

POLICY FOR THE IMPLEMENTATION OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT FOR FISHERIES AND AQUACULTURE WITHIN WESTERN AUSTRALIA



Fisheries Management Paper No.157



Department of
Fisheries



Ecologically
Sustainable Development

Catching Sustainability



Fish for the future

March 2002

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**POLICY FOR THE IMPLEMENTATION OF
ECOLOGICALLY SUSTAINABLE DEVELOPMENT
FOR FISHERIES AND AQUACULTURE WITHIN
WESTERN AUSTRALIA**

Department of Fisheries

MARCH 2002



Policy for the Implementation of Ecologically
Sustainable Development for Fisheries and
Aquaculture within Western Australia

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TABLE OF CONTENTS

MINISTER’S FOREWORD	5
EXECUTIVE SUMMARY	6
1.0 INTRODUCTION	11
2.0 HISTORY OF SUSTAINABLE DEVELOPMENT	12
2.1 Origins.....	12
2.2 Sustainable Development in Australia – ESD	13
3.0 SUSTAINABLE DEVELOPMENT AND FISHERIES POLICY.....	17
3.1 International Initiatives	17
3.2 National Policy Developments.....	18
3.3 ESD and Fisheries Legislation in WA	19
3.4 Other Relevant Legislation and Processes	20
4.0 IMPLEMENTATION OF ESD IN FISHERIES	22
4.1 National ESD Conceptual Framework for Fisheries	22
4.2 Core Objectives for ESD and Australian Fisheries.....	24
4.3 ESD Components.....	26
4.4 Scope	28
5.0 NATIONAL ESD REPORTING FRAMEWORK.....	29
5.1 Ensuring Reporting Consistency.....	29
5.2 Reporting Process	30
5.3 Component Trees	30
5.4 Risk Assessment/Prioritisation Process	31
5.5 Component Reports.....	34
6.0 IMPLEMENTATION IN WA.....	36
6.1 Consultation	36
6.2 Reporting and Assessment	37
6.3 Accountability	38
6.4 Management Arrangements	38
6.5 Costs of Implementation	39
6.6 Policy Development	39
7.0 CONCLUSIONS	40
8.0 ABBREVIATIONS AND ACRONYMS USED	41
9.0 BIBLIOGRAPHY	42

APPENDIX 1	Diagram of the Conceptual Framework for ESD	45
APPENDIX 2	NSESD Definition, Objectives and Guiding Principles	46
APPENDIX 3	National ESD Reporting Framework: Generic Component Trees	47
APPENDIX 4	National ESD Reporting Framework: Consequence Levels and Likelihood Definitions for Risk Assessment.....	55
APPENDIX 5	National ESD Reporting Framework: Component Report Heading	58
APPENDIX 6	Comparison of Commonwealth (EA) Guidelines for Sustainable Fisheries with the National ESD Framework.....	61
APPENDIX 7	Bellagio Principles of Assessing Sustainable Development IISD (1997)	66
APPENDIX 8	ESD Terminology/Glossary	68
APPENDIX 9	Structure, Headings and Required Information for the ESD Reports	70
APPENDIX 10	ESD Summary Tree	71



Minister's Foreword

The Western Australian Government has embraced the notion of Ecologically Sustainable Development (ESD) and its guiding principles and is actively working to ensure that the philosophy of sustainability underpins government policies, activities and decision-making.

The policy outlined here is the first step towards fully implementing ESD principles in the management of the fisheries resources of Western Australia.

It is likely to be revised several times in the next few years, as we blaze the trail that leads to its implementation across all fisheries and aquaculture sectors.

The production of this ESD policy for Western Australian fisheries represents a major achievement for the Department of Fisheries and the State, as it is one of the first policies of this kind to be completed in the world in any resource sector.

The policy covers the origins of the concepts of ESD, both nationally and internationally, and how they can be implemented within the fisheries context in general and, specifically, within WA. Due to recent changes in Commonwealth legislation, this version focuses on the environmental components of ESD required to complete the assessments that are necessary in order to retain export approval for our major commercial fisheries.

Future versions of this ESD fisheries policy will expand upon the social and economic components of ESD, especially how they relate to resource allocation issues. Ultimately, the ESD framework will be expanded for use within a regional marine planning context.

A Sustainable Policy Unit has been created within the Department of Premier and Cabinet and a primary role of the Unit is to coordinate the development of a State Sustainability Strategy, which will stimulate and support the pursuit of sustainability across government, industry and the community. The Sustainability Policy Unit has generally endorsed the ESD fisheries policy and confirmed the need for future versions to expand on the social and economic components of ESD.

The policy was based upon a number of national ESD projects promoted by the Standing Committee for Fisheries and Aquaculture (now called the Marine and Coastal Committee of the Natural Resources Management Standing Committee) and funded by the Fisheries Research and Development Corporation. Its development has involved consultation with the Department of Fisheries ESD Reference Group - which has members from the major commercial, recreational, conservation and indigenous sectors - along with representatives from the Department of Conservation, Department of Environment and the Auditor General.

This version has been amended following a formal review process involving the Western Australian Fishing Industry Council, Recfishwest, the Conservation Council of WA and the Sustainability Policy Unit of the Department of Premier and Cabinet.

A number of ESD reports and their associated applications to Environment Australia have already been developed for our main commercial fisheries using the methods outlined in this policy. These will be available from the Department of Fisheries' website at: <http://www.wa.gov.au/westfish>

I hope the publication of this ESD fisheries policy on the Department of Fisheries' website will help raise the community's awareness about these important issues and assist in gaining support for the other activities that are likely to flow from its implementation.

Kim Chance MLC

MINISTER FOR AGRICULTURE, FORESTRY AND FISHERIES

Introduction

Ecologically Sustainable Development (ESD) is the concept that seeks to integrate short and long-term economic, social and environmental effects in all decision making. It therefore represents a fundamental shift in public policy because it affects all government departments and agencies to some degree. Whilst ESD has proven elusive to implement effectively and demonstrate progress, the current policy outlines a practical and efficient framework to move forward.

