the effect or outcome a particular issue will have. Consequence relates to the importance of an issue.

Disease
A condition resulting from exposure to or infection with a biological agent such as a bacterium, a virus, a protozoan or a parasite.

Diseased
Affected with disease.

Environment
Surroundings in which an organisation operates, including air, water, land natural resources, flora, fauna, humans and their interrelation. (ISO 14001:2004).

Environmental Management System (EMS)
Part of an organisation's management system used to develop and implement its environmental policy and manage its environmental aspects.
A management system is a set of interrelated elements used to establish policy and objectives and methods to achieve those objectives. A management system includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources. (ISO 14001:2004).

Environmental Objective
Overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve. (ISO 14001:2004).

Environmental Performance
Measurable results of an organisations management of its environmental aspects. (ISO 14001:2004).

Environmental Policy
Overall intentions and direction of an organisation related to its environmental performance.

Environmentally Sustainable Development
Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased (COAG 1992).

Facility
A facility includes the building or complex of buildings, plus the associated ponds and water channels built for the specific purpose of farming abalone.

Generic Component Tree
The structure which is the basis of the National ESD Framework and the EMS Framework, comprising of 8 components (see Note to the Reader).

Genetically Modified Organism (GMO)
An organism whose genome has been artificially modified by the addition of genetic material from another species. (Beaumont & Hoare 2003).

Impact
Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisations environmental aspect. (ISO 14001:2004).

Invasive Marine Species
Invasive marine species are organisms (usually transported by human activities) which successfully establish themselves in, and then overcome, otherwise intact, pre-existing native ecosystems.

Industry
Industry refers to the Tasmanian land-based abalone farming industry.

Likelihood
The likelihood is the conditional probability of an event occurring. It relates directly to the impact of the event, not the activity surrounding the event.

Managed or Residual Risk
The level of risk, taking into account current management arrangements.

Risk

The chance of something happening that will have an impact on objectives (AS/NZS 4360: 1999).

Risk Analysis
Risk analysis involves consideration of the source of risk, their consequences and the likelihood that these consequences may occur. (AS/NZS 4360: 1999)

Risk Matrix
A table that combines the likelihood and consequence of an event happening, to quantify a risk.

Sensitive habitats
An area in which plant or animal life or their habitats are either rare or especially valuable because of the unique role they play in the environment. Sensitive species and their ecological systems are plants and animals in danger of dying out due to low numbers of individuals per population, a limited number of populations, or a limited, fragmented or vulnerable habitat.
Sensitive habitats include:

- The areas where these species live.
- The areas necessary for the survival of these species (such as breeding, migration or feeding grounds).
- Any location where disturbance is likely to lower the population numbers.

Sustainable Development
Managing the use development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while:

- Sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and
- Safeguarding the life-supporting capacity of air, water, soil and ecosystems; and
- Avoiding, remedying or mitigating any adverse effects of activities on the environment. (RPMS).

Sustainability
The ability to be able to operate in the future under current conditions.

Target Risk
The level of risk that the Industry is working towards achieving.

Environmental Management System Framework

Appendices Accompanying Guide and Risk Assessment for Ecologically Sustainable Development

PhycoTec
Environmental Management

TAGA

Tasmania

Australian Government
Fisheries Research and Development Corporation

FRDC Project 2004/096

Environmental Management System Framework

Tasmanian Farmed Abalone Industry

Appendices Accompanying Guide and Risk Assessment for Ecologically Sustainable Development

Version 1.0
August 2006

PhycoTec Environmental Management

TAGA Tasmanian Abalone Growers Association

TFI

Tasmania

Australian Government
Fisheries Research and Development Corporation

FRDC Project 2004/096

ENVIRONMENTAL MANAGEMENT SYSTEM FRAMEWORK

Compliance Guide and Risk Assessment of Ecologically Sustainable Development for the Tasmanian Farmed Abalone Industry

APPENDICES

Version 1.0

AUGUST 2006

This document is part of a national initiative to assist the seafood sector in the uptake of Environmental Management Systems. The document is based on the National ESD Framework 'How To' Guide for Aquaculture, Version 1.1 (Fletcher et al. 2004). Regular updating of the information in the document will take place. While the views in this document reflect the general views of the Industry, it should not be taken as the view of any individual in Industry or the Steering Committee for the project.

The project has been funded by the Tasmanian Abalone Growers Association (TAGA), the Tasmanian Fishing Industry Council (TFIC), the Tasmanian Department of Primary Industries and Water (DPIW) and the Fisheries Research and Development Corporation (FRDC) as Project 2004/096.

Correct Citation
Marshall JA (2006). Environmental Management System Framework: Compliance Guide and Risk Assessment of Ecologically Sustainable Development for the Tasmanian Farmed Abalone Industry: Version 1.0, Appendices accompanying guide. FRDC, Canberra, Australia. 153pp.

PhycoTec Environmental Management

Document Control

The Environmental Management System Framework: Compliance Guide and Risk Assessment of Ecologically Sustainable Development for the Tasmanian Farmed Abalone Industry: Accompanying Appendices is a living document subject to periodic review to capture regulatory changes and Industry's adaptive management.

This document is uncontrolled, and therefore freely available to industry representatives, regulatory authorities and other stakeholders as requested.

Copy Number ……..

Issued to ……

Date of Issue ……

CONTENTS

APPENDIX 1.0: RISK ASSESSMENT TABLES FOR AQUACULTURE ESD COMPLIANCE: 1

APPENDIX 1.1:PRINCIPLES AND OBJECTIVES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD) AND SUSTAINABLE DEVELOPMENT (SD). BY COLIN DYKE. 7

APPENDIX 1.2.2: RISK OF TRANSFER OF DISEASE FROM INTERSTATE 10

APPENDIX 1.3.6.3: SALTMARSH HABITAT 17

APPENDIX 2.2.3: THREATENED, MARINE OR MIGRATORY BIRDS ASSOCIATED WITH ABALONE GROWING REGIONS. 19

APPENDIX 2.2.3.1: PROTOCOL FOR LAND-BASED ABALONE FARMING ACTIVITIES IN THE PRESENCE OF LISTED THREATENED, MARINE OR MIGRATORY BIRDS. 21

APPENDIX 2.2.4: NOTES ON THREATENED, ENDANGERED AND PROTECTED SPECIES: 22

APPENDIX 2.2.5: PROTECTED AREAS: WORLD HERITAGE, RAMSAR, MARINE PARKS AND SENSITIVE HABITATS. 24

APPENDIX 2.2.5.1: PROTECTED AREAS: WORLD HERITAGE, RAMSAR, MARINE PARKS AND SENSITIVE HABITATS. 25

APPENDIX 3.1: COMMONWEALTH AND TASMANIAN LEGISLATION MATRIX RELEVANT TO COMPONENT 3.1: SITE SELECTION, CONSTRUCTION AND INFRASTRUCTURE ASPECTS. 33

APPENDIX 3.2: COMMONWEALTH AND TASMANIAN LEGISLATION MATRIX RELEVANT TO COMPONENT 3.2: OPERATIONAL ASPECTS. 36

APPENDIX 6.0: BACKGROUND FOR INDIGENOUS COMMUNITY WELLBEING 38

APPENDIX 7.1.1.1: STATUTORY PLANNING PROCESSES UNDER THE MARINE FARMING PLANNING ACT 1995 FOR A PLAN PREPARED BY THE DPIWE OR AN APPROVED PERSON 40

MARINE FARMING PLANNING APPROACH 42

APPENDIX 7.1.2.1.2: REQUIREMENTS FOR ABALONE FARMING AS LISTED BY THE AQUACULTURE BUSINESS APPROVALS (BAP) WEBSITE 43

APPENDIX 7.2.1: CODE OF CONDUCT FOR AUSTRALIAN AQUACULTURE 47

APPENDIX 8.2.2.5: MARKETING OF TASMANIAN FARMED ABALONE 53

APPENDIX 8.2.3.1: REGULATORY IMPACTS ON THE TASMANIAN FARMED ABALONE INDUSTRY. 57

APPENDIX 8.2.3.2: MARINE FARM LICENCE CONDITIONS & REQUIREMENTS RELATING TO ENVIRONMENTAL MANAGEMENT: SUMMARY OF SCHEDULES & PROCEDURES 63

APPENDIX 1.0: RISK ASSESSMENT TABLES FOR AQUACULTURE ESD COMPLIANCE:

ADAPTED FROM THE NATIONAL ESD FRAMEWORK

Consequence Tables

1.1 General

The general consequence table was developed as the basic template for all assessments of consequence. The levels of this table are generic and the interpretation of the definitions will need to be adapted to the issue being assessed.

Table 1.1. The General Consequence Table for use in ecological risk assessments related to aquaculture

Consequence	Score	Definition
Negligible	**0**	Very insignificant impacts. Unlikely to be measurable
Minor	**1**	Possibly detectable but minimal impact on structure/function or dynamics
Moderate	**2**	Maximum acceptable level of impact – recovery measurable in months or years
Severe	**3**	This level will result in wider and longer term impacts – recovery measurable in years
Major	**4**	Very serious impacts with relatively long time frame likely to be needed to restore to an acceptable level – recovery measurable in decades
Catastrophic	**5**	Widespread and permanent irreversible damage or loss will occur – unlikely to ever recover (eg causing extinctions)

1.2 Habitat Issues

Habitat issues look at the direct affect of aquaculture activities on the ecosystem. Habitat (eg seagrass) should be assessed at the regional level, defined as the entire habitat equivalent to that occupied by the exploited stock. The extent of the impact should be judged on the best estimate of the original extent of the habitat. Some habitats are more fragile than others, which will affect the level of disturbance that they can withstand sustainably. Furthermore, some habitats will form more important functions such as juvenile fish habitats and this will need to be included in the determination.

Table 1.2. Suggested consequence levels for the impact of aquaculture on habitats (Three levels – non-fragile, fragile, critical)

Consequence	Score	♦ Definition
Negligible	**0**	♦ Insignificant impacts to the habitat or populations of species making up the habitat. Unlikely to be measurable. ♦ Activity only occurs in a very small area of the habitat *(eg. <1% of the original habitat*) ♦ If impacting a larger area, the impact is unlikely to be measurable against the background.
Minor	**1**	♦ Measurable impact on habitat(s) but these are very localised compared to total habitat area *(eg. <5% of the original habitat*)
Moderate	**2**	♦ More widespread but acceptable impact on the habitat, but the levels are still considerable given the % of the area affected, the types of impact occurring and the recovery capacity of that habitat (*eg. <50% of non-fragile habitats, < 20% of fragile habitats, < 5% of critical habitats*)
Severe	**3**	♦ The level of impact on habitat is greater than the habitat's ability to recover adequately in the long term (years) (*eg. impact area results in >25-50% of habitat being removed, >10% for critical habitats*) ♦ The level of impact results in strong downstream effects from loss of function
Major	**4**	♦ Substantial amounts of habitat being affected, which may endanger its long-term survival and result in severe changes to the ecosystem function. (*eg. 70-90% of the non-fragile habitat being affected; >30% of fragile habitats; 10-20% of critical habitats*)
Catastrophic	**5**	♦ The entire habitat is in danger of being affected or removed in a major way. (*eg. >90% of the non-fragile habitat being affected; >50% of fragile habitats; 30% of critical habitats*).

1.3 Ecosystem Issues

The indirect impacts due to flow-on affects of food chain interactions should be assessed at a regional/bioregional level, rather than just the area where the industry/sector operates, unless industry covers the extent of the

community/bioregion. The changes to the ecosystem from the addition or removal of nutrients may be difficult to predict. It is important to address the scale of the impact and to recognise that is not possible to have no effect. The level of acceptable change needs to be determined.

Table 1.3. Suggested consequence levels for the impact of aquaculture on the general ecosystem/trophic levels.

Consequence	Score	Definition
Negligible	**0**	General - Insignificant impacts to habitat of populations, unlikely to be measured against background variability Interactions may be occurring with ecosystem but it is unlikely that there would be any change outside of natural variation.
Minor	**1**	None of the affected species play a keystone role in ecosystem – only minor changes in relative abundance of other constituents.
Moderate	**2**	Measurable changes to the ecosystem components without there being a major change in function (no loss of components)
Severe	**3**	Ecosystem function altered measurable and some function or components are locally missing/declining/increasing outside of historical range &/or allowed/facilitated new species to appear. Recovery measured in years
Major	**4**	A major change to ecosystem structure and function (different dynamics now occur with different species/groups now the major components of the region) Recovery measurable in decades.
Catastrophic	**5**	Total collapse of ecosystem processes. Long-term recovery period may be greater than decades

1.4 Social/Political Consequences

The social political consequence table considers the affect of aquaculture on the community that derives a significant proportion of employment and/or income from the industry, either directly or indirectly. The understanding of the social impacts of management decisions does not assume that either aquaculture management decisions will be made to minimise the social impacts at the expense of ecological considerations. The management agency should be made aware that if a management action will have server-or worse- social impacts on a local community, this should be bought to the attention of the relevant local, state or Australian Government agencies.

Table 1.4. Possible consequence levels for impacts of aquaculture management at a socio-economic level.

Consequence	Score	Definition
Negligible	0	No impact – would not have any flow-on impact to the local community. No agency staff would need to make a statement.
Minor	**1**	May have minor negative impact on the community (e.g. minor job losses), but these would be easily absorbed.
Moderate	**2**	Some increase in unemployment and decrease in overall income to which the community would adjust to over time. Some community concern about the loss of amenity, which may translate to some political action or other form of protest.
Severe	**3**	Significant reductions in employment and income associated with the fishery. Significant employment and income flow-on effects to other community businesses, as reduced income and increased unemployment affects the local community
Major	**4**	High level of community impact which the community could not successfully adapt to without external assistance. Significant level of protest and political lobbying likely. Large-scale employment and income losses in the seafood sector of the local economy. Significant flow-on effects in terms of unemployment and income reductions as a consequence to changes in the fishery. Decline in population and expenditure-based services (eg. Schools, shops, bank)
Catastrophic	**5**	Large-scale impacts well beyond the capacity of the community to absorb and adjust to. Likely to lead to large-scale rapid decline in community income and increase in unemployment in areas directly related to industry. May lead to large-scale and rapid reduction in population. Likely to lead to high levels of political action, protest and conflict. Significant reduction in access to private and public sector services, as businesses become unviable. Government and commercial services decline below threshold levels. Total change in community from eg. rural to industrial.

Likelihood Tables

Table 1.5. Likelihood table showing definitions.

Likelihood	Score	Definition	Indicative frequency
Remote	**1**	Never heard of, but not impossible.	One in 1,000 years
Rare	**2**	May occur in exceptional circumstances.	Once every 100 years
Unlikely	**3**	Uncommon, but has been known to occur	Once every 30 years
Possible	**4**	Some evidence to suggest this may possibly occur	Once every 10 years
Occasional	**5**	May occur	Once every 3 years
Likely	**6**	It is expected to occur	Once a year or more

Risk Tables

Table 1.6. Risk matrix – numbers in cells indicate risk value, the shade indicates risk ranking (see Table 1.7 for details).

		Consequence					
Likelihood		**Negligible**	**Minor**	**Moderate**	**Severe**	**Major**	**Catastrophic**
Remote	**1**	0	1	2	3	4	5
Rare	**2**	0	2	4	6	8	10
Unlikely	**3**	0	3	6	9	12	15
Possible	**4**	0	4	8	12	16	20
Occasional	**5**	0	5	10	15	20	25
Likely	**6**	0	6	12	18	24	30

Table 1.7. Risk Ranking and Outcomes.

Risk Ranking	Risk Value	Description	Reporting Requirements	Management Response
Negligible	**0**	Not an issue	Short justification only	Nil
Low	**1-6**	Acceptable – no specific control measures needed	Full justification needed	No specific action needed to achieve acceptable performance
Moderate	**8-12**	Specific management needed to maintain acceptable performance	Full performance report	Review current arrangements
High	**15-18**	Not desirable – continue strong management action. Further or new risk control measures may need to be introduced in the near future	Full performance report	Probable increases to management needed
Extreme	**>20**	Unacceptable – major changes required to management approach in near future	Full performance report	Substantial additional management controls needed.

APPENDIX 1.1:PRINCIPLES AND OBJECTIVES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD) AND SUSTAINABLE DEVELOPMENT (SD). By Colin Dyke.

