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Seafood EMS
Recipes for Success

... to help you to learn from the experiences
of the Seafood EMS pilot groups

SEAFOOD SERVICES
AUSTRALIA

LEADERS IN INDUSTRY DEVELOPMENT

SEMS

Seafood EMS Recipes for Success

... to help you to learn from the experiences of the seafood EMS pilot groups

Seafood Services Australia Ltd is proud to bring you, in this publication and others in the series of Seafood EMS Resources, the distilled wisdom of the industry leaders who have pioneered seafood environmental management systems in Australia.

The Seafood EMS Resources result from an intensive R&D program made possible by the Australian Government's investment of $1.65 million of Natural Heritage Trust funds through industry partnership programs, including the EMS National Pilot and Pathways to Industry EMS programs. The seafood industry invested $3 million in-kind in these latter two programs.

This R&D capitalised on the innovative strategic investments in environmental management systems in the seafood industry by the Fisheries Research and Development Corporation, with strong support from the Australian seafood industry.

The industry has earned a leading reputation around the world and among other primary industries for these ground-breaking initiatives and its enthusiastic uptake of seafood EMS. By using the Seafood EMS Resources, you're taking advantage of the best EMS experience currently available.

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SEAFOOD SERVICES AUSTRALIA

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Helping Communities Helping Australia
A Commonwealth Government Initiative

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Seafood EMS Recipes for Success

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… more resilient to change now that we understand continual improvement … better community perceptions from our credible, positive stories … higher credibility e.g. with conservation groups, because our EMS is based on scientific principles … stronger relationships between us (UNITY!!) …

Victoria — Bays and Inlets

… we've changed the political landscape since getting into EMS … the community recognition we've gained is helping our survival … the notion has grown that the industry is a valued part of the community …

Tasmania — oysters

… our staff enjoy their jobs more — much happier … proven sustainability means the business is more secure … we're leading by good example in Landcare, local government etc … EMS links up our QA, QMS, OH&S, management plans and controls, licence conditions and audit processes … improved capacity to promote all-round quality and respond to market access issues …

South Australia — southern rocklobster

… EMS gives us a common language to communicate risks and threats and to talk about them in a non-threatening way … communication channels between skipper and crews are opening up … training has increased people's awareness of their responsibility … third-party certification is generating digestible information to show the community …

Western Australia — pearls

… our participants took control of the agenda and expressed best practice in a form that's gone down well in the wider community … stakeholders are more aware of the positive steps we're taking in managing risks … the discipline in preparing cases in some detail has been good for us … the status of our industry has gone up …

EMS reminds us that the future is ours to manage

Congratulations to the seafood industry — leaders in environmental management systems!

Five years ago, the notion that the Australian seafood industry would become a world leader in environmental management systems would have been considered far-fetched.

Today, the industry's EMS leadership is widely acknowledged throughout the world and our nation.

This achievement is testament to the inspiration and untiring effort of the staff and directors of Seafood Services Australia Ltd and of the many industry people who have contributed their expertise and time to making EMS work. Prominent among them are the members of the six pilot groups who, by trial and error, showed the way ahead for seafood industry innovators. They have demystified EMSs and have provided easily understood models specifically for the seafood industry.

The seafood industry's achievements have built on longstanding research and development investment in environmental management by the Fisheries Research and Development Corporation. The recent successful outcomes of the six pilot projects were enabled by timely investment by the Australian Government, starting in 2003: some $1.65 million of Natural Heritage Trust funding was allocated through industry partnership programs, including the *EMS National Pilot and Pathways to Industry EMS*. The seafood industry, in turn, invested $3 million in-kind in these latter two programs.

Through these initiatives, lessons learnt by the seafood industry are being transmitted to other Australian primary industries, further increasing their effectiveness. It is highly satisfying that these collaborations between the Australian Government and industry to enhance the future profitability and sustainability of primary industries have been so successful.

In five years, stimulated by Australian Government initiatives such as the Natural Heritage Trust, there has been a sea-change in attitudes about what is possible in managing the environment. Challenges that seemed insurmountable then can now be met by systematic approaches. Importantly, seafood environmental management systems also allow the industry to *demonstrate* responsible, sustainable natural resource management. Knowledge of this environmental responsibility is starting to spread throughout the community, with many eventual economic, environmental and social benefits in prospect from increased community confidence in the industry.

This publication, *Seafood EMS Recipes for Success,* is one of ten paper-based and electronic "Seafood EMS Resources", including an interactive CD-ROM and a website. Its purpose is to help you to benefit from the experiences of the Seafood EMS pilot groups.

It is with an immense sense of pride that I commend this publication to everyone who has the long-term profitability and sustainability of their seafood business or sector at heart.

The Hon. Sussan Ley, MP
Parliamentary Secretary to the
Minister for Agriculture, Fisheries and Forestry

Tools to help you to do business better — the Seafood EMS Resources

You can't afford to waste time and money when you're running a business. So there's a lot to be said for taking advantage of the experiences of other people.

SSA's Seafood EMS Resources help you to do just that. Thanks to investments by the Fisheries Research and Development Corporation, the seafood industry and the Australian Government's Natural Heritage Trust Pathways to Industry EMS program, you can "pick the brains" of seafood industry people who have pioneered environmental management systems (EMSs) for our industry. We're proud that with their help, we've led the way in EMS — not only among Australian primary industries but world-wide.

We've thoroughly tested and refined all the Seafood EMS Resources so that you can start preparing an EMS — tailored to your unique situation — right now. Here they are:

Choose the right environmental management system

… take a quick read through the **Seafood EMS Chooser**

Develop your EMS and put it into practice

… follow the **Seafood EMS Self-assessment and Training Manual** — it also lets you have your skills and knowledge recognised under the National Seafood Industry Training Package

Save time with handy worksheets

… included with the Seafood EMS Self-assessment and Training Manual, the **Seafood EMS Worksheets** help you to work through each EMS step

Prefer an interactive program?

… then you'll really like the **Seafood EMS CD ROM** — it helps you to set goals for the environment, food safety and quality, OH&S, profitability and community relations, and to integrate them into your day-to-day business activities

Be rigorous — get assessed

… the **Seafood EMS Assessor's Guide** can be used by an EMS Assessor to judge your skills and knowledge against the EMS units of competency in the National Seafood Industry Training Package

Get recognised, get community support

… the Seafood **EMS Communication Kit** helps your EMS achievements to be recognised and supported by the community

Grab new ideas

… visit the Seafood EMS website — **www.seafoodems.com.au** — to bring you new EMS resources and ideas

Pick the brains of the trail-blazers

… Seafood EMS **Recipes for Success** tells you about the experiences of people in the Seafood EMS pilot groups

… and Walking the Talk — **Seafood EMS Case Studies** gives you more information if you need it

Get together with your stakeholders

… the **Engagement of Stakeholders Study** helps you to decide on the best strategies

1. An Overview of EMS in the Seafood Industry

An Environmental Management System (EMS) is not a document. It is representative of a new philosophy and a new way of doing business in the seafood industry. This report evaluates the development and implementation of EMS in the seafood industry through examining six case studies that reflect a diversity of industry groups and production methods.

The three key areas that this report focussed on are: 1) Identifying the critical success factors for EMS in the seafood industry, 2) Development of a framework for assessing the on-ground outcomes from EMS, and 3) Identifying outcomes from EMS including using the developed framework to assess on-ground outcomes from EMS.

Critical Success Factors

Critical success factors that enhance the uptake and impact of EMS in the seafood industry included the following:

Facilitators

The presence of a facilitator proved to be critical in terms of ensuring continuity and continual support for participants during development of an EMS, particularly in the initial phase. In lay terms, facilitators can be described as both the engine of EMS and the lifeboat with participants being the drivers.

Consider cultural aspects

Commercial fishers and aquaculture groups are not culturally homogenous, with cultural practices and experiences varying, typically with area. Specific cultural aspects of participants and groups of participants in commercial fishing and aquaculture need to be taken into consideration by facilitators and other groups when developing an EMS.

Meet the needs of participants

The reasons participants develop an EMS are diverse, and the motivations should drive the structure of the EMS and the outcomes. The commonest reason though is to help seafood businesses maintain access to the wild for harvesting or growing product. In line with the diversity of motivations for undertaking an EMS, the EMS must meet the needs of the participants.

Be Industry driven

The EMS process and the EMS must be industry driven – the participants themselves must identify the objectives, scope and solutions to problems.

Encompass more than one seafood business

The common property nature of the wild catch sector (and marine aquaculture access) means that in many cases an EMS for a specific business is not necessarily the best option. Instead, the main focus of EMS in the seafood industry should continue to be with groups of businesses at the local or regional level.

Timing of external input and/or public release

At some stage in the EMS process, participants will wish to either involve the community through consultation or participation, or communicate the contents of the EMS to the community. There is no universal "right time" for involving the community and involvement should be considered by participants on a case by case basis. Likewise, there was no universal right time for "buy-in" by government agencies.

Speed of progress

Different EMS groups will progress at different speeds and this should be recognised and be allowed to occur. However, a very rapid development (e.g. weeks from start to finish) does not necessarily represent the best approach to deliver the potential of EMS. Sufficient time needs to be given to engender cultural change in the industry groups.

Direct economic benefits are not mandatory

Direct economic benefits (e.g. price premiums) are not necessarily obligatory or an over-ridding reason for undertaking an EMS. If any direct economic benefits are to accrue, they are only likely to accrue after an EMS has become well established.

Documentation needs to be minimal and simple

By itself, EMS paperwork does not generate progress and without due care, benefits for the participants of EMS may be lost under the weight of paperwork. Participants generally considered that the Green Chooser was pitched at an appropriate level for engendering initial interest in EMS and providing step by step guidance.

Review and auditing options

Review and auditing of EMS is essential and the various review and auditing options should be communicated to EMS participants. Review and auditing procedures, whether they are internal or external need to lean towards being performance rather than document driven.

Early tangible outcomes

While EMS is a long-term journey, the identification of tangible and substantive outcomes that can be achieved by the group early in the journey is extremely beneficial for engendering commitment to EMS.

Outcomes from EMS in the Seafood Industry

A lesson from the case studies is that there is no single quantifiable outcome that can be used to assess the success or otherwise of the EMS process or an EMS. However, a range of outcomes that can be identified both for the industry, the community and for natural resource management. The outcomes included on-ground environmental outcomes as well as social outcomes including capacity building and training.

The assessment framework developed and applied to the six case studies identifies a range of substantive, informative and participatory outcomes.

Building social capital

EMS successfully contributed to the building of social capital in the seafood industry, which is increasingly viewed as key components for fisheries governance and biodiversity conservation. EMS contributed positively and significantly to the three interrelated pillars of social capital: trust and trust worthiness, civic engagement and co-operation, and social networks. Trust and co-operation represent outcomes of social capital, while social networks represent causal factors in its determination.

Empowerment

An outcome from undertaking an EMS was greater empowerment of individuals and groups. Generally, empowerment is defined as the process through which individuals or groups become strong enough to participate within, share in the control of and influence events and institutions affecting their lives. It is defined as a mechanism to give people within fishing communities a chance to influence their own future in order to cope with the impacts from globalization; competing use of freshwater, marine and coastal environments; and other fisheries-related issues

On-ground environmental outcomes

Clear on-ground environmental outcomes were evident in each of the case studies investigated, including by-catch reduction or avoidance, reduction of waste and litter, recycling, change from non-biodegradable to biodegradeable products and control of introduced species.

Training undertaken

Training is an important component of capacity building and EMS has catalysed a number of participants to undertake accredited training in a range of environmental disciplines.

Greater linkages and networks

An EMS facilitates greater linkages and better networking with the community and with community groups. This can potentially aid participants maintain resource access.

Reflection

The process of undertaking an EMS can be important tool for reflection by the participants on their environmental performance. Reflection opens participants up to thinking more about their performance in relation to industry norms and community expectations.

2. Introduction

The Australian seafood industry is dependent on a healthy environment for seafood production.

The Australian seafood industry has a long history of initiatives aimed at ensuring and demonstrating it is meeting the high environmental standards required of it by government, the community and indeed itself. Australia has been a world leader in the introduction of environmentally friendly trawl fishing technologies including turtle excluder devices (TEDs) and bycatch reduction devices (BRDs), a leader in the sustainable management of aquaculture activities, and a strong campaigner for a clean and productive coastal zone.

Building on significant past achievements, the Australian seafood industry has embarked upon the development of environmental management systems (EMS) as the principle systematic driver for the continued improvement of environmental, economic and social performance of the industry.

Six EMS pilot projects (covering seven EMS projects) have been funded as part of an initiative funded by the Natural Heritage Trust:

1. South Australian Rock Lobster Fishery Clean and Green EMS.
2. Pinctada maxima Pearl Oyster Round Pearl Culture Industry EMS (WA/NT).
3. Moreton Bay and Cairns Fishery EMS.
4. Little Swanport Oyster EMS.
5. Victorian Bays and Inlets Fishery EMS.
6. Northern Territory Barramundi Fishery EMS.

These pilot projects cover a broad range of seafood production activities . They cover aquaculture production to achieve industry consistency through the enterprise level (Pearl Producers Association) and multiple enterprises at the whole of catchment level (Little Swanport Estuary Oysters). They also cover a diversity of commercial fisheries, including a species specific rock lobster fishery principally targeting a high value product for export, a multiple endorsed fishery with myriad target species adjacent to an urban centre (Moreton Bay), a line and trawl fishery adjacent to an area of significance for international tourism, a net fishery in a remote area targeting an iconic species (Northern Territory Barramundi Fishery), and a small scale fishery with a very long history of targeting fresh and affordable local seafood for domestic consumers (Victorian Bays and Inlets Fishery).

The pilot studies include examples of EMS' that commenced specifically as part of the EMS rollout funded by Seafood Services Australia and the Fisheries Research and Development Corporation. This includes the Moreton Bay EMS, the Victorian Bays and Inlets EMS and the Northern Territory Barramundi EMS. While the remaining EMS case studies have been woven into industry EMS strategic initiatives which commenced prior to this and were at more advanced stages of development and implementation.

The purpose of this report is to illustrate the value of EMS as a management tool for seafood businesses to achieve their environmental, economic and social goals and in achieving broader natural resources management goals associated with fishing and aquaculture as well as demonstrating to the community the seafood industry's environmental credentials. Specifically, this report:

1. Identifies the benefits of EMS both from the perspective of natural resource management and seafood industry participants.
2. Documents the lessons learnt from the case studies for the extension of EMS into other fisheries.
3. Documents the development and application of a framework for evaluating the benefits of EMS.

The report targets existing and potential industry leaders, facilitators and training providers and government officials who have a desire to be involved in the continued development of the seafood industry through EMS.

The structure of this report is as follows:

Section 3 explains the need to evaluate EMS and briefly reports on the development, implementation and evaluation of EMS and other relevant initiatives undertaken by other industries. Specifically focussed on are the mining and agricultural industries and lessons relevant for the seafood industry from these other industries are described.

Section 4 briefly documents the methods used in this report for evaluating EMS.

Section 5 describes the lessons learnt from the case studies that are relevant to the continued development of the documented EMS' as well for the uptake of EMS elsewhere in the seafood industry. This section concludes with the "Recipes for Success" for EMS development and implementation in the seafood industry.

Section 6 documents outcomes that have resulted from development and implementation of the EMS. Outcomes discussed include on-ground environmental outcomes as well as social capacity outcomes.

Section 7 reports on the evaluation of each case study, the full details of each evaluation are contained in Appendix 1.

Section 8 discusses the way forward for EMS in the seafood industry.

This initiative is one of a number associated with the National Heritage Trust and Seafood Services Australia EMS Pilot Program. Other initiatives include:

- The Green Chooser and the Eight Step Seafood EMS process developed to demystify concepts such as "continual environmental improvement" and to provide customized and user friendly EMS models suitable for the seafood industry.
- Seafood EMS FarmBis project that developed an interactive CD for individuals to develop and EMS.
- The Natural Heritage Trust funded EMS Pathways Project that addresses the roll out of EMS in the seafood industry. This project focuses on four key areas:
  - National EMS Development and Coordination.
  - Communication and Training
  - Standards Development and Certification
  - Business Support and Incentives.

3. Evaluating Environmental Management Systems

EMS presents a large cultural change and it should be expected that such a change will take time to become fully absorbed and integrated into decision making by an organization, business or group (MacManus, 2001).

A growing concern is whether or not adoption and implementation of EMS delivers tangible benefits to those involved (Morrow and Rondinelli, 2002). As well as benefits to the participants, for seafood production there must be benefits for other stakeholders as well.

Evaluating the costs and benefits of environmental management systems (EMS) in the seafood industry is a complex task. Any framework developed should have sufficient utility to allow it, or components of it, to be applicable in a wide variety of instances and at several different scales. Owing to the diversity of issues enshrined, evaluation frameworks that encompass more than one component are considered the most appropriate (for instance see Fadeeva, 2005).

Evaluating the role and impacts of an EMS requires consideration of the views of three main groups – industry group members putting it together, the relevant regulatory and management agencies, and the general public.

Evaluation is critical as there are increasing concerns that EMS does not lead to improvements in environmental performance, particular in the long-term, and is simply another form of "greenwash". For instance, the Australian sugar industry developed the COMPASS project and associated workbook as a self-help guide to improving profitability and environmental performance of the industry (Azzopardi, 2001). The workbooks include various checklists and basic risk ranking and performance assessment tools. This package could be considered to be an EMS and, hence, reaction to it is important in terms of the future public attitude to EMS. The sugar industry's initiative is identified by some environmental NGOs as greenwash due to the fact that it is known that the number of farmers adopting the approach is low and on-ground outcomes are not perceived to flow from the initiative.

In many industries (e.g. mining and manufacturing), the pursuit of EMS (particularly ISO14001) has become the norm rather than the exception. EMS is not new and attempts to evaluate EMS have occurred in a range of industries. Most of the evaluation and discussion has focused on aspects regarding ISO systems and accreditation in general, and the pursuit of cleaner production (eco-efficiency) (e.g. Fryxell and Szeto, 2002; Morrow and Rondinelli, 2002; Babarki et al., 2004).