The Department of Fisheries is committed to implementing ESD. These principles are contained within the objectives of the *Fisheries Resources Management Act 1994* (FRMA) and it is, therefore, incumbent upon the agency to demonstrate both to the government and the broader community that these principles are being achieved.

The purpose of this ESD policy is to outline a way forward by showing in a practical manner:

- how the ESD principles will be interpreted and applied within the fisheries context generally and within the Department of Fisheries specifically,
- the conceptual framework that will be used to assess performance against ESD principles,
- the methods for reporting on and auditing this performance, and
- how these principles and the framework relate to other relevant state, national and international treaties and instruments.

History of ESD

The concept of *sustainable development* emerged during the 1970s and 1980s following concerns about the impacts that unrestrained economic growth and development were having on the environment. It was recognised that we need to ensure that “*development .. meets the needs of the present without compromising the ability of future generations to meet their own needs*” (WCED, 1987).

The term *Ecologically Sustainable Development* (ESD) was adopted in Australia to emphasise the importance of the environment to long term survival and to ensure that there was a balanced approach in dealing with environmental, social and economic issues. The National Strategy on ESD (CoA, 1992) was agreed by all Australian governments and includes the definition of ESD which states that we should be ‘*using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased*’.

It is this definition that will be used as the basis of this policy.

Elements of ESD

The ESD strategy includes three key objectives:

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

Whilst ESD has often been wrongly assumed to address only environmental issues, these three objectives, along with the seven guiding principles within the national strategy, recognise that continued development (that is, use of resources in a sustainable manner) is a necessary element in meeting the overall objectives. It is the integrated approach of including the wider economic, social and environmental implications within decision-making processes that is the cornerstone, and major innovation, of ESD.

The maintenance or improvement of wellbeing both within and between generations is a major element of ESD. How this is determined is probably one of the more contentious issues because it raises a number of philosophical issues, including the extent to which ‘trade-offs’ of one form of capital for another will obviously affect what is left for future generations. Full transferability is often called ‘weak’ sustainability, whereas minimal transferability is called ‘strong’ sustainability. Given that the protection of biodiversity and the maintenance of ecological systems are clearly necessary to the fulfilment of ESD, because these ultimately underpin all economic and social activities, we will be using a relatively strong definition of sustainability.

One of the important guiding principles in the strategy was the inclusion of the ‘precautionary principle’ which seeks to ensure that “*where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*” This does not mean, however, that full certainty is required before an activity can proceed. Instead, the level of caution required to allow an activity needs to be proportional to the level of potential impacts, the level of information available, along with the safeguards and review periods imposed.

Finally, the issues addressed within ESD are not fixed; they are likely to be subject to an ongoing process of evolution. In this respect, ESD should be seen as a means, not an end.

ESD and Fisheries

The principles of ESD are highly relevant to fisheries management, which has always been about more than setting minimum biological limits. Societal goals and values often influence the acceptable levels of exploitation of species well above any biologically based limit. Consequently, ESD is now accepted as the foundation for natural resource management in Australia being a major component of all fisheries legislation at both State and Commonwealth levels. Additionally, these principles are consistent with a number of international treaties and initiatives such as UNCLOS and the UN Code of Conduct for Responsible Fisheries.

Within WA, whilst the specific term ESD is not mentioned in the *Fisheries Resources Management Act 1994* (FRMA), the objects are fully consistent with the ESD objectives and guiding principles. Thus they cover issues related to the environment, social and economic issues, their integration and the aspects of governance that enable the appropriate outcomes to be achieved.

Changes to Commonwealth environmental legislation (for example, the *Wildlife Protection (Regulation of Exports and Imports) Act 1982*)* now include the requirement for all export fisheries to undergo an assessment against guidelines for sustainability. This, combined with generally raised community expectations, has increased the urgency for fisheries management agencies to demonstrate that they are pursuing the principles of ESD for all fisheries.

* Which has subsequently been moved into the revised EPBC Act

Implementation of ESD

Most previous attempts to assess ESD for fisheries have failed. This was largely due to the frameworks being too restrictive, often attempting to develop a single set of indicators that could be used across all fisheries (Staples, 1997). Issues and information levels vary too widely across fisheries for such an approach to be meaningful. Furthermore, indicators by themselves are of limited value. To enable performance to be evaluated requires an objective, an indicator and performance limits/measures. These three form a package, all are needed before any one of them is useful (Chesson et al., 2000).

To facilitate the national implementation of ESD within Australian fisheries, the Standing Committee on Fisheries and Aquaculture (SCFA) formed an ESD Working group in October 1999. This group sponsored a number of specific projects (mostly funded by FRDC) to progress ESD issues for fisheries within Australia to ensure that consistent and effective outcomes were achieved. The Department of Fisheries is participating in this approach and this policy is fully consistent with this initiative.

The development of a national system to report on ESD for all Australian fisheries forms a major turning point in fisheries management. This initiative has the support of all fisheries agencies in Australia and, importantly, received strong support and involvement from a number of stakeholder groups. Thus, the SCFA working group met in June 2000 with a reference group of stakeholders and agreed on a set of ESD objectives specifically relevant for fisheries. This meeting also developed a conceptual framework for reporting and assessing performance against these objectives which was subsequently tested and revised through a series of case studies and reviews.

ESD has been divided into eight major components relevant to fisheries:

Contributions of the fishery to ecological well-being¹

1. Retained species
2. Non-retained species
3. General Ecosystem

Contributions of the fishery to human well-being

4. Indigenous well-being
5. Community and regional well-being
6. National social and economic well-being

Ability of the fishery to contribute

7. Impact of the environment on the fishery
8. Governance

To maximize the consistency of approach amongst different fisheries, the issues that were raised by the SCFA and the ESD reference group under each of the major components were arranged into a series of generic component trees. Taking the generic component tree as a starting point, each fishery can tailor the component tree to suit its circumstances, expanding some sub-components and collapsing others depending upon the fishing methods, areas of operations and the species involved.

¹ For aquaculture the retained and non-retained species components are replaced by 'within facility' and 'within catchment' components.