Background

- Australia's involvement in international law, and being signatory to international treaties and agreements are the responsibility of the Australian Government.
- Australia has committed to the concept of ecologically sustainable development (ESD) (more commonly known as "sustainable development") through such international agreements and activities.
- The Australian Constitution, through the division of constitutional powers between Australian, State and Territory governments, prevents the Australian Government directly making law for the States and Territories.
- To enable demonstration that Australia's international obligations are being met across all of Australia equitably and consistently, and to ensure on-ground outcomes, various arrangements/mechanisms are used by and between the Australian, State and Territory Governments. These include:
  - **Council of Australian Governments** (COAG), and subsequent agreements reached.(COAG is the peak intergovernmental forum in Australia, comprising the Prime Minister, State Premiers, Territory Chief Ministers and the President of the Australian Local Government Association – three tiers of government.)
    COAG agreements (often) require States and Territories to enact legislation (which may be peculiar to each) demonstrable of meeting Australia's international obligations.
  - **Ministerial Councils**
    Over 40 Commonwealth-State Ministerial Councils and fora facilitate consultation and cooperation between the Australian Government and state and territory governments in specific policy areas. The councils initiate, develop and monitor policy reform jointly in these areas, and take joint action in the resolution of issues that arise between governments. In particular, Ministerial Councils develop policy reforms for consideration by COAG, and oversee the implementation of policy reforms agreed by COAG.

  The **NRM Ministerial Council** was established in 2001 by COAG agreement. The Council is the peak government forum for consultation, coordination and, where appropriate, integration of action by governments on natural resource management issues (for example, through the Intergovernmental Agreements on the 'National Action Plan for Salinity and Water Quality' and the 'National Policy for the Translocation of Live Aquatic Organisms').

Principles of Sustainable Development

A formal description of the 'principles of ecologically sustainable development'can be found at Section 3.5 of the *Intergovernmental Agreement on the Environment, May 1992* They are as follows:

3.5.1 **Precautionary Principle**

Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
ii. an assessment of the risk-weighted consequences of various options.

3.5.2 **Intergenerational Equity**

The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

3.5.3 **Conservation of Biological Diversity and Ecological Integrity**

Conservation of biological diversity and ecological integrity should be a fundamental consideration.

3.5.4 **Improved Valuation, Pricing and Incentive Mechanisms**

- Environmental factors should be included in the valuation of assets and services.
- Polluter pays – i.e. those who generate pollution and waste should bear the cost of containment, avoidance or abatement.
- The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.
- Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.

Objectives of the Resource Management and Planning System of Tasmania

"SCHEDULE 1 - Objectives of the Resource Management and Planning System of Tasmania

1. The objectives of the resource management and planning system of Tasmania are –

(a) to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity; and

(b) to provide for the fair, orderly and sustainable use and development of air, land and water; and

(c) to encourage public involvement in resource management and planning; and

(d) to facilitate economic development in accordance with the objectives set out in paragraphs (a), (b) and (c); and

(e) to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in Tasmania.

2. In clause 1(a) –

"sustainable development" means managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural wellbeing and for their health and safety while –

(a) sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil and ecosystems; and

(c) avoiding, remedying or mitigating any adverse effects of activities on the environment."

Relationship Between the Principles of Sustainable Development and the Objectives of the Resource Management and Planning System of Tasmania

The principles of sustainable development are effectively enshrined in the objectives.

APPENDIX 1.2.2: RISK OF TRANSFER OF DISEASE FROM INTERSTATE

ADAPTED FROM JONES & STEPHEN 2005 (DRAFT) FOR TRANSLOCATION OF ABALONE IN AUSTRALIA.

Hazard identification for abalone

The parasites and diseases associated with abalone in Australia are being identified through a national project (FRDC 2002/201) coordinated by Dr Judith Handlinger. Her project team has examined over 3000 abalone from Western Australia, South Australia, Victoria, New South Wales and Tasmania. Unfortunately, the final results of that study were not available at the time of finalising this document.

Hazards identified at the workshop were:
Perkinsus sp.
Vibrio spp.
Flavobacteria
Non-specific fungal infections
Mudworm infections
Gill ciliates
Cestode metacercariae
Parasitic flukes
Shell fouling organisms
Parasites/viruses/rickettsia-like organisms of unknown significance

Of these reported parasites and diseases, known at the time that the workshop was held, only one, *Perkinsus olseni*, is nationally reportable, and is associated with clinical disease only in South Australia and New South Wales.

Risk assessment

The methodology used at the workshop involved obtaining a consensus by the workshop attendees as to the consequences and likelihood scores for each identified hazard. The approach taken at the workshop was to condense the likelihood of pathogen transfer and the likelihood of pathogen establishment into one likelihood, that of establishment, and this initially caused some confusion. The likelihood of a parasite being transferred is quite different from the likelihood that the pathogen will establish or spread in the environment once the initial transfer has occurred (either from farm to farm or from farm to the environment). For example, there is a likelihood associated with the transfer of a *Bonamia* infected oyster to a new location, but successful establishment of *Bonamia ostreae* in a new host requires a challenge dose which is much greater than one infected particle and may require a simultaneous challenge with thousands of infectious particles to be successful (Hervio et al. 1995).

For the purposes of the workshop, and to simplify the methodology, the likelihood was defined as the likelihood of pathogen transfer and establishment in the new environment, not that of disease outbreak. The reason for this is that, while the likelihood of successful transfer and establishment can be deduced, the expression of clinical disease involves an interaction between the host (and its existing parasite fauna), the disease agent and the environment that is more complex to predict.

The consequences were based on the potential impact if a disease outbreak were to occur. Some pathogens will spread rapidly through the population causing high mortality, others will be slow to spread and have a limited impact at the population level and this information was incorporated into the scores provided by the workshop attendees.

The product of the consequences score and the likelihood score generated a risk ranking (from Table 1). The justification for the risk ranking was documented in order that the ranking can be defended against criticism. At the workshop, known state and territory differences for each hazard were also documented.
At the workshop, issues raised that were outside of the ability of the participants to resolve but which might have a bearing on the scores were noted as "Major Issues". These generally involved lack of research information and are included in this document after "Next Steps".
Abalone risk assessment – disease hazards.

Table 1. Risk Matrix – numbers in cells indicate Risk Value, the colours/shades indicate Risk Rankings (see Table 4 for details)

		Consequences				
Likelihood		**Negligible**	**Low**	**Moderate**	**High**	**Catastrophic**
		0	**1**	**2**	**3**	**4**
Negligible	**1**	0	1	2	3	4
Low	**2**	0	2	4	6	8
Moderate	**3**	0	3	6	9	12
High	**4**	0	4	8	12	16

Table 2. Risk Rankings and Outcomes

Risk Rankings	Risk Values	Likely Management Response
Negligible Acceptable	0-4	Risks are acceptable and are managed through current procedures.
Moderate Management Required	5 – 8	Risks are acceptable provided Risk Reduction measures are implemented to reduce risk to acceptable level.
Extreme Unacceptable	9 – 16	Risk is unacceptable. Risk management measures will be required to achieve "acceptable risk", or it may not be possible to meet the "acceptable risk" at all.

These hazards were discussed in the workshop. A summary of the risk has been provided in the Table 1.2.2. The Consequences, Likelihood and Risk Rating were derived by consensus, based on the Tables 3 & 4 (above).

Table 1.2.2. Summary of risk assessments from Jones & Stephens 2005.

Hazard/Pathogen	Cons	Likelihood	Rating
Perkinsus spp..	4	2 May be higher for wild stock to farm movements	8 (or higher)
Vibrio bacteria (*V. harveyi, V. splendidus*)	1	4	4
Flavobacteria	1	4	4
Non-specific fungal infections	1	4	4
Mudworm infestations (*B. knoxi, P. hoplura*)	2	2	8
Gill ciliates	0	2	0
Metacercariae	1	1	1
Parasitic flukes	1	1	1
Fouling organisms include: Boring sponges, boring algae, barnacles, seastars, seaweeds, spirorbids	3	3	9
Unknown parasites/diseases/viruses/RLOs	3	3	9

Risk management for abalone translocation

It was an interesting outcome from the Workshop that *Perkinsus*, nationally and internationally reportable, had a risk ranking of at least eight. The ecological threat posed by shell fouling organisms was assessed to be higher, at nine, requiring specific risk management.

For those hazards that require management, there are a range of options available to Managers. Some of these, which may be used by managers, were identified by the workshop in the following risk management table.

There was some criticism by reviewers that the risk management table gives no indication of the impact of each measure on the "acceptable risk" or whether a combination of measures might be necessary. This was deliberate. It became clear during the course of the project that jurisdictions did not want to be bound by measures that they might or might not want to impose to meet their individual "acceptable risk". Instead a "toolbox" approach was adopted for this project and a number of potential management measures have been tabled.

Appendix 1.2.2

EMS FRAMEWORK: TASMANIAN FARMED ABALONE INDUSTRY

DRAFT

TRANSLOCATION OF ABALONE – RISK MANAGEMENT – OR "CONTROLLING STRATEGIES" TABLE

Hazard/Pathogen	Risk rating	Controlling Strategies					Comments/Issues
		Quarantine measures	Facility requirements (design, effluent treatment, recirculation, etc)	Treatment or management requirements	Documentation (translocation app, licence, health cert etc)	Other	
Perkinsus spp.	8	For wild stock, separation from other stock on farm (before or after movement).	Choice of site location (whether near natural populations). In the marine environment, increasing distance between farm and wild susceptible animals reduces risk of infection through dilution.	Only use visually clean broodstock. Maintain optimal nutrition of stock. Reporting of significant mortalities on a routine basis, with follow-up laboratory analysis. Keeping records of stock numbers, keeping mortalities for examination.	Statutory Declarations from farmers (surveillance and sampling of wild cohorts for broodstock). Collect stock, produce progeny and batch test, destroy adults (numbers tested depends on confidence level required). History of facility testing, taking into account seasonality. Documented health surveillance program.	Restrict age groups or life stages. Wild versus captive bred stock. Restrict movement to on shore facilities (no open water)[1]. Separation of adults and juveniles at fertilization.	
Vibrio bacteria	4			Avoid transfer of stock during periods of high temperatures.			Doing nothing is an option from a regulatory perspective.

[1] Imported live fish, eggs and gametes of aquaculture origin should not be released into unenclosed waters. European Commission Decision 2003/858/EC.

				Hygiene measures.			Control at a farm level.
Flavobacteria	4						
Fungal infections	4						
Mudworm	4			Visual inspections of stock. Air-drying[2].	Only move stock from farms with no history of mudworm. Only move stock from facilities where water is filtered. Health certification if going to an area free of mudworm.	Not moving adult shell from known affected areas to uninfected areas?	Successfully eradicated from coastal zone by handpicking affected shell[3].
Gill ciliates	0						
Metacercariae	1						
Parasitic flukes	1						
Shell fouling organisms	9	Quarantine, spawn and then destroy broodstock adults.	Cleaning shell prior to movement. Treat with antifouling paints etc. Only translocate farm-bred stock from land-based sites (preferably	Visual inspections of stock.	History of freedom from shell fouling on farm.	Smaller shell less likely to have fouling organisms.	

[2] Lleonart et al. (2003a). May not be effective. See comments and lists of treatments at http://www.pac.dfo-mpo.gc.ca/sci/shelldis/pages/sabelab_e.htm
[3] Raloff (1999)

			using filtered water).				
Unknown diseases	9	Separation from other stock on farm (before or after movement) together with effluent water treatment).		Stress animals to see if the disease occurs in stressed animals[4]. If not, then there may not be a problem.		Restrict movement to on shore facilities (no open water).	This was put in to show that the process would work for a wide range of problems. Where there are scientifically based concerns over pathogens which are present but not causing disease, but which have the potential to cause disease (e.g. rickettsia, microcells in mollusc haemocytes) then some form of disease risk minimisation may be warranted.

[4] Malham et al. (2003) provide evidence for a link between stress and disease outbreaks in abalone.

Monitor and review

Information on emerging diseases or additional information on known diseases will become available when FRDC project 2002/201 (Abalone disease survey) becomes available. The risk assessments associated with abalone will need to be re-evaluated to incorporate new knowledge about hazards, and to ensure that management measures are still appropriate.

Next steps

It is up to each jurisdiction to complete the 'likelihood' and 'consequences' tables for their jurisdiction, to complete the documentation of the reasons for the scores assigned and then to adopt such management measures as will allow the translocation of abalone to meet their acceptable level of risk.

The potential to translocate fouling and boring organisms was identified as the most serious risk. Both that risk, and the risk posed by the identified disease agents, is capable of being managed through a range of management measures, particularly the use of on-shore facilities.

In the case of hatchery reared genetic lines the disease and fouling risks might best be managed through the use of high health hatchery facilities to produce the genetically selected lines. These could then be sold as "specific pathogen free" stock.
The impact of selected genetic lines on the marine environment is of theoretical concern and the risks (if they exist) cannot be quantified on evidence currently available.

References

Lleonart, M., Handlinger, J., Powell, M. 2003a. Spionid mudworm infestation of farmed abalone (*Haliotis* spp.). Aquaculture 221: 85-96.

Raloff, J. 1999. A first: scientists oust a marine invader. Science news 156: 151.

Malham, S.K., Lacoste, A., Gelebart, F., Cueff, A., Poulet, S.A. 2003. Evidence for a direct link between stress and immunity in the mollusc *Haliotis tuberculata*. Journal of experimental zoology part A. Comparative experimental biology 295: 136-144.

APPENDIX 1.3.6.3: SALTMARSH HABITAT

How you can help

You can help this saltmarsh and other wetlands by keeping our waterways clean.

Remember if it goes into the stormwater it will end up in the saltmarsh and at our beaches.

Make sure your litter goes in a bin.

Do not let solid material, oils, poisons or paints go down the drain.

Wash paint brushes in buckets and pour water through paper to remove paint residue.

Wash your car on the lawn not in the street.

Get involved with Coastcare and help remove weeds and rubbish.

Dispose of garden waste in accordance with council regulations.

Do not take your horse, dog or bike into wetland areas.

Enjoy the saltmarsh for its beauty and value the role it plays in cleansing your environment.

For more information contact

Tranmere - Clarence Plains Land & Coastcare Inc. 6247 6925
Coastcare 6233 6427

The Parks and Wildlife Service:
Seven Mile Beach Office 6248 4053
Clarence City Council 6245 8619
Birds Tasmania
GPO Box 68 Hobart 7001

Published with the assistance of Coastcare - a cooperative Commonwealth / State / Local Government program supporting communities caring for our coast.

So you live near a Saltmarsh!

W. Andrews

The mouth of the Clarence Plains Rivulet at Rokeby Beach is a Saltmarsh.

This Saltmarsh, like many others, is under increasing threat from urban development and poor land management.

The saltmarsh provides a unique habitat that supports both freshwater and marine plants and animals and plays an important role in cleansing our waterways.

Tranmere - Clarence Plains Land & Coastcare Inc.

Saltmarshes are special

A saltmarsh is a special type of wetland. They form part of the intertidal zone of the coastline. At high tide they are flooded with seawater and at low tide they are a bed of mud and grasses.

Saltmarshes support a distinctive community of land plants and grasses with highly specialised salt tolerance. They also provide a unique habitat that supports both freshwater and marine animals.

Tidal creeks and freshwater streams cut through the saltmarsh and the plants and grasses act as a filtration system for water and other sediments from the surrounding catchment area.

Did you know?

Saltmarshes are important breeding grounds for both freshwater and marine fish!

The jollytail, a freshwater fish that can be found in saltmarsh areas.
Picture courtesy of The Fauna Handbook, Uni. of Tasmania

Importance of bacteria

Most of the food eaten by the invertebrates and young fish in a saltmarsh is in the form of broken down plant matter known as detritus.
The detritus is created by large numbers of good bacteria that live in the muddy bottom of the saltmarsh. Some of these bacteria enrich the water with nitrogen which can in turn be used by the plants.

Under threat

A healthy saltmarsh requires a buffer zone of native vegetation that prevents erosion and protects water quality. Native vegetation also provides homes for native wildlife.

The Clarence Plains Rivulet saltmarsh is under threat from a loss of native vegetation and water pollution.

Weeds like boneseed and African boxthorn can be introduced to saltmarsh areas by livestock grazing and the dumping of garden waste. Both of these plants are voracious competitors and replace native species very quickly.

The saltmarsh filters runoff from farms in the catchment area and roads in the surrounding surburban areas. Any litter or contaminants that make it into the stormwater will end up here.

Pollution can result in the death of the plants, which affects the entire saltmarsh community. An unhealthy saltmarsh means that polluted water flushes out into the Derwent Estuary as well.

Threatened species

The narrow-leaved New Holland daisy *Vittadinia muelleri*, which is listed as rare under the Tas. Threatened Species Protection Act 1995, can be found amongst the vegetation surrounding the marsh.

Photo courtesy of Hans and Annie Wapstra

Saving our saltmarshes!

The Tranmere - Clarence Plains Land & Coastcare Group recognises the importance of this area and in partnership with Clarence City Council and The Parks and Wildlife Service is working hard to preserve it.

Together with local land owners they have fenced the saltmarsh to prevent livestock, including horses, from grazing. They have implemented weed removal programs to tackle the boneseed and boxthorn infestation.

They have put together this information brochure and an onsite sign to educate you about the value of this area and what you can do to help preserve it.

Watch out for the birds

This area is a great place to observe both native and migratory birds.

Saltmarshes provide homes and food for many species of birds, in particular wading birds like herons and egrets.