In terms of cleaner production, this has the clear advantage of being able to quantify change in environmental performance, particularly if assessment is employed before and after adoption. For instance, Babakri et al. (2004) found significant changes of between 6.5% and 18.9% in key parameters that measured recycling. However, most case studies show that it is difficult to attribute environmental improvements directly to the adoption and certification of an EMS (Boiral and Sala, 1998; Rondinelli and Vastag, 2000; Morrow and Rondinelli, 2002).

More generally, evaluation of EMS in the manufacturing sector found four sets of positive impacts from EMS adoption: improvements in employee awareness, operational efficiency, managerial awareness, and operational effectiveness (Rondinelli and Vastag, 2000). These issues have relevance for the seafood industry.

However, In the current context, evaluation needs to be considerably broader and work in the mining and agriculture sectors has the most relevance because both have direct environmental impacts as well as a range of social impacts and dependencies.

3.1. Evaluating EMS in the Mining Industries

EMS in the mining industry tends to be at the enterprise level and is largely driven by a desire to achieve or maintain ISO14000 series certification and drive competitive advantage.

Specific quantifiable information on the benefits to the mining industry of EMS is difficult to identify. However, a range of general advantages have been identified and evaluated to varying degrees.

Supply-chain relationships in the minerals industry are somewhat different to those of other industries due to the large scale of the industry and the long term scale of the contracts between buyer and seller. There is little evidence to suggest any effect of EMS on the buyer and seller relationship. However, EMS has been considered to have potential in influencing the financing and insuring of mining ventures. Financiers are increasingly driven by community and shareholder interest to look more closely at what they provide finance for, together with an interest to ensure no hidden environmental liabilities exist (Kirkpatrick and Pouliot, 1996).

In the mining industry it has also been found that EMS can act as insurance against environmental liability and prosecution. Courts can regard an implemented EMS as a mitigating factor in prosecutions for environmental offences. In NSW the Land and Environment has considered EMS as a favourable mitigating factor under the NSW Protection of the Environment Operations Act 1997. An EMS was observed to lessen the severity of fines imposed for environmental offences.

An identified advantage for undertaking an EMS in the mining industry is "first mover" advantage, whereby the early adopters may gain a headstart on competitors through undertaking the EMS process. This advantage is likely to strongest when underpinned by cleaner production audits that can demonstrate significant on-ground production savings. However, the relative magnitude of the advantage is likely to dwindle through time, as others take up the technology or approach which eventually becomes the norm.

For the mining sector, an advantage in terms of resource access as a result of EMS has been documented. Resource access is also a critical issue for the seafood industry as a whole. Mining firms which have attained high levels of community trust through demonstrated performance through an EMS normally progress through public consultation and regulatory approval processes for new resource exploitation projects quicker than firms with a less reputable track record (Sharma and Vredenburg, 1998).

Key EMS lessons for the seafood industry from the mining industry:

- EMS has become the norm rather than the exception, although there are benefits from being among the early adopters.
- Financiers are increasingly driven by community and shareholder interests to look more closely at what they provide finance for together with an interest to ensure no hidden environmental liabilities exist, and EMS can positively influence financiers and act as insurance against environmental liability.
- Mining firms that have attained high levels of community trust through demonstrated performance through an EMS normally progress through regulatory approval for new developments quicker and with less community resistance. This is likely to be of critical importance for parts of the aquaculture industry that may undergo similar assessment and approval processes as the mining industry.

3.2. Evaluating EMS in the Agricultural Industries

EMS for the agriculture sector differs from the mining and other sectors in that it is principally targeted at the individual or group (association) level rather than at the enterprise level. This makes it similar to most EMS in the seafood industry.

Agriculture in Australia shares many similarities with the seafood industry. It too wants to market products as clean and green, and EMS is viewed as a tool for justifying such environmental claims. However agriculture, like fishing, is a socio-cultural practice, not just a way of making a living from an economic perspective (Vanclay, 2004). Thus, benefits other then direct economic benefits come into play and also require assessment.

Assessment of EMS in the Australian agriculture industry has focussed on the role of EMS in developing sustainability indicators that are meaningful to farmers (Carruthers and

Tinning, 2003) and the role of EMS as a group learning exercise for achieving integration of production and environmental management (Ridley et al. 2003). Ten out of 14 farm businesses had changed farming practices as a result of EMS (Ridley et al., 2003). Ridley et al. (2003) also identified that EMS should be communicated to participants with emphasis on understanding principles rather than concentrating on the EMS process.

While the review of the literature on the development and implementation of EMS in the mining and agricultural industries yields important considerations, it is clear that there is no "off-the-shelf" approach for evaluating EMS in the seafood industry.

In Australian agriculture, much of the assessment of EMS (and Landcare) has focussed on assessing attitudinal changes to the environment by participants and awareness (e.g. Curtis and De Lacy, 1996). An often asked question has been whether these changes lead to improved on-ground outcomes. This is particularly important for fisheries and aquaculture because of the requirement to access public waters for production, and in the case of wild catch fisheries, directly utilise common property resources.

With respect to fisheries and aquaculture, simply demonstrating a shift in participant's attitudes to the environment is unlikely to engender significant improvement in community confidence in environmental performance. Regulatory agencies may be unwilling to devolve responsibility to industry if they do not consider that EMS will deliver tangible on-ground outcomes that address public concerns at the local level.

To address this, there is a critical need for an evaluation approach that assesses systematically and comprehensively the benefits to natural resource management from developing and implementing EMS. As such, it is important that ultimately the on-ground outcomes, in addition to the process itself, are evaluated. This is particularly important for the general public who will, most probably be more interested at knowing their local fish stock and environment is healthy due to management arrangements, rather than the exact detail of the process to develop those arrangements.

Key EMS lessons for the seafood industry from the agricultural industries:

- EMS can deliver key social advantages for participants through a group learning process.
- Farmers have changed farming practices as a result of EMS
- One hundred percent voluntary adoption of EMS is not realistic, but nor is it necessary.
- EMS in the agricultural industries is based at the group or individual level rather than at the enterprise or corporate level. This group learning approach can be a good approach to aiding cultural change among primary producers

4. Methodologies

4.1 Using the ESD Framework to Assess the Outcomes of EMS

Assessing and evaluating actual outcomes generally takes a longer time period than evaluating processes. Fortunately there is an existing framework, the National ESD Frameworks for Wild Catch Fisheries and Aquaculture that provides a good base upon which to assess outcomes for natural resource management

The National ESD Framework was developed to implement ESD within the management of all Australian fisheries and aquaculture resources. They were cooperatively developed by a number of agencies and organisations including: Bureau of Rural Sciences, WA Fisheries, University of Queensland and the CSIRO. The framework encompasses ecological, economic and social issues. The ecological components of the framework are frequently used by state fisheries agencies in preparing their strategic assessments of fisheries for export accreditation under the EPBC Act.

Further information on the frameworks and there development can be found at: http://www.fisheries-esd.com/c/home/index.cfm

It is recognised by the BRS (2000) that, while ESD and EMS are not the same, nor are they alternatives, they are closely interrelated. The ESD frameworks focus on identifying ESD outcomes. An EMS focuses on how management will achieve those outcomes. The National ESD Frameworks can be modified and expanded slightly to provide a comprehensive tool for evaluating outcomes, including the on-ground outcomes of implementing Environmental Management Systems (EMS) in the seafood industry. The modified framework for assessing EMS identifies:

- The ESD components in the relevant fields (ecological, social and economic and governance).
- For each ESD component, what to measure and identify or record.
- Where the information can be obtained.
- The agencies responsible for data collection, collation or publication.
- EMS performance measures.

After the framework has been applied, each ESD component is placed into a category depending on its relevance to the activity at hand, together with how it is addressed in the EMS. The categories are:

- Not relevant to the fishery under consideration.
- Relevant to the fishery or aquaculture enterprise but not addressed in the EMS.
- Relevant to the fishery or aquaculture enterprise and appropriately addressed in the EMS.

- Relevant to the fishery and aquaculture enterprise with the EMS delivering clear on-ground outcomes over and above statutory requirements.

From the application of the framework, three possible types of outcomes are identified – substantive, informative, participative (Table 1).

Table 1. The Three Types of Possible Outcomes That May Be Included in a Seafood EMS

Type of outcome	Definition
Substantive	A substantial change or prohibition of an on-ground practice to take affect immediately the EMS is implemented
Informative	A change that commits the association or business to collect additional key information or provide additional support to research agencies. A change that provides additional information/ resources for EMS participants
Participative	A change that commits the association or business to further participation in management forums.

The framework was developed through an iterative and adaptive outlined in figure 1. The reason for this iterative process was to capture the learning's from each case study and provide a feedback loop where information from the case studies themselves could be used to further inform and modify the framework.

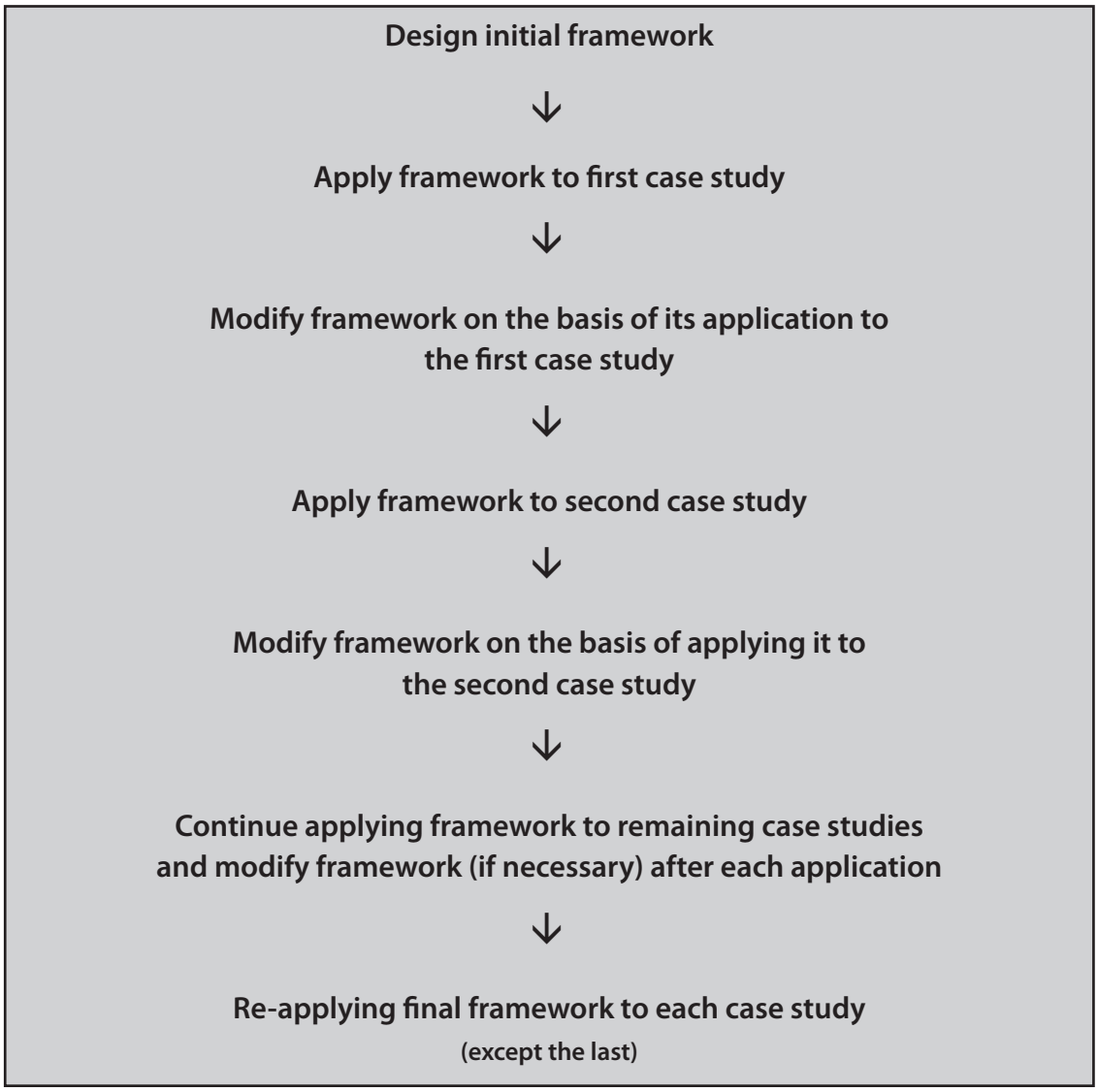

Figure 1. Schematic outlining the iterative process used to develop and apply the assessment framework. The final framework is included in this report, and it is the application of this final framework to each case study which is described.

The framework need not be used to drive the day to day development and implementation of an EMS. Depending on the objectives of the EMS, it is not mandatory to apply this framework in every case. However, it is likely to be beneficial for industry or group leaders to consider the framework initially so that they have a good understanding of the potential issues to address.

The following tables document the ESD components of relevance to EMS, the issues to identify, describe or record; the agencies or individuals that provide data; and EMS performance measures.

The EMS Evaluation Framework for Assessing EMS Outcomes

ECOLOGICAL COMPONENTS

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Retained/cultured species	– Major target and byproduct species – Major cultured species – Sustainability indicators for major target and byproduct species	– State or Commonwealth Fisheries agencies – Commonwealth Environment Agency – State or Commonwealth Research Agencies – Fishers/farmers	– An appropriately referenced list of major target (or cultured) and byproduct species – Relevant actions for improving the accuracy or resolution of information – Documented new or existing arrangements for retained species beyond current regulatory controls

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Non–retained species (threatened and non–threatened)	– Non–retained species – Sustainability indicators for non–retained species – Interactions with threatened species – Presence of adopted measures to reduce the number of non–retained species captured and/or improve their subsequent survival rates when released. – Presence of any specific protocols or approaches to reduce interactions with threatened species. – Contact phone numbers to report incidents/interactions.	– Fishers/farmers – State or Commonwealth Fisheries agencies – Commonwealth Environment Agency – State or Commonwealth Research Agencies – Universities – Cooperative Research Centres	– An appropriately referenced list of non–retained species – Measures adopted to reduce the number of non–retained species captured. – Measures adopted to maximize the survival of non–retained species – Relevant actions for improving the accuracy or resolution of information – Documented new or existing arrangements beyond current regulatory controls. – Information to aid fishers in identifying threatened or listed marine species is included. – A list of relevant contact details to inform authorities of any relevant interactions with threatened or listed marine species. – Any significant issues regarding provisioning are identified and mitigation approaches are identified and implemented.

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Water quality (nutrients and pollutants)	– Potential sources of impact. – Nutrients/ contaminants discharged – Frequency and seasonality of discharge – Volume of discharge – Concentration of nutrients/contaminants (average and peak)	– Fishers and farmers – State Environmental agencies – Local Councils	– Water quality impacts from the activity is documented. – Relevant actions to improve the accuracy or resolution of information is included in the EMS – Where water quality impacts are considered a risk, the EMS documents any on–going processes to further reduce water quality impacts
Fuel usage and air emissions	– Average fossil fuel use per vessel or farm. – Average fossil fuel use per kilo of production. – Approaches to minimise fuel usage – Relevant engine performance standards	– Fishers/farmers – Marine safety or transport agencies	– Fossil fuel use on a per vessel/farm and a per kilo of production basis is documented – Specific targets for reducing fossil fuel use are included in the EMS. – Impediments to achieving the reduction targets and how these impediments are proposed to be overcome are included in the EMS. – Relevant engine performance standard agreed to by participants are documented.

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Marine debris	– Significant sources of marine debris . – Indicative quantities of marine debris. – Opportunities for recycling are identified. – Relevant legislation	– Fishers/farmers	– Significant sources of marine debris from the activity are documented in the EMS. – Measures to reduce marine debris are documented in the EMS. – The EMS documents opportunities for recycling. – The EMS identifies relevant clean–up initiatives and commits participants to becoming involved.
Pests, diseases and pathogens	– Significant sources of pests, diseases and pathogens are identified – Relevant legislation is identified.	– Fishers/farmers – Animal health agencies	– The EMS documents significant sources of pests, diseases and pathogens. – The EMS includes reference to relevant biosecurity or animal health legislation. – The EMS documents mitigation measures and includes implementation schedules.
Introduced and translocated species	– Relevant translocation policies – Possible pathways for translocation events to occur. – Species potentially introduced or translocated.	– Fishers/farmers	– The EMS includes additional approaches to comply with translocation policies – The EMS includes additional approaches to monitor or mitigation translocation events. – The EMS contains sufficiently detailed information and pictures of introduced species that should not be spread any further.

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Benthic and habitat impacts	– Mechanisms whereby the activity impacts benthic assemblages. – Indicative spatial and temporal scale of the impact. – Issues that influence recovery.	– Fishers/farmers – State or Commonwealth Fisheries agencies – Commonwealth Environment Agency – State or Commonwealth Research Agencies	– The EMS identifies benthic impacts that result from fishing or aquaculture activities and the mechanisms that cause this impact. – The EMS identifies the spatial and temporal scales of the benthic impacts. – The EMS identifies approaches to mitigating the intensity and/or scale (spatial and temporal) of the impact. – The EMS utilises existing scientific information in support of conclusions – The EMS documents relevant actions to improve the accuracy or resolution of information
Bait collection and usage	– Bait species used in the fishery. – Significant impacts from bait harvesting are identified.	– Fishers/farmers – State or Commonwealth Fisheries agencies – Commonwealth Environment Agency. – State or Commonwealth Research Agencies	– The EMS documents relevant actions to reduce significant impacts from bait harvesting. – Bait species, sources, and collection methods are included in the EMS.
Trophic impacts	– Potential mechanisms whereby trophic impacts may result from the activity.	– Fishers/farmers – State or Commonwealth Fisheries agencies – Commonwealth Environment Agency. – State or Commonwealth Research Agencies	– The EMS documents possible trophic impacts resulting from the activity and the mechanisms whereby these impacts occur.