After all the components/issues for a fishery have been identified, a risk assessment is conducted to determine the appropriate level of response. This separates those issues requiring specific management actions, and therefore regular ongoing assessment of performance, from those issues that only require a justification for the low-risk rating. This is done to ensure that resources are devoted in the most efficient manner.

For each issue that requires ongoing management, a comprehensive report is generated that includes an appropriate operational objective, indicator and performance measure to demonstrate that the objective is being achieved by the associated management responses.

Implementation in WA

The actions needed to occur to implement ESD within each WA fishery sector may include changes to consultation, the reporting and assessment regimes used, the content of management arrangements, and the development of further ESD policies. In particular, the second phase of ESD development will involve the integration across sectors as suggested within the Integrated Fisheries Management Strategy.

WA ESD Fisheries Reference Group

To ensure the effective development and implementation of this ESD policy, the support (and hopefully ownership) will be required by all major stakeholders and the general community. This support is facilitated by the WA ESD Fisheries Reference Group which was established in September 2000 and includes representatives of most stakeholder groups including commercial, recreational, indigenous, environmental groups and a number of 'non-fisheries' government agencies.

Reporting and Assessment

All fisheries (commercial, recreational and aquaculture) need to be assessed against the ESD objectives with the report made available for public comment. This reporting will be the responsibility of the Department of Fisheries in conjunction with the relevant MAC and associated stakeholders. Due to the recent changes in the Commonwealth environmental legislation administered by Environment Australia, which will require all export fisheries to have an assessment on their environmental sustainability, the initial assessments will concentrate on the environmental components of ESD for our major export based commercial fisheries. The social and economic elements of ESD will be covered in detail in second phase assessments.

Accountability

Verification of the reporting and assessment outcomes is critical to ensuring that this process is viewed as transparent, objective and robust. This will require the development of appropriate third party auditing system. This will occur both on an annual basis, for performance against current agreed objectives, along with five-ten year reviews of these objectives and all the management arrangements. This suggested process is currently being negotiated between the Departments of Fisheries and Environmental Protection and the Office of the Auditor General.

Management Arrangements

The major administrative tools to implement ESD within fisheries are the fishery management plans, regulations, notices and their associated guidelines. The contents of a management plan, or their accompanying guidelines, needs to be expanded to include the 10 major elements deemed best practice – such as having specific operational objectives for at least the components/issues that are within the scope of the FRMA with

reference made to other relevant non-legislative instruments – such as industry codes of practice and Environmental Management Systems.

Current Actions – Planned Timetable

May-Dec. 2001 – Complete assessments of the environmental and governance components of ESD for the Rock Lobster, Shark bay Prawn, Shark Bay Scallop, Exmouth Gulf Prawn, Abalone, Pearl Oyster and Shark Bay Snapper fisheries enabling applications to be sent to Environment Australia (EA) for continued export approval for these cost recovered fisheries.

2002 – Complete assessments of the environmental and governance components of ESD for the majority of the State's export-based fisheries.

2003 – Finish all ESD assessments for the commercial fisheries

Begin the assessment of recreational fisheries and aquaculture industries.

Cost of Impementation

Given that this process is largely about changing how we manage fisheries, not adding further tasks, it should not require significantly extra resources to complete.

Policy Development

A number of additional policies that relate to ESD will also need to be developed.

1. The reporting framework needs to progress to be completed for all fisheries and sectors.
2. The current State of Fisheries framework needs to be adapted to conform to the ESD structure of reporting.
3. Agreed benchmarks and standards for the assessment of performance of environmental components need to be developed.
4. Appropriate indicators for the social and economic components of ESD are needed.
5. A framework for integrated fisheries management is required that includes the explicit mechanisms for allocation-reallocation of resources across fisheries. (Toohey Committee report)
6. Finally, a cross-agency framework needs to be developed for broad-scale integrated marine planning.

Conclusions

This process of implementing ESD will result in a sea-change within agencies. The broader concepts involved will require innovation in the collection of new data, using new methodologies to deal with these issues, and even the types of participants involved in the process. There will not, therefore, be instant solutions available and for many components, even if a suitable objective and indicator can be identified, the data will often not be available to complete analyses. Nonetheless, even the identification of the issues should be seen as a substantial improvement and therefore a large step forward in the process of implementing ESD. If initiation were to be delayed until all required data were available, then the process would never begin.

The high level of discipline required to complete this task should also lead to a process of continuous improvement and therefore the achievement of best practice performance for fisheries management. Moreover, the high levels of transparency in the decision-making that is a major part of this process should significantly reduce the level of routine enquiries about regulatory decisions that currently consume considerable management resources.

1.0 INTRODUCTION

“Man is both creature and moulder of his environment, which gives him physical sustenance and affords him the opportunity for intellectual, moral, social and spiritual growth... Both aspects of man’s environment, the natural and the man-made, are essential to his well-being and to the enjoyment of basic human rights the right to life itself”. (UN Conference on the Human Environment, 1972)

Ecologically Sustainable Development (ESD), or *sustainable development (SD)* as it is more widely known, is the concept that seeks to integrate short and long-term economic, social and environmental effects in all decision-making. It is, therefore, one of the most fundamental shifts in public policy that has occurred during the last 20 years, because it affects all government departments and agencies to some degree (PC, 1999). Since its inception, a considerable level of thought and discussion has taken place but the complexity of issues raised, which often extend beyond agencies’ traditional sphere of experience, has meant that ESD has been an elusive concept to both implement effectively and demonstrate achievement in a practical manner.

Government is committed to the concepts of ESD and has been actively pursuing at least some aspects for decades. Moreover, these principles are now implicitly contained in the objectives of the *Fisheries Resources Management Act 1994 (FRMA)* and they are referred to in a number of higher-level instruments and international treaties that the agency is directly or indirectly expected to satisfy. It is, therefore, incumbent upon the Department of Fisheries to be able to demonstrate to both the government and the broader community that these requirements are being achieved.