Look out for the white faced heron and shorebirds, such as kelp gulls and pied oystercatchers, who use the marsh area for food and shelter.

White faced heron

Migratory birds like the red necked stint, which breeds in Siberia and Alaska, may also be seen resting at the saltmarsh as they refuel their energy reserves for their long jouney.

APPENDIX 2.2.3: THREATENED, MARINE OR MIGRATORY BIRDS ASSOCIATED WITH ABALONE GROWING REGIONS.

Many migratory birds breed in the high Arctic Tundra and China during the northern summer and migrate to the Southern Hemisphere as winter approaches. The birds can be found feeding on exposed sand and mud flats during low tide and roosting on the high ground near their feeding sites during the high tide. Important migratory shorebirds are listed in Table 2.2.3.

References

Barrett G, Silcocks A, Barry S, Cunningham R, Poulter R (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union. 824pp.

DPIWE (1998). Marine Farming Development Plan. Great Oyster Bay and Mercury Passage, Department of Primary Industries, Water and Environment, Tasmania. 118pp.

DPIWE (1999). Marine Farming Development Plan. Far North West, Department of Primary Industries, Water and Environment, Tasmania. 64pp.

DPIWE (2000). Marine Farming Development Plan. Tamar Estuary, Department of Primary Industries, Water and Environment, Tasmania. 44pp.

DPIWE (2000). Marine Farming Development Plan. Blackman Bay, Department of Primary Industries, Water and Environment, Tasmania. 60pp.

Table 2.2.3. Threatened, migratory and marine birds as classified by the EPBC Act 1999. Endangered (E), vulnerable (V) and rare (R) species as listed by Bryant and Jackson (1999) listed to occur in regions where land-based abalone farming occurs. P indicates species protected under the LMRMA, N indicates not listed as E, V or R but considered of high conservation value.

Common name	Scientific name	Listed Marine Species	Listed Migratory Bird	Listed Threatened Species EPBCA/ TSPA		1. North West	2. Tamar	3. Bicheno	4. Great Oyster Bay	5. Blackman
Arctic jaeger	*Stercorarius parasiticus*	X	X			X				
Bar-tailed godwit	*Limosa lapponica*	X	X			X	X			X
Caspian tern	*Sterna caspia*	X	X			X	X	X	X	
Common greenshank	*Tringa nebularia*		X			X	X		X	X
Crested tern	*Sterna bergii*	X	X			X	X	X	X	X
Curlew sandpiper	*Calidris ferruginea*	X	X			X	X		X	X
Double-banded plover	*Charadrius bicinctus*	X	X			X	X	X	X	X
Eastern curlew	*Numenius madagascariensis*	X	X			X			X	X
Fairy tern	*Sterna nereis*				R	X	X	X	X	X
Great crested grebe	*Podiceps cristatus*				R		X		X	X
Great knot	*Calidris tenuirostris*	X	X			X	X	X		X
Grey goshawk	*Accipiter novaehollandiae*		X		R	X	X	X	X	
Grey plover	*Pluvialis squatarola*	X	X			X	X			
Grey-tailed tattler	*Heteroscelus brevipes*	X	X			X	X			
Hooded plover	*Thinornis rubricollis*	X		V		X	X	X	X	X
Latham's snipe	*Gallinago hardwickii*	X	X			X	X			
Lesser sand plover	*Charadrius mongolus*	X	X			X	X	X		
Little penguin	*Eudyptula minor*	X			N	X	X	X	X	X
Little tern	*Sterna albifrons sinensis*	X		E	E	X	X	X	X	X
Orange-bellied parrot	*Neophema chrysogaster*	X				X				
Pacific golden plover	*Pluvialis fulva*	X	X			X	X	X	X	
Red knot	*Calidris canutus*	X	X			X	X	X		X
Red-capped plover	*Charadrius ruficapillus*	X				X	X	X	X	X
Red-necked stint	*Calidris ruficollis*	X	X			X	X	X		
Ruddy turnstone	*Arenaria interpres*	X	X			X	X	X		
Sharp-tailed sandpiper	*Calidris acuminata*	X	X			X				
Short-tailed shearwater	*Puffinus tenuirostris*	X	X		N	X	X	X	X	
Shy albatross	*Thalassarche cauta*	X		V	V	X	X	X	X	
Swift parrot	*Lathamus discolor*	X		E	V	X	X	X	X	X
Whimbrel	*Numenius phaeopus*	X	X			X	X			X
White/Great egret	*Ardea alba*	X	X			X	X	X	X	X
Wedge tailed eagle	*Aquila audax fleayi*			E	V	X			X	X
White-bellied sea-eagle	*Haliaeetus leucogaster*	X			V	X	X	X	X	X
White fronted tern	*Sterna striata*	X			R	X		X		

APPENDIX 2.2.3.1: PROTOCOL FOR LAND-BASED ABALONE FARMING ACTIVITIES IN THE PRESENCE OF LISTED THREATENED, MARINE OR MIGRATORY BIRDS.

To be Developed

APPENDIX 2.2.4: NOTES ON THREATENED, ENDANGERED AND PROTECTED SPECIES:

Many land based abalone farms are located in areas rich in native species diversity, which may contain threatened, endangered or protected species that are closely associated with the marine environment. A number of species in Tasmania have been listed as rare, endangered, threatened or vulnerable under the *Tasmanian Species Protection Act* 1995 (TSPA) and/or the Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999 (EPBCA). A few of these species are also protected under *the Living Marine Resources Management Act* 1995 (LMRMA). These species are listed in Table 2.2.4. Information on shorebirds can be found in Section 1.3.6 Behavioural Changes and Impacts, and Section 2.3.3 Listed Migratory Birds

The threatened or endangered terrestrial animals have specific habitats and would have been identified through the local government planning process (see Section 1.3.7). The key threat to many vulnerable insects is the use of chemicals (which are not used in the industry), pesticides and the loss of native vegetation. The Industry maintains as part of its environmental management to:

- Maintain native vegetation where possible on site in areas adjacent to marine leases
- Avoid building drains or levees that alter drainage patterns or may direct fluids and waste onto sensitive areas such as saltmarsh and coastal wetlands
- Restrict vehicle movements to confined tracks to avoid habitat degradation and to reduce the introduction of weeds and root-rot infection.
- Fence areas to maintain habitat integrity if necessary.
- Minimise the use of chemicals.
- Control the presence of cats and dogs to reduce predation.

The presence of threatened marine mammals is unlikely to be impacted upon by land based farming activities. Care is taken to ensure any sub marine pipes are well secured. Awareness and protection of a stable marine habitat is required for the Industry to be sustainable, which enhances the protection of threatened marine species.

Key issues to ensure that threatened and endangered marine species are maintained include:

- No habitat modification through siltation affecting the substrate, removal of rocks or substrate for the shoreline, or damming preventing movement of water upstream
- Awareness of water quality to maintain habitat
- Awareness of introduced marine pests that may compete with and displace native threatened marine species.
- Not disturbing or removing any threatened or endangered marine species.

Further information on threatened and endangered species in Tasmania can be found at www.dpiwe.tas.gov.au/inter.nsf/Attachments/RLIG-5425ZR/$FILE/threatfauna.pdf or : http://www.dpiwe.tas.gov.au/inter.nsf/WebPages/SJON-58E2VD?open#ThreatenedSpeciesLis

Table 2.2.4. Endangered (E), vulnerable (V) and rare (R) species as listed by Bryant and Jackson (1999) listed to occur in regions where land-based abalone farming occurs. P indicates species protected under the LMRMA, N indicates not listed as E, V or R but considered of high conservation value.

Common name	Scientific name	Region				
		1. North West	2. Tamar	3. Bicheno	4. Great Oyster Bay	5. Blackman
Birds						
Fairy tern	*Sterna nereis*	R			R	R
Forty spotted pardalote	*Pardalotus quadragintus*			E	E	E
Great crested grebe	*Podiceps cristatus*				R	
Hooded plover	*Thinornis rubricollis*	V		V	V	V
Little penguin	*Eudyptula minor*	N		N	N	N
Little tern	*Sterna albifrons sinensis*	E			E	E
Orange-bellied parrot	*Neophema chrysogaster*	E				
Short-tailed shearwater	*Puffinus tenuirostris*	N			N	
Swift parrot	*Lathamus discolor*			V	V	V
Wedge tailed eagle	*Aquila audax fleayi*	V	V	V	V	V
White-bellied sea-eagle	*Haliaeetus leucogaster*	N	N		N	N
White fronted tern	*Sterna striata*			N		
Terrestrial Invertebrates						
Broad-toothed stag beetle	*Lissotes latidens*					E
Chaostola skipper	*Antipodia chaostola*				E	
Northwest velvet worm	*Ooperipatellus cryptus*	R				
Marine animals						
Australian grayling	*Prototroctes maraena*	V	V	V	V	V
Live bearing seastar	*Patririella vivipara*					E
Marine Mammals						
Blue whale	*Balaenoptera musculus*			E	E	
Humpback whale	*Megaptera novaengliae*			E	E	
New Zealand fur seal	*Arctocephalus australis*	R				
Southern right whale	*Eubalaeba australis*			E	E	
Terrestrial mammals						
Eastern barred bandicoot	*Perameles gunnii gunnii*	V	V	V	V	V
New Holland mouse	*Pseudomys novaehollandiae*		V	V	R	
Spotted-tail quoll	*Dasyurus maculatus*			V	V	V
Reptiles						
Leatherback turtle	*Dermochelys coriacea*	V	V	V		
Green and gold frog	***Litoria raniformis***			V	V	
Marine algae						
Brown alga	**Cystoseira trinodis**					R

References

Bryant S, Jackson J (1999). Tasmania's Threatened Species Handbook: What, where and how to protect Tasmanians threatened animals. Threatened species Unit, Parks and Wildlife Service, Tasmania.

APPENDIX 2.2.5: PROTECTED AREAS: WORLD HERITAGE, RAMSAR, MARINE PARKS AND SENSITIVE HABITATS.

Some abalone farms are located adjacent to areas recognised as of environmental significance. These areas are listed in Table 2.2.5.

Table 2.2.5. Protected habitats under the *EPBCA* 1999 adjacent to marine farming areas

Region (MFDP) Zone (MFZ)	Conservation area	Status	Significance
NorthWest			
5, 6, 7, 9	Boullanger Bay-Robbins Island shorebird habitat	National Estate property	Shorebird habitat
3,4	Shipwreck Point	Marine birds	Shorebird habitat
Bicheno			
	Governor Island Marine Protected Area	Marine Protected Area	Marine conservation area
Great Oyster Bay			
11	Moulting Lagoon Game Reserve	Ramsar wetland	Waterfowl habitat
12b	Freycinet National Park	NPW	Nature reserve
6a, 6b	Seaford Point		Coastal birds
12a, 12b	Great Oyster Bay	DPIW	Shark nursery
Blackman			
1, 2, 3, 4, 5, 6, 7, 8, 9, 19, 20, 21	Long Spit & Porpoise Hole	Private nature reserve	Coastal & migratory birds
All	Blackman Bay	DPIW	Shark Nursery

Abalone farming activities are adjacent to, but do not adjoin any Ramsar sites, World Heritage sites, or Marine Protected Areas.

References

DPIWE Marine Farming Development Plans (various). Department of Primary Industry, Water and Environment, Tasmania.

http://www.deh.gov.au/water/wetlands/ramsar/ramaust.html

http://www.ramsar.org

APPENDIX 2.2.5.1: PROTECTED AREAS: WORLD HERITAGE, RAMSAR, MARINE PARKS AND SENSITIVE HABITATS.

Tasmania

SHOREBIRD CONSERVATION

ROBBINS PASSAGE/BOULLANGER BAY WETLANDS AREA

Values Mapping Project

Where

Robbins Passage and Boulanger Bay are located on the far north west coast of Tasmania. This location contains the largest area of tidal mud and sandbanks in the state as well as a series of islands and tidal channels, beaches and estuaries. This variety of habitats makes the area especially important for many shorebird species. Although the region is generally sparsely populated, a number of activities such as dairy farming and commercial fishing have been practiced for over a century.

The birds

The Robbins Passage Wetlands are claimed to support higher numbers of shorebirds than all other shorebird sites in Tasmania combined. The area is especially important for migratory species such as eastern curlew, ruddy turnstone and curlew sandpiper. Resident species that occur in high numbers include the sooty and pied oystercatchers and the hooded plover which is nationally listed as a threatened species.

Red-necked stint.

Who

The main players in the Values Mapping Project included the Robbins Passage Wetlands Coast and Landcare Group, Birds Tasmania, Community Solutions and WWF Australia. The catalyst for the Values Mapping Project and the involvement of so many stakeholders was a nomination to have the wetlands of this area listed under the Ramsar convention identifying it as a wetland of international importance. Considerable opposition was voiced by locals who were concerned that such a listing would impose restrictions upon use of the area. These events led to the formation of the Robbins Passage Wetlands Coast and Landcare Group which aims to promote community awareness of the conservation values of the wetland and to ensure that the area is appropriately managed.

Problems and Challenges

The important habitat value of the Robbins Passage Wetlands for shorebirds in Tasmania has only been fully appreciated in recent times. However, the area has been utilised for commercial and recreational purposes for well over a century. In the beginning, the general community's awareness of the importance of this area to shorebird conservation was low and no formally organised group existed to manage this extensive coastal wetland.

There was a perception from the locals that the public consultation process associated with the nomination for Ramsar listing was inadequate. This situation had the potential to create major division in the community and to result in a negative outcome for all parties involved. It was felt that the historical, social and recreational values of the area to the local population were not duly recognised.

Other problems facing the site include human disturbance- especially by the inappropriate use of four wheel drive vehicles, overfishing, impacts on water quality from surrounding dairy farms and the spread of weeds such as rice grass which have the potential to make shorebird roosting and feeding sites unusable.

WWF

Birds Australia

Natural Heritage Trust

Community Solutions

Solutions

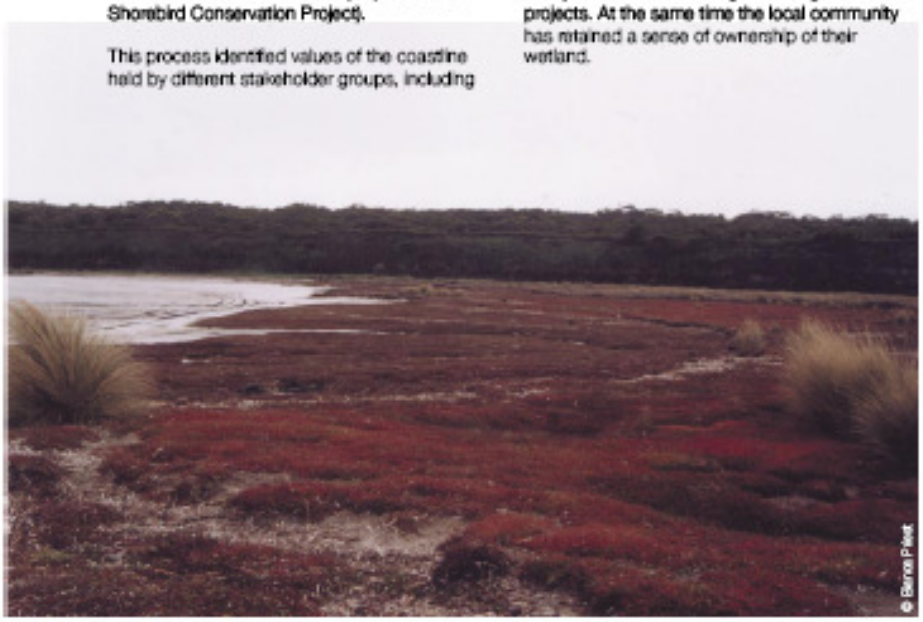
Following local opposition, the nomination of the area for Ramsar listing was not endorsed by State Government. Instead, a local plan for managing the area was adopted which involved the formation of the local Robbins Passage Wetlands Coast and Landcare Group. The group recognised the need to build partnerships and raise awareness of the environmental values and issues of the area. This included a close working relationship with Birds Tasmania who had prepared the original Ramsar nomination. Both organisations were able to put the past behind them and work together to wisely manage the wetland.

This special area of coastline is valued by many different people for a range of reasons. The Values Mapping Project was proposed to bring together the range of stakeholder groups – user, management and interest – to identify and discuss important areas within the wetlands and any issues concerning their use, especially in relation to shorebirds. The Values Mapping Project took place over three days in Smithton and included small group discussions, a field trip followed by a series of presentations on the wetlands and a workshop on the final day. The project was coordinated by Community Solutions - independent consultants with experience in resolving conflict – in partnership with Birds Tasmania and WWF Australia (as part of the Shorebird Conservation Project).