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measure
External environmental impacts on the participants	– Significant external environmental impacts. – Any unusual environmental occurrences (e.g. algal outbreaks) are acknowledged. – Contact phone numbers to report incidents.	– Fishers/farmers own experiences – State or Commonwealth Fisheries and Environmental agencies – Local environmental NGOs (e.g. Coastcare groups) – State or Commonwealth Research Agencies	– The EMS documents participants activities to help mitigate external impacts through direct or indirect activities. – The EMS identifies protocols for reporting any unusual environmental occurrences to the appropriate authority. – The EMS documents relevant actions to improve the accuracy or resolution of information.
Visual impacts	– Significant visual impacts. – Mitigation measures – Lights at sea or over water (e.g. marker buoys)	– Relevant State Planning, Development or Environmental agencies. – Fisheries agencies. – Fishers/farmers	– Sources of visual impacts and who are likely to be impacted are included in the EMS. – The EMS documents approaches to minimize visual impacts from development and activities
Carrying capacity (regional level)	– Carrying capacity of culturing environment	– State or Commonwealth Fisheries, Environmental agencies and research Agencies	– The EMS documents carrying capacity of the environment. – The EMS includes mechanisms to ensure that carrying capacity is not exceeded
Animal ethics	– Animal ethics concerns	– Fishers/farmers own experiences	– The EMS documents any animal ethics concerns associated with the fishing or farming activity. – The EMS includes any relevant mitigation measures.

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Noise	– Significant sources of noise impacts. – Mitigation measures.	– Relevant State Planning, Development or Environmental agencies.	– Sources of noise impacts and who are likely to be impacted are included in the EMS. – The EMS documents approaches to minimize noise impacts from development and activities

SOCIAL AND ECONOMIC COMPONENTS

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Return on investment	– Trends in license values or the value of shares/units – Gross value of production (GVP) – Trends in farm value – Trends in value of capital – Net economic return	– License brokers – Industry classifieds – Publicly accessible databases – Fisheries Management Plans – Research publications – Land evaluations	– The EMS documents trends in license values or the value of shares/ units – The EMS documents trends in farm values – The EMS documents trends in value of capital – The EMS documents trends in GVP – The EMS documents the net economic return of the fishery
Gender equity	– Trends in number of WINSC members	– WINSC National coordinator	– The EMS documents the roles females play in the association or businesses – The EMS documents the number of WINSC members in the Association or business.
Training	– Training requirements – Training options	– Training and/or industry organisations	– The EMS documents training requirements and possible training options for the future. – Specific training undertaken is documented.

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Fleet structure	– Number, size and average age of vessels – Fleet capacity relative to need	– Fisheries Management Plans – DEH Assessment reports – Annual reports – Economic assessments	– The EMS documents the number, size and average age of vessels – The EMS sets out a process for determining fleet capacity relative to need
Communication	– Media output (positive and negative)	– Media reports – Fishers and farmers	– Appointment of a media contact person within the association or business – The EMS documents community recognition of the EMS process. – Records (including hard or electronic copies) of media reports are maintained. – The EMS includes a list of relevant contacts. – Information on the EMS is available on the internet. – Mechanisms to enhance communication within the industry or industry groups are included.
Occupational Health & Safety	– Relevant OH&S guidelines/issues. – Relevant legislation. – The number of incidents	– Relevant Government Acts. – Fishers and farmers	– The EMS documents relevant OH&S guidelines and how they are to be complied with. – The EMS documents practical approaches to mitigate OH&S issues. – Relevant OH&S contacts are included in the EMS. – The EMS includes, or proposes to collect information on the number of incidents occurring

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Employment	– Contribution of the fishery or farms to employment at the regional level.. – The demographic profile of the employees	– Fishers or farmers knowledge and experience – Australian Bureau of Statistics website – Research reports	– Figures on regional employment are included. – The seasonality of employment is identified and included. – The demographics of the employment base is described.
Social capital	– Length of time resident in local community. – Length of time in the commercial fishing/ aquaculture industry	– Fishers or farmers knowledge – Research reports	– The EMS documents the length of time participants have been in the local community and in their industry.
Community health benefits	– Seafood consumption levels	– FRDC website – Research reports	– The EMS identifies the health benefits of seafood – The EMS includes information on seafood consumption levels

GOVERNANCE COMPONENTS

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Legal access rights	– The length of time of tenure or access – Presence of a limited license regime – Transferability – Transparency of issuing and/or transferal arrangements – Presence of an appeals process	– State or Commonwealth agencies – Maritime lawyers	– The EMS identifies the presence and nature of the limited license regime – The EMS identifies the tenure arrangements for relevant land or marine based facilities. – Relevant legal access rights are documented in plain English. – The EMS identifies feasible improvements in legal access rights. – The EMS briefly documents the process of license approval/ assessment – The EMS documents any relevant appeals process.
Strategic environmental assessment	– The activity has undertaken a strategic environmental assessment under State or Commonwealth environmental, planning or development legislation.	– Commonwealth Department of Environmental – Relevant State Planning, Development or Environmental agencies	– The EMS documents briefly the strategic assessment undertaken and the outcomes of this assessment – The EMS includes and undertakes any relevant recommendations made by the consent authority during the approvals process

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Research and Development	– Presence of a general R&D levy – Input into an R&DPlan – Involvement of stakeholders in R&D prioritization and assessment of proposals – Presence of cash or in–kind contributions to specific R&D projects – Benefits of research flowing back to investors	– State and Commonwealth agencies	– The EMS includes relevant general information on R&D. – The EMS documents the cash contribution of associations or businesses through general R&D levies collected. – The EMS documents the involvement of stakeholders in R&D prioritization. – The EMS documents any cash or in–kind contributions to specific projects of associations or businesses through direct cash or in–kind contribution to specific projects. – The EMS includes R&D priorities of the association or business – The EMS identifies R&D projects that are being undertaken by the association or business.
Participation	– Membership in participatory forums (e.g. Catchment Management Groups, MACs) – Additional participatory forums where the input of fishers/farmers is critical or highly desirable but is not currently being achieved	– Commonwealth, State and local government agencies	– Membership of relevant existing participatory forums is maintained. – Progress is made towards obtaining membership on further identified participatory forums

Component	What to identify, record or measure	Agencies/individuals responsible for data collection/collation publication	EMS Performance measures
Reporting/auditing	– The presence of reporting/auditing mechanisms.	– Fishers/farmers	– Reporting/auditing requirements are included in the EMS. – Review mechanisms are included in the EMS

4.2. Assessing the Lessons and Outcomes from the Six EMS Case Studies

By itself, using the ESD framework cannot tell the full story regarding lessons learnt in the case study process and the outcomes, particularly the social outcomes derived from the process. There are a range of outcomes that cannot be formally quantified, but nonetheless are important for understanding the benefits of EMS.

The project methodology included a national technical reference panel (TRP) where representatives from each study report on their progress, including discussing lessons learnt and outcomes achieved, as well as challenges encountered. Key information provided by these representatives was recorded by the author and assessed. Where necessary follow up phone calls to the representatives were also made to further discuss and elaborate on any relevant issues. There were also additional participants that attended TRP meetings including representatives from the Bureau of Rural Sciences, the Marine Stewardship Council and Oceanwatch. These participants provided additional input into the EMS process from differing perspectives.

For the Moreton Bay, Little Swanport Oyster Industry and the South Australian Rock Lobster EMS', visits were made to the relevant areas to question and discuss EMS issues with the grassroots participants. There was no formal survey instrument provided to participants as part of this study, but discussions involved and covered several key themes: including motivations for EMS development, perceived environmental benefits of EMS, challenges of developing and implementing EMS, industry benefits of EMS, government agencies perceptions of EMS, and communication of EMS within the industry and to other stakeholders. For the remaining three case studies this was not possible in the timeframes available.

5. Lessons learnt from the Six Seafood EMS Case Studies

A number of key lessons can be distilled from the pilot program and the case study groups. These lessons have relevance for other fisheries that wish to pursue EMS, as well as other industries. Many of these lessons can not be measured and assessed in an analytical sense, but this does not mean that they are unimportant. This section focuses on these lessons.

Facilitators are critical

EMS case study groups were provided with limited financial resources to employ an EMS facilitator. The presence of a facilitator proved to be critical in terms of ensuring continuity and continual support for participants during development of an EMS. The key role of a facilitator is to harness the diversity of ideas, approaches and beliefs among participants and ensure this diversity is used positively. In lay terms, facilitators can be described as both the engine of EMS and the lifeboat in case something is going wrong. The participants are the drivers.

The Technical Reference Panel allowed for cross-pollination of ideas and the sharing of experiences by EMS facilitators. This also gave the EMS Facilitators an additional level of support for their endeavours.

Motivations

There is a very wide range of motivations for participants undertaking the development of an EMS. The diversity of motivations for undertaking an EMS demonstrates the utility of the approach. This diversity of motivations is also a feature of EMS in other industries (for instance see Morrow and Rondinelli, 2002).

Maintaining resource access is an important motivation for undertaking EMS in the seafood industry, which appears to differ from motivations in agriculture. It is a motivation common to all pilot groups, but is of particular importance for the Victorian Bays and Inlet Fishery, the Moreton Bay fisheries and the Northern Territory Barramundi fishery and for pearling in WA/NT.

Motivations can also include internal issues such as pride, which was evident in participants of the South Australian Rock Lobster EMS. For the aquaculture industry, maintaining access is also paramount for existing businesses, but also, access to suitable new sites is also critical for new aquaculture ventures.

Consideration of cultural requirements

There are cultural considerations regarding commercial fisheries (e.g. Acheson, 1981; Minnegal et al., 2003; King, 2005) that need to be taken into consideration when developing an EMS. Such considerations for aquaculture are also likely to exist, but have not been documented. These cultural considerations are a product of the interaction between people and place, and vary from area to area and fishery to fishery (or farm to farm). They are influenced by the history of the fishery (or farm) and its development, the nature of the fishery (or aquaculture industry) itself, and the families themselves that are involved.

While there are cultural commonalities among fishing communities, there are also subtle differences (Eder, 2005) and it is critical that professionals working with EMS participants understand the cultural practices associated with a specific fishery. Rural extension research identifies that a key social principle is the requirement for an understanding of the world view of farmers (Vanclay, 2004). For the seafood industry, one of the best ways identified in the case studies of understanding this worldview and industry culture is to accept invitations to join the participants in their fishing (or farming) activities. This means that a professional can gain first hand knowledge of the interactions of the participants with each other, other stakeholders and with the natural environment.

Overcoming "the hump in the road"

In both the Moreton Bay and Victorian Bays and Inlets pilot groups, a key issue was overcoming "the hump" in development. That is, initially, many EMS participants were found to be cautious and questioning towards EMS (but not hostile). EMS progress in the early stages was very much instigated and driven by the facilitator. Without a facilitator, progress would most likely have ceased and the EMS would have been abandoned. However as progress was made, true industry ownership ensued where the industry participants guided the facilitator. A "hump in the road" had to be overcome for this to happen, and crossing this hump required a level of understanding of EMS, empowerment of individuals and groups and the successful building of social capital.

After the hump in the road was crossed, industry participants themselves also commenced a more active role in providing their own funding and seeking additional funding elsewhere for industry initiatives and funding EMS implementation. This is important because it, and the commitment it represents, demonstrates that there is a very high likelihood of pilot projects commenced as part of this current initiative (e.g Moreton Bay and the Victorian Bays and Inlets) continuing beyond the current funding arrangements.

Meeting the needs of the EMS participants

In line with the diversity of motivations for undertaking an EMS, the EMS must meet the needs of the participants. If improving the participant's relationship with the local community is the motivation for undertaking the EMS then the EMS must be focused on meeting this need.

Encompass more than one seafood business

The common property nature of the wild catch sector (and marine aquaculture access) means that in many cases an EMS for a specific business is not necessarily the best option. Instead, an EMS may be more effective if it covers a number of businesses in the local area or region.

If the EMS is to cover more than one seafood business, in order to promote continuity of the EMS, an industry association should have primary carriage of the EMS. (eg PPA) The type of industry association though can be variable, but it is critical that it involves grassroots industry members. It can be a State peak body, or a local or regional body.

Industry driven

The EMS process and the EMS must be industry driven – the objectives, scope and solutions to problems must be identified by the participants themselves. Facilitators should not drive the intent or focus of the EMS, but may provide significant support in terms of providing the words for describing it.

Timing of external input and/or public release

At some stage in the EMS process, participants will wish to either involve the community through consultation or participation, or communicate the EMS to the community. There is no universal "right time" for involving the community, although it can be influenced by the motivations for undertaking the EMS, and be considered on a case by case basis. If the EMS is being developed to build stronger links between the participants and the local community, then it is likely to be best to involve parts of the community earlier in the process. In the case of pearling a risk assessment workshop was held inclusive of external stakeholders and again when the risk assessment was reviewed three years later.

Speed of progress

EMS Groups need to show progress over the medium to long time period, but the speed of this progress is highly variable within and between groups. Different EMS groups will progress at different speeds.

During development of an EMS, progress is not even. That is, significant progress can be made over a short period of time, but then be followed by longer periods of little or no activity. The reasons for this can be that participants are in a period of high fishing or harvesting activity, or that other management issues (e.g. marine park planning) have taken on a higher short term priority. In the case of the Northern Territory barramundi fishery EMS, the nature of the fishery means that virtually the entire fleet are at sea for extended periods of time, thus making it difficult to progress the EMS during such periods. If strict timeframes and inflexible milestones are applied to EMS development, then success is likely to be compromised.

Caution should be exercised in assuming that a very rapid development (e.g. weeks from start to finish) represents the best outcome for implementing EMS. Sufficient time needs to be given to ensure that participants understand the issues and have thought through their significance or otherwise and sufficient time to engender overall cultural change. As a ballpark figure the minimum timeframe EMS development and implementation is in the order of two years.

Buy-in from state based resource managers

Among the case study groups, there was a diversity of views regarding the need for and timing of the "buy-in" from state based resource managers. Buy-in refers to formal recognition in planning and management process and/or cash support for the ongoing implementation of EMS. Some groups considered that early buy-in was critical as it could demonstrate to participants that EMS was taken seriously by managers and could thus lead to benefits for participants in terms of fisheries legislation/policy arrangements. Others however, considered that there was a risk early government buy-in could see the process lose its industry focus and ownership and become just another bureaucratic tool, and preferred any buy-in after the industry itself had bedded down the process and demonstrated outcomes.

The Moreton Bay EMS also demonstrated that buy-in from government also differed between agencies. The Queensland Environmental Protection Agency (EPA) bought on to the Moreton Bay EMS from the beginning, providing financial support for EMS development. However, the Queensland Department of Primary Industries and Fisheries (QDPI&F) remained reticent throughout the process to directly provide any support.

Direct economic benefits are not mandatory

There has been an emphasis on the direct economic benefits such as price premiums and improved market access that an EMS may bring. While this can be a motivation for undertaking an EMS, it is not necessarily obligatory or an over-ridding reason for undertaking an EMS and this was highlighted by participants from both the South Australian and Tasmanian case studies. The observations in this study are similar to those from Vanclay (2004) who concluded that such benefits were also not mandatory for changes in farming practices and adoption of new farming technologies.

Economic benefits are only likely to accrue after an EMS has become well established. The development of the Litlle Swanport EMS commenced prior to the majority of the case studies in this program. It is the only case study where a clear economic benefit has been reported from EMS implementation, namely the reduction in insurance premium.

Whether EMS can result in better market access or price premiums was beyond the scope of this report.

Documentation is required, but needs to be minimal and simple

Fishers are not keen to fill in paperwork; however some documentation is obviously necessary for an EMS. Paperwork needs to be kept simple and minimal. Without due care, benefits for the participants of EMS may be lost under the weight of paperwork. By iteslf, EMS paperwork does not generate progress (Boiral and Sala, 1998). Simple checklists and graphics such as those contained in the "Green Chooser" were generally found to be appropriate. The Green Chooser has been found to be extremely popular with participants and there appears to be scope for applying similar presentation styles and a similar level of detail in documentation for other primary industries.

EMS documentation is the output from the EMS process, which can lead to achieving the outcomes desired by the participants.

EMS is unlikely to universally influence marine park zoning

Marine park zoning can have profound impacts on seafood businesses businesses through significant reductions in access. Establishment of marine parks in Australia is driven by international and national policy and guidelines (e.g. National Representative System of Marine Protected Areas). Zoning arrangements for marine parks are based on the CAR principles (Comprehensive, Adequate, and Representative) and these principles are

applied using computer software such as MARXAN. Given the principles and approaches to modern marine park planning, there is limited scope for EMS to act as a factor that strongly influences zoning arrangements. Participants in the Cairns EMS project were disappointed that EMS development was not acknowledged by the Great Barrier Reef Marine Park Authority in re-zoning of the Great Barrier Reef. That said, the re-zoning progress had been underway for a significant period prior to the commencement of EMS development meaning that there was little tangible change to fishing practices and community acceptance that could be demonstrated by fishers to the Authority.

In the case of the Pearl Producer's EMS, the EMS process did contribute to a favourable outcome for the industry with respect to special pearling zones being established in two marine parks in Western Australia where other commercial activity is restricted.

Review and auditing

Review and auditing of EMS is essential and there are a number of options. These options should be communicated to EMS participants. Review and auditing procedures, whether they are internal or external need to lean towards being performance rather than document driven. However, whether to undertake a third-party audit, and the details of this audit, should always be in the hands of the participants.

The challenge for participants considering a full third party audit using registered auditors is the expensive and for participants with a newly developed EMS it was identified to be very daunting. The Victorian Bays and Inlets Fishery desired to move beyond a simple internal audit, however with a very small-scale fishery, a full third party audit by registered auditors was not feasible. As a compromise, a panel of independent fisheries experts was established to undertake the annual review of the EMS and these experts were willing to give their time free of charge. The Victorian Bays and Inlets Fishery Association has identified three key review of principles:

• Industry's understanding of the EMS approach

The EMS approach is still new in the fishing industry and is part of a cultural change. The future and performance of the VBIFA EMS depends largely on how well fishers understand and embrace the EMS concept, what they have learnt from developing an EMS and how satisfied they are with it today.