Whilst there is a considerable volume of literature available on the benefits of adopting these concepts (see Bibliography), there has generally been a lack of success in the implementation of ESD across government (PC 1999). Efforts need to be directed at making the concept an explicit part of the daily realities and activities of government, including fisheries management. The purpose of this document is to outline an implementation policy that in a practical way shows:

- how the ESD principles will be interpreted and applied within the fisheries context generally and within the Department of Fisheries specifically,
- the conceptual framework that will be used to assess performance against ESD principles,
- the methods for reporting on and auditing this performance, and
- how these principles and the framework relate to other relevant state, national and international treaties and instruments.

The policy builds upon the work that has already been done at the State level, in conjunction with the WA-ESD Reference group, at the national level with the Standing Committee for Fisheries and Aquaculture (SCFA)* and at the global level through various UN and NGO initiatives. Given that this is still the initial phase of development, this policy will be updated regularly as experience in the implementation and assessment of ESD evolves.

* Now the Marine and Coastal Committee of the Natural Resources Management Standing Committee

2.0 HISTORY OF SUSTAINABLE DEVELOPMENT

2.1 Origins

The concept of sustainable development resulted from the growing realisation of the inadequacies of earlier models of unrestrained economic growth and development. Methods for judging success or potential benefits often focused too narrowly on short term economic measures such as GDP to effectively gauge the longer-term and wider implications of development activities. This often led to market failure from over-exploitation or over-pollution resulting in significant economic and social costs (FAO, 1999).

The formal recognition of the deficits in such a policy can be traced to the 1972 UN Conference on the Human Environment (UNHE) held in Stockholm where the interrelationships between continuing economic and social development and the health of the environment were first articulated. Among the 26 principles compiled included two that were to be the genesis of a new approach to assessing development:

“The natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management.”

“Economic and social development is essential for ensuring a favorable living and working environment for man and for creating conditions on earth that are necessary for the improvement of the quality of life.” (UNHE, 1972)

The decades subsequent to this conference saw substantial shifts in public awareness of the potential impacts of human activities on the environment with the drafting of new environmental legislation and the advancement in our understanding of the requirements for effective resource management. In most cases, however, these were developed without effective links to the potential interactions with economic and social issues. The major change to international policy occurred following the release of the UN World Commission on Environment and Development report *Our Common Future* (WCED, 1987). The *Brundtland Report* (as it became known, named after the Commission’s head) made it clear that the world’s pattern of economic growth was not sustainable on ecological grounds and that a new type of development was required to meet foreseeable human needs. This new concept of sustainable development must -

Definition of Sustainable Development

“...meet the needs of the present without compromising the ability of future generations to meet their own needs”

(WCED, 1987)

Within this definition, the term ‘development’, relates to the total quality of life – not merely to economic growth (Staples, 1997); whilst ‘sustainability’ relates to the “persistence of certain necessary and desired characteristics of people, their communities and organisations and the surrounding ecosystem over time” (IISD, 1997). The rate of sustainable development is, therefore, limited by the supply of natural resources (and their rate of renewal), the availability of technology to use these efficiently and the effectiveness of the social systems

to manage the process and distribute the benefits (FAO, 1999). **Sustainable development recognises that there is a fundamental interdependence between people and their surrounding world.**

These concepts were subsequently expanded by the UN into the global action plan, known as Agenda 21 which was ratified by countries (including Australia) at the UN Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992 ('The Earth Summit'). Thus, there is now global consensus and a high-level political commitment that sustainable development should be the foundation for all future government policies and actions, particularly in relation to natural resource management. Progress towards meeting Agenda 21 is assessed annually by the UN Commission for Sustainable Development (CSD).

2.2 Sustainable Development in Australia – ESD

The history of implementation of sustainable development in Australia closely parallels the advances that were occurring at the international level. Following the release of the *Brundtland report*, the Prime Minister released a policy statement on the environment entitled *Our Country Our Future*. This release began the Commonwealth Government's process of adapting the concepts of sustainable development for Australian conditions.

ESD Chronology

- 1972: Some principles of ESD first presented at UN Meeting 1972 in Stockholm
- 1980: Report by International Union for Conservation of Nature, United Nations Environmental Program, WWF report on sustainable development released
- 1983: National Conservation Strategy developed by Australian Government
- 1987: WCED report (Brundtland report) entitled *Our Common Future* released by World Commission on Environment and Development
- 1989: Australian Prime Minister releases Statement on environment *Our Country our Future*
- 1990: ESD Discussion paper Released
- 1991: Nine ESD Working Groups report, including one on Fisheries Ecosystem Management
- 1992: UN Rio Conference on the environment and development (Agenda 21)
 Australian and State governments agree to endorse ESD as part of the Inter-government agreement on the environment leading to the National Strategy on ESD.
- 1993 ESD becomes a major policy shift for all government agencies
- 1993 Principles of ESD incorporated into the objects of the new Fisheries Act in WA and other jurisdictions
- 1999 Review of ESD Implementation in Commonwealth agencies.

The term 'Ecologically Sustainable Development' (ESD) was adopted by Australian governments to emphasise the importance of the environment in sustainable development to ensure there was a balanced approach to dealing with environmental, social and economic issues. The concepts, definition and principles were established following the release in 1990 of *Ecologically Sustainable Development: A Commonwealth Discussion Paper* and the formation of nine ESD Working Groups. The reports from these groups (including one on Fisheries Ecosystem Management), along with consideration of the relevant international reports and plans (see above), provided the foundation for the National Strategy for Ecologically Sustainable Development, or NSESD (CoA, 1992), which is still the major policy document for sustainable development in Australia.

The NSESD, which was endorsed by the Council of Australian Governments (COAG)² in 1992, includes the official definition of ESD (see below), a set of core objectives and a number of guiding principles³.

The NSESD definition of ESD

We should be

‘using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased’.

(CoA, 1992)

The simplified definition listed in the strategy is that “*ESD is development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations*”. This version is similar to the definition of sustainable development used in other countries (such as Canada) and the objectives within relevant international treaties (such as Agenda 21, UNCED 1992), each of which were based upon the principles outlined in the *Brundtland report* (see above). In fact, the NSESD itself fulfils Australia’s obligation entered into in Rio de Janeiro in 1992 to implement Agenda 21. It is the NSESD definition of ESD that will be used as the basis for this policy.