This process identified values of the coastline held by different stakeholder groups, including recreational, social and economic values as well as the conservation values. Key areas where conflicting uses were likely to occur were identified and a conflict resolution process was undertaken. In nearly all instances favourable outcomes were achieved for all parties involved either by finding alternative sites were activities could be carried out where they had a lesser impact on other values, or by modifying the timing and the way in which activities were carried out. The project generated much trust and goodwill amongst participants and cleared the path for a collaborative approach to future management and planning to proceed.

The approach taken in this instance is one of total community inclusion. Eighteen stakeholder groups have been regularly involved in consultation and management of the wetland. These include organisations which can provide scientific advice and expertise such as the Nature Conservation Branch within the Department of Primary Industries, Water and the Environment (DPIWE) and Birds Tasmania, as well as user groups including the local oyster-grower's association and community groups such as local schools, indigenous groups and local council.

This close relationship with a wide range of stakeholders has helped the group to obtain nearly $100 000 of funding for a range of projects. At the same time the local community has retained a sense of ownership of their wetland.



Bird Pt (Robbins Is) - an important roost site for shorebirds in NW Tas.

Outcomes for the environment

- Community awareness of the wetland and its values has been enhanced.
- Establishment of a close working relationship between the group, locals and other stakeholders.
- Interpretive signage has been installed at key access areas to the wetland and inappropriate four wheel drive vehicle access and use has been curtailed.
- Regular monitoring of shorebird numbers during summer and winter by experienced observers has been implemented.
- An innovative program to control the weed Rice Grass has commenced.
- A comprehensive water quality monitoring program is in use which utilises latest technology and will provide a high quality monitoring system.

Outcomes for the participants

- The public profile of the group has been raised substantially.
- Participants have gained knowledge and expertise from scientists, professionals and other stakeholders.
- Valuable experience in successfully applying for grants has been gained.

Measures of success

This project has successfully achieved a number of positive social outcomes, including the following:

- Conflicts over the use of the wetland have been successfully resolved.
- The profile of the wetland and its ecology among the local community has increased and a sense of ownership of the wetland has been developed.
- A community group with a desire to look after the environment has been established.

With time, the results of the current bird counts and water monitoring programs will provide valuable insights into the effects of certain activities. It is only then that it will be possible to see how successful the Values Mapping Project has been in protecting shorebirds from disturbance and habitat degradation.

WWF

BirdsAustralia

Natural Heritage Trust

Community Solutions

Shipwreck Pt (Parking lot) - an important roost site for shorebirds.

Future strategies and directions

- The continuity of the public's support and enthusiasm will need to be maintained.
- Further survey work of shorebird numbers and distribution is required as it is likely that new roosting sites will be discovered.
- Monitoring of impacts of existing and proposed wind farms will be required.
- The appointment of a wetland coordinator to develop and initiate projects agreed as important during the values mapping project. These projects will focus on education, investigating shorebird use of the wetlands and weed control.

Key groups and contacts

Birds Australia
Tel (03) 9882 2622
Email: mail@birdsaustralia.com
Website: www.birdsaustralia.com.au

WWF Australia (Shorebird Conservation Project and Threatened Species Network)
Freecall 1800 032 551
Website: www.wwf.org.au

Community Solutions:
Website: www.communitysolutions.com.au

Robbins Passage Wetlands Coast and Landcare Group

Australasian Wader Studies Group
Website: www.tasweb.com.au/awsg/

Summary

The Robbins Passage Wetlands Coast and Landcare Group and values mapping project has made an important contribution to shorebird conservation because;

All stakeholders were included and worked together cooperatively

The local community was empowered to manage their wetland appropriately.

The group and project have utilised the media well to let the community know what they were doing and why the wetland was so important.

Important objectives for the group and the project in future will include;

Continuing to engage and cooperate with all existing stakeholders and include new stakeholders in the project as the need arises.

Continue to develop quantitative monitoring programs and gather data on project outcomes on a regular basis.

Sharp-tailed sandpiper.

Common Greenshank.

The shorebird case studies were developed by Birds Australia as part of the Shorebirds Conservation Project which is funded by the National Heritage Trust and managed by WWF Australia

APPENDIX 2.2.7 THE DEVELOPMENT AND ADOPTION OF BEST PRACTICE MEASURES TO MINIMISE THE INTRODUCTION OR TRANSLOCATION OF INVASIVE MARINE SPECIES (MARINE PESTS) THROUGH BIOFOULING

AQUACULTURE AS A VECTOR

Goal
The goal is to minimise the risk of translocation of invasive marine species through the activities of aquaculture.

Background
Aquaculture industries have long recognised the threat that invasive marine species (be they endemic, naturalised or new incursions) pose to environmental, economic and social values, as aquaculture often becomes the first victim of those incursions.
Past ad hoc approaches to controlling the translocation of invasive marine species include voluntary management and translocation practices implemented by some sectors of industry, government imposition of management controls, expensive monitoring programs – e.g. for toxic dinoflagellates, and bio-toxin monitoring for food safety.
It is in this light that the aquaculture industry welcomes the Australian Government and State government authorities' implementation of a national strategy for introduced marine pest management, to minimise the risks posed to environmental, economic and social values. All parties also recognise that natural recruitment as well as vectors such as storms, currents and the effects of climate change will contribute to the expansion of marine pest populations and range.

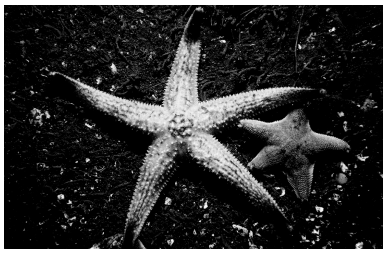
Principles
The development and adoption of any management system should be based on a set of principles that take into consideration the needs and circumstances of different geographic regions, the biological and physical requirements of the cultured species, be outcome focused and be supported by implementation Guidelines.

1. Management options should be cost-effective, practicable, environmentally responsible and safe.
2. When appropriate, Government agencies should provide waterproof identification guides for all species of concern.
3. Governments should identify/record areas where the listed species already exist.
4. Industry should report existing/new incursions of listed species.
5. Industry should, prior to dispatch for on-growing in other areas, and on receival prior to relaying, visually inspect the product for the presence and removal of marine species of concern.
6. Industry should clean or air dry cultured species housing equipment before transfer to areas free of species of concern.
7. Industry will remove and dispose of species of concern in an appropriate manner.
8. Management options must not endanger the life, quality or safe food status of the cultured species.

Table 1. Distribution of introduced marine species in Tasmanian land-based abalone growing regions (sourced from the Marine Farming Development Plans). (*) indicates those species regarded as invasive marine species on the Australian Ballast Water Management Advisory Committee (ABWMAC) target species list (which is under review), (P) indicates information is not comprehensive.

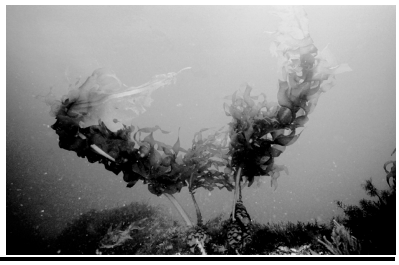
Common name	Scientific name	Region				
		1. North West	2. Tamar	3. Bicheno	4. Great Oyster Bay	5. Blackman
		P		P		P
Bivalves						
Asian theora clam	*Theora fragilis*		X			
Bag mussel*	*Musculista senhousia*		X			
Bivalve	*Theora ubrica*					
European clam*	*Varicorbula gibba*					
New Zealand bivalve	*Venerupis largillierti*		X			
Pacific Oysters	*Crassostrea gigas*		X		X	X
Echinoderms						
New Zealand seastar	*Patiriella regularis*					
Northern Pacific seastar*	*Asterias amurensis*				X	X
Rough seastar	*Astrostole scabra*					
Gastropods (Univalves)						
New Zealand screwshell	*Maoricolpus roseus*		X		X	
Crustaceans						
European shore crab*	*Carcinus maenas*	X		X	X	X
New Zealand cancer crab	*Cancer novaezealandiae*					
New Zealand half-crab	*Petrolisthes elongatus*		X		X	
Ascidians and Seasquirts						
Colonial ascidian	*Botryllus schlosseri*				X	
European seasquirt	*Ascidiella aspersa*				X	
Fish						
Atlantic salmon	*Salmo salar*					
Brown trout	*Salmo trutta*					
Rainbow trout	*Onchorhynchus mykiss*					
Macroalgae						
Broccoli weed	*Codium fragile tomentosoides*		X			
Japanese seaweed*	*Undaria pinnatifida*				X	X
Phytoplanton						
Toxic dinoflagellate*	*Alexandrium catenella*				X	
Toxic dinoflagellate*	*Alexandrium tamarense*		X			
Toxic dinoflagellate*	*Gymnodinium catenatum*				X	X

DESCRIPTION OF SELECTED TARGET INVASIVE MARINE SPECIES IN TASMANIAN LAND-BASED ABALONE GROWING AREAS



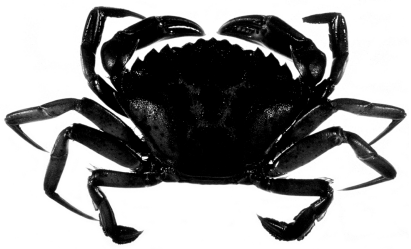
Northern Pacific seastar

The northern Pacific seastar (*Asterias amurensis*) can grow up to 50 cm in diameter. It has 5 arms with pointed tips and is common around southeast Tasmania, particularly in the Derwent River. The seastar feeds on native species and may compete with native predators. It is also implicated in the decline of the endangered spotted handfish (Section 2.2.4).



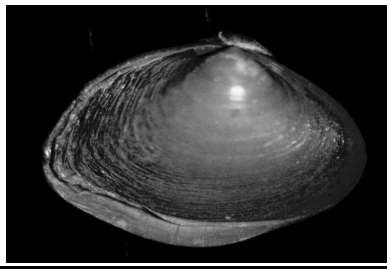
Japanese Kelp (Wakame)

Japanese Kelp (*Undaria pinnatifida*) is a brown algae with a midrib that runs along the centre of the plant. It has a frilly structure (sporophyll) near the base of the stem. Undaria grows up to 3 m and competes with native plants and animals. It produces spores that are easily transported. It is important that boats, fishing gear and dive equipment are washed and dried before moving to other areas to prevent spread of the spores.



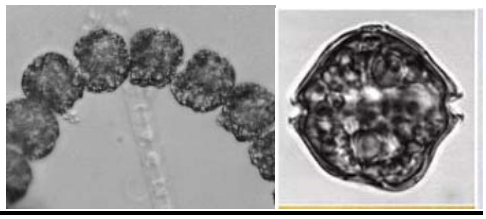
European green crab

The European green crab (*Carcinus maenas*) is a medium sized crab that grows up to 8 cm wide. It has 5 spines on either side of the eyes. Green craps do not have swimming paddles on their back legs, distinguishing them from native crabs. The crab is a voracious predator and competes with our native species. The green crab can be transported with aquaculture gear and impacts on the States' aquaculture farms.



European clam

The European clam (*Varicorbula gibba*) is a small bivalve reaching up to 20 mm. One shell is bigger than the other distinguishing it from native clams. The pest has a high growth rate and is tolerant of many environmental conditions. It can form extremely high population densities, excluding native species. The pest can be transported in the hulls of vessels and by the movement of aquaculture gear.



Toxic dinoflagellates

The toxic dinoflagellate (*Gymnodinium catenatum*) is a microscopic cell (60µm long) which often forms chains of 4 to 16 cells. Blooms of the dinoflagellate cause shellfish to be contaminated with paralytic shellfish toxins, causing extended closures of oyster growing areas (See Aspect 1.2.3 Quality Assurance). This species produces small, robust micro-reticulate cysts known to be transported in ship's ballast water. It is important that boats and equipment are washed down before moving to new locations. The abalone farming industry has strict protocols in place to avoid translocation of the dinoflagellate, particularly during a bloom (See Appendix 1.2.5).

The toxic dinoflagellate *Alexandrium catenella* and *A. tamerense* are closely related and only distinguishable through high-powered microscopy. *Alexandrium catenella* may occur in chains or single cells where as *A. tamarense* occurs as a single cell or occasionally as pairs. Blooms of this species can result in the closure of oyster leases with severe economic losses. Both species are considered toxic and a threat to the Tasmanian shellfish industry.

Further information on Invasive Marine Species is available from http://www.dpiwe.tas.gov.au/inter.nsf/ThemeNodes/LBUN-5KK5EP?open

APPENDIX 3.1: COMMONWEALTH AND TASMANIAN LEGISLATION MATRIX RELEVANT TO COMPONENT 3.1: SITE SELECTION, CONSTRUCTION AND INFRASTRUCTURE ASPECTS.

Note: The following tables are a guide only on not determined to be comprehensive.

Table 3.1.1. Commonwealth legislation pertaining to the site selection, construction and infrastructure of a marine farming facility.

Commonwealth Legislation Matrix	3.1.1. Habitat Effects	3.1.2. Erosion	3.1.3. Seepage	3.1.4. Shading	3.1.5. Rehabilitation	3.1.6 Soil Quality	3.1.7. Noise / Dust	3.1.8. Infrastructure	3.1.9. Waste	3.1.10. Water Flow	3.1.11. Navigation	3.1.12. Alienation	3.1.13 Proximity to sensitive fauna/regions	3.1.14 Proximity to users	3.1.15. Water table
Aboriginal and Torres Strait Islander Heritage protection Act 1984															
Australian Maritime Safety Authority Act 1990								X			X				
Environment and Heritage Amendment Act 2000	X														
Environment Protection and Biodiversity Conservation Act 1999	X														
Fisheries legislation (Consequential Provisions) Act 1991															
Fisheries administration Act 1991															
Navigation Act 1912											X	X			
Protection of Movable Cultural Heritage Act 1986													X	X	
Resource Assessment Commission Act 1989	X												X	X	
Sea Installations Act 1987												X			
Seas and Submerged Lands Act 1973												X			

Table 3.1.2. Tasmanian legislation pertaining to the site selection, construction and infrastructure of a marine farming facility.

Tasmanian Legislation Matrix	3.1.1. Habitat Effects	3.1.2. Erosion	3.1.3. Seepage	3.1.4. Shading	3.1.5. Rehabilitation	3.1.6 Soil Quality	3.1.7. Noise / Dust	3.1.8. Infrastructure	3.1.9. Waste	3.1.10. Water Flow	3.1.11. Navigation	3.1.12. Alienation	3.1.13 Proximity to sensitive fauna/regions	3.1.14 Proximity to users	3.1.15. Water table
Aboriginal Lands Act 1995												*X*			
Aboriginal Relics Act 1975												X			
Crown Lands Act 1976	X	X			X	X		X	X	X		X	X	X	X
Disposal of Uncollected Goods Act 1968					X				X						
Energy Co-ordination and Planning Act 1995								X							
Environmental Management and Pollution Control Act 1994			X				X		X					X	X
Farm Water Development Act 1993										X					
Fire Services Act 1979	X														X
Forest Practices Act 1985	X														
Groundwater Act 1985			X							X					X
Health Act 1997															
Historic Cultural Heritage Act 1995	X												X		
Hobart Regional Water (Arrangements) Act 1996								X							

Tasmanian Legislation Matrix	3.1.1. Habitat Effects	3.1.2. Erosion	3.1.3. Seepage	3.1.4. Shading	3.1.5. Rehabilitation	3.1.6 Soil Quality	3.1.7. Noise / Dust	3.1.8. Infrastructure	3.1.9. Waste	3.1.10. Water Flow	3.1.11. Navigation	3.1.12. Alienation	3.1.13 Proximity to sensitive fauna/regions	3.1.14 Proximity to users	3.1.15. Water table
Hydro-Electric Corporation Act 1995								X							
Land Acquisition Act 1993	X														
Land Use Planning and Use Act 1993	X	X	X		X	X	X	X	X		X	X	X	X	X
Litter Act 1973									X						
Living Marine Resources Management Act 1995	X			X	X			X	X	X		X			
Local Government Act 1993 – (Planning schemes)		X	X		X			X	X	X			X	X	
Marine Farming Planning Act 1995				X				X							
Marine and Safety Authority Act 1997										X	X				
National Parks and Reserves Management Act 2002	X														
Police Offences Act 1935									X						
Pollution of Waters by Oil and Noxious Substances Act 1987										X					X
Resource Management and Planning Appeal Tribunal Act 1993	X														
Resource Planning and Development Commissions Act 1997															
State Water Quality Act 1999										X					
Sewer and Drains Act 1954			X							X					
Threatened Species Protection Act 1995	X														
Water Management Act 1895			X					X	X	X					
Workplace Health and Safety Act 1995														X	

APPENDIX 3.2: COMMONWEALTH AND TASMANIAN LEGISLATION MATRIX RELEVANT TO COMPONENT 3.2: OPERATIONAL ASPECTS.

Note: The following tables are a guide only on not determined to be comprehensive.

Table 3.2. Commonwealth legislation pertaining to the operational aspects of a marine farming facility.