• Environmental performance

The environmental best practices recommended in the VBIFA EMS are industry-driven, voluntary and often go beyond the requirements of government agencies. This review is to assess the adoption of these voluntary best practices by VBIFA members.

• Community perceptions

After demonstrating their environmental performance, the biggest challenge for VBIFA members is to actively engage with the community and have their role better understood and appreciated. Developing a public EMS document describing their activities was a positive first step. However, this is not sufficient in itself and VBIFA members need to promote the environmental benefits of their EMS to:

a- Other commercial fishers; and
b- Other stakeholder groups, some of which can be antagonistic to commercial fishing activities.

For the Northern Territory barramundi fishery EMS an annual internal review is proposed and the results of this review are to be made available to all participants, other stakeholders and the general public. While the review is still internal, its proposed wide distribution gives an additional level of transparency to the process.

In the case of pearling a risk assessment workshop was held inclusive of external stakeholders and again when the risk assessment was reviewed three years later using the SSA EMS Risk Assessment CD as the vehicle.

System dependent versus person dependent

It has been identified that EMS can make environmental management "system dependent" rather than "person dependent" (Morrow and Rondinelli, 2002). However, in the seafood industry that was found not to be strictly true, with heavy dependence on one or a small number of "industry champions". The absence of these champions in the seafood pilot groups due to other commitments (e.g. fishing or harvesting!), led to a slowing down or indeed a pause, in EMS progress in some instances. Most noticeably, this was found to be the case in the Moreton Bay EMS'.

There will be critics of EMS – internal and external

There will be critics of EMS, both from within the industry itself and from members of the community. Regardless of how good an initiative is, universal support from industry members will not be forthcoming. This is not a fact restricted to the seafood industry. A level of resistance to EMS is observed in a range of business enterprises (Morrow and Rondinelli, 2002). Participants should only be those committed to the process.

Likewise there will be members of the community or members of community groups that

will not support an EMS. This should not be seen as a reason for discontinuing the EMS process. A minority of community members are inflexible in their views of commercial fishing and aquaculture and the environmental performance of both and will not be swayed by any initiative undertaken. However, many community members are flexible and are genuinely looking for information upon which to make an informed judgment. Providing evidence that a group is committed to improving environmental performance and delivering tangible environmental outcomes can be just the information the community is looking for.

Early tangible outcomes/changes

While EMS is a long-term journey, the identification of tangible and substantive outcomes that can be achieved by the group early in the journey is extremely beneficial for engendering commitment to EMS.

An example is the Little Swanport EMS, where the control of introduced rice grass was a task tackled early in EMS implementation. Participants were involved in the successful on-ground control of the grass, meaning that they had a positive tangible environmental outcome that they could see themselves. Early successes (no matter how small) can be the catalyst for the long-term EMS commitment.

Address more than one issue in an EMS

While issues should be prioritised, an EMS should not focus on a single issue. This is because if substantial headway can not be made on that issue, interest in EMS will inevitably wane. Likewise, if that single issue is solved to the satisfaction of the participants, there is unlikely to be motivation for continuing with the EMS. In any case, seafood production is a multi-dimensional pursuit in itself and cannot be distilled into a single issue.

100% voluntary adoption of EMS is not feasible, but is also not required

It will never be the case that all commercial fishers or aquaculture producers will voluntarily uptake EMS. However, this is not necessarily a limitation. The well-established Landcare program, which is generally deemed by government to be highly successful, has participation rates of about 30% (Campbell, 1997).

In terms of participation, it was noteworthy that the level of participation in EMS during the life of the case studies did not decline, it either remained constant or grew, the latter being more common. In the case of the Moreton Bay EMS, only nine participants attended the initial EMS meeting, however this increased to 33 at the meeting to finalise that EMS.

A QUANTITATIVE COST BENEFIT ANALYSIS IS NOT CURRENTLY POSSIBLE

Highly desirable is a formal cost benefit analysis of EMS in the seafood industry. In this evaluation, the feasibility of such an analysis was investigated. However, it was found that at this point of EMS development in the seafood industry such an analysis was not possible. Even for the South Australian Rock Lobster and Little Swanport estuary EMS', that have a development history that predates the current program.

The issue is that there is insufficient information to quantitatively assess the benefits.

THERE IS NO SINGLE QUANTIFIABLE OUTCOME!

A lesson from the case studies is that there is no single quantifiable outcome that can be used to assess the success or otherwise of the EMS process or an EMS. However, there are a range of outcomes that can be identified both for the industry, the community and for NRM. These outcomes are discussed throughout the remainder of this report.

6. Outcomes from the Six Seafood EMS Pilot Projects – What's in it for me?

If I (or we) do an EMS, what's in it for me (or us)? It's a question that EMS participants rightfully ask.

What's in it for us, is also a question that government agencies ask when they consider whether to commence or continue to support EMS.

In this section EMS outcomes are discussed in broad terms. Specific outcomes for each case study are discussed in the next section.

Building Social Capital

Social capital and social networks are increasingly been viewed as key components for fisheries governance (Grafton, 2005) and biodiversity conservation (Pretty and Smith, 2004). The term social capital is an all-encompassing term for the norms and social networks that facilitate co-operation among individuals and between groups of individuals (Portes, 1998).

EMS contributes positively and significantly to the three interrelated pillars of social capital identified and reviewed by Paldam (2000) and Grafton (2005): trust and trust worthiness, civic engagement and co-operation, and social networks. Trust and co-operation represent outcomes of social capital, while social networks represent causal factors in its determination.

In terms of trust and trust worthiness, it promotes the sharing of knowledge and information about the resource and resource use. With an effective interchange of ideas, fishers become better aware of the consequences of their collective actions on the resource, while fisheries managers benefit from the timely feedback about local changes in the stock and environmental conditions (Grafton, 2005). An EMS and the EMS process is a vehicle for seafood producers to put forward their knowledge in a form that they actively choose and it also allows for their own consideration of their collective actions on the resource. The common property nature of commercial fishing resources in particular has lead to a level of secrecy regarding activities that has been counter-productivity in terms of community perceptions of the sector, and ultimately resource access.

Co-operation between fishers is a necessary condition for a well managed fishery (Grafton, 2005). The need is for co-operation among seafood producers and between seafood producers and other stakeholders, both of which can avoid conflicts happening, and

enhance the capacity to resolve them should they arise. Enhanced co-operation between seafood producers as a result of the EMS process were evident – in particular, in Moreton Bay and in the Victorian Bays and Inlets. In Moreton Bay there is a long history of conflict between commercial fishers, principally those using different apparatus to target the same species. The frequency of these conflicts has greatly diminished and fishers have been able to work co-operatively on common goals. In Victoria, the circumstances were somewhat different but no less salient. The Victorian Bays and Inlet fishery consists of a number of geographically isolated fisheries and the EMS provides a common focus that is applicable across the geographic range of the fishery.

Social networks can be divided into three categories: bonding, bridging and linking social capital (reviewed in Grafton, 2005). Bonding social capital involves linkages within groups of like-minded individuals (e.g. within the same resource dependent community. Examples of this type of network being developed or enhanced are common to all EMS pilot groups. Bridging social capital is concerned with linkages across similar, but different, groups or social networks. An example of this type of capital being developed as a result of EMS is the Victorian Bays and Inlet case study. Linking social capital involves connections and engagement across disparate groups or networks, but at different hierarchies. The connection between a government agency and the seafood industry represents a form of linking social capital. Examples of EMS building this type of social capital include the Little Swanport Oyster Industry and the Victorian Bays and Inlets case study.

Importantly, the building of social capital is not just solely an outcome for the seafood industry itself, it is increasingly being recognised as contributing positively to biodiversity conservation (Pretty and Smith, 2004).

Many of the outcomes discussed in more detail in this section are related to the building of social capital.

Empowerment

An outcome from undertaking an EMS has been greater empowerment of individuals and groups. Empowerment is a well established issue in psychology, public health, social work and education, but its applicability to fisheries is only just being recognised (Jentoft, 2004). Empowered communities are generally better able to deal with change (Buchy and Race, 2001).

Generally, empowerment is defined as the process through which individuals or groups become strong enough to participate within, share in the control of and influence, events and institutions affecting their lives (Torre, 1986). Specific to fisheries, empowerment is defined as a mechanism to give people within fishing communities a chance to influence

their own future in order to cope with the impacts from globalization; competing use of freshwater, marine and coastal environments; and other fisheries-related issues (Raakjaer-Nielsen et al., 2003).

The process of empowerment has both individual (=psychological) and collective (=community) components which are interrelated (Zimmerman and Rappaport, 1988; Jentoft, 2004). EMS as applied to the seafood industry has an emphasis on interactive learning through shared knowledge and shared experiences. However, while the collective component is emphasised, individual empowerment can also be achieved. The individual component has three main dimensions: personality, cognitive and motivational.

The personality dimension refers to strengthened self-efficacy and self-confidence, the feeling of being able to master one's domain by one's own action. In the case of the seafood industry, most participants have mastered their own domain in a narrow sense (e.g. their boat or farm) without EMS, but EMS was demonstrated to provide self confidence in interacting with other parts of their domain in a broader sense (e.g. interactions with community and government).

The cognitive dimension refers to the feeling of assurance that one has the knowledge and skills to manage one's affairs. EMS was demonstrated to provide the knowledge and skills for managing one's affairs through training and capacity building, developing a management and reporting discipline and communication within and external to the seafood industry. These points are elaborated further in this section.

The motivational dimension concerns, the willingness, desire, and resolve to control one's environment and become involved in the political process. EMS does not necessarily provide the impetus for this to occur, but it did provide an important tool for interacting in political processes.

EMS as a co-management tool

EMS is a form of, or a potential tool for greater co-management in the seafood industry. While co-management can progress without EMS, the EMS process can build the level of social capital, and facilitate the level of personal development and training and the level of recognition by government, which are key potential prerequisites for co-management to succeed.

Co-management can be described as a continuum from wholly centrally run management to self regulation by an industry (Figure 2).

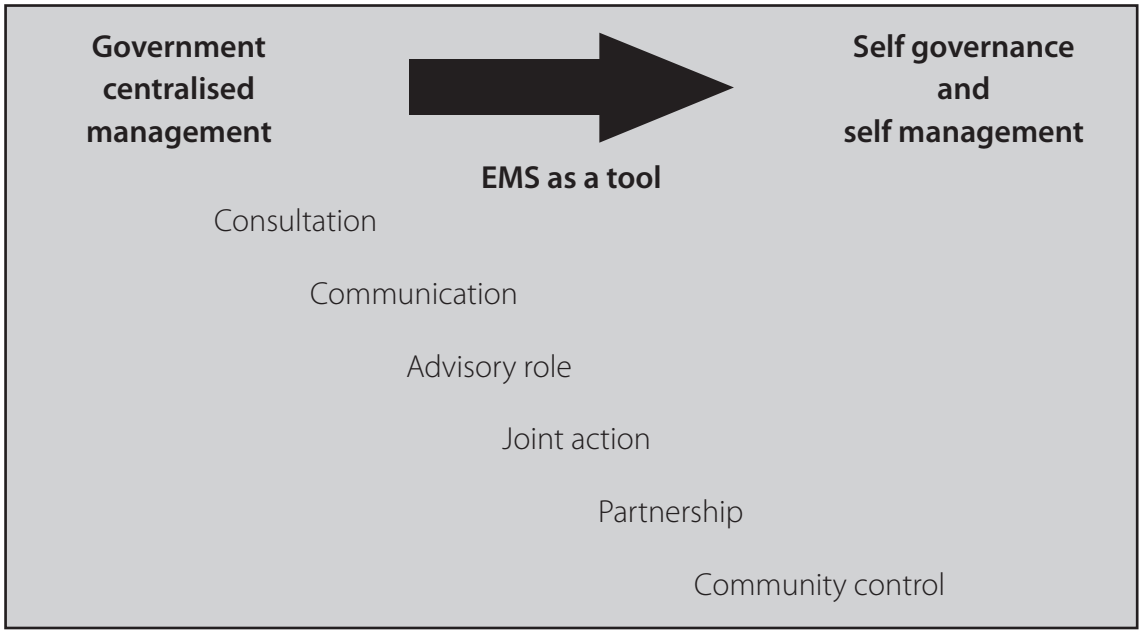

Figure 2. The co-management continuum that extends from government centralised mangement to self governance and self management.

Platform for establishing legitimacy and credibility

For effective long-term engagement in natural resource management it requires stakeholders to demonstrate their credibility. An EMS can be a critical platform for demonstrating the environmental credibility of the industry participants and that they are good "team members" in the community. Legitimacy can be increased by involving additional stakeholders so that the outcome is more fully representative of a locality (Korfmacher, 2000).

A change from operational thinking to strategic thinking

Commercial fishermen and aquaculturalists have traditionally relied upon a very clear focus on operational thinking. That is, focusing on the day to day operations of their boats, farms and seafood businesses. However, modern business management requires focus more on strategic thinking to ensure viability. EMS facilitates such a shift because it requires participants to think ahead by setting up a structured process of planning, doing, reporting and reviewing. The advantage of this shift is that it is likely to increase the chances that a seafood business can remain competitive.

Relationships within the industry – communication among participants

Although not an explicit aim or motivation for undertaking an EMS, an outcome from the process of preparing an EMS has been greater communication among participants (also see previous discussion of social capital). When commercial fishers come together in a forum it is often to debate issues such as allocation, which are contentious and nearly always results in "winners" and "losers". Such issues are not conducive to promoting social cohesiveness among industry participants. In contrast, the process of developing EMS is inherently positive with no participants being disadvantaged relative to other participants.

In Moreton Bay, members of fisheries that have a long history of antagonism towards each other (e.g. mesh netters and haul netters) successfully worked together on the EMS and has facilitated continued dialogue between these groups and appears to have been successful in mitigating conflict and developing mutual understanding. In the Little Swanport estuary, the EMS has fostered very strong linkages between all oyster production businesses in the estuary, much stronger than those that existed prior to the EMS. In the case of the South Australian Rock Lobster Fishery, the development and implementation of their EMS led to commercial fishers developing a shared vision for their fishery, and participants reported more constructive dialogue among themselves when discussing contentious areas of fisheries management among themselves.

Environmental outcomes

A frequent criticism of corporate EMS based on ISO14001 in particular is whether they actually deliver significantly improved environmental outcomes (Boiral and Sala, 1998; Rondinelli and Vastag, 2000; Morrow and Rondinelli, 2002). Clear and tangible environmental outcomes are evident in the seafood EMS pilot program and these are detailed elsewhere in this report.

Training

EMS led to seafood participants undertaking formal training in environmental practices relevant to the fishing industry. EMS can give a focus and an overarching theme to environmental training, but without being too prescriptive. In the case of the Little Swanport Estuary EMS, some of the participants undertook training in algae taxonomy after this was identified through the EMS as a relevant consideration for oyster farming.

Greater linkages and networks

Building social networks is discussed in the section on social capital. Gale (1991) notes that networks of diverse interests can be very effective at the local level in negotiating and lobbying with governments. An EMS can facilitate greater linkages and better networking with the community and with community groups. With an EMS, participants have an environmental "product" that they can take to the community and community groups.

Communication with the community

The demonstrated commitment to improving environmental performance that an EMS represents can lead to better or new communication channels with the local community. It can help industry participants to become central players in environmental debates in their local community.

EMS provides a single document that draws on a wide range of disparate information sources to produce a single, coherent and comprehensive picture of fishing activities at a local or regional level. For instance, the Victorian Bays and Inlet Fishery EMS, provides a single document, which provides detailed descriptions of fishing gears and how they are used, together with information on target species, relevant legislation, and the spatial area of the fishery. This information is available elsewhere but is scattered through a range of documents some of which are not easily accessible to the general public.

Reflection

The process of undertaking an EMS can be important tool for reflection by the participants on their environmental performance. Reflection opens participants up to thinking more about their performance in relation to industry norms and community expectations (Carruthers and Tinning, 2003).

Improved access to finance through reduced risk

This is clearly an outcome (or desire) of EMS in other industries (e.g. mining). In the agriculture sector, there are documented cases where financial institutions are now starting to incorporate environmental management into the evaluation of credit risk ratings (Carruthers and Tinning, 2003 and references therein). However, Minoli and Bell (2003) question the interest and relevance of EMS with respect to insuring against pollution risks.

In the case of the Little Swanport EMS, participants reported reduced public liability costs principally through the incorporation and management of OH&S issues in their EMS. This is an example of a clear and tangible economic outcome from that EMS. Pearling experiences similar benefits from their excellent environmental record and efforts to sustain that performance.

Such issues are likely to be of greater relevance in the future as external pressure from financial institutions that has been placed on the mining industry and beginning to be placed on parts of the agriculture industry, are increasingly applied to the seafood industry.

Management and reporting discipline

An EMS engenders greater management and reporting discipline. This may have benefits for the participants in terms of understanding "the regulatory world".

It also engenders greater discipline on external stakeholders to responsibly raise issues through communication channels rather than through trial by media.

7. Evaluation of the EMS Case Studies

In this section of the report, the evaluation of the six specific case studies is presented. Details of each study are presented and the outcomes delivered by EMS in each study are reported. Full details on the EMS evaluations are included in Appendix 1.

7.1. Evaluation of the South Australian Rock Lobster Fishery EMS

The South Australian Rock Lobster Fishery is the South Australian case study. The fishery is a high value export orientated fishery. The South Australian Rock Lobster Fishery commenced their "Clean and Green" Program approximately four years to the commencement of the current EMS initiatives. The program is focusing on a "whole of chain" approach that includes food safety and occupational health and safety (OH&S), as well as environmental considerations. The Clean and Green Program is overseen by the South Australian Rock Lobster Advisory Council. Participants have invested significant amounts of their own time and money into the program over a long period of time

The motivations for participants undertaking the program include:

1. Reducing duplication of government services in the areas of food safety and OH&S.
2. Contributing to co-management, with fishers aiming to demonstrate that they have the capacity to be treated as equals in fisheries management.
3. Pride – an approach to demonstrate that their fishery and product is the best.
4. A tool to communicate to the community the positive contributions and activities of the fishery.