What are the Major Elements of ESD?

The core objectives of the National Strategy on Ecologically Sustainable Development are:

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

The objectives and guiding principles in the NSESD recognise that continued development (use of resources) is a necessary element in meeting these objectives and that solely protecting the environment, by stopping all activities, would not be consistent with ESD. This is a significant issue because ESD has often been wrongly assumed to only address environmental issues. For example, in a review of ESD implementation amongst Commonwealth agencies, some reported that they had not undertaken any ESD related activities because they had no core environmental responsibilities (PC, 1999).

Similarly, a relatively restricted view of ESD is also reflected in the new *Environment Protection & Biodiversity Conservation Act (EPBC)*, in which one of the objects is to

“promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources” (EPBC, 1999).

There is no specific mention of broader economic and social aspects of ESD within this object or others in the Act despite the Regulatory Impact Statement for the bill stating that

“the principles of ecologically sustainable development are now universally accepted as the basis upon which environmental, economic and social goals should be integrated in the development process”.

² The COAG includes all Commonwealth, State and Territory governments.

³ See Appendix 2 for the full set of NSESD objectives and guiding principles

Restricting the assessment of ESD performance to only evaluating the environmental impacts of an activity is not consistent with the NSESD and runs the risk of failing in a similar way that only examining economic factors failed previously. To be consistent with ESD principles, resources not only need to be ‘used’⁴ sustainably, but how they are used, who benefits and when, along with the impacts of their use, all need to be evaluated. Thus, what is required is the “*need to consider, in an integrated way, the wider economic, social and environmental implications of our decisions and actions for Australia, the international community and the biosphere...*” (CoA, 1992). It is this integrated approach that is the cornerstone, and the major innovation, of ESD.

The maintenance or improvement of well-being within and between generations is also a major element of ESD. How this is determined is probably one of the more contentious issues because it raises a number of philosophical issues such as the extent to which there is the ability to trade off one form of capital for another. One extreme view is that only the total amount of capital needs to be maintained among generations without concern for the mix amongst natural, manufactured and human capital (such an approach is often called ‘weak sustainability’ *sensu* Goodland, 1995). This allows for one generation to inherit significantly less environmental capital but more manufactured capital. However, it is often not possible to substitute some amenities and services from one form of capital to another (PC, 1999). Moreover, if some activity results in irreversible impacts, irrespective of the level of alternative forms of capital generated, this is unlikely to be consistent with other ESD objectives.

The protection of biodiversity and the maintenance of ecological systems are clearly necessary to the fulfillment of ESD because these ultimately underpin all economic and social activities. This relates to both the requirements for us to live (clean water, air and so on), the ability to keep utilizing renewable resources to optimize social and economic benefits, and also to protect the things we don’t yet know of which may be needed in the future.

In addition to the core objectives, one of the important guiding principles in the strategy was the inclusion of the ‘precautionary principle’ which seeks to ensure that:

*“where there are threats of **serious or irreversible environmental damage**, lack of **full scientific certainty** should not be used as a reason for postponing measures to prevent environmental degradation.” (Emphasis added).*

This principle acknowledges that there is rarely full scientific certainty associated with the potential impacts of human activities (including fishing) on the environment. Thus, in cases where there is a reasonably high probability of an undesirable outcome occurring, actions should be taken immediately. It does not mean, however, (as it has sometimes been misinterpreted) that full certainty about all potential impacts is required before an activity can proceed (FAO, 1996).

The intention of this approach is that the level of caution required to assess the initiation or continuation of an activity needs to be commensurate with the level of potential impacts, the level of information available to cover the burden of proof and the effectiveness of the management to control the situation. Where there is a high likelihood of a significant impact from a new activity, or where activities are operating close to the maximum accepted level, a comprehensive set of information and controls would be necessary. Whereas, small-scale activities with no obviously strong impacts anticipated, should require few data to support their position. Thus, the level of risk should be based on the likelihood of “**serious or irreversible damage**”, not just the potential that some elements may change⁵. Undesirable outcomes should be specified as precisely as possible to allow the

⁴ ‘Used’ does not necessarily mean extractive, use can be passive, as in eco-tourism.

⁵ Remembering that many impacts of fishing (but not all), are reversible albeit at different time scales (Mace & Gabriel, 1999).

maximum level of scientific rigor to be applied in determining the risk, thereby minimizing the use of fear or perceptions.

Importantly, the NSESD specifies that the guiding principles and core objectives need to be considered as a package; no objective or principle should dominate the others. Consequently, as full substitution of capital is incompatible with at least one ESD objective – we will be using a stronger definition of sustainability. There is however, a growing trend that environmental conservation (not preservation) should be seen as being of primary importance. Thus the shift in thinking has moved from the ‘Mickey Mouse’ attitudes of a few decades ago to a balanced approach to one where it recognised that all activities require the environment to be available in the long term (See Figure 1).

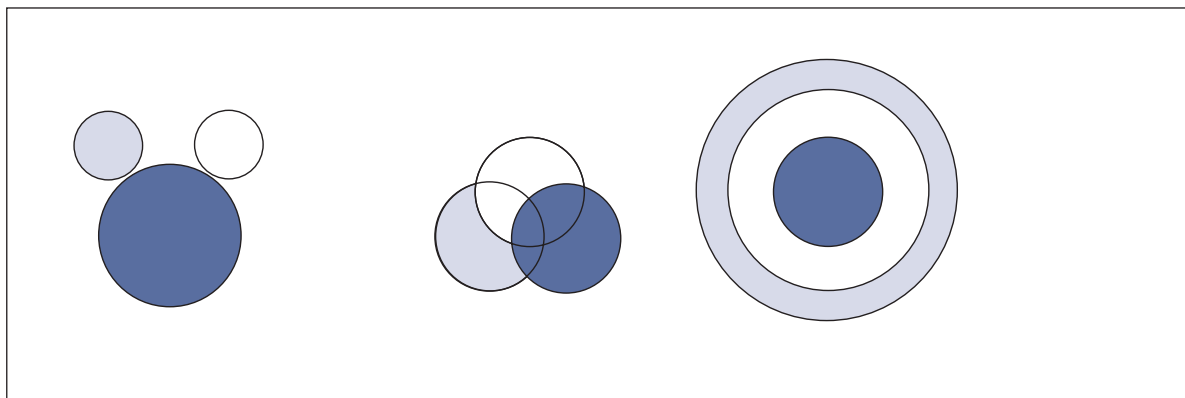


Figure 1. Diagrammatic representation of the shift in the relationships amongst Economic ■, Social □ and Ecological ■ issues over the past 40 years – (Modified from Lowe, 2001).