Commonwealth Legislation Matrix	3.2.1.1. Health surveillance	3.2.1.2. Stocking Density	3.2.1.3. Predation	3.2.2.1 Water Use	3.2.2.2 Visual	3.2.2.3. Air	3.2.2.4. Energy	3.2.2.5. Noise & Light	3.2.2.6 Habitat Effect	3.2.2.7 Chemicals/Theraputants	3.2.3.1 Water Quality	3.2.3.2. Sedimentation	3.2.3.3. Fish Disposal	3.2.3.4.Sewerage	3.2.3.5. General Rubbish	3.2.3.6 Biofouling
Environment Protection and Biodiversity Conservation Act 1999			*X*						*X*			*X*				
Quarantine Act 1908	*X*															

Table 3.1.2. Tasmanian legislation pertaining to the site selection, construction and infrastructure of a marine farming facility.

Tasmanian Legislation Matrix	3.2.1.1. Health surveillance	3.2.1.2. Stocking Density	3.2.1.3. Predation	3.2.2.1 Water Use	3.2.2.2 Visual	3.2.2.3. Air	3.2.2.4. Energy	3.2.2.5. Noise & Light	3.2.2.6 Habitat Effect	3.2.2.7 Chemicals/Theraputants	3.2.3.1 Water Quality	3.2.3.2. Sedimentation	3.2.3.3. Fish Disposal	3.2.3.4.Sewerage	3.2.3.5. General Rubbish	3.2.3.6 Biofouling
Agricultural and Veterinary Chemicals(control of use) Act 1995										X						
Animal Health Act 1995	X		X													
Crown Lands Act 1976									X							
Dangerous Good Act 1998										X						
Environmental Management and Pollution Control Act 1994						X		X			X		X	X	X	
Health Act 1997											X		X	X	X	
Living Marine Resources Management Act 1995			X		X							X				X
Local Government Act 1993 – (Planning schemes)				X		X		X			X	X	X	X	X	
Marine Farming Planning Act 1995		X			X											
Marine and Safety Authority Act 1997					X											
National Parks and Reserves Management Act 2002									X							
Poisons Act 1971										X						
Sewer and Drains Act 1954														X		
Threatened Species Protection Act 1995									X							
Water Management Act 1895				X												
Workplace Health and Safety Act 1995										X						

APPENDIX 6.0: BACKGROUND FOR INDIGENOUS COMMUNITY WELLBEING

For the past 40,000 years the Aboriginal people have lived in Tasmania and during this time have harvested the shellfish, hunted native animals, gathered plant foods and utilised many coastal areas for every day living. Evidence of this lifestyle can be seen in the Aboriginal sites and artefacts that have been found around the coastline and inland across Tasmania. The Aboriginal community believes that all Aboriginal heritage sites are important as they give meaning to the landscape within which they exist. Aboriginal heritage surveys can often be required as part of the development approval process for assessing the impact of land based developments.

The Tasmanian Aboriginal people make no distinction between the land and sea, which they view as having a connectedness. As a result, coastal environments are considered an integrated cultural landscape / seascape that is conceptually very different from the broader Australian view of the land and the sea (National Oceans Office 2002). The Aboriginal people see themselves as environmentalists with sustainability as part of their culture. As a community reliant on natural food sources, their survival required resource sustainability practices.

The Aboriginal Tasmanians today are part of a vibrant, productive community working towards self-determination. Cultural activities and festivals are still participated in by the Tasmanian Aboriginal community. This component takes into consideration the Tasmanian Aboriginal community as they exist today, but also considers the importance of their past history. Below is a brief synopsis of why particular areas have importance to the Aboriginal community. Each area below refers to that of the Marine Farming Plans, rather than boundaries recognised by the Aboriginal community.

North West
The North West marine farming area encompasses the area, which was the home of the Parperloihener people, part of the North West Tribe. Visits to the Robbins Island area were made from the Northern Tribes to collect food and shells and trade ochre with the NorthWest Tribes (Ryan 1996). However, Robinson's diary stated that a source of ochre was identified form the mouth of the Welcome River in the area.

Tamar
The North Midlands Tribe occupied the area around the Tamar River with the Leterremairrener clan residing on the banks of the Tamar near Port Dalrymple. The Tamar was a rich hunting ground allowing this tribe to settle for most of the year. Their diet consisted of shellfish, riverine and estuarine bird life, kangaroos, wallabies and possums, and vegetables. Tribes from other areas of the state had winder rights to gather shellfish and eggs from this region.

Great Oyster Bay
The coastline surrounding the Great Oyster Bay marine development plan was used extensively by Aboriginal Tasmanians prior to European occupation, with evidence easy to find in many coastal landforms. Many of these sites are marked with

extensive middens, tools and other artefacts, as the East Coast was particularly important for the Aboriginal populations who moved to the area during winter.

A number of bands were members of the Oyster Bay Tribe, including the Linetemairrener tribe from North Moulting Lagoon, the Loontitetermairremener band at North Oyster Bay, and the Poredareme band in Little Swanport. Great Oyster Bay was also a winter site for the Ben Lomond Tribe. A large midden of oyster shells at Little Swanport is a legacy of the quality and quantity of the local flat oysters *(Ostrea angasi*) consumed by the local aboriginal population. The Great Oyster Bay area, particularly Moulting Lagoon, was considered to be a rich food source by the Aboriginal Tasmanians.

Dunalley and Tasman

The Pydairrerme people from the Great Oyster Bay Tribe were based on the Tasman Peninsula and moved up and down the East Coast to Little Swanport and the Eastern Marshes (Terry 1996). These bands harvested shellfish, hunted native animals, gathered plant foods and utilised the region for every day living.

The remnants of these activities can be seen in Aboriginal middens and artefact scatter around the coastlines of the Tasman Peninsula. These sites and artefacts are extremely significant to today's Aboriginal community.

Norfolk

The Pydairrerme people from the Tasman Peninsula were of the Great Oyster Bay Tribe and would have lived and gathered food from the Norfolk Bay area.

References

Department of Environment and Land Management (1996) Vulnerability of the coastal zone to climate change in Tasmania. In: Australian Coastal Vulnerability Case Studies: CDROM (PC(Windows)). Commonwealth Coastal Action Program – Climate Change Program.

Felton H (1989) The Moomairemener People of South-East Tasmania. In: Davenport WT, and City Of Clarence (Eds), Spirit of Clarence – a Tasmanian Community. City of Clarence, Rosny Park, Tasmania. 175pp.

National Oceans Office (2002) Sea Country - an Indigenous perspective. The South-east regional marine plan assessment reports. 186 pp.

Ryan L (1996) The Aboriginal Tasmanians (2nd Edition) Allen & Unwin Pty Ltd., St Leonards, Australia. 380pp.

Terry I (1996) Municipality of Sorell Heritage Study Stage 1, Thematic History, Prepared for the Sorell Council.

APPENDIX 7.1.1.1: STATUTORY PLANNING PROCESSES UNDER THE MARINE FARMING PLANNING ACT 1995 FOR A PLAN PREPARED BY THE DPIWE OR AN APPROVED PERSON

(S 16) DPIWE or a person applies to the Minister for approval to prepare draft Plan.

(S 16) Minister may:
- grant approval to prepare a draft Plan; or
- refuse approval.

(S 17) Planning Authority (PA) notifies Marine Farming Review Panel that planning has commenced seeking advice as to any particular person or body that the Panel may wish the PA to consult with or any particular matter that the Panel would like the PA to consider in the preparation of a draft Plan.

(S 25) Within 12 months (or any other period the Minister allow) after approval the PA must submit a draft Plan to the Panel.

(S 25) Within 9 weeks (or any other period the Minister allows) the Panel must:
- if Plan is suitable for exhibition recommend public exhibition to the Minister;
- if not suitable: - amend the draft Plan and refer to Min for exhibition: or
  - require PA to amend draft Plan within a specified period.

(S 26) Minister may:
- give approval for exhibition, in which case the PA must advertise the draft Plan within 6 weeks (or any other period the Panel allows) of approval for a period of 2 months; or
- refuse approval and refer the draft Plan back to the Panel seeking further information or stating areas of concern.

(S 28) Within 3 months of closing date for representations the PA must submit a report as per S 28 to Panel.

(S 29) Following consideration of the PA's report the Panel may:
- accept or reject draft Plan; or
- modify the draft Plan.
- require the PA to modify the draft plan.

The Panel must notify the PA of rejection of any modification.

(S 30) If Panel modifies to a substantial extent the draft Plan then the public consultation process is repeated.

(S 31) If the Panel considers the draft Plan appropriate it recommends that draft Plan be approved. The Minister may:
- refuse to approve the draft Plan and indicate concerns to the Panel; or
- approve the draft plan by signing.

If Plan is approved the PA must advertise the approval by public notice.

INITIAL RESEARCH/CONSULTATION FOR THE DEVELOPMENT OF A MARINE FARMING DEVELOPMENT

- Marine Farmers
- MAST/ Marine Board/Recreation Boating
- Commercial fishing interests (includes discussion with DPIW Wild Fisheries)
- Recreational fishing (includes discussions with DPIW Recreation Fishing staff)
- General recreation
- Bureau of Meteorology
- Bureau Statistics
- Local councils re
  - -Effluent disposal (this includes discussions with DTAE Environment staff)
  - -Land based planning
- National Parks Staff re significant fauna issues
- Tas Group of Birds Tasmania
- DPIW Fisheries staff re marine flora and fauna issues
- DTAE Cultural heritage staff re Aboriginal issues
- Tasmanian Fisheries Institute re initial environmental survey.
- DPIW Threatened Species Unit.

During this initial consolation some issues may arise which are specific to a region. Also certain individuals may be identified with detailed knowledge of the region. These issues and individuals are also researched and consulted during the Planning process. For example in the case of Pitt Water CSIRO have undertaken considerable research concerning the regions importance as a shark nursery. In this case ex employees with considerable knowledge were also contacted.

Numerous references are used as listed in marine farming development plan.

MARINE FARMING PLANNING APPROACH

The planning process undertaken in the development of the marine farming development plans is outlined below.

Preparation of a draft marine farming development plan

- Consultation with farmers.
- Review of marine farm files and overseas literature
- Collection and collation of environmental data.
- Identification of other users, and zone boundary restrictions.
- Initial outline of draft zones.
- Consultation with stakeholders.
- Review of zone boundaries.
- Preparation of draft plan.

Intradepartmental Consultation

- Consultation with nominated officers of the DPIWE.
- Secretary's approval to release to Tasmanian Aquaculture Council.

Initial Review

- Internal review by Tasmanian Aquaculture Council.
- Comments received considered.
- Secretary sends plan to Marine Farming Planning Review Panel (Panel).

Marine Farming Planning Review Panel

- Panel considers plan. May direct changes or reject draft plan.
- Panel recommends to Minister that draft plan be released for public consultation.

Public Exhibition

- Two month period for public comment and representations.

Representations

- Representations are collated and considered by DPIWE with preparation of a report to the Panel.
- The Panel considers representations and where appropriate conduct a hearing in relation to representations made.
- Draft plan modified as necessary by the Panel.
- If Draft Plan is modified public exhibition period is repeated.

Final Plan

- Panel submits plan to Minister for approval.

Implementation

- Implementation of Marine Farming Development Plan.

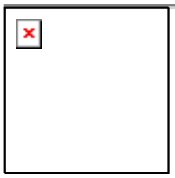
Review

- The MFDP must be reviewed within 15 years of implementation to ensure primary objectives are met, and to allow for changing circumstances that may be relevant. A statutory process for alterations to the MFDP is outlined in the legislation.

Adopted from T Thomas, DPIWE Marine Farming Branch

APPENDIX 7.1.2.1.2: REQUIREMENTS FOR ABALONE FARMING AS LISTED BY THE AQUACULTURE BUSINESS APPROVALS (BAP) WEBSITE

Aquaculture Business Approvals Package Application No. HSOL-6MW2J4



Aquaculture BAP Report

Summary

Report for:
Contact name: Agh Balone
Postal address: 5 Maloney Street, Richmond
Tasmania
Phone number:
Fax number:
Email address:

Wednesday, 15 March 2006
Thank you for using the Aquaculture Business Approvals Package.

Your answers to specific question were as follows:

You will be farming in **Salt** water.
You will be farming on **Land**.
You **will** be using Crown Land.
You **will not** be taking River water.
You **will** be constructing new Dams or Ponds.
The species you will be farming is **Abalone**.
You **will** be processing fish.
You **will not** be processing Rock Lobster, Abalone, Giant Crab or Scallops, not obtained from your licensed Marine Farm.
You **will not** be processing more than 10 tonnes per annum of any species not obtained from your licensed Marine Farm.
You **will not** be processing more than 100 tonnes per annum of any species.
You **will** be processing fish for export.

The Tasmanian Government has adopted an integrated process for dealing with fish farm licence applications, whereby you can now lodge a series of forms tailored to your requirements with a single liaison officer at DPIWE. This liaison officer will then distribute the forms to the appropriate officers in the various branches, and arrange for any follow-up to take place. You have a list of contact officers with this report. If you have any queries about the information you have to provide, or require some guidance as to what is required please contact the relevant Contact officer.

Your report contains information about each of the forms, details of any guidelines or information sheets, contact details for each of the agencies, and in some cases, additional sources of information.

You will also be provided with the forms for completion and lodgement with:
Aquaculture Liaison Officer
Marine Farming Branch
Department of Primary Industries, Water & Environment

4th Floor, Marine Board Building, Hobart
GPO Box 44, Hobart TAS 7001
Phone 03 6233 6528
Fax 03 6233 3065

You will still need to lodge other applications directly with the relevant council.

Forms

Based on the information you have provided you will require the following forms:

Applicant Details for Aquaculture Approval Process.
Application for Use or Development.
Application to use Crown Land.
Application for Permission to Construct a Dam.
Application for Grant of a Marine Farming Licence (land based).
Application for a Marine Farming Licence - Species Details.
Notification of Intention to take/discharge Ocean Water.
Form - AQIS information Sheet.
Application for Registration/Renewal of a Food Business.

Applicant Details

The Applicant Details form provides general details about you and your business to each of the relevant agencies and councils. Please complete this form and attach it to each application you lodge. If you intend lodging all your state government application forms with the Liaison Officer at DPIWE, then you do not need more than one copy of this form. You will need to attach a copy of this form to applications lodged directly with the council.

Application for Use or Development - Location Details

The Location Details form provides details about your proposed development to each of the relevant agencies and councils. It contains sufficient information to be used as a cover sheet for your development application to council as well as providing location details for various agencies. You should read the applicant information attached to this form as soon as possible. The list of documents you are required to attach to this form is included in the applicant information.
Also provided with this form are Guidelines for the preparation of a Development Proposal and Environmental Management Plan. It is important that you contact the Environment Assessment Officer as soon as possible to determine the requirements for your proposal. If you intend to process more than 100 tonnes of fish per annum you should advise the Environment Assessment Officer who will advise you of any further requirements.
If your development application relates wholly, or in part, to Crown Land, you will require the written approval of Crown Land Services before you lodge your development application.
Contact:
Planning Officer from the relevant council.

Application to Use Crown Land

If you require access to the water over Crown Land, Reserved Road or Coastal Reserve, or intend to build structures or construct works [roads, jetties, etc] partially or wholly on Crown Land you will require either a licence or lease. If you are unsure what you require, you should discuss your needs with the contact officer. The contact officer will advise you of the fees payable. Fees must be paid at the time you lodge your application.
Contact:
Chris Price
Crown Land Services Unit
Department of Primary Industries, Water & Environment
5th Floor, 134 Macquarie Street, Hobart
GPO Box 44, Hobart TAS 7001
Phone 03 6233 7888
Fax 03 6233 5638

Application for Permission to Construct a Dam

If you wish to construct a dam or pond for use in your fish farm you need to obtain permission from the Department of Primary Industries, Water and Environment. If you wish to fill your pond or dam from inland rivers or streams you will also require a Water Licence.
Contact:
Garry Evans
Department of Primary Industries, Water & Environment
4th Floor, 134 Macquarie Street, Hobart
GPO Box 44, Hobart TAS 7001
Phone 03 6233 2613
Fax 03 6224 4977
Email garry.evans@dpiwe.tas.gov.au

Application for Grant of a Marine Farming Licence [land based]

Issued by the Marine Farming branch of DPIWE. You will be required to provide details of the species you wish to farm. The licence will only apply to fish farmed at that location and premise. You must pay your licence fees when you apply for your licence. If your licence is not granted you may apply to have your fees refunded. You still need to apply for all other licences and permits such as access over Crown Land, approval from your council and any processing licences or permits required.
Contact:
Darby Ross
Marine Farming Branch
Department of Primary Industries, Water & Environment
4th Floor, Marine Board Building, Hobart
GPO Box 44, Hobart TAS 7001
Phone 03 6233 6528
Fax 03 6233 3065
Email Darby.Ross@dpiwe.tas.gov.au

Registration as an Export Premise - Information

If you intend to export the fish you process, your premise must be registered with the Australian Quarantine and Inspection Service. Your premise will have to meet certain prescribed standards in the areas of construction, equipment, hygiene and security etc.
The legislation in this area has changed. Further details can be obtained from the AQIS web site.
Contact:
Ray Collins
Senior Fish Inspector
Australian Quarantine and Inspection Service
Hobart
Phone 03 6233 2502

Application for Registration/Renewal of Food Business

Under the Food Act 2003, as a fish processor your business will need to be registered with the relevant council. All fish processors must comply with the ANZFA Food Standards Code. Further information can be obtained from the relevant council.
Contact:
Environmental Health Officer from the relevant council.