The evaluation of the South Australian Rock Lobster EMS identified that there were some important on-ground environmental outcomes that have been delivered by the EMS over and above regulatory requirements. Specifically, the EMS has documented actions for marine debris and ghost fishing, impacts from bait usage, water quality impacts from fishery operations, and ecological impacts on non-retained species (threatened and non-threatened). These are important national (or indeed global) environmental issues that can be very difficult to cost-effectively manage through regulation at the local level.

We have applied our assessment framework to the South Australian Rock Lobster "Clean and Green" program and the results are summarised in Table 2. For issues where EMS is identified as delivering on-ground outcomes over and above statutory requirements, we have then identified, using the definitions in Table 1, whether these outcomes are substantive, informative or participative (Table 3). The categories are not mutually exclusive.

Table 2. A Summary of the Evaluation of the South Australian Rock Lobster Fishery EMS

	Not relevant to the fishery	Relevant to the fishery but not addressed in the EMS	Relevant to the fishery and appropriately addressed in the EMS	Relevant to the fishery with the EMS delivering clear on-ground outcomes over and above statutory requirements
Ecological	Trophic impacts	Retained species	Stock enhancement	Marine debris and ghost fishing
	Translocation	Discarding/ provisioning		Bait usage
	Benthic impacts	Fuel usage/ exhaust		Non-retained species (threatened and non-threatened)
	Noise			Water quality
	Carrying capacity			External impacts
	Pests, pathogens and diseases			Visual impacts
				Animal ethics
Social and Economic		Return on investment		Communication
		Gender equity		OH&S
		Fleet structure		Training
		Employment		
		Social capital		
		Community health benefits		
Governance		Participation in management	Legal access rights	Reporting and Auditing
			R&D	
			Strategic environmental assessment	

Table 3. The Types of Outcomes Delivered by the South Australian Rock Lobster EMS

Participatory	Informative	Substantive
Communication	Non-retained species (threatened and non-threatened)	Marine debris and ghost fishing.
Reporting and Auditing	External impacts	Bait usage
	Training	Non-retained species (threatened and non-threatened)
		Water quality
		Visual impacts
		Animal ethics
		OH&S

7.2. Evaluation of the Little Swanport Oyster Industry EMS

The Tasmanian case study is oyster production in the Little Swanport estuary, which is one of the largest in eastern Tasmania. The estuary contains oyster grow out operations as well as a hatchery. The hatchery supplies farms through Tasmania and South Australia, meaning that the pacific oyster industry in Little Swanport has national significance. Production is for domestic consumption.

There are several motivations for the participants to undertake their EMS. Participants see EMS as a tool for implementing ecosystem-based management both for their business and within the entire catchment. Oyster production is impacted by land use practices in the catchment. Dry land salinity is a significant problem, particularly in the upper catchment. By demonstrating their commitment to the environment, the participants consider that they may have greater influence on other industries in the catchment to improve their environmental practices.

The ecological impact of oyster production has been assessed by a detailed risk assessment contained in Crawford (2003). This risk assessment provides strong justification for some issues not being required to be addressed in the EMS.

The current evaluation identified that there were some important on-ground environmental outcomes that have been delivered by the EMS over and above regulatory requirements. Specifically, the EMS has documented actions for water quality monitoring and improvement, fuel and oil usage and air quality, marine debris, visual impacts, OH&S, training.

We have applied our assessment framework to the Little Swanport Oyster Industry EMS and the results are summarised in Table 4. For issues where EMS is identified as delivering on-ground outcomes over and above statutory requirements, whether these outcomes are substantive, informative or participative (Table 5) are identified. The categories are not mutually exclusive.

Table 4. A summary of the review of the Little Swanport Oyster Industry EMS

	Not relevant to the activity	**Relevant to the activity but not addressed in the EMS**	**Relevant to the activity and appropriately addressed in the EMS**	**Relevant to the activity with the EMS delivering additional information, and/or clear on-ground outcomes over and above statutory requirements**
Ecological	Retained species		Pests, diseases and pathogens	Non-retained species (threatened or otherwise)
	Trophic impacts			Water quality (nutrients & pollutants)
	Bait collection and use			Fuel usage & air emissions
	Noise			Marine debris
	Animal ethics			Translocation
				Benthic impacts
				External environmental impacts
				Visual impacts
Social and Economic	Fleet structure	Gender equity	Return on investment	Communication
		Community health benefits	Social capital	OH&S
				Training
Governance	Strategic environmental assessment		Legal access right	Research and development
			Reporting and auditng	
			Participation in management	

Table 5. The Types of Outcomes Delivered by the Little Swanport Oyster Industry EMS

Participatory	Informative	Substantive
Communication	Non-retained species (threatened and non-threatened)	Marine debris
Reporting and Auditing	External impacts	Fuel usage and air emissions
External impacts	Benthic impacts	Translocation
R&D	Return on investment	Water quality (nutrients and pollutants)
	Training	Visual impacts
	R&D	Carrying capacity
	Training	OH&S

7.3. Evaluation of the Victorian Bays and Inlets EMS

The Victorian Bays and Inlet fishery is an inshore fishery characterised by low capital investment, but a very strong historical participation in the fishery by many families. It is orientated towards supply fresh local finfish for the domestic market. Traditionally the fishers have not put much emphasis on engaging the broader community in how they harvest what is accepted as a community resource and have probably suffered from the resulting isolation. The fishery mainly uses gear that has been demonstrated by peer-reviewed studies to be low impact from an environmental perspective, but the public perception is to the contrary.

The fishery is under pressure to maintain access from both marine park zoning and recreational fishers. Maintaining resource access is one of the primary motivations for participants to undertake development of an EMS and become involved as a pilot group.

The Victorian Bay and Inlet EMS is underpinned by a risk assessment based on likelihood and consequence. The EMS was highly commended at the Victorian Coastal Awards for Excellence in 2004, which is an award presented by the Victorian Coastal Council. This represents a high level of community recognition of their EMS initiative.

The EMS represents the collation of important information relevant to the fishery in a single coherent and well illustrated document. As such, if circulated to interested parties, it is likely to be an effective communication tool that outlines the history of the fishery, the gears used, and the commitment of the participants to their fishery. In particularly, there can often be confusion among the public as to the fishing gear permitted for use and how it is used. The EMS documents this very well through diagrams and illustrations.

The evaluation of the EMS identified that there were some important on-ground environmental outcomes that have been delivered by the EMS over and above regulatory requirements. Specifically, the EMS has documented actions for non-retained species (threatened and non-threatened), water quality, marine debris and ghost fishing, translocation, external environmental impacts, and OH&S (Tables 6 and 7).

Table 6. A summary of the review of the Victorian Bays and Inlet EMS

	Not relevant to the activity	**Relevant to the activity but not addressed in the EMS**	**Relevant to the activity and appropriately addressed in the EMS**	**Relevant to the activity with the EMS delivering additional information, and/or clear on-ground outcomes over and above statutory requirements**
Ecological	Bait collection and use	Trophic impacts	Retained Species	Non-retained species (non threatened & threatened)
	Visual impacts	Animal ethics	Fuel usage & air emissions	Water quality
	Carrying capacity		Benthic and habitat impacts	Marine debris & ghost fishing
	Noise			Translocation
				External environmental impacts
Social and Economic		Gender equity	Fleet structure	Communication
		Training	Employment	OH&S
			Social capital	
			Community health benefits	
Governance		Strategic environmental assessment	Legal access rights	
			R&D	
			Reporting & auditing	
			Participation in management	

Table 7. The Types of Outcomes Delivered by the Victorian Bays and Inlet EMS

Participatory	Informative	Substantive
	Communication	Communication
	Non-retained species (non threatened & threatened)	OH&S
	Translocation	Non-retained species (non threatened & threatened)
	External environmental impacts	Translocation
	Water quality	Water quality
		Marine debris & ghost fishing

7.4. Evaluation of the Pearl Producers Association EMS

Pearl production relies on a sustainable pearl oyster wild fishery (species Pinctada maxima). and the pearl culture activity is the largest aquaculture sector in Australia. The production of pearls requires pristine water quality, high nutrient values and generally occurs in the remote areas of the Kimberley and Northern Terrotory, many of which have high conservation values. The Broome Pearl was recently recognised by the Western Australian Government as one of the seven icons of WA.

The Pearl Producers Association (PPA) took the deliberate strategic decision in 1998 to actively demonstrate sound environmental performance. To achieve this they have developed and Environmental Policy, held several risk assessment workshops and an developed an EMS Manual using a case study (the MG Kailis Group pearling operations) to provide a template at an enterprise level for building an EMS system within the industry. It uses ISO14001 as its model. While many of the case studies have aimed to present a document for direct public use, the PPA EMS is to be used as an industry template more focused at driving and documenting in detail internal processes and procedures.

The PPA has several industry focused documents and public processes developed since 1998 which support the public access to the pearling industry's environmental credentials. This includes an environmental research plan with the first project on habitat impact assessment beginning in July 2005.

The Environmental Policy establishes the vision, direction and guiding principles for environmental management within a pearling operation. The Environment Policy establishes industry level and pearl farm operational level responsibilities.

The EMS Manual provides a framework for the implementation of the Environmental Policy within the MG Kailis case study. The EMS Manual provides an overview of the organisational structure underpinning the EMS and a brief summary of documentation required and it's administration. The EMS divides operational activities into 15 elements, each of which has a specific objective. Elements covered include: hazard identification and risk assessment; change management control; employee selection, competency and training; and audit and review.

A detailed risk assessment of pearling industry practices using likelihood and consequence tables was undertaken by the PPA via a multi-stakeholder workshop in 2001. A review of that risk assessment was held in 2004 to support the EMS project. The risk assessment documents a range of safeguards for each activity where risk was assessed.

The evaluation of the EMS identified that the policy and EMS are very much focused on the internal operations of the industry and individual farms, rather than providing details that educate the public with regard to pearl farming activities. The wider pearling industry strategy has been develop the tools and evidence first and then take a formal educative role into the community. The existence however, of an environmental policy and EMS may possibly suggest to the general public that the pearling industry is acting responsibly. That said, the EMS still did demonstrate substantive onground outcomes identified in Tables 8 and 9.

Table 8. A summary of the review of the Pearl Producers Association EMS

	Not relevant to the activity	Relevant to the activity but not addressed in the EMS	Relevant to the activity and appropriately addressed in the EMS	Relevant to the activity with the EMS delivering additional information, and/or clear on-ground outcomes over and above statutory requirements
Ecological	Bait collection and use	Trophic impacts	Retained species	Non-retained species (threatened)
	Noise	Fuel usage and air emissions	Non-retained species (non threatened)	Water quality (nutrients and pollutants)
	Animal ethics	Visual impacts	Benthic impacts	Marine debris and ghost fishing
			Carrying capacity	Translocation
				Pests, diseases and pathogens
Social and Economic	Fleet structure	Return on investment		Communication
	Community health benefits	Gender equity		OH&S
		Employment		Training
		Social capital		
Governance	Strategic environmental assessment	Legal access rights		Document administration
		Research and Development	Reporting and Auditing	
		Participation in management		

Table 9. The Types of Outcomes Delivered by the Pearl Producers Association EMS

Participatory	Informative	Substantive
OH&S	Communication	Non-retained species (threatened)
Training		Water quality (nutrients and pollutants)
		Marine debris and ghost fishing
		Translocation

7.5. Evaluation of the Moreton Bay and Cairns EMS

The Queensland EMS pilot project was different from those in other states in that it involved two geographically disparate pilot groups in two very different fisheries – Moreton Bay and Cairns.

Moreton Bay

Moreton Bay is one of Queensland's most important coastal resources. In addition to its natural attributes, the Bay contributes significantly to the economy of the region and the State through a wide range of commercial and recreational uses. Moreton Bay is considered unique in that it is one of the most productive fisheries in Queensland. It has many special features, including habitat for a large range of vulnerable and commercially important marine species and large tracts of saltmarsh, mangrove and seagrass communities. The whole of Moreton Bay is a multi-use marine park under State marine park legislation.

Despite the level of productivity, the Bay's resources are under increasing pressure owing to its close proximity to the urban hot spots of Brisbane and south-east Queensland in general. Over the past 10 -15 years the professional fishers of Moreton Bay have faced increasing challenges on many levels – business-related, personally and socially. The fishers of Moreton Bay recognize that they have a responsibility to harvest seafood on behalf of the community in an environmentally sustainable manner (as current technology and techniques allow).

To manage business and personal challenges as they arise, in addition to continually improving environmental performance, the fishers of Moreton Bay decided to develop an Environmental Management System (EMS). The Moreton Bay fishery is diverse in terms of techniques and target species. The Moreton Bay EMS focuses on the trawl and fish fisheries and commercial shell collection. The EMS includes a vision, scope, risk assessment, policy, actions, code of industry best practice, implementation strategy, audit, review and reporting mechanisms.

The EMS was developed in accordance with guidelines set out by Seafood Services Australia (the Green Chooser), the Australian Standard ISO 14001:1996 Environmental Management Systems, the Food and Agriculture Organisation (FAO) Code of Conduct for Responsible Fishing and the Australian Seafood Industry Council (ASIC) Code of Conduct for a Responsible Seafood Industry.

Commercial fishers in Moreton Bay use the EMS as a vehicle to proactively manage their local industry in a manner that goes beyond legislative requirements to ensure a more secure future for professional fishing and, more importantly, the marine environment on which our livelihood depends. The EMS contains substantive measures that improve the environmental performance of tunnel netting in particular by adopting the use of "grids", which are analogous to turtle excluder devices for trawl fisheries.

The Moreton Bay EMS won the 2006 Queensland Department of Primary Industries Sustainable Primary Producers award.

Cairns

The Cairns EMS Pilot Group progressed rapidly to undertaking a risk assessment of their environmental activities, however, the impetus for developing an EMS waned and no EMS was finalized by this pilot group. As such, no formal analysis of the Cairns EMS was able to be undertaken. However, a brief discussion of this EMS pilot group is salient in terms of understanding the factors that lead to progress ceasing.

The Cairns region is an important area for commercial prawn trawling (including for broodstock collection for the prawn farming industry), line fishing for live coral trout, net fishing for barramundi and mud crabbing. The area is one of the most important locations for international tourism in Australia. The area is also an important area for recreational fishing and also harbours a large charter and guided fishing sector. An area historically important for net fishing (Trinity Inlet) was closed for reasons of resource allocation in 1999.

The principal reason as to why EMS development and implementation did not proceed in the Cairns region was the implementation of the Representative Areas Program (RAP) by the Great Barrier Reef Marine Park Authority (GBRMPA). This program led to a significant increase in the area closed to commercial fishing and significant economic impacts on commercial fishing operators (see Hundloe et al., 2003). Many of the initial participants in the EMS process were put out of business by the RAP and thus took no further part in the process. Other participants, while still remaining in the industry, focused their efforts on the RAP and restructuring their businesses and obtaining structural adjustment monies.

Table 10. A summary of the review of the Moreton Bay EMS

	Not relevant to the activity	Relevant to the activity but not addressed in the EMS	Relevant to the activity and appropriately addressed in the EMS	Relevant to the activity with the EMS delivering additional information, and/or clear on-ground outcomes over and above statutory requirements
Ecological	Pests, pathogens and diseases	Trophic impacts	Retained species	Non-retained species (threatened and non-threatned)
	Translocation	Fuel usage and air emissions	Benthic impacts	Water quality
	Bait collection and use	Animal ethics		Marine debris and ghost fishing
	Visual impacts			
	Carrying capacity			
	Noise			
Social and Economic		Gender equity	Return on investment	OH&S
		Social capital	Fleet structure	
		Community health benefits	Communication	
			Training	
			Employment	
Governance		Document administration	Legal access rights	R&D
		Participation in management	Strategic environmental assessment	
			Reporting and auditing	

Table 11. The Types of Outcomes Delivered by the Moreton Bay EMS

Participatory	Informative	Substantive
	OH&S	Water quality
	R&D	Non retained species
		Marine debris and ghost fishing

7.6. Evaluation of the Northern Territory Barramundi Fishery EMS

The Northern Territory barramundi fishery commenced development of an EMS after an informal mentoring visit led by commercial barramundi fishers from the Gulf of Carpentaria.

Over a long period of time the fishery has been under pressure to maintain access to fishing areas, principally from recreational anglers. The key motivation for undertaking the EMS is to maintain access to the resource, or more colloquially "self preservation". The purpose of the EMS is to document how barramundi licensee committee members are currently meeting, and will continue to meet, their responsibilities as users of a public resource.

The EMS builds on previous industry led initiatives including the Code of Conduct for Responsible Fishing and Aquaculture Operations and Protected Species Awareness Information for Professional Fishermen. The EMS is based on a risk assessment (likelihood and consequence) approach. Proposed strategies are well linked to clear objectives with simple and cost-effective performance indicators.

Table 12. A summary of the review of the Northern Territory Barramundi Fishery EMS

	Not relevant to the activity	Relevant to the activity but not addressed in the EMS	Relevant to the activity and appropriately addressed in the EMS	Relevant to the activity with the EMS delivering additional information, and/or clear on-ground outcomes over and above statutory requirements
Ecological	Fuel usage and air emissions	Trophic impacts	Retained species	Non-retained species (threatened & non-threatened)
	Pests and pathogens	Animal ethics		Water quality (nutrients & pollutants)
	Translocation			Marine debris & ghost fishing
	Bait collection and use			Benthic impacts
	Visual impacts			External environmental impacts of the participants
	Carrying capacity			
	Noise			
Social and Economic		Return on investment	Fleet structure	Communication
		Gender equity	Training	
		OH&S		
		Social capital		
		Employment		
		Community health benefits		
Governance		Strategic environmental assessment	Legal access rights	
		Participation in management	R&D	
			Reporting & auditing	

Table 13. The Types of Outcomes Delivered by the Northern Territory Barramundi Fishery EMS

Participatory	Informative	Substantive
	Communication	Non-retained species (threatened & non-threatened)
	External environmental impacts of the participants	Water quality (nutrients & pollutants)
		Marine debris & ghost fishing
		Benthic impacts

8. Case Study Synthesis

The EMS case studies in this program were diverse by design. The EMS documents differ substantially in detail and focus which is a demonstration of the utility of the EMS approach and this utility is necessary given the diversity of the Australian fisheries and aquaculture sectors, and this is borne out by brief consideration of each case study.