Finally, ESD is not a fixed state. Instead, it is an ongoing process of evolution that will involve a large degree of choice as to how the present and future needs of our society are to be met (IISD, 1997). Such choices require the broad involvement of all levels of society because there is normally more than one possible solution. Consequently, through time, changes are likely to occur in the degree to which certain features are valued (for example, community acceptance of slavery or hunting of whales). Thus, when the NSESD was developed, it was recognised that there was no identifiable point where it can be said that ESD has been achieved. Instead, ESD should be seen as a means not an end involving –

“changing the way we think, act and make decisions to help ensure Australia’s economic development is ecologically sustainable” (CoA, 1992).

3.0 SUSTAINABLE DEVELOPMENT AND FISHERIES POLICY

The sense of urgency to progress and implement ESD has varied greatly across sectors (PC, 1999). Within the fisheries context, the relevance and requirement to embrace the principles of sustainable development was recognised relatively quickly. Fishing is an important activity throughout the world, contributing to the livelihoods of 200 million people, providing more than 100 million tonnes of fish and fish products for which over a billion people are dependent for their protein and or cultural/social needs (FAO, 1999). Moreover, the direct impacts of fishing (targetting stocks) combined with other human induced changes to the environment (pollution, habitat removal) and significant advances in technology have lead to a number of situations around the world where these activities have clearly not been sustainable (Mace, 1997). Added to this, the regulatory and access arrangements for fishing are one of the more contentious areas of public policy.

Natural resource management involves far more than the mere setting of minimum biological limits for affected species. Activities that affect the environment need to make some positive social and/or economic benefit otherwise they can be considered vandalism. Moreover, depending upon societal values, the acceptable limit of exploitation (above the biological limit) ranges from ‘do not harvest at all’ (dolphins) to ‘fully exploit’ (prawns). Thus, the development of effective fishery management arrangements must deal with a highly complex labyrinth of environmental, social, economic and political values and it could therefore be argued that fisheries management has for many years implicitly been integrating social, economic and ecological data within its decision-making progress. A consequence of implementing ESD should include dealing explicitly with these interactions, which should greatly assist agencies deliver effective and transparent outcomes.

3.1 International Initiatives

The first major international instrument to address the linkage between the protection, preservation and utilisation of resources in the marine areas was the UN Convention on the Law of the Sea (UNCLOS, 1982). Amongst the important issues addressed within UNCLOS was the development of a new legal framework for improved management of marine resources. These included specific references to “not endangering species by over-exploitation” and that populations of both the harvested species and species associated with or dependent upon harvested species were to be maintained to “produce maximum sustainable yields qualified by relevant environmental and economic factors”.

The UN Committee on Fisheries (COFI) recognised that further work was required to assist the worldwide achievement of sustainable fisheries and organised an International Conference on Responsible Fishing. The resolutions from this conference, held in Cancun, Mexico 1992, became an important contribution to the Rio Summit, specifically within Chapter 17 of the Agenda 21 report on Oceans and Coastal Areas which states that:

“coastal states should obtain the full social and economic benefit from the sustainable utilization of marine living resources”.

Following ratification at the UNCED summit, these Cancun resolutions were used as the basis for the FAO to develop a Code of Conduct for Responsible Fisheries. This code was completed in 1995 and included a series of objectives⁶, each of which is consistent with ESD, such as:

“to establish principles .. for responsible fishing and fisheries activities, taking into account all their relevant biological, technological, economic, social, environmental and commercial aspects”.

An FAO technical meeting was held in Australia in 1999 to prepare a set of technical guidelines to support this Code and facilitate its implementation (FAO, 1999). These guidelines brought together current knowledge related to fisheries and proposed a set of practical approaches to develop and use a sustainable development reference system (SDRS) to measure progress towards sustainable development. The meeting concluded that sustainable development of fisheries would require improved governance and changes in the perspective of the main stakeholders to focus on more long-term outcomes and suggested a series of objectives that involved

- sustaining fisheries harvesting and processing activities based on specified and identifiable marine ecosystems,
- ensuring the long-term viability of the resource which supports these activities,
- catering for the well-being of a fishery workforce within the wider community and broader economic context, and
- maintaining the health and integrity of marine ecosystems for the benefit of other uses and users including biodiversity, scientific interest, intrinsic value, trophic structure and other economic uses such as tourism and recreation.

The group recognised that while many of the broader objectives of sustainable development will be consistent with the specific goals of the fishery sector (such as maintenance of fish stocks), achieving other objectives may limit the way a fishery pursues its own objectives. These could involve the need to protect endangered species, the allocation of resources to a competing sector (for example, to the recreational sector) or the restriction of access to areas for other activities to occur (such as mining, tourism and marine parks). This reiterates that the management of fisheries for sustainable development must involve a range of issues that is wider than the mere survival of fish stocks and fishing activity.

It should be noted that these guidelines (FAO, 1999) were developed with a significant level of input from Australian scientists and managers. Not surprisingly, it has been one of the major resources for the development of this current ESD policy.