Application for a Marine Farming Licence - Species Details

This information is used by Marine Farming branch of DPIWE in conjunction with your Application for a licence. It provides additional details about the type of fish and your methods of farming.
Contact:
Darby Ross
Marine Farming Branch
Department of Primary Industries, Water & Environment
4th Floor, Marine Board Building, Hobart
GPO Box 44, Hobart TAS 7001
Phone 03 6233 6528

Fax 03 6233 3065
Email Darby.Ross@dpiwe.tas.gov.au

Notification of Intention to take/discharge Ocean Water

If you intend to take/discharge ocean water, you must meet certain Water Quality standards. Environment branch will provide you with details of standards you must meet. This form provides the Environment branch with information about the location of your pipes and the amount of water you will take/discharge.
Contacts:

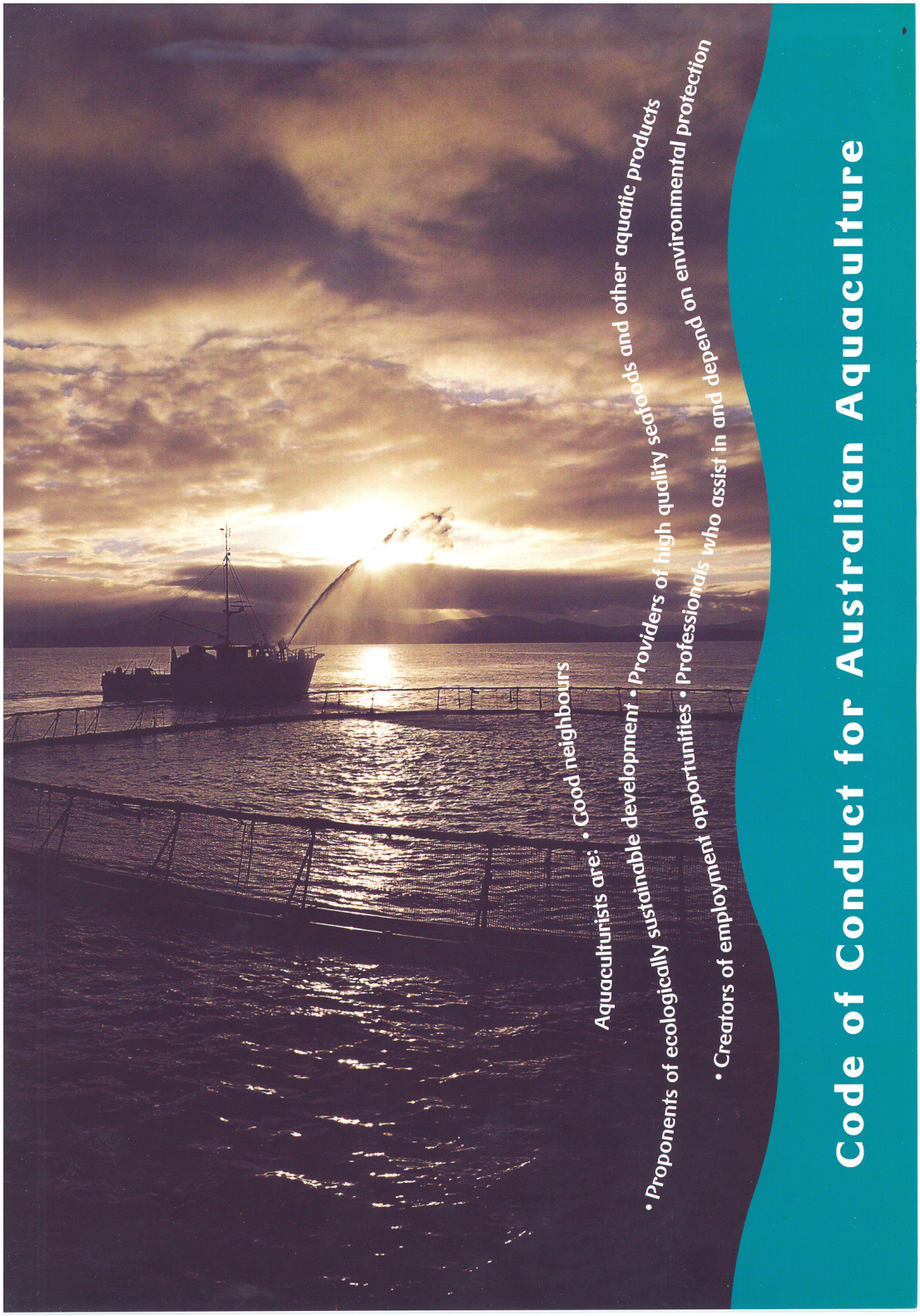
Environmental Health Officer at the relevant council

Rowan Moore
Environmental Officer
Department of Primary Industries, Water & Environment
134 Macquarie Street, Hobart
GPO Box 44, Hobart TAS 7001
Phone 03 6233 6693
Fax 03 6233 3800
Email Rowan.Moore@dpiwe.tas.gov.au

Registration as an Export Premise - Information

If you intend to export the fish you process, your premise must be registered with the Australian Quarantine and Inspection Service. Your premise will have to meet certain prescribed standards in the areas of construction, equipment, hygiene and security etc. The legislation in this area has changed. Further details can be obtained from the AQIS web site.
Contact:
Ray Collins
Senior Fish Inspector
Australian Quarantine and Inspection Service
Hobart
Phone 03 6233 2502

APPENDIX 7.2.1: CODE OF CONDUCT FOR AUSTRALIAN AQUACULTURE



AQUACULTURE

The Food and Agricultural Organisation of the United Nations has defined aquaculture, or fish farming, as " the farming of aquatic organisms, including fish, molluscs, crustaceans and plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators. Farming also implies individual or corporate ownership of the stock being cultivated."

In addition to the culture of edible species (such as salmon, oysters and prawns), aquaculture in Australia includes:

- Hatchery production of juveniles for use in growout operations (farms), stocking private or public waterways for recreational fishing, and restocking natural waters for conservation purposes
- Harvesting of eels, microalgae, zooplankton or other organisms from water bodies that are under some form of lease and/or management
- Culture of aquarium and ornamental fish and aquatic plants for sale
- Culture of aquatic organisms for the extraction of pigments, fine chemicals and other products such as pearls, skins and shells
- Value-adding of traditional wild caught species such as rock lobster and southern bluefin tuna

PRINCIPLES FOR THE AQUACULTURE INDUSTRY

To maintain ecological and economic sustainability, the aquaculture industry has adopted a set of principles that form the basis or underlying philosophy for the Code of Conduct:

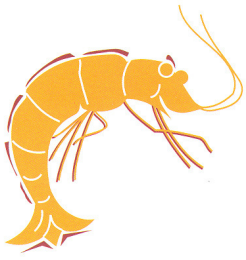
- Ecologically sustainable development
- Economic viability
- Long term protection of the environment to ensure availability of suitable sites for aquaculture operations
- Compliance with, and auditing of adherence to, regulations and the Code of Conduct
- Resource sharing and consideration of other users of the environment
- Research and development to support the achievement of the above five priorities

These principles provide the industry with the mechanism to implement the Code of Conduct as well as providing specific sectors or regions of the industry with the necessary framework for developing their own Codes of Practice.

THE CODE

Industry will work in conjunction with government and other stakeholders to ensure that aquaculture developments are managed sustainably (ecologically and economically) and that their considerable social, economic and environmental advantages are achieved. This will be accomplished through five guiding principles for environmental best practice.

FOR THE AQUACULTURE INDUSTRY TO BE ECOLOGICALLY AND ECONOMICALLY SUSTAINABLE, AQUACULTURISTS WILL :



- Comply with regulations
- Respect the rights and safety of others
- Protect the environment
- Treat aquatic animals humanely
- Promote the safety of seafood and other aquatic foods for human consumption

To Comply With Regulations Aquaculturists Will:

- Support practical and cost effective strategies to ensure that relevant environmental performance standards are monitored and met
- Promote appropriate incentives for responsible environmental performance and advocate sanctions for non-compliance
- Promote effective consultative mechanisms with governments, the community and other users
- Expand self management and co-regulation to include industry-based codes of practice that specifically address environmental issues

To Respect The Rights And Safety Of Others Aquaculturists Will:

- Recognise the needs of other users of the waterways and promote methods to minimise user conflicts
- Recognise that the use of public resources confers responsibility on the user
- Encourage consultation with the community and other users of the waterways to enable legitimate concerns and issues to be raised and solutions proposed
- Advocate that the farm sites and infrastructure be kept clean and tidy and noise impacts minimised
- Promote goodwill in the local community and provide for farm visits and other opportunities for education and tourism
- Recognise and promote the community benefit from monitoring and reporting on the state of the aquatic environment
- Advocate the installation of appropriate navigational markers and other measures to prevent accidents

PHOTOGRAPHY (above and front cover): TASSAL

To Protect The Environment Aquaculturists Will:

- Encourage the development and operation of aquaculture in a manner and at a rate in accordance with ecologically sustainable principles
- Support a total catchment approach based on natural resources management which arrests degradation and provides improved outcomes for sustainable resource use through effective co-operation between government agencies and the community
- Promote industry training and education opportunities in environmental awareness, clean production methods and best practice
- Recognise the importance of good site selection, system design and infrastructure to minimise ecosystem changes
- Monitor and regularly review on-farm management practices to minimise the risk of ecological damage
- Minimise and, where practicable, eliminate the use of agricultural and veterinary chemicals
- Ensure the correct use and disposal of registered chemicals
- Support the development and use of diets and feeding strategies which minimise adverse impacts
- Adopt farm design and on-farm management practices that encourage integration, recycling and reuse of effluents
- Provide for disposal and/or processing of wastes to minimise the risk of ecological damage
- Continue to work with the authorities to control the spread of exotic species
- Continue the development of protocols for dealing with genetically modified material, with particular reference to the capacity of these organisms to produce progeny or genetically modified materials themselves
- Work in association with governments to develop appropriate protocols regarding the transfer and culture of exotic species and the translocation of live product within and between states
- Support the maintenance of precise records regarding the transfer or translocation of stock between areas or operators

To Treat Aquatic Animals Humanely Aquaculturists Will:

- Seek the development of on-farm expertise in health management and ecological sustainability
- Promote the maintenance of efficient and sustainable stocking densities
- Address the physical and biological requirements of the species to be farmed
- Encourage the installation of anti-predator devices designed to exclude predators without deliberately injuring them
- Seek methods to transfer and harvest which reduce stress to stock
- Endorse the use of humane slaughter methods

To Promote The Safety Of Seafood And Other Aquatic Foods For Human Consumption Aquaculturists Will:

- Support the maintenance, and expansion where necessary, of chemical residue testing as well as shellfish and other quality assurance programs
- Endorse compliance with the requirements of the National Food Hygiene Standards
- Encourage the continued adoption of internationally recognised food quality standards
- Highlight the sensitivity of the waterways to pollution and its resultant effects on the quality and safety of seafoods
- Support the maintenance of precise records regarding the transfer of products destined for human consumption between all links in the distribution and marketing chain
- Support the use of accurate product labelling

- Support the development of appropriate contingency plans to deal with unplanned releases of aquaculture species/stock, or the spread of diseases, parasites and other pathogens
- Encourage the immediate reporting of any mass mortalities of stock or other environmental problems to the relevant agencies and the containment of diseased or infected stock
- Identify responsibilities for environmental monitoring proportionate to possible environmental risk and benefits
- Provide guidelines on reporting and analysis of findings, taking into account the costs and benefits of such monitoring
- Promote the correct disposal of dead stock in a manner which will not render the likelihood of any disease or pathogen being released into natural waterways
- Encourage research and development programs that are funded and supported jointly by industry and governments to expand knowledge and understanding of aquaculture operations and their environmental interactions

PHOTOGRAPHY: CSIRO MARINE RESEARCH

THE CODE OF CONDUCT AND WHY IT IS NEEDED

With a clean environment and freedom from many of the major diseases experienced in the northern hemisphere, Australian aquaculturists have a strong competitive marketing advantage. Our 'clean and green' image has allowed many of our aquaculture products to command premium prices.

Clean water also means faster growing and healthier fish. Hence, environmental protection is a major priority for the industry, as it relies on the provision of clean waters for its livelihood. Poor site selection, insufficient capital investment, deficient farm design, inadequate public administration, or inappropriate management may mean that some aquaculture operations cause environmental change. Through the peak national body, the Australian Aquaculture Forum the industry is committed to implementing farming practices based on ecologically sustainable development principles. Recognition of the need for aquaculture to play a major role in protecting the marine, estuarine and freshwaters of Australia led to the development of this Code of Conduct.

The Code of Conduct evolved out of a 15-month consultation process involving more than 350 representatives from industry, government, environmental interest groups, Aboriginal groups and other stakeholders with a commitment to the sustainable management of Australia's aquatic environment.

This Code is voluntary, except in so far as parts of the Code may have been given, or may be given, binding legal effect by means of legislation. On behalf of the wider Australian aquaculture industry, the Australian Aquaculture Forum's national and state member associations have prepared and endorsed this Code's 43 points to provide minimum standards for environmental performance. AAF will encourage all aquaculturists to adopt this Code as a statement of the industry's commitment to ecologically sustainable development.

The preparation and distribution of this Code is one of the first steps in a strategy promoting correct environmental practices within the aquaculture industry. The guiding principles outlined in the Code of Conduct will provide specific sectors or regions of the industry with a frame-work in which they can develop their own Codes of Practice, with a focus on ecological and economic sustainability for their particular culture species, site or culture operation.

This Code of Conduct was initiated by the Australian Aquaculture Forum and was developed with assistance and funds from the Fisheries Research and Development Corporation and Environment Australia's Coastal and Clean Seas Program. The co-operation of Recfish (the peak body for the recreational fishing industry) and the Aquaculture Committee of the Standing Committee on Fisheries and Aquaculture is also acknowledged.

Printing and distribution costs were partially funded by the Department of Primary Industry, Queensland; Primary Industry and Resources South Australia; Fisheries Victoria and the Western Australian Fisheries Department.

This Code is supported by the State and Territory Aquaculture Managers.

SPONSORS

FISHERIES RESEARCH & DEVELOPMENT CORPORATION

Environment Australia
Department of the Environment

CONTACT

To find out more about the Code or learn about sustainable aquaculture practices, contact the Australian Aquaculture Forum at PO Box 533, Curtin, ACT 2605, Australia, or tel: 02 6281-0383, fax: 02 6281-0438, email: aaf@asic.org.au

AUSTRALIAN AQUACULTURE FORUM MEMBERS

Tasmanian Aquaculture Council
PO Box 878, Sandy Bay TAS 7006.

S.A. Oyster Growers Association
PMB 49, Port Lincoln, S.A. 5606.

NSW Farmers Association – Oyster Section
GPO Box 1068, Sydney, NSW 2001.

Victorian Aquaculture Council
PO Box 3027, South Melbourne, VIC 3205.

Aquaculture Council of W.A.
P.O. Box 55, Mt Hawthorn, W.A. 6016.

Oyster Farmers Assoc. Of N.S.W.
PO Box 254, Turramurra, NSW 2074.

Australian Tuna Boat Owners Association
PO Box 416, Eastwood, SA 5063.

Pet Industry Joint Advisory Council
Suite 2, 39 Darcy Rd, Wentworthville, NSW 2145.

Aquaculture Council of Queensland
PO Box 2064, Bribie Island, QLD 4507.

APPENDIX 8.2.2.5: MARKETING OF TASMANIAN FARMED ABALONE

Ausab Pty Ltd

A Leading Supplier of Premium Quality Australian Abalone

ausab

about ausab

Growing Abalone, Growing Markets

As pioneers of the Australian farmed abalone industry, Ausab shareholders have steadily increased production and in 2005 will provide in excess of 250 tonnes of the prized abalone to customers all over the world.

Global demand for abalone is still on the rise. In 2008, the Ausab Farms expect to produce 1000 tonnes of abalone, establishing the group as a leading worldwide marketer of abalone.

Ausab will ensure a continuous year round supply of succulent premium abalone to a diversity of global markets. Rapid freezing processes, packaging solutions and storage procedures developed by Ausab technicians ensure delivery of the highest quality product to the world. Abalone is supplied Live, Frozen in Shell, Individually Quick Frozen (IQF) Meat, and Canned.