The Pearl Producers Association EMS is very much focussed on driving the internal day to day environmental performance of a pearling company, and as such it shares clear similarities with EMS in the manufacturing and mining industries to which it has similarities. The Moreton Bay and Victorian Bays and Inlets EMS' both focus on communicating aspects of the fishery and its environmental performance to local communities. The South Australian Rock Lobster EMS is focussed on a through chain approach to environmental performance with certification being an important endpoint. The Little Swanport Oyster Industry EMS is focussed on driving environmental performance of the industry itself as well as maintaining and improving the health of the catchment upon which the industry is dependent through on-ground actions as well as negotiation with landholders. As such it has analogies with total catchment management.

Despite the diversity, there are however some commonalties among the case studies. Importantly, all cases studies have undertaken risk assessments in order to assess impacts and prioritise actions. While the details of the risk assessments differ slightly among case studies, all are based on assessment of likelihood and consequence, and the important point is that thinking about and understanding risk in a formalised way has become a day to day part of seafood businesses and associations. This was not the case prior to the implementation of EMS.

Resource access and security of access were common themes and motivations for developing and implementing EMS in the Victorian Bays and Inlets, Moreton Bay, Little Swanport Oyster Industry, the WA/NT Pearling industry and the Northern Territory barramundi fishery. Beyond access being maintained for seafood and pearl production in these areas (which is the case), there is no direct way of assessing success of EMS for resource access. It can be argued that access would have been maintained without an EMS. Nonetheless in terms of resource access, EMS can be considered to be an approach for enhancing the chances of resource access being maintained. It is a valuable aid, but not necessarily a panacea.

All case studies demonstrate on-ground changes that result in self-driven improvements in environmental performance, over and above statutory environmental requirements. This demonstrates that EMS can drive environmental change and is not just simply "greenwash".

There are a number of components that the evaluation identified as being relevant to the fishery and worthy of consideration, but that were not adequately covered. This should not be inferred as the EMS having "failed". Regardless of the topic or field, in nearly all reviews or evaluations, there are areas for improvement identified by reviewers. A review such as this one provides an opportunity for participants to reflect and make modifications if they wish. These modifications can range from significant changes to on-ground practices to just simply providing more information on a specific topic.

Surprisingly, the majority of EMS' did not generally cover economic and social issues as well, or in as much detail, as environmental issues. This was a conscious decision on the part of participants. The reasons for this included the desire to maintain economic information as commercial in confidence (PPA EMS), and the belief that the inclusion of such information was not a priority in comparison to other information.

9. The Way Forward

This section maps out some key areas and information gaps, key considerations, and resource requirements that need to be filled in order to continue to develop EMS in the seafood industry.

9.1. On-going Support

From the outset, economic support provided by the Commonwealth government for the case studies to allow the participants to hire an EMS facilitator (or provide other support) was only for a set period (generally 18 months). A significant challenge is to either find a way to continue the level of support, or to maintain EMS momentum after the initial support period has been completed. Some industries such as Pearling and the South Australian Rock Lobster have made financial commitments to sustain the EMS as part of a wider industry strategy.

9.2. Mentoring Program

The Technical Reference Panel at its last meeting discussed ways for industry members to continue to learn from each other and build social capital. It was identified that workshops, while beneficial to a certain degree, were not necessarily optimal and that expansion of the mentoring program be considered. The mentoring program involves industry members visiting other ports or farms and interacting with local operators on their vessels in their fishery or on their farms for a week or more. The visitor's stay with local fishers or farmers which reduces the cost, but importantly also immerses the visitor more in the local culture.

9.3. Cleaner Production (eco-efficiency)

There is a clear need for a comprehensive and systematic review of cleaner production (eco-efficiency)opportunities for the seafood industry. Cleaner production is defined as improvements to a production process so the process uses less energy, water or other input, or generates less waste or less environmentally harmful waste. This is the approach most commonly used to quantify the economic benefits of businesses or organisations adopting more environmentally beneficial changes.

In addition to environmental benefits, such an approach can potentially help the seafood industry identify priority areas for reducing its cost of production.

9.4. Quantitative Cost Benefit Analysis

A quantitative cost-benefit analysis has the advantage that it can more clearly identify costs and benefits resulting from EMS. The possibility of undertaking a quantitative cost benefit analysis as part of this study was investigated, but it was determined that such a study would be too premature, particularly in terms of quantifying benefits.

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APPENDIX 1

South Australian Rock Lobster Fishery EMS Evaluation

Ecological Components

COMPONENT:	RETAINED SPECIES

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

- The EMS identifies key agreed biological reference points to be used to monitor the sustainability of the principal target species, and the legislation which contain these reference points.
- The EMS identifies the major target species and the by-product species.
- The EMS identifies and reinforces the need individual fishers to accurately record the retained catch.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

- The EMS utilises existing published information.

Comments: Nil

COMPONENT:	NON-RETAINED SPECIES – NON THREATENED

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

- The major non-retained species are identified.
- Measures (escape panels) adopted to reduce the number of non-retained species are identified.
- The EMS makes appropriate reference to the best practice video for maximizing the survival of non-retained species.

Does the EMS include additional information, actions or improvements: Yes

- Specific approaches to maximize the survival of non-retained species.

EMS Performance measures:

- The EMS contains an appropriately referenced list of non-retained species.
- The EMS identifies measures adopted to reduce the number of non-retained species captured.
- The EMS documents approaches that go beyond legislative controls (minimizing survival of non-retained species)

Comments: Maximising the survival of non-retained species is important from a biological perspective and is particularly critical for the fishing industry when the non-retained species are juveniles of the principal target species, which is the case in the Southern Rock Lobster Fishery. It is difficult to cost-effectively enforce protocols that maximize the survival of non-retained species and the best approach to achieve it is through industry initiatives.

COMPONENT:	NON-RETAINED SPECIES – THREATENED

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

- The major threatened species that the fishery has the potential to interact with are identified.
- The EMS identifies relevant legislative requirements with respect to threatened species.
- Measures adopted to reduce the interaction with threatened species are identified.
- The EMS includes information to aid fishers in identifying threatened species
- The EMS includes relevant contact numbers for reporting interactions.
- The EMS includes measures to minimise harm to any threatened species that the fishery interact with

Does the EMS include additional information, actions or improvements: Yes

- Measures adopted to reduce the interaction with threatened species are identified.
- The EMS includes information to aid fishers in identifying threatened species
- The EMS includes relevant actions to improve the accuracy or resolution of information on relevant threatened species.
- The EMS identifies measures adopted to reduce the number of non-retained species captured.
- The EMS includes relevant contact numbers for reporting interactions.
- The EMS includes measures to minimise harm to any threatened species that the fishery interact with.

EMS Performance measures:

– The EMS contains a list of threatened species the fishery has the potential to interact with.
– The EMS documents approaches that go beyond legislative controls.

Comments: Nil

COMPONENT: WATER QUALITY (NUTRIENTS AND POLLUTANTS)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– Sources of water quality impacts are identified.
– Mitigation approaches are identified.

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes on-ground actions that mitigate the risk of impacts from oil spills through spill control and prevention mechanisms.
– The EMS makes reference to waste oil disposal facilities that are currently operationally. This facility was industry initiated, but implemented through a government and industry partnership.
– Practical protocols for minimising fuel spills during re-fuelling.

EMS Performance measures:

– The EMS documents potential water quality impacts from the activity.
– The EMS documents current on-ground actions for mitigating water quality impacts.

Comments: The EMS includes significant on-ground actions over and above statutory requirements.

COMPONENT: TROPHIC IMPACTS

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Trophic impacts of fishing and aquaculture activities are increasingly being recognised by researchers and managers as a factor to consider in managing these activities. Information on such impacts in Australian fisheries are only just beginning to emerge.

COMPONENT:	FUEL USAGE AND AIR EMISSIONS

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Minimising the use of fossil fuels is important from an environmental perspective as well for reducing individual fishers operational costs. The EMS also includes appropriate education material directed at seafood industry participants.

COMPONENT:	MARINE DEBRIS AND GHOST FISHING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

- The EMS identifies sources of marine debris.
- The EMS refers to the specific relevant legislation.
- The EMS identifies opportunities for recycling and has implemented these opportunities through on-ground actions

Does the EMS include additional information, actions or improvements: Yes

- The EMS requires significant sources of solid waste (e.g. bait boxes) that would constitute marine debris if released into the marine environment, be left onshore and recycled appropriately.
- The EMS has implemented a cardboard recycling strategy and has invested in infrastructure to undertake this strategy.
- Through education of fishers (and suppliers), the EMS seeks to significantly reduce or eliminate waxed cardboard in bait packaging which is difficult to recycle.

EMS Performance measures:

- The EMS includes relevant actions to reduce the quantity of marine debris.
- The EMS documents opportunities for recycling.

Comments: The EMS includes significant on-ground actions over and above statutory requirements. The EMS also includes appropriate education material directed at seafood industry participants.

COMPONENT: TRANSLOCATION

Relevance: No

Justification: There are no significant translocation issues for this fishery. The fishery does not seek to introduce non-indigenous species and because of the nature of the fishery, accidental translocations are unlikely to be a significant issue.

COMPONENT: PESTS, PATHOGENS AND DISEASES

Relevance: No

Justification: There are no significant pest, pathogen or disease issues for this fishery.

COMPONENT: BAIT COLLECTION AND USE

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS identifies appropriate bait species for use in the fishery.

Does the EMS include additional information, actions or improvements: Yes

– The EMS identifies best practice bait species and other approved bait sources.
– The EMS requires records to be kept of bait purchased and used in fishing operations.

EMS Performance measures:

– The EMS acknowledges the need to consider bait use in the context of the fishery.
– The EMS identifies suitable bait species.

Comments: Fisheries such as the rock lobster fishery have the potential to put extra pressure on bait resources. There are no specific legislative requirements regarding appropriate bait species for use in the fishery. Bait in this fishery represents an opportunity to utilise what would otherwise be waste seafood material or pest species (e.g. carp). There are no additional environmental impacts on bait species by their use in the fishery.

COMPONENT: BENTHIC IMPACTS

Relevance: No

Justification: It is conceivable that placing pots on the substratum causes benthic impacts beneath the pots themselves. However, the spatial scale of such an impact is such that the impact would be undetectable and, in any case, ecologically trivial. Such impacts would also be reversible.

Component: External environmental impacts on the participants

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes relevant contact phone numbers to report environmental events such as oil spills, unusual marine species, algal blooms and fish kills.
– The EMS includes a requirement to keep records of environmental events such as oil spills, unusual marine species, algal blooms and fish kills.

EMS Performance measures:

– Contact phone numbers for reporting unusual or concerning environmental events are included in the EMS.

Comments: Nil

COMPONENT: VISUAL IMPACTS

Relevance: Yes (see marine debris component)

Appropriate information identified, recorded or measured: Yes (see marine debris component)

Does the EMS include additional information, actions or improvements:

– See marine debris component

EMS Performance measures:

– See marine debris component

Comments: Marine debris can cause visual impacts when it washes ashore, particularly if it washes ashore in populated or highly used areas of the cost. The EMS adequately addresses visual impacts from the fishery by adequately addressing marine debris.

COMPONENT:	CARRYING CAPACITY
Relevance:	No
Justification:	This component is not relevant to wild-catch fisheries.
Component:	Noise
Relevance:	No

Justification: The fishery operates in offshore waters. From our understanding of the fishery, we did not identify any significant noise impacts from the operation of the fishery that require addressing in the EMS.

COMPONENT:	ANIMAL ETHICS
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes

– The fishery includes relevant guidelines for the ethical treatment of animals

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes protocols for euthanasing live lobsters

EMS Performance measures:

- Relevant animal ethics issues are considered and, if necessary addressed.

Comments: Nil

Social and Economic Components

COMPONENT:	RETURN ON INVESTMENT
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	GENDER EQUITY
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	FLEET STRUCTURE
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	COMMUNICATION
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes (but see comment)
Does the EMS include additional information, actions or improvements:	Yes

– The EMS includes a communication component. Communication is not a statutory responsibility, but it is the responsibility of the fishing industry group.

EMS Performance measures:

– The EMS identifies media contact people.
– The association has maintained records of print and electronic media reports.
– Members receive copies of relevant media reports.
– Information on the EMS is available on the internet.

Comments: The caveat on this component is that the EMS does not contain the information, but the information is known to exist and be applied in practice, and this was only identified through detailed discussion with operators in the fishery.

COMPONENT: OCCUPATIONAL HEALTH AND SAFETY (OH&S)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes detailed information on OH&S requirements and how these requirements are to be met.

EMS Performance measures:

– The EMS identifies relevant OH&S legislation, policies and guidelines.
– The EMS identifies operational approaches for meeting OH&S requirements.

Comments: OH&S issues are addressed in the EMS in considerable detail. A weblink to a detailed code of conduct is included in the EMS.

COMPONENT: TRAINING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– Training requirements are identified.

Does the EMS include additional information, actions or improvements: Yes

– The EMS requires vessel operators to undertake successful completion of the 2-day Clean Green training program.

EMS Performance measures:

– The EMS identifies training requirements.
– The EMS makes reference to additional training requirements.

Comments: Nil

COMPONENT: EMPLOYMENT

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Nil

COMPONENT: SOCIAL CAPITAL

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Nil

COMPONENT: COMMUNITY HEALTH BENEFITS

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Nil

Governance Components

COMPONENT: LEGAL ACCESS RIGHTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS makes adequate reference to legislation that defines legal access rights for the fishery.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS adequately identifies the legal access rights for the fishery.

Comments: Nil

COMPONENT: STRATEGIC ENVIRONMENTAL ASSESSMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The fishery has undertaken strategic assessment under the Environment Protection and Biodiversity Conservation Act 1999, and included details of this assessment in the EMS

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS has included details of the strategic assessment undertaken under the Environment Protection and Biodiversity Conservation Act 1999.
– Relevant recommendations made by the consent authority during the approvals process are included in the EMS.

Comments: Nil

COMPONENT: RESEARCH AND DEVELOPMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The fishery pays a levy to the Fisheries Research and Development Corporation for research and development.
– The EMS includes a weblink to relevant information of research and development.

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– The EMS includes relevant general information on R&D.
– The EMS identifies R&D projects that are being undertaken by the participants.

Comments: Nil

COMPONENT: REPORTING AND AUDITING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS discusses relevant standards and auditing.

Does the EMS include additional information, actions or improvements: Yes

– The EMS documents auditing requirements that go beyond statutory requirements.

EMS Performance measures:

– Auditing requirements are included in the EMS.

Comments: The EMS does not specifically discuss reporting requirements, but it does discuss evaluation and auditing

COMPONENT:	PARTICIPATION IN MANAGEMENT

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Participants in the fishery are actively involved in the management of their fishery, but the EMS does not reflect this active involvement.

Little Swanport Oyster Industry EMS Evaluation

Ecological Components

COMPONENT: RETAINED SPECIES

Relevance: No

Justification: This component is not relevant for an aquaculture operation that is not directly harvesting wild species

Component: Non-retained species – non threatened

Relevance: Yes (indirectly)

Appropriate information identified, recorded or measured: Yes

– The EMS identifies species that interact with the oyster production process, oyster furniture and in nearby areas.

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes additional research projects aimed at improving knowledge of oyster furniture as estuarine habitat.

EMS Performance measures:

– Relevant actions to improve the accuracy or resolution of information

Comments: Nil

COMPONENT: NON-RETAINED SPECIES – THREATENED

Relevance: Yes (indirectly)

Appropriate information identified, recorded or measured: Yes

– The major threatened species in the area of the lease are identified.
– The EMS includes information to aid fishers in identifying threatened species

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes relevant actions to improve the accuracy or resolution of information on relevant threatened species.
– The EMS includes relevant contact numbers for reporting interactions.

– The EMS includes measures to minimise harm to any threatened species that the fishery interact with.

EMS Performance measures:

– The EMS contains a list of threatened species that use the Little Swanport estuary.
– The EMS documents initiatives that go beyond legislative controls.

Comments: EMS participants have been integral in identifying and managing human interactions with fairy terns and little terns, and educating the public on the National significance of the local population.

COMPONENT:	WATER QUALITY (NUTRIENTS AND POLLUTANTS)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– Sources of water quality impacts from oyster growing activities are identified.
– Mitigation approaches are identified.

Does the EMS include additional information, actions or improvements: Yes

– The EMS documents the use of biodegradable synthetic oils in outboard motors.
– The EMS documents that oyster furniture does not use polluting substances such as tar.

EMS Performance measures:

– The EMS documents potential water quality impacts from the activity.
– The EMS documents current on-ground actions for mitigating water quality impacts.
– The EMS documents relevant actions to improve the accuracy or resolution of information.

Comments: The EMS includes significant on-ground actions over and above statutory requirements. The use of the synthetic oils is estimated by participants to reduce overall oil costs by 5%. The EMS documents water quality monitoring initiatives jointly funded by participants and government through the National Action Plan for Salinity and Water Quality.

COMPONENT:	TROPHIC IMPACTS

Relevance: No

Justification: Risk assessment by Crawford (2003) identified this issue as low risk.

COMPONENT: FUEL USAGE AND AIR EMISSIONS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes a significant change in the method of disposable of redundant plastic oyster baskets from burning to recycling.

EMS Performance measures:

– Protocols and approaches to reducing air (e.g. exhaust) emissions from fishing operations are identified.

Comments: The traditional approach for disposing of redundant plastic oyster baskets was by burning. The burning of plastics is not desirable. The plastic oyster baskets are now compressed into wool bales for recycling.