3.2 National Policy Developments

In Australia, the initiation of ESD within the fisheries sector began with the Fisheries Ecosystem Management Working Group (FEMWG), one of the nine working groups that contributed to the NSESD. Their report (Anon, 1991) identified that, whilst relatively strong management arrangements were already in place compared to most regions of the world, there were still a number of challenges and objectives for the fisheries management agencies and the fishing industry in Australia to address. The major challenge was that fisheries management agencies needed to adopt a fisheries ecosystem management framework which will provide a more holistic and sustainable approach to management of aquatic resources. The report suggested that agencies should

⁶ See www.fao.org/fi/agreem/codecond/codecon.asp

- review and amend legislation to ensure it provides for ESD principles,
- develop management plans consistent with ESD and review existing plans to ensure they reflect ecosystem approach,
- develop mechanisms for prioritizing scientific and economic research,
- cooperatively work on management boundaries,
- formalise international commitments,
- develop a National Representative System of MPAs,
- cooperate on control of introduced and translocated species, and
- develop MAC structures for all major fisheries.

Fisheries Legislation

Whilst the suggested actions from the FEMWG generally focussed on ecological issues, most have been, or are currently being addressed. Of particular importance is that in the 10 years since this report was released, nearly all fisheries management agencies in Australia now have ESD either explicitly or implicitly as part of the enabling legislation. Consequently, there now exists a strong legislative platform from which to develop specific national and state positions regarding the ecological sustainable development of Australian fisheries resources.

3.3 ESD and Fisheries Legislation in WA

Within WA, whilst the specific term ESD is not mentioned in the *Fisheries Resources Management Act 1994* (FRMA), the objects of the Act are fully consistent with the objectives and guiding principles as listed in the NSESD.

FRMA Objects

- to conserve fish and to protect their environment;
- to ensure that the exploitation of fish resources is carried out in a sustainable manner;
- to enable the management of fishing, aquaculture and associated industries and aquatic eco-tourism;
- to foster the development of commercial and recreational fishing and aquaculture;
- to achieve the optimum economic, social and other benefits from the use of the resources;
- to enable the allocation of fish resources between users of those resources;

FRMA 1994, Section 3

Thus these objects cover all aspects of ESD including the issues related to the environment, social and economic issues, their integration and the aspects of governance that enable the appropriate outcomes to be achieved.

3.4 Other Relevant Legislation and Processes

During the last few years, changes to the legislation (or regulations) of Commonwealth agencies (such as Environment Australia and the Great Barrier Reef Marine Park Authority), and non-fishery agencies within some jurisdictions also require fisheries activities to be assessed against various aspects of ESD. In addition, there has been an increased focus on the potential for eco-labelling in the development or maintenance of [export] markets.

The changes to Schedule 4 of the *Wildlife Protection (Regulation of Exports and Imports) Act (1982)** (which affects the ability to export a species) and the newly created Environmental Protection and Biodiversity Conservation Act 1999 (which affects all Commonwealth fisheries and/or fisheries which impact upon “matters of national environmental significance” and protected species) requires affected fisheries to undergo an assessment against their guidelines for sustainability⁷. These guidelines are largely based upon the Marine Stewardship Council guidelines⁸ (MSC, 1999), and only cover environmental components and a restricted number of governance issues, therefore ignoring social and economic issues. This restricted assessment is also reflected in the narrow interpretation of ESD incorporated within the objects of the EPBC Act (see above).

Having variations in the interpretation of ESD results in a dilemma for governments with some agencies (EA) taking the narrow, purely environmental sustainability approach whereas most fisheries management agencies must, to meet their legislative requirements, take a wider view. Such differences also create uncertainty for industry and it is hoped that the development of this policy will help resolve this issue.

In some jurisdictions, agencies other than the fisheries department may have legislative requirements to assess the adequacy of the fisheries management arrangements. For example, all commercial fisheries in NSW now need to be assessed against a set of guidelines administered by the Department of Urban Affairs and Planning under the Environmental Protection Act. Moreover, the decision-making process for development applications or continued access of aquaculture developments, usually involves submission of assessments to a number of government agencies.

Within WA, the other departments that have a direct interest in the performance of the Department of Fisheries including the Department of Environmental Protection (WA) and the Office of the Auditor General. In particular, the Auditor General has been auditing the performance indicators published in the Annual Report of the Department of Fisheries for the past four years.

Non-Government accreditation processes are also evolving within the fisheries management landscape. For example, the Marine Stewardship Council (MSC) process is designed for industries wanting to gain independent environmental accreditation to assist with market access or enhanced market leverage for their products. The concept has been adapted from a similar process available for forestry industries which involves an assessment against a set of guidelines to examine the sustainability of a fishery with respect to its impact on the target species, the effects on the rest of the ecosystem and the management arrangements that ensure this sustainability. The first fishery in the world to be accredited under this MSC scheme was the Western Australian Rock Lobster Fishery. It is unknown how much of an influence such accreditation will have on the marketing opportunities for fisheries.

⁷ See appendix 5 for guidelines and comparison with National ESD Framework process

⁸ See www.msc.org/templates/template1.asp?page=26 for MSC guidelines

* This has subsequently been incorporated into the EPBC Act

Thus there are a number of processes and legislative requirements based on the assessment of some or all aspects of ESD (see Table 1). Given this variety of requirements, it is important to develop a conceptual framework that incorporates all these issues and can assist with any or all of these needs – thereby minimising the level of duplication.

Pressure	Requirements	Agency Responsible
Legislative Commitment to ESD and Fisheries	All Government's Policy	Each Fisheries Jurisdiction
Government and General Community Expectations and Auditing	WPA, EPBC, EPA/DoE/OAG,	Govt Agencies and Industry
Other Related Policies	Oceans, NRMSC	Govt Agencies
Market Access/Leverage	Environmental Accreditation	MSC, ISO, Markets, Industry

Table 1. Summary of Legislation/Issues/Policies

4.0 IMPLEMENTATION OF ESD IN FISHERIES

Whilst the high level objectives of ESD are relatively simple in concept, translation of these high level objectives, such as intergenerational equity and the maintenance of ecosystem function, into operational objectives at the fishery management plan level has proved difficult to achieve both in Australia (Staples, 1997) and elsewhere (Garcia, 1997). Most fisheries agencies have measures for some components, particularly those related to the biological sustainability of target species but without clear objectives, indicators and performance measures for all aspects of ESD, agencies risk being unable to demonstrate that they are achieving, or even pursuing, ESD.