Ausab supports continuous improvement. Research continues into new and improved freezing processes, packaging solutions and storage procedures that enhance the delivery of the delectable abalone.

Ausab's versatility allows the group to accommodate the diverse needs of its customers. If you have a special requirement, why not talk to Ausab and experience first hand their versatility and dedication to providing the worlds finest abalone.

Introducing Ausab Pty. Ltd.

Australia's largest Abalone Farms have joined forces to create Ausab Pty Ltd. Ausab accounts for 65% of Australia's farmed abalone exports and continues to forge links with delighted customers across the globe.

Ausab farms are located on the shores of the cool and pristine Great Southern Ocean.

Here we grow premium grade abalone including Greenlip, Blacklip and Hybrid species. Stringent quality control ensures production to the highest quality. Ausab's customers in the demanding and knowledgeable Asian markets are particularly impressed with the highly prized delicacy.

AUSAB PTY LTD
Suite 8b, 41 Wellers Drive, Osborne Park, WA 6017 • PO Box 1436, Scarborough, WA 6022 Australia
Tel: (+618) 9244 7555 Fax: (+618) 9244 7500 • Email: admin@ausab.com.au Web: www.ausab.com.au

ausab abalone

Delicacy

For thousands of years Abalone has been the ocean's most prized delicacy, a luxury from the sea. Their considerable growing time and the high nutritional content has made this delicious seafood very valuable. Some even praise the medicinal and aphrodisiac powers of abalone.

The South Coast of Australia is home to the cool and pristine Great Southern Ocean, a turbulent ocean bordering Antartica. Ausab Abalone farms are located along this coast and is where they grow the oceans most prized delicacy – Ausab Abalone.

Time

Ausab Abalone Farms nurture abalone for three to four years. With no energy expelled fighting for survival, abalone grow flawlessly and become perfectly textured and nutritional. This puts Ausab Abalone in extremely high demand throughout the world and places Australia as the largest and most celebrated producer of abalone in the world.

With advancing scientific knowledge and technical capabilities, Ausab abalone farms are producing and enhancing this age-old delicacy and making it accessible like never before. Contact Ausab to experience the world's finest abalone.

Greenlip Abalone

Greenlip Abalone has a prominent flavour and a smooth texture. Desired throughout the world, it is in extremely high demand.

Hybrid (Tiger) Abalone

Australia's Hybrid Abalone is a cross between the Greenlip and Blacklip, Hybrid Abalone gives the connoisseur the best of both worlds with the distinctive abalone flavour and a fine texture.

Blacklip Abalone

Blacklip Abalone is gentle and subtle on the palate. The demand for its delicate texture makes it highly sought after throughout global markets.

AUSAB PTY LTD
Suite 8b, 41 Wellard Drive, Osborne Park, WA 6017 • PO Box 1436, Scarborough, WA 6922 Australia
Tel: (+618) 9244 7555 Fax: (+618) 9244 7500 • Email: admin@ausab.com.au Web: www.ausab.com.au

ausab

ausab products

Ausab prides itself in supplying the freshest possible abalone to the world, packaged using the latest technologies. Abalone are hand selected ensuring only the finest product. Rapid freezing processes, packaging solutions and storage procedures developed by Ausab technicians ensure delivery of the highest quality product in the world. Abalone is supplied Live, Frozen in Shell, Individually Quick Frozen (IQF) Meat, or Canned. Buyers can be confident that product displaying the Ausab logo ensures you are receiving the worlds finest.

Ausab's versatility allows the group to accommodate the diverse needs of its customers. With Nitrogen Freezing, Traditional Rock Salt Freezing and a wide range of canning options available, customers provide input into the supply of their abalone.

Live Abalone — Hand selected, hand packed and delivered live. The ultimate in abalone appreciation.

SIZE	WEIGHT
Large	110g – 120g
Medium	90g – 110g
Small	70g – 90g

Frozen in shell — Rapidly frozen and packaged whole, this form presents beautifully to the discerning buyer.

SIZE		SIZE	
131g +	(4L)	71g – 90g	(L)
111g – 130g	(3L)	50g – 70g	(M)
91g – 110g	(2L)		

IQF Meat — Shucked and individually quick frozen to ensure the freshest abalone possible.

WEIGHT
41g – 60g
31g – 40g
21g – 30g

Canned — Shucked and then processed to the highest standards. With numerous drained weights and abalone sizes available, the canning options are numerous.

DRAINED WEIGHTS		
213g	180g	160g

SIZE	SIZE
4F	9F
6F	10F
6F	11F
7F	12F
8F	

Other products — Whether it is Pickled Abalone Gut, Abalone Shell or for Medicinal purposes, Ausab will work with customers to ensure their needs are met. If you have a special requirement, why not talk to Ausab and experience first hand their dedication to providing the worlds finest abalone products.

AUSAB PTY LTD
Suite 8b, 41 Walters Drive, Osborne Park, WA 6017 • PO Box 1436, Scarborough, WA 6922 Australia
Tel: (+618) 9244 7555 Fax: (+618) 9244 7500 • Email: admin@ausab.com.au Web: www.ausab.com.au


BABY
ABALONE
BABY
ABALONE
BABY
ABALONE
BABY
ABALONE
BABY
ABALONE
BABY
ABALONE

APPENDIX 8.2.3.1: REGULATORY IMPACTS ON THE TASMANIAN FARMED ABALONE INDUSTRY.

Contents

8.2.3.1 Background
8.2.3.2 Resource Management Planning System
8.2.3.3 Living Marine Resources Management Act 1995
8.2.3.4 National Parks and Reserves Management Act 2002
8.2.3.5 Nature Conservation Act 2002
8.2.3.6 Threatened Species Protection Act 1995
8.2.3.7 Aboriginal Relics Act 1995
8.2.3.8 Environmental Protection and Biodiversity Conservation Act 1999
8.2.3.9 State Policies and Projects Act 1993
8.2.3.10 State Costal Policy 1996
8.2.3.11 State Policy on Water Quality Management 1997
8.2.3.12 Land Use Planning and Approvals Act 1993
8.2.3.13 Management Controls

8.2.3.1: Background

Land based abalone farming has developed in Tasmania in the 1980s. As the development of farms occur on freehold land, they are not governed under the *Marine Farming Planning Act 1995* (MFPA), but do fall under the *Living Marine Resources Management Act 1995.* The relevant local government as well as various state government agencies as outlined in Component 7 and Appendix 7.1.1.1 must approve development of a facility.

8.2.3.2: Resource Management Planning System

A suite of laws, policies and procedures integrated under the Resource Management and Planning System (RMPS) guides Tasmania's environmental planning and management system. The RMPS is based on the principles of **sustainable development** that are set out in Schedule 1 of each of the key pieces of legislation. These objectives are as follows:

(a) to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity; and
(b) to provide for the fair, orderly and sustainable use and development of air, land and water; and
(c) to encourage public involvement in resource management and planning: and
(d) to facilitate economic development in accordance with the objectives set out in paragraphs (a), (b) and (c): and
(e) to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State.

In clause 1(a), "sustainable development" means managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while:

(a) sustaining the potential of natural and physical resources to meet the reasonable foreseeable needs of future generations; and
(b) safeguarding the life-supporting capacity of air, water, soil and ecosystem; and
(c) avoiding, remedying or mitigating any adverse effects or activities on the environment.

Further information can be located from http://www.rmpat.tas.gov.au/home.html and the act can be viewed from http://www.thelaw.tas.gov.au. The principles of the RMPS are integrated into the following Acts.

8.2.3.3: Living Marine Resources Management Act 1995

The *Living Marine Resources Management Act 1995* (LMRMA) places responsibility on the Government to manage the State's living marine resources in a sustainable manner. The legislation has clear objectives for the management of fish and their habitats in a sustainable way for the enjoyment of all "users" – such as commercial wild fishers, recreational fishers, marine farmers, divers and marine observers.

The Act contains powers to protect the marine environment and powers of enforcement. It retains the mechanism for research to be undertaken by the way of Permits. This research includes investigation into wild fisheries and habitat management and new marine farming technologies, in existing or new locations as covered in Section 12 of the Act. A scientific research permit will have its own unique set of conditions which may include some environmental conditions.

Licences for marine farming activities are allocated under this Act (together with other licences for such activities as fish processing or commercial wild fishing). Marine farming licences issued pursuant to the LMRMA and management controls contained within marine farming development plans, are the principle instruments for controlling specific marine farming activities. Licence conditions are reviewed on an annual basis, and may be subject to variation during renewal and transfers of licence (Sections 83 and 86 of the Act). DPIWE have a charter of adaptive management and therefore may need to change licence conditions in specific circumstances.

8.2.3.4: National Parks and Reserves Management Act 2002

The *National Parks and Reserves Management Act* 2002 (NPRMA) closely follows the objectives of the RMPS, and provides for the reservation of land and water for the purpose of conservation and the development of management plans in those areas. Marine farms developed within the boundaries of a National Park or reserved land will have to comply with the permit conditions guided by the management objectives of the management plan for the corresponding area. Existing management policies will be covered for each relevant regional area. Individual facilities will be required to investigate their own site in relation to the NPRMA which may include such issues as the removal of trees, public access and leasing of land. Further information can be found at http://www.thelaw.tas.gov.au.

8.2.3.5: Nature Conservation Act 2002

The *Nature Conservation Act* 2002 contains provisions with respect to the conservation and protection of the fauna, flora and geological diversity of the State, to provide for the declaration of national parks and other reserved land and for related purposes.

8.2.3.6: Threatened Species Protection Act 1995

The *Threatened Species Act 1995* (TSPA) is to provide for the protection and management of threatened native flora and fauna and to enable and promote the conservation of native flora and fauna. The provisions of the Act relate to the threatened species listed in the Appendices to the Act, which are categorised according to their status as endangered, vulnerable or rare.

Once a species is listed, the Act allows steps to be taken to protect it or its critical habitat. These steps may include the development of recovery plans and threat abatement plans, or land management plans or agreements. Further regional details are listed in Section 2.2.4. Further information can be found at http://www.thelaw.tas.gov.au.

8.2.3.7: Aboriginal Relics Act 1995

All Aboriginal sites in Tasmania are protected under the *Aboriginal Relics Act 1975*. Section 14(1) of the Act states that to damage, destroy, remove, conceal or interfere with an Aboriginal relic requires a permit form the Minister for national parks and Wildlife. Relics need not have been formally identified in order to be covered by the provisions of this Act. The provisions of the Act apply to all land tenures. Further regional details are covered in Section 2.3.3. Further information can be found at http://www.thelaw.tas.gov.au.

8.2.3.8: Environmental Protection and Biodiversity Conservation Act 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBCA) provides provisions for the protection of the environment and the conservation of biodiversity, and for related purposes. The Act provide the head of power for the Commonwealth to assess and approve or reject actions that are likely to have an impact on a matter of national environmental significance.

Matters of national environmental significance are listed as:

- World heritage properties (see Section 2.3.3);
- RAMSAR wetlands of international importance (see Section 2.2.5);
- listed threatened species and communities (see Section 2.2.4)
- migratory species protected under international agreements (see Section 2.2.3)
- nuclear action; and
- the Commonwealth marine environment.

The Act requires the person proposing to take an action which is likely to have a significant impact on a matter of national environmental significance to refer the proposal to the Commonwealth Minister for Environment. Any future marine farming proposals may need to consider the provisions of the EPBCA. Further information can be found at http://scaleplus.law.gov.au/html/pasteact/3/3295/top.htm.

8.2.3.9: State Policies and Projects Act 1993

The *State Policies and Project Act 1993* provides for the making of State Policies. State Policies are statutory documents, which are intermediate between the provisions

of an Act and policies and provisions of planning schemes and other mechanisms, identified in relevant legislation.

Current State Policies relevant to the development of marine farming development plans are the *State Coastal Policy 1996* and the *State Policy on Water Quality Management1997*. Further information can be found at http://www.thelaw.tas.gov.au.

8.2.3.10: State Costal Policy 1996

The *State Coastal Policy Validation Act* 2003 validates the State Coastal Policy of 1996 for all State waters to a distance of one kilometre inland from the high-water mark. The outcomes of the policy are guided by three main principles: the protection of the natural and cultural values of the coast; sustainable development and use of the coast; and the shared responsibility of the management of the coastal zone.

Specific Policy Outcomes that relate to marine farming development plans state:

- "*Marine farming will be planned, developed and conducted in the coastal zone having regard to the sustainable development considerations and in accordance with the MFPA and other relevant terrestrial and marine resource management and planning legislation and consistent with this Policy."*
- *Marine farming development plans will be prepared, approved and gazetted under the MFPA and consistent with the objectives, principles and outcomes of this policy."*

The objectives of the State Coastal Policy are governed by the sustainable objectives of the RMPS including sustainable development. Further information can be found at http://www.thelaw.tas.gov.au.

8.2.3.11: State Policy on Water Quality Management 1997

The *State Policy on Water Quality Management 1997* (SPWQM) purpose is "to achieve sustainable management of Tasmania's surface water and ground water by protecting or enhancing their qualities while allowing for the sustainable development in accordance with the objectives of Tasmania's RMPS."

The SPWQM requires that Protected Environmental Values be determined by agreement between the Board of Environmental Management and Pollution Control and the DPIWE, as a Planning Authority, for marine farming zones.

Protected Environmental Values (PEV) are values or uses of the environment for which it has been determined that the environment should be protected. Following the setting of PEV for marine farming zones, the Board of Environmental Management and Pollution Control will define water quality objectives which will be used to determine if PEV are being met, over time.

The PEV are described in Component 2 for each regional area. Guidance notes relating to the environmental impact of facilities on surface and ground water are provided in Section 3.1.3 and 3.1.15. Further information on the SPWQM is available from http://www.thelaw.tas.gov.au.

8.2.3.12: Land Use Planning and Approvals Act 1993

The *Land Use Planning and Approvals Act* 1993 (LUPAA) sets out the process for the preparation, approval and amendment of planning schemes. This Act requires that planning schemes:

- must seek to further the objectives of the RMPS and of the planning process established by LUPA (Schedule 1 Objectives part 2);
- must be prepared in accordance with State policies;
- may provide for the use, development, protection or conservation of land; and
- must have regard to the strategic plan of a council.

LUPA requires coordination between planning schemes and consideration of the region as an entity in environmental, economic, recreational and social terms. LUPA also requires *"sound strategic planning and coordinated action by State and local government*".

The Act provides for councils to exercise planning controls over the use and development within defined areas. Planning controls may be extended below low water mark for development which is related to or affects the use of adjacent land except in the case of marine farming and fishing in State waters. Further information can be found from http://www.thelaw.tas.gov.au. Regional information is covered in Sections 2.3 and 8.2.1.

8.2.3.13: State Policy on Water Quality Management 1997

The *State Policy on Water Quality Management* 1997 has been developed under the *State Policies and Project Act* 1993 to allow for sustainable development of water bodies. This policy applies to all surface waters, including coastal water and ground water or water bodies which flow into the above areas accessible by the public.
The objectives of the policy, in brief, are to

- maintain or enhance water quality;
- ensure that point source pollution does not prejudice the achievement of water quality objectives and that pollutants discharged to waterways are reduced as far as it is reasonable and practical by the use of best practice environmental management;
- ensure efficient and effective water quality monitoring programs are carried out and the responsibility and cost is shared by those who use and benefit from the resource;
- facilitate and promote integrated catchment management; and
- apply the precautionary principle.

Within the *State Policy on Water Quality Management* 1997, section 42 states that:

- Areas designated for marine farming should be chosen such that marine farms are sited and can be operated to provide sustainable environmental outcomes;
- Areas designated for marine farming should be protected from adverse changes in water quality arising from adjacent land based activities or activities in the adjacent coastal area; and

- Marine farming operations should be managed and regulated as required to ensure that they do not prevent the achievement of recognised water quality objectives outside the marine farming leases.

APPENDIX 8.2.3.2: MARINE FARM LICENCE CONDITIONS & REQUIREMENTS RELATING TO ENVIRONMENTAL MANAGEMENT: SUMMARY OF SCHEDULES & PROCEDURES

Abalone

Schedule 2: Abalone Farm Recording & Reporting Procedures.

Schedule 2A: Identification of farmed abalone over 90 mm in length.

Schedule 2B: Retail sales of abalone from land based marine farm.

.

SCHEDULE 2

Tasmania
Department of Primary Industries Water & Environment

Abalone Farm Recording & Reporting Procedures

(December 2002)

MARINE RESOURCES

Overview

Marine farmers licensed to farm abalone (genus Haliotis) as a species on their marine farming licence are required to comply with the following reporting and recording procedures with respect to their farmed abalone and abalone broodstock.

The procedures are designed to:

- Comply with the National Docketing System (Tier 2) agreed to by all Australian fisheries jurisdictions;
- Further the objectives of the Resource Management and Planning System of Tasmania and;
- Help in the management of fish diseases.