COMPONENT: MARINE DEBRIS AND GHOST FISHING

Relevance: Yes (marine debris only)

Appropriate information identified, recorded or measured: Yes

– The EMS identifies sources of marine debris.
– The EMS identifies opportunities for recycling and has implemented these opportunities through on-ground actions

Does the EMS include additional information, actions or improvements: Yes

– The EMS commits the participants to an annual clean up of marine debris (from the oyster industry and others) within the estuary.

EMS Performance measures:

– The EMS includes relevant actions to reduce the quantity of marine debris.
– The EMS includes clean-up initiatives.

Comments: The EMS includes significant on-ground actions over and above statutory requirements.

COMPONENT: TRANSLOCATION

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS documents translocation risks from the activity.

Does the EMS include additional information, actions or improvements: Yes

– The EMS encourages the participants to opportunistically remove Pacific oysters within the estuary outside oyster leases.
– The EMS includes a dedicated program for the monitoring and eradication of rice grass within the estuary.

EMS Performance measures:

– Relevant actions to monitor or mitigate translocation events.

Comments: Pacific oysters are an introduced species. Mitigation activities involve monitoring there presence in the estuary outside the lease area and removing them if they are located. Rice grass in an introduced species with significant ecological impacts on salt marsh assemblages. Rice grass was not introduced by oyster growing activities but is a significant threat to estuarine health upon which oyster production depends. The rice grass removal program is partly funded by government and has been highly successful in the control of the species in the estuary with eradication being an obtainable goal.

COMPONENT: BAIT COLLECTION AND USE

Relevance: No

Justification: Bait is not required for oyster production.

COMPONENT: BENTHIC IMPACTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS documents the spatial scale (under the oyster furniture)of the benthic impacts
– The EMS describes how the production techniques ensure that impacts are reversible.

EMS Performance measures:

– The EMS documents relevant actions to improve the accuracy or resolution of information on benthic impacts.
– The EMS documents the spatial scale of impacts.

Comments: Crawford (2003) identifies that habitat disturbance is a medium risk and the EMS addresses this risk.

COMPONENT:	EXTERNAL ENVIRONMENTAL IMPACTS ON THE PARTICIPANTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS contains information (detailed) on external environmental impacts on the oyster industry that originate within the catchment.
– Relevant pathways for achieving, where possible, mitigation of external impacts through membership of local environmental NGOs, catchment management committees etc.
– Involvement or in-kind support to activities such local habitat rehabilitation work etc.

EMS Performance measures:

– The EMS documents relevant actions to improve the accuracy or resolution of information.
– The EMS documents participants activities to help mitigate external impacts through direct or indirect activities.

Comments: The EMS documents water quality monitoring initiatives jointly funded by participants and government through the National Action Plan for Salinity and Water Quality. The EMS includes details of participatory approaches instigated by EMS participants to address external impacts in the short, medium and long term.

COMPONENT:	VISUAL IMPACTS

Relevance: Yes (also see marine debris component)

Appropriate information identified, recorded or measured: Yes

– The EMS identifies practical approaches for minimising the visual impacts of oyster farming
– Also see marine debris component

Does the EMS include additional information, actions or improvements: Yes

– The EMS identifies practical approaches for minimising the visual impacts of oyster farming that go beyond legislative and policy guidelines.
– Also see marine debris component

EMS Performance measures:

– The EMS documents approaches to minimize visual impacts from development and activities
– Also see marine debris component

Comment: Oyster farming has been identified as potentially having a significant visual impact in estuarine environments. The EMS documents practices to minimise visual impacts that are centred on the symmetrical and orderly arrangement of oyster furniture. Additionally, the EMS proposed an approach for marking the leases that reduces signage. This has since been implemented by EMS participants. Marine debris can cause visual impacts when it washes ashore.

COMPONENT:	CARRYING CAPACITY

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– Approaches (precautionary) to ensure carrying capacity is not exceeded are documented.
– EMS participants have surrendered lease area and stock at lower than industry standards to ensure that carrying capacity is not exceeded.

EMS Performance measures:

– The EMS documents carrying capacity of the environment.
– The EMS includes precautionary mechanisms to ensure that carrying capacity is not exceeded

Comment: There is currently no quantitative model for estimating carrying capacity of an estuary such as Little Swanport. EMS participants have based their management of carrying capacity on a precautionary basis.

COMPONENT:	NOISE
Relevance:	No
Justification:	Risk assessment identified that this issue was not significant.
Component:	Animal ethics
Relevance:	No

Justification: Bivalves are not yet subject to animal ethics requirements. Risk assessment identified that this issue was not significant.

Social and Economic Components

COMPONENT:	RETURN ON INVESTMENT
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes
Does the EMS include additional information, actions or improvements:	No

EMS Performance measures:

- The EMS documents trends in the GVP of oyster farms in the estuary.

Comments: Nil

COMPONENT:	GENDER EQUITY
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT: FLEET STRUCTURE

Relevance: No

Justification: This is not relevant for the aquaculture activities encompassed by the EMS.

Component: Communication

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes a media strategy based on opportunistically, but proactively utilising local media contacts.

EMS Performance measures:

– The Association has maintained records of print and electronic media reports, and presentations.

Comments: Nil.

COMPONENT: OCCUPATIONAL HEALTH AND SAFETY (OH&S)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes (partly)

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Relevant OH&S contacts are included in the EMS.

Comments: The EMS does not include details of relevant OH&S guidelines, policies or legislation.

COMPONENT: TRAINING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– Potential training requirements are identified.

Does the EMS include additional information, actions or improvements: Yes

– Some of the EMS participants have undertaken formal training in algal identification.

EMS Performance measures:

– The EMS identifies training requirements.

– Specific training undertaken is documented.

Comments: Algal identification is important because algae are one of the food sources for oysters. Further some algal species at some times of the year can be toxic and the early identification of toxic alga; outbreaks which may be a threat to estuarine (and oyster) health. Training in rice grass surveying and removal were also undertaken.

COMPONENT:	EMPLOYMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS identifies the contribution of the farming businesses to employment at the regional level.

EMS Performance measures:

– Figures on regional employment are included.

Comments: Nil

COMPONENT:	SOCIAL CAPITAL

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements No

EMS Performance measures: No

Comments: Nil

COMPONENT:	COMMUNITY HEALTH BENEFITS
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

Victorian Bays and Inlets EMS Evaluation

Ecological Components

COMPONENT:	RETAINED SPECIES

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– An appropriately referenced list of major target and by-product species is included in the EMS.

Comments: Nil

COMPONENT:	NON-RETAINED SPECIES – NON THREATENED

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The major non-retained species are identified.
– Measures adopted to reduce the number of non-retained species captured are identified.
– The EMS makes appropriate reference to maximizing the survival of non-retained species through handling procedures and gear modifications for some nets

Does the EMS include additional information, actions or improvements: Yes

– The EMS documents approaches that go beyond legislative controls (minimizing survival of non-retained species)

Comments:

– Maximising the survival of non-retained species is important from a biological perspective. The EMS explains in considerable detail with appropriate illustrations as to how the modified Gippsland Lakes haul seine net functions and the performance

of the net is quantitatively supported by research referred to.

EMS Performance measures:

– Relevant actions to improve the accuracy or resolution of information

Comments: Nil

COMPONENT: NON-RETAINED SPECIES – THREATENED

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The major threatened species in the fishing area are identified.

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes relevant actions to improve the accuracy or resolution of information on relevant threatened species.
– The EMS includes relevant contact numbers for reporting interactions.
– The EMS includes measures to minimise harm to any threatened species that the fishery interacts with.

EMS Performance measures:

– The EMS contains a list of threatened species that use the bays and inlets where the fishery operates.
– The EMS documents initiatives that go beyond legislative controls.

Comments: Nil

COMPONENT: WATER QUALITY (NUTRIENTS AND POLLUTANTS)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– Sources of water quality impacts from fishing activities are identified.
– Mitigation approaches are identified.

Does the EMS include additional information, actions or improvements: Yes

– As well as describing the practices that are undertaken by the fishery, it also

documents practices that are not undertaken

EMS Performance measures:

– The EMS documents potential water quality impacts from the activity.
– The EMS documents current on-ground actions for mitigating water quality impacts.

Comments: Nil

COMPONENT: TROPHIC IMPACTS

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Trophic impacts of fishing and aquaculture activities are increasingly being recognised by researchers and managers as a factor to consider in managing these activities. Information on such impacts in Australian fisheries are only just beginning to emerge.

COMPONENT: FUEL USAGE AND AIR EMISSIONS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Protocols and approaches to reducing air (e.g. exhaust) emissions from fishing operations are identified (but only in general terms).
– A relevant engine performance standard is identified and agreed to by participants

Comments: In this case, the participants have agreed to keep engines in the best possible condition which is at, and above, the performance checks required by Marine Safety Victoria. The Marine Safety Victoria standard represents an appropriate standard.

COMPONENT: MARINE DEBRIS AND GHOST FISHING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS identifies sources of marine debris.

Does the EMS include additional information, actions or improvements: Yes

– The EMS identifies a range of appropriate actions including no discarding of material at sea, retrieval of any marine debris, or alerting appropriate authorities to large items of marine debris.

EMS Performance measures:

– The EMS documents significant sources of marine debris from the activity.
– The EMS includes measures to reduce marine debris.
– The EMS includes (limited) clean-up initiatives.

Comments: The EMS provides sufficient explanation as to why marine debris is not a significant issue in this fishery compared to others, but it still does include relevant actions. The EMS recommends general and opportunistic clean-up activities rather than participation in organised clean-up activities such as those run by Clean-up Australia.

COMPONENT: TRANSLOCATION

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS documents translocation risks from the activity.
– The EMS contains detailed information and pictures of introduced species that should not be spread any further.

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes actions for minimising the likelihood of the industry spreading pests such as the European shore crab, northern Pacific seastar and black stripped mussels.

EMS Performance measures:

– Relevant actions to monitor or mitigate translocation events are included.

Comments: Monitoring and mitigation measures for the spread of marine pests once introduced are difficult to enforce through regulation. Industry driven initiatives such

as those documented in the EMS represent one of the most cost-effective methods of limiting the spread of the organisms by the fishing activity.

COMPONENT: BAIT COLLECTION AND USE

Relevance: No

Justification: The fishery is almost solely a net fishery, which does not require bait.

COMPONENT: BENTHIC IMPACTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS identifies the spatial and temporal scales of the benthic impacts.
– The EMS identifies approaches to mitigating the intensity and/or scale (spatial and temporal) of the impact.
– The EMS utilises existing scientific information in support of conclusions

Comments: Nil

COMPONENT: EXTERNAL ENVIRONMENTAL IMPACTS ON THE PARTICIPANTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS contains sufficient information on external environmental impacts on the fishery.

EMS Performance measures: Nil

Comments: The EMS contains sufficient information on external environmental impacts on the fishery, but it does not document participants activities to help mitigate external impacts through direct or indirect activities.

COMPONENT: VISUAL IMPACTS

Relevance: No

Justification: Visual impacts regarding this fishery have not been documented by risk assessment as being significant, and no documented instances of concerns regarding the visual impacts from this fishery.

COMPONENT:	CARRYING CAPACITY
Relevance:	No
Justification:	This component is not relevant to wild-catch fisheries.
Component:	Noise
Relevance:	No

Justification: Noise impacts regarding this fishery have not been documented by risk assessment as being significant, and no documented instances of concerns regarding noise impacts from this fishery.

COMPONENT:	ANIMAL ETHICS
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	Nil

Comments: Animal ethics concerns are increasingly relevant for a fishery targeting finfish.

Social and Economic Components

COMPONENT:	RETURN ON INVESTMENT
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes
Does the EMS include additional information, actions or improvements:	No

EMS Performance measures:

- The EMS documents general trends in the GVP of the estuary.

Comments: Nil

COMPONENT:	GENDER EQUITY
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	FLEET STRUCTURE
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	Yes

- The EMS documents the number, size and average age of vessels

Comments: An assessment of the fleet structure relative to needs has not been undertaken.

COMPONENT:	COMMUNICATION
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes
Does the EMS include additional information, actions or improvements:	Yes

EMS Performance measures:

– The EMS includes a list of relevant contacts.
– The EMS documents community recognition of the EMS process.

Comments: The EMS itself as a whole can be considered to represent an important communication. The effectiveness of this tool for the broader community is enhanced by the non-technical language used throughout, together with a range of highly relevant pictures and diagrams.

COMPONENT:	OCCUPATIONAL HEALTH AND SAFETY (OH&S)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes information on OH&S requirements and how these requirements are to be met.

EMS Performance measures:

– The EMS identifies relevant OH&S legislation, policies and guidelines.
– The EMS identifies operational approaches for meeting OH&S requirements.

Comments: Nil

COMPONENT:	TRAINING

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Nil

COMPONENT:	EMPLOYMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Figures (albeit general) on regional employment are included.

Comments: Nil

COMPONENT:	SOCIAL CAPITAL

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements No

EMS Performance measures: No

Comments: Nil

COMPONENT: COMMUNITY HEALTH BENEFITS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS identifies the health benefits of seafood

Comments: Nil

Governance Components

COMPONENT: LEGAL ACCESS RIGHTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS makes adequate reference to legislation that defines legal access rights for the fishing activities.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS adequately identifies the legal access rights for the activity.

Comments: Nil

COMPONENT: STRATEGIC ENVIRONMENTAL ASSESSMENT

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: The EMS does not mention the strategic environmental assessment of commercial fishing activities undertaken by the Department of Environmental and Heritage for the purposes of the Environmental Protection and Biodiversity Conservation Act 1999.

COMPONENT: RESEARCH AND DEVELOPMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS documents various research projects undertaken by participants, or where participants provided in-kind support.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS documents any cash or in-kind contributions to specific projects of associations or businesses through direct cash or in-kind contribution to specific projects.

Comments: Nil

COMPONENT: REPORTING AND AUDITING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS discusses relevant standards and auditing.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Review mechanisms are included in the EMS.

Comments: Nil

COMPONENT: PARTICIPATION IN MANAGEMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

-The EMS documents (albeit briefly) the participatory forums the association or businesses are involved in.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Membership of relevant existing participatory forums is maintained.

Comments: Nil

Governance Components

COMPONENT: LEGAL ACCESS RIGHTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS makes adequate reference to legislation that defines legal access rights for the farming practice.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS adequately identifies the legal access rights for the activity.

Comments: Nil

COMPONENT: STRATEGIC ENVIRONMENTAL ASSESSMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The fishery has undertaken strategic assessment under the Environment Protection and Biodiversity Conservation Act 1999, and included details of this assessment in the EMS

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS has included details of the strategic assessment undertaken under the Environment Protection and Biodiversity Conservation Act 1999.
– Relevant recommendations made by the consent authority during the approvals process are included in the EMS.

Comments: Nil

COMPONENT: RESEARCH AND DEVELOPMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS documents various research projects undertaken by participants, or where participants provided in-kind support.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS includes relevant general information on R&D.
– The EMS documents the involvement of stakeholders in R&D prioritization.
– The EMS documents any cash or in-kind contributions to specific projects of associations or businesses through direct cash or in-kind contribution to specific projects.

Comments: Nil

COMPONENT: REPORTING AND AUDITING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS discusses relevant standards and auditing.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Auditing requirements are included in the EMS.

Comments: Nil

COMPONENT:	PARTICIPATION IN MANAGEMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

-The EMS documents the participatory forums the association or businesses are involved in.
-The EMS documents the forums the associations or businesses should be involved in.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Membership of relevant existing participatory forums is maintained.
– Progress is made towards obtaining membership on further identified participatory forums

Comments: The participants are actively involved in driving participatory forums in their catchment.

Pearl Producers Association EMS Evaluation

Ecological Components

COMPONENT:	RETAINED SPECIES

Relevance: Yes (indirectly held for grow out purposes)

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Relevant actions to improve the accuracy or resolution of information

Comments: Pearl production relies on both the regulated harvesting of wild stock and the production of hatchery animals. The EMS was farm gate entry focused – post capture.

COMPONENT:	NON-RETAINED SPECIES – NON THREATENED

Relevance: Yes (indirectly)

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Relevant actions to improve the accuracy or resolution of information

Comments: The harvest of pearl oysters from the wild is species specific. The EMS identifies that the attraction of fauna to pearling infrastructure is a medium risk.

COMPONENT:	NON-RETAINED SPECIES – THREATENED

Relevance: Yes (indirectly)

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– Measures adopted to reduce the number of non-retained species captured.
– Relevant actions for improving the accuracy or resolution of information.

Comments: Risk assessment identified that the risk of entanglement with whales (listed marine species under the EPBC Act) and other animals was low. Safeguards include spatial segregation of farm infrastructure from whale migration areas.

COMPONENT: WATER QUALITY (NUTRIENTS AND POLLUTANTS)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS acknowledges the need to comply with relevant waste water regulations and also prevent any unlicensed discharges at all times.

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

- The EMS documents on-going processes to further reduce water quality impacts.
- The EMS identifies an Oil Spill Contingency Plan.
- The EMS identifies relevant codes to comply with

Comments: The EMS identifies that fuel tanks are demonstrated to be compliant with AS1940.

COMPONENT: TROPHIC IMPACTS

Relevance: Yes

Appropriate information identified, recorded or measured:
Desk top studies completed. Knowledge gaps identified and research strategy developed. Research has commenced that will focus in detail on this issue.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Trophic impacts of fishing and aquaculture activities are increasingly being recognised by researchers and managers as a factor to consider in managing these activities. Information on such impacts in Australian fisheries is only just beginning to emerge. The research projects proposed should be more clearly articulated in the EMS.

COMPONENT: FUEL USAGE AND AIR EMISSIONS

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: The EMS lacks detail on specific actions.

COMPONENT: MARINE DEBRIS AND GHOST FISHING

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– Measures to reduce marine debris are documented.
– Positive incentives for reducing marine debris are offered.

Comments: The positive incentive is a reward for the return of lost buoys.

COMPONENT: TRANSLOCATION

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– The EMS includes additional approaches to monitor or mitigate translocation events in line with government policy and established protocols.
– The EMS documents potential sources of translocated material.

Comments: While Pinctada maxima is a native species and is cultured within its range. A moderate risk from the activity is the translocation (or introduction) of exotic species.

COMPONENT: PESTS, DISEASES AND PATHOGENS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

- The EMS documents significant sources of pests, diseases and pathogens
- The EMS includes reference to relevant biosecurity or animal health legislation and certification (for hatcheries)
- The EMS includes additional approaches to monitor or mitigate translocation events in line with government policy and established protocols.

Comments: Disease can be an extremely significant issue for a hatchery and failure to adhere to strict protocols may result in significant economic loss for an enterprise and the industry.

COMPONENT: BAIT COLLECTION AND USE

Relevance: No

Justification: The production of pearls is an aquaculture activity and does not rely on the collection or use of bait species.

COMPONENT: BENTHIC IMPACTS

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

- The EMS identifies the spatial scale of the benthic impacts.
- The EMS documents relevant actions to improve the accuracy or resolution of information.

Comments: The spatial scale of the benthic impacts is restricted to under and directly adjacent to farm infrastructure. The EMS identifies funded research projects that address knowledge gaps.

COMPONENT: EXTERNAL ENVIRONMENTAL IMPACTS ON THE PARTICIPANTS

Relevance: Unclear

Appropriate information identified, recorded or measured:

Does the EMS include additional information, actions or improvements:

EMS Performance measures:

Comments:

COMPONENT:	VISUAL IMPACTS
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No

Comments: Visual impacts are a frequent issue raised in opposition to a variety of mollusc culturing techniques including pearl production. While the production documented in the EMS is generally well away from built-up areas, pearl farming still has the potential to impact visual amenity of tourists in remote areas. In the absence of clear and equitable guidelines on acceptable visual impacts in wilderness, the actual impacts of visual impacts of pearl farming and its acceptability or otherwise remains speculative.

COMPONENT:	CARRYING CAPACITY
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No

EMS Performance measures:

– The EMS documents research priorities for addressing knowledge gaps in relation to carrying capacity of the environment.

Comments: No

COMPONENT:	NOISE
Relevance:	No

Justification: There are no recipient communities directly adjacent to pearl farming areas.

COMPONENT:	ANIMAL ETHICS

Relevance: No

Justification: Bivalves are not yet subject to animal ethics requirements. Risk assessment identified that this issue was not significant.

Social and Economic Components

COMPONENT:	RETURN ON INVESTMENT
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	
Comments:	Confidentiality issues.

COMPONENT:	GENDER EQUITY
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	FLEET STRUCTURE
Relevance:	No

Justification: This is not relevant for the aquaculture activities encompassed by the EMS.

COMPONENT:	COMMUNICATION
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes
Does the EMS include additional information, actions or improvements:	Yes

The EMS identifies the need for a communications program which identifies environmental issues relevant to each external party and lists internal responsibility and authority for

communication with each external body.

EMS Performance measures:

– The EMS documents a detailed communications plan.

Comments: Nil

COMPONENT: OCCUPATIONAL HEALTH AND SAFETY (OH&S)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

The EMS includes information on OH&S requirements and how these requirements are to be met.

EMS Performance measures:

– The EMS identifies relevant OH&S legislation, policies and guidelines.
– The EMS identifies operational approaches for meeting OH&S requirements.

Comments: Nil

COMPONENT: TRAINING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

The EMS includes a very high level of detail in regards to training and competencies.

EMS Performance measures: Yes

– The EMS documents training requirements and possible training options for the future.
– The EMS includes a commitment and actions to maintain competency.
– The EMS includes key environmental responsibilities in position descriptions.

Comments: Nil

COMPONENT: EMPLOYMENT

Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	SOCIAL CAPITAL
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes
Does the EMS include additional information, actions or improvements	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	COMMUNITY HEALTH BENEFITS
Relevance:	No
Justification:	Pearls are not consumed.

Governance Components

COMPONENT:	LEGAL ACCESS RIGHTS
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	STRATEGIC ENVIRONMENTAL ASSESSMENT
Relevance:	No

Justification: Existing pearl farms are not required to undertake an EIA and are not currently

required to undertake a strategic environmental assessment under the Commonwealth Environmental Protection and Biodiversity Conservation Act.

COMPONENT:	RESEARCH AND DEVELOPMENT
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	REPORTING AND AUDITING
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes

– The EMS discusses relevant standards and auditing.

Does the EMS include additional information, actions or improvements:	Not applicable

EMS Performance measures:

– Reporting/auditing requirements are included in the EMS
– Review mechanisms are included in the EMS

Comments: Documentation of reporting and auditing requirements are one of the strengths of the EMS

COMPONENT:	PARTICIPATION IN MANAGEMENT
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	Nil

Comments:	Nil
COMPONENT:	DOCUMENT ADMINISTRATION
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes
Does the EMS include additional information, actions or improvements:	Not applicable

EMS Performance measures:

– The EMS documents an approach for administration of EMS documentation.

Moreton Bay EMS Evaluation

Ecological Components

COMPONENT:	RETAINED SPECIES

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS identifies the major target species and the by-product species.
– The EMS identifies and reinforces the need individual fishers to accurately record the retained catch.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Relevant actions to improve the accuracy or resolution of information.

Comments: Nil

COMPONENT:	NON-RETAINED SPECIES – NON THREATENED

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– Measures adopted to reduce the number of non-retained species captured are identified.
– Documented new or existing arrangements beyond current regulatory controls

Comments: Approaches documented to reduce the number of non-retained species include crab excluders in otter trawl nets and grids in tunnel nets.

COMPONENT:	NON-RETAINED SPECIES – THREATENED

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The major threatened species in the fishing area are identified.

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes relevant actions to improve the accuracy or resolution of information on relevant threatened species.
– The EMS includes measures to minimise harm to any threatened species that the fishery interacts with.

EMS Performance measures:

– The EMS contains a list of threatened species that use the area where the fishery operates.

Comments: Nil

COMPONENT: WATER QUALITY (NUTRIENTS AND POLLUTANTS)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– Sources of water quality impacts from fishing activities are identified.
– Mitigation approaches are identified.

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– The EMS documents potential water quality impacts from the activity.
– The EMS documents current on-ground actions for mitigating water quality impacts.

Comments: Nil

COMPONENT: TROPHIC IMPACTS

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Trophic impacts of fishing and aquaculture activities are increasingly being recognised by researchers and managers as a factor to consider in managing these

activities. Information on such impacts in Australian fisheries are only just beginning to emerge.

COMPONENT:	FUEL USAGE AND AIR EMISSIONS
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	MARINE DEBRIS AND GHOST FISHING
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes (but in part only)
Does the EMS include additional information, actions or improvements:	No

– The EMS identifies a range of appropriate actions including no discarding of material at sea

EMS Performance measures:

– The EMS documents significant sources of marine debris from the activity.
– The EMS includes measures to reduce marine debris.

Comments: The EMS contains general comment and actions for personal rubbish and waste generated as part of the fishing activity. Ghost fishing issues are not addressed but likely to be relevant for some of the fisheries.

COMPONENT:	PESTS, PATHOGENS AND DISEASES
Relevance:	No

Justification: There are no documented pest, pathogen or disease issues associated with the fisheries in Moreton Bay.

COMPONENT:	TRANSLOCATION

Relevance: No

Justification: There are no documented translocation issues associated with the fisheries in Moreton Bay.

COMPONENT: BAIT COLLECTION AND USE

Relevance: No

Justification: The fisheries included in the EMS do not require bait.

COMPONENT: BENTHIC IMPACTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS identifies approaches to mitigating the intensity and/or scale (spatial and temporal) of the impact.

Comments: Nil

COMPONENT: EXTERNAL ENVIRONMENTAL IMPACTS ON THE PARTICIPANTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS contains sufficient information on external environmental impacts on the fishery.

EMS Performance measures:

- The EMS documents relevant actions to improve the accuracy or resolution of information

Comments: Nil

COMPONENT: VISUAL IMPACTS

Relevance: No

Justification: Visual impacts regarding this fishery have not been documented by risk assessment as being significant, and there are no documented instances of concerns regarding the visual impacts from this fishery.

COMPONENT: CARRYING CAPACITY

Relevance: No

Justification: This component is not relevant to wild-catch fisheries.

COMPONENT: NOISE

Relevance: No

Justification: Noise impacts regarding this fishery have not been documented by risk assessment as being significant, and there are no documented instances of concerns regarding noise impacts from this fishery.

COMPONENT: ANIMAL ETHICS

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

Comments: Animal ethics concerns are increasingly relevant for a fishery targeting or impacting on finfish.

Social and Economic Components

COMPONENT: RETURN ON INVESTMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

- The EMS documents general trends in the GVP of the estuary.

Comments: Nil

COMPONENT: GENDER EQUITY

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Nil

COMPONENT: FLEET STRUCTURE

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: Yes

- The EMS documents the number, size and average age of vessels

Comments: An assessment of the fleet structure relative to needs has not been undertaken.

COMPONENT: COMMUNICATION

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– The EMS documents community recognition of the EMS process.

Comments: The EMS itself as a whole can be considered to represent an important communication. The effectiveness of this tool for the broader community is enhanced by the non-technical language used throughout, together with a range of highly relevant pictures and diagrams.

COMPONENT:	OCCUPATIONAL HEALTH AND SAFETY (OH&S)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes information on OH&S requirements and how these requirements are to be met.

EMS Performance measures:

– The EMS identifies relevant OH&S legislation, policies and guidelines.
– The EMS identifies operational approaches for meeting OH&S requirements.

Comments: Nil

COMPONENT:	TRAINING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

- The EMS documents training requirements and possible training options for the future.

Comments: Nil

COMPONENT:	EMPLOYMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Figures on regional employment are included.

Comments: Nil

COMPONENT:	SOCIAL CAPITAL
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes
Does the EMS include additional information, actions or improvements	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	COMMUNITY HEALTH BENEFITS
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

Governance Components

COMPONENT:	LEGAL ACCESS RIGHTS
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes

– The EMS makes adequate reference to legislation that defines legal access rights for the fishing activities.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS adequately identifies the legal access rights for the activity.

Comments: Nil

COMPONENT:	STRATEGIC ENVIRONMENTAL ASSESSMENT
Relevance:	Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments:
The EMS does not mention the strategic environmental assessment of commercial fishing activities undertaken by the Department of Environmental and Heritage for the purposes of the Environmental Protection and Biodiversity Conservation Act 1999.

COMPONENT: RESEARCH AND DEVELOPMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– The EMS documents the involvement of stakeholders in R&D prioritization.
– The EMS includes R&D priorities of the association or business

Comments: Nil

COMPONENT: REPORTING AND AUDITING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS discusses relevant standards and auditing.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Review mechanisms are included in the EMS

Comments: Nil

COMPONENT: DOCUMENT ADMINISTRATION

Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	
Comments:	Nil

COMPONENT:	PARTICIPATION IN MANAGEMENT
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	
Comments:	Nil

Northern Territory Barramundi Fishery EMS Evaluation

Ecological Components

COMPONENT:	RETAINED SPECIES

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS identifies the major target species and the by-product species.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Relevant actions to improve the accuracy or resolution of information.

Comments: Nil

COMPONENT:	NON-RETAINED SPECIES – NON THREATENED

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS identifies non-retained species that interact with the fishery.
– The EMS includes adopted measures to reduce the number of non-retained species captured and improve their subsequent survival rates when released.

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– Measures adopted to reduce the number of non-retained species captured are identified.
– Documented new or existing arrangements beyond current regulatory controls.

Comments: Nil

COMPONENT:	NON-RETAINED SPECIES – THREATENED

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The major threatened species in the fishing area are identified.

Does the EMS include additional information, actions or improvements: Yes

– The EMS includes relevant actions to improve the accuracy or resolution of information on relevant threatened species.
– The EMS includes measures to minimise harm to any threatened species that the fishery interacts with.

EMS Performance measures:

– The EMS contains a list of threatened species that use the area where the fishery operates.
– The EMS includes adopted measures to reduce the number of non-retained threatened captured in the fishery and measures adopted to mazimise the survival of these species.

Comments: The EMS includes detailed sections on interactions with dugongs and crocodiles with further sections currently being drafted relating to turtles and sawfish. This sections document the vulnerability of the species, best practice use of nets, approaches to safely extracting a live specimens accidentally captured and reporting interactions.

COMPONENT: WATER QUALITY (NUTRIENTS AND POLLUTANTS)

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– Sources of water quality impacts from fishing activities are identified.
– Mitigation approaches are identified.

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– The EMS documents potential water quality impacts from the activity.
– The EMS documents current on-ground actions for mitigating water quality impacts.

Comments: Nil

COMPONENT: TROPHIC IMPACTS

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Trophic impacts of fishing and aquaculture activities are increasingly being recognised by researchers and managers as a factor to consider in managing these activities. Information on such impacts in Australian fisheries are only just beginning to emerge.

COMPONENT: FUEL USAGE AND AIR EMISSIONS

Relevance: No

Justification The EMS has undertaken a risk assessment for greenhouse gas emissions and determined that the risk of the activity to air quality is low due the small size of the fleet and the low fuel consumption. While, this conclusion is no doubt correct, the EMS would have benefited from some additional information that verifies it.

COMPONENT: MARINE DEBRIS AND GHOST FISHING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS identifies a range of appropriate actions including no discarding of material at sea

EMS Performance measures:

– The EMS documents significant sources of marine debris from the activity.
– The EMS includes measures to reduce marine debris.

Comments: The EMS contains general comment and actions for personal rubbish and waste generated as part of the fishing activity. Ghost fishing issues are appropriately addressed.

COMPONENT: PESTS, PATHOGENS AND DISEASES

Relevance: No

Justification: There are no documented pest, pathogen or disease issues associated with the fishery.

Component: Translocation

Relevance: No

Justification: There are no documented translocation issues associated with this fishery.

COMPONENT: BAIT COLLECTION AND USE

Relevance: No

Justification: The fishery included in the EMS does not require bait.

COMPONENT: BENTHIC IMPACTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– The EMS identifies approaches to mitigating the intensity and/or scale (spatial and temporal) of the impact.
– The EMS documents relevant actions to improve the accuracy or resolution of information.

Comments: The risk assessment identifies that the fishery has a low potential impact on seagrass beds. The EMS commits participants to monitoring seagrass beds in their local area and report changes to the responsible Government agency.

COMPONENT: EXTERNAL ENVIRONMENTAL IMPACTS ON THE PARTICIPANTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

– The EMS contains sufficient information on external environmental impacts on the fishery.

EMS Performance measures:

– The EMS documents relevant actions to improve the accuracy or resolution of information.

Comments:

COMPONENT:	VISUAL IMPACTS

Relevance: No

Justification: Visual impacts regarding this fishery have not been documented by risk assessment as being significant, and there are no documented instances of concerns regarding the visual impacts from this fishery.

COMPONENT:	CARRYING CAPACITY

Relevance: No

Justification: This component is not relevant to wild-catch fisheries.

COMPONENT:	NOISE

Relevance: No

Justification: Noise impacts regarding this fishery have not been documented by risk assessment as being significant, and there are no documented instances of concerns regarding noise impacts from this fishery.

Component: Animal ethics

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Animal ethics concerns are increasingly relevant for a fishery targeting or impacting on finfish.

Social and Economic Components

COMPONENT:	RETURN ON INVESTMENT

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

- The EMS documents general trends in the GVP of the estuary.

Comments: Nil

COMPONENT: GENDER EQUITY

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Nil

COMPONENT: FLEET STRUCTURE

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: Yes

- The EMS documents the number, size and average age of vessels

Comments: Information presented is in general terms only. An assessment of the fleet structure relative to needs has not been undertaken.

COMPONENT: COMMUNICATION

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: Yes

EMS Performance measures:

– The EMS documents community recognition of the EMS process.

Comments: The EMS itself as a whole can be considered to represent an important communication. The effectiveness of this tool for the broader community is enhanced

by the non-technical language used throughout, together with a range of highly relevant pictures and diagrams.

COMPONENT:	OCCUPATIONAL HEALTH AND SAFETY (OH&S)
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	No
Comments:	Nil

COMPONENT:	TRAINING
Relevance:	Yes
Appropriate information identified, recorded or measured:	Yes
Does the EMS include additional information, actions or improvements:	No

EMS Performance measures:

- The EMS documents training requirements and possible training options for the future.

Comments:	Nil

COMPONENT:	EMPLOYMENT
Relevance:	Yes
Appropriate information identified, recorded or measured:	No
Does the EMS include additional information, actions or improvements:	No
EMS Performance measures:	
Comments:	Nil

COMPONENT:	SOCIAL CAPITAL
Relevance:	Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements No

EMS Performance measures: No

Comments: Nil

COMPONENT: COMMUNITY HEALTH BENEFITS

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Nil

Governance Components

COMPONENT: LEGAL ACCESS RIGHTS

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS makes adequate reference to legislation that defines legal access rights for the fishing activities.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– The EMS adequately identifies the legal access rights for the fishing activity.

Comments: Nil

COMPONENT: STRATEGIC ENVIRONMENTAL ASSESSMENT

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: The EMS does not mention the strategic environmental assessment of commercial fishing activities undertaken by the Department of Environmental and Heritage for the purposes of the Environmental Protection and Biodiversity Conservation Act 1999.

COMPONENT: RESEARCH AND DEVELOPMENT

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: Yes

– The EMS includes relevant general information on R&D.
– The EMS documents the involvement of stakeholders in R&D prioritization.

Comments: Nil

COMPONENT: REPORTING AND AUDITING

Relevance: Yes

Appropriate information identified, recorded or measured: Yes

– The EMS discusses relevant standards and auditing.

Does the EMS include additional information, actions or improvements: No

EMS Performance measures:

– Reporting and auditing requirements are included in the EMS.
– Review mechanisms are included in the EMS.

Comments: Nil

COMPONENT: PARTICIPATION IN MANAGEMENT

Relevance: Yes

Appropriate information identified, recorded or measured: No

Does the EMS include additional information, actions or improvements: No

EMS Performance measures: No

Comments: Nil

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