This document deals with:

- pre reporting movement of farmed abalone/processed farmed abalone/abalone broodstock on and off marine farms; and
- recording and documenting the receipt and dispatch of farmed abalone/processed farmed abalone/abalone broodstock.

The procedures will be supported by (1) Farmed Abalone Movement and (2) Abalone Broodstock Movement docket books that will be printed by the Department of Primary Industries Water and Environment and provided to marine farmers licensed to farm abalone.

Reporting and documenting movement of farmed abalone

Reporting requirements:

Marine farmers are required to report all movements of farmed abalone stock/processed farmed abalone onto and off their licensed marine farm on Farmed Abalone Movement Docket pro-formas.

A facsimile of a Farmed Abalone Movement Docket is provided at Appendix 1.

Reporting Procedures

Outward movement of farmed abalone from licensed marine farms

- A marine farmer consigning farmed abalone stock / processed farmed abalone from his/her licensed marine farm is required to complete Part A of the Farmed Abalone Movement Docket in full prior to dispatch.

- A marine farmer is required to report the movement of abalone stock / processed farmed abalone off his/her licensed marine farming premises by faxing a copy of the original docket (white) with Part A completed to Marine Resources Fisheries

Management and Quota Audit Unit on 6233 3198. *This document must be faxed prior to the consignment leaving the marine farming premises.*

- Marine farmers are required to retain the white original and blue carbon copy (with Part A completed) of the Farmed Abalone Movement Docket upon consignment. The yellow and green carbon copies of the Farmed Abalone Movement Docket are to accompany the consignment to its final destination.

- Marine farmers are required to routinely submit white original Farmed Abalone Movement Dockets to Marine Resources, Department of Primary Industries, Water and Environment along with their quarterly marine farming production returns.

- Marine farmers are required to retain the blue carbon copy of the Farmed Abalone Movement Docket for five years.

Inward movement of farmed abalone onto marine farming or licensed processor premises

- A marine farmer or licensed processor receiving farmed abalone onto his/her licensed marine farm or processing premises is required to complete Part B of the Farmed Abalone Movement Docket in full immediately upon receipt of a consignment. The marine farmer or processor should do this by filling out Part B of the yellow carbon copy of the Farmed Abalone Movement Docket.

- A marine farmer is required to report the receipt of farmed abalone onto their marine farm by faxing the yellow carbon copy of the Farmed Abalone Movement Docket with Parts A and B completed to Marine Resources Fisheries Management and Quota Audit Unit on 6233 3198. *This document must be faxed within eight hours of the consignment arriving at the marine farming or processing premises.*

- Tasmanian licensed processors receiving consignments of farmed abalone must receipt in accordance with the provisions of the *Fisheries (Processing and Handling) Rules 2001.*

- Marine farmers and licensed processors are required to submit the completed yellow carbon copy of the Farmed Abalone Movement Docket to Marine Resources, Department of Primary Industries, Water and Environment along with their quarterly marine farming production or fish processing returns.

- Marine farmers and licensed processors are required to retain the green carbon copy of the Farmed Abalone Movement Docket for five years.

(Note: The inward movement reporting procedures are only required to be followed by marine farmers and licensed fish processors in Tasmania.)

General Requirements:

Records

Care must be taken to ensure accuracy of the information in completing Parts A and B of the Farmed Abalone Movement Dockets by marine farmers and licensed processors.

Weights must be measured using a trade approved weighing device verified by a weighing instrument as defined in the *Weights and Measurements Act 1935*.

Blue and Green carbon copies of Farmed Abalone Movement Dockets must be kept by the marine farmer/licensed processor for five years from the date of issue.

Identification of farmed abalone

Farmed abalone above 90mm in shell length must be readily identifiable as farmed stock. This is to be achieved in either of the following ways –

1. individually marking or tagging farmed abalone to the satisfaction of the Director Marine Resources. (For some marine farming situations, the shell colouration of farmed abalone fed on an artificial diet will provide adequate marking of fish to the satisfaction of the Director.); or

2. separately packing farmed abalone greater than 90 mm shell length and farmed abalone less than 90mm shell length and reporting on the number or weight of each category when consigning fish from the licensed marine farm.

(Note: Method 2 is an interim measure to enable abalone farmers to consign farmed abalone of greater than 90 mm shell length in circumstances where an adequate marking/tagging system has not been approved by the Director Marine Resources.)

Licence holders opting for method 2 must first advise the Director Marine Resources of the approximate percentage of farmed abalone greater than 90mm shell length they anticipate consigning from their marine farm. This figure will be used as a trigger for review should the percentage of abalone greater than 90mm shell length consigned from the marine farm begin to markedly exceed the nominated figure.

Method 2 will be immediately phased out upon the development of a universally applicable system for readily distinguishing farmed abalone from wild abalone stock.

Farmed abalone below 90 mm in shell length do not need to be marked or tagged.

Abalone Broodstock

Marine farmers licensed to farm abalone will be required to maintain documentation to account for any abalone sourced from the wild for broodstock purposes either under an appropriate authority or purchased from a licensed processor.

In the case of wild abalone harvested under an appropriate authority, marine farmers will be required to comply with the conditions of that authorisation as well as maintaining an accurate and up-to-date inventory of the abalone broodstock harvested under that authority and held on the marine farming premises, providing details of:

- the number of animals and the date that the abalone broodstock were received onto the marine farming premises;
- the species of abalone broodstock;
- the date, number and species of any mortalities of abalone broodstock; and
- the date, number and species of any abalone broodstock destroyed by the marine farmer.

This inventory will be required to be available for inspection by authorised DPIWE officers upon demand.

Dockets for abalone broodstock sourced from a licensed processor will need to be retained by the marine farmer for five years. Dockets will be required to verify both the purchase of broodstock from a licensed processor and the sale of the broodstock back to a licensed processor. Only wild abalone broodstock originally purchased by a licensed marine farmer from a licensed processor can be sold to a licensed processor.

The marine farmer must retain these dockets for a period of five years from the date of issue.

In addition, the marine farmer will be required to record the movement of abalone broodstock both onto and off the licensed marine farming premises on an Abalone Broodstock Movement Docket in accordance with the reporting procedures detailed below.

A facsimile of an Abalone Broodstock Movement Docket is provided at Appendix 2.

Inward movement of wild abalone broodstock onto marine farming premises

- A marine farmer receiving wild abalone broodstock onto his/her licensed marine farm is required to complete Part A of the Abalone Broodstock Movement Docket in full upon receipt of a consignment.

- A marine farmer is required to report the receipt of wild abalone broodstock onto the marine farm by faxing a copy of the original docket (white) with Part A completed to Marine Resources Fisheries Management and Quota Audit Unit on 6233 3198. This document must be faxed within eight hours of the consignment arriving at the marine farming premises.

- Marine farmers are required to submit the original of the Abalone Broodstock Movement Docket with Part A completed to Marine Resources, Department of Primary Industries, Water and Environment along with their quarterly marine farming production returns.

- Marine farmers are required to retain the blue carbon copy of the Abalone Broodstock Movement Docket for five years.

Outward movement of wild abalone broodstock from licensed marine farms

- A marine farmer consigning wild abalone broodstock from his /her licensed marine farm is required to complete Part B of the Abalone Broodstock Movement Docket in full prior to dispatch.

- A marine farmer is required to report the movement of wild abalone broodstock off his/her licensed marine farming premises by faxing a copy of the original docket (white) with Part B completed to Marine Resources Fisheries Management and Quota Audit Unit on 6233 3198. This document must be faxed prior to the consignment leaving the marine farming premises.

- Marine farmers are required to retain the white original and blue carbon copy (with Part B completed) of the Abalone Broodstock Movement Docket upon consignment. The yellow and green carbon copies of the Abalone Broodstock Movement Docket are to accompany the consignment to the licensed processor.

- Marine farmers are required to routinely submit white original Abalone Broodstock Movement Dockets to Marine Resources, Department of Primary Industries, Water and Environment along with their quarterly marine farming production returns.

- Marine farmers are required to retain the blue carbon copy of the Abalone Broodstock Movement Docket for five years.

Inspection of marine farms

Each abalone farm can be expected to be visited at least once per year by DPIWE marine farming inspectors or quota audit officers. Audits may be done to verify any of the information reported to DPIWE and to inspect records required to be maintained as part of this program.

Inspections will be carried out at random on reported movements of stock to ensure the integrity of these reported events.

APPENDIX 1

Approved Form F1013

Farmed Abalone Movement Docket

Docket No:

Part A: To be completed by the marine farming licence holder (or person for the time being in charge of the marine farming premises) ***DISPATCHING*** farmed abalone from licensed marine farm

PART A

Marine Farming Licence No.: | Date of movement: / / | Time of dispatch: am / pm

Name of Receiver:

Receiver's address:

(1) EITHER: Weight of consigned, live farmed abalone ***less*** than 90mm shell length: Greenlip kg Blacklip kg Hybrid kg

OR: Number of consigned, live farmed abalone ***less*** than 90mm shell length: Greenlip Blacklip Hybrid

(2) EITHER: Weight of consigned, live farmed abalone ***greater*** than 90mm shell length: Greenlip kg Blacklip kg Hybrid kg

OR: Number of consigned, live farmed abalone ***greater*** than 90mm shell length: Greenlip Blacklip Hybrid

(3) Weight of farmed abalone consigned by the marine farming licence holder in a form other than live (one form per docket only): Greenlip kg, Blacklip kg, Hybrid kg

circle one of: frozen whole on shell ~ par-boiled on shell ~ cryovac (whole on shell) ~ shucked abalone meat (fresh/chilled/dry/IQF/block frozen/canned/par-boiled/retorted/cryovac) ~ other _____

Number & description of containers:	number	description
< 90mm shell length		
> 90mm shell length		
other		

Name of Carrier(s):

Address of Carrier(s):

Mode(s) of transport: | Transport identification: (eg. Vehicle registration / plane flight details)

Weighing Device Serial No: | Date last certified:

Declaration and Certificate

I declare that:
- *all details recorded in Part A of this document were filled out by me and are accurate and complete in every respect*
- *all abalone recorded on this document are farmed abalone*
- *I have not made a false or misleading statement or made a misleading omission on this docket*

Name of marine farming licence holder (or person for the time being in charge of the marine farming premises) dispatching farmed abalone:

Signature of marine farming licence holder (or person for the time being in charge of the marine farming premises) dispatching farmed abalone:

Part B: To be completed by the person ***RECEIVING*** farmed abalone from licensed marine farm

PART B

Name of Receiver:

Marine Farming Licence No./ Processor Entitlement No.: | Date of receipt: / / | Time of receipt: am / pm

Place of receipt:

(1) EITHER: Weight of consigned farmed abalone ***less*** than 90mm shell length: Greenlip kg Blacklip kg Hybrid kg

OR: Number of consigned farmed abalone ***less*** than 90mm shell length: Greenlip Blacklip Hybrid

(2) EITHER: Weight of consigned farmed abalone ***greater*** than 90mm shell length: Greenlip kg Blacklip kg Hybrid kg

OR: Number of consigned farmed abalone ***greater*** than 90mm shell length: Greenlip Blacklip Hybrid

(3) Weight of farmed abalone consigned by the marine farming licence holder in a form other than live (one form per docket only): Greenlip kg, Blacklip kg, Hybrid kg

circle one of: frozen whole on shell ~ par-boiled on shell ~ cryovac (whole on shell) ~ shucked abalone meat (fresh/chilled/dry/IQF/block frozen/canned/par-boiled/retorted/cryovac) ~ other _____

Number & description of containers:	number	description
< 90mm shell length		
> 90mm shell length		
other		

Weighing Device Serial No: | Date last certified:

Declaration and Certificate

I declare that:
- *I have personally weighed/counted and received the amount of farmed abalone recorded in Part B of this document; and*
- *All details recorded in Part B of this document were filled out by me and are accurate and complete in every respect;*
- *I am satisfied that all abalone received and recorded in Part B of this document are farmed abalone and*
- *I have not made a false or misleading statement or made a misleading omission on this docket*

Name of person receiving farmed abalone:

Signature of person receiving farmed abalone:

Instructions on how to complete PART B of this docket are on the back of this docket. **USE ONLY BALL POINT PEN TO FILL IN DOCKET.**

APPENDIX 2

Approved Form F1014

Abalone Broodstock Movement docket

Docket No:

PART A: To be completed by the marine farming licence holder (or person for the time being in charge of the marine farming premises) RECEIVING wild abalone broodstock onto a licensed marine farm

PART A

Place of receipt:

Date of receipt: / / Time of receipt: am. / pm.

Marine Farming Licence No.:

Number of wild abalone broodstock received onto farm: Greenlip Blacklip

Source of broodstock:

(1) EITHER: Name of fish processing licence holder:

Address of fish processing licence holder:

(2) OR: Authority under which wild abalone broodstock taken:

Authority number:

Declaration and Certificate

I declare that:
- *all details recorded in Part A of this document were filled out by me and are accurate and complete in every respect*
- *all abalone recorded on this document are broodstock abalone*
- *I have not made a false or misleading statement or made a misleading omission on this docket.*

Name of marine farming licence holder (or person for the time being in charge of the marine farming premises) receiving wild abalone broodstock:

Signature of marine farming licence holder (or person for the time being in charge of the marine farming premises) receiving wild abalone broodstock:

PART B: To be completed by the marine farming licence holder (or person for the time being in charge of the marine farming premises) DISPATCHING wild abalone broodstock to a holder of a fish processing licence.

PART B

Marine Farming Licence No.: Date of movement: / / Time of dispatch: am. / pm.

Name of fish processing licence holder receiving abalone:

Address of fish processing licence holder receiving abalone:

Number of wild abalone broodstock consigned: Greenlip: Blacklip:

Declaration and Certificate

I declare that:
- *all details recorded in Part A of this document were filled out by me and are accurate and complete in every respect*
- *all abalone recorded on this document are broodstock abalone originally sourced from a holder of a fish processing licence*
- *I have not made a false or misleading statement or made a misleading omission on this docket.*

Name of marine farming licence holder (or person for the time being in charge of the marine farming premises) dispatching wild abalone broodstock:

Signature of marine farming licence holder (or person for the time being in charge of the marine farming premises) dispatching wild abalone broodstock:

Note: Only wild abalone broodstock originally purchased from a holder of a fish processing licence can be sold to a licensed processor.
USE ONLY BALL POINT PEN TO FILL IN DOCKET.

SCHEDULE 2A

IDENTIFICATION OF FARMED ABALONE OVER 90 MM IN LENGTH

As Marine Farming Licence No. XXX is endorsed for abalone, a condition of the licence requires the compliance with the provisions of the Abalone Farm Recording and Reporting Procedures December 2002 (AFRRP). A copy of the AFRRP is attached as a schedule to this licence.

The AFRRP (page 3) makes specific provisions for the management of the movement of farmed abalone over 90 mm in shell length.

The reporting of the consignment of abalone over 90mm in shell width is reviewed annually as part of the licence renewal process to manage compliance with the AFRRP.

Accordingly could you please complete the questionnaire below and return to the Manager Marine Farming Branch, GPO Box 44, HOBART TAS 7001 **or** facsimile no. 62 333065.

---

(1) With respect to marine farming Licence No. **XXX** it is intended that:

(a) farmed abalone with a shell length greater than 90mm **will** be consigned from the licensed premises / marine farming lease during the period of the licence;

(b) farmed abalone with a shell length greater than 90mm **will not** be consigned from the licensed premises / marine farming lease during the period of the licence;

(*Please cross out entirely either (a) or (b) above which ever option is **not** applicable*.)

(2) If you do intend to consign farmed abalone with a shell length of greater than 90mm during the licence period, please advise below of the method (as detailed in the Abalone Farm Reporting and Recording Procedures December 2002) that will be used for the identification of these fish.

……
……
……
……
……
……

Name of Licence Holder: …….

Signature of Licence Holder: ……...

DATE: ……../……../ 20…….

SCHEDULE 2B

RETAIL SALES OF ABALONE FROM LAND BASED MARINE FARM NO. XXX

Conditions for the retail sale of abalone from licensed land based marine farm No. XXX

The specific conditions for this activity are as follows:

- Retail door sales will be restricted to a maximum of three dozen farmed abalone for an individual sale;

- The purchaser is to be issued a receipt with an individual number when purchasing farmed abalone from your farm which details the name of your business, marine farming licence number, the date of sale, the number, species and size of abalone purchased and the amount paid for the abalone;

- You should maintain a record that contains the date of each individual sale, the number, species and size of abalone and receipt number for each "door sale" of farmed abalone. This record should be available for inspection by the Department of Primary Industries, Water and Environment and retained for five years from the date of entry.

Environmental Management System Framework

Tasmanian Farmed Abalone Industry

Code of Practice

In Development

PhycoTec
Environmental Management

TAGA

TFI

Tasmania

Australian Government
Fisheries Research and Development Corporation

FRDC Project 2004/096