To demonstrate that ESD is being addressed requires an appropriate conceptual framework that maps out

- how the general ESD objectives will be applied in the fisheries context,
- the scope of the issues that will be addressed, and
- how progress will be reported and assessed.

The choice of framework is important because it affects the value of the processes and information generated to the agency in conducting its core business, the accessibility of the process to the general public and ultimately whether the entire process is successful or not.

4.1 National ESD Conceptual Framework for Fisheries

To facilitate the national implementation of ESD within Australian fisheries, the Standing Committee on Fisheries and Aquaculture (SCFA)⁹ formed an ESD Working group in October 1999. This group has sponsored a number of specific projects to progress ESD issues and ensure that consistent and effective outcomes are achieved. The Department of Fisheries is committed to fully participating in this approach and this policy should be seen as part of this process.

The current series of National initiatives, which include the FRDC funded project to develop a system to report on ESD for all Australian fisheries, forms a major turning point in fisheries management. The project obtained the support of all fisheries agencies in Australia and, importantly, received strong support from the other stakeholder groups present at the March 2000 Geelong workshop on ESD and fisheries. This support was conditional upon the requirement to ensure adequate stakeholder involvement during the development of this framework.

The SCFA working group met in June 2000 with a reference group of stakeholders¹⁰ to adapt the general ESD concepts as stated in the NSESD into a series of ESD objectives specifically relevant for fisheries. This meeting also developed a draft conceptual framework for reporting and assessing performance against these principles which was to be tested through a series of case studies covering a number of jurisdictions, fishing methods and data quality.

These draft objectives and frameworks were ratified at SCFA 43 in September 2000 and at MCFFA¹¹ in October 2000.

⁹ The SCFA included the heads of each fisheries agency in Australia, NZ and the CSIRO – this has now been replaced by the Marine and Coastal Committee of the NRMSC.

¹⁰ The reference group includes representatives from ASIC, EA, ATSIC, WWF, RecFish, FRDC, TRAFFIC and other technical experts.

¹¹ Ministerial Council for Forestry Fisheries and Aquaculture.

In developing this conceptual framework the working group utilised the considerable body of literature that has been building over the past 10 years. A number of different frameworks have been proposed during this period, none of which has yet to become widely accepted. The systems used to develop this framework include elements from the General Sustainability framework, the Commission on Sustainable Development framework, the BRS ESD framework (Chesson & Clayton, 1998) and the Pressure-State-Response Framework (as used by NZ for their assessments, MoE, 1998)¹². These frameworks variously separate issues into a series of more refined components, by splitting issues into a number of environment, human and other categories. The specific benefits and difficulties of each of the Sustainable Development Reporting Systems (SDRS) have been reviewed extensively (such as FAO, 1999, Garcia and Staples, 2000, and Chesson et al., 2000).

To determine which elements should be considered within the ESD framework for fisheries, the methods outlined in the FAO technical guidelines and the Bellagio principles for assessing sustainable development (IISD, 1997) were used.

Most previous attempts to assess ESD for fisheries have failed, largely because the frameworks used have been too restrictive, often attempting to develop a single set of indicators that could be used across all fisheries (Staples, 1997). Whilst there is an obvious advantage in the use of a single set of indicators for comparisons amongst fisheries, given the high level of disparity in the issues affecting fisheries, this approach can result in the focus being at such a high level that they cannot be effectively measured. Alternatively, a large number of indicators are developed, many of which are irrelevant, redundant or unable to be measured.

The more fundamental problem with this approach, however, is the excessive focus on the identification of indicators. This is often seen as being the most important element of ESD but the indicators by themselves are, however, of limited value. Instead, the focus of attention should be on the development of a series of effective operational objectives specific to each fishery each of which should be measurable by some indicator (with its level of bias/robustness acknowledged), along with an explicit performance measure that allows a clear interpretation of what is acceptable performance and what is not. Thus, *“the objective, indicator and performance measure form a package, all three are needed before any one of them is useful”* (Chesson et al., 2000).

Finally, within the framework, there is also a need to clearly identify what specific management actions are present to achieve the operational objectives. This enables the development of a feedback loop whereby the performance of the current management system can be assessed and changes made if performance is not acceptable.

¹² A full description is available in the FAO Technical Guidelines (FAO, 1999).

The Bellagio Principles of Assessment

Assessments should:

1. have a clear vision of sustainable development with goals that define this vision,
2. take a holistic perspective,
3. include all essential elements of sustainable development – equity within and among generations, ecological conditions, economic and social concerns and governance,
4. adopt an appropriate scope both in time, space and activity,
5. take a practical focus based upon having explicit objectives, relevant indicators and clearly defined reference points,
6. have the methods used, judgements and assumptions made and uncertainties accessible for scrutiny,
7. be designed to address the needs of stakeholders,
8. have included participation by all key stakeholders,
9. have the capacity for repeated measurement and be responsive to change, and
10. be assured by having sufficient institutional capacity to support the process.

IISD (1997)

Thus a clear vision of the core objectives and major goals for all fisheries to meet ESD has been developed. An effective process to determine the specific issues and objectives on a fishery-by-fishery basis, including consultation with stakeholders has been developed and trialled. Finally, the ESD reporting arrangements clearly document performance for all aspects of a fishery, including the management responses, governance issues and interactions with external influences. Consequently, the National ESD conceptual framework is consistent with the 10 Bellagio Principles for Assessment (IISD, 1997¹³), which were developed by a group of experts to serve as a practical guideline for an entire sustainable development assessment scheme.

4.2 CORE OBJECTIVES FOR ESD AND AUSTRALIAN FISHERIES

In developing the following set of objectives for Australian fisheries (both core objectives and major components), the SCFA Working Group integrated:

- the general objectives and principles of ESD as outlined in the NSESD,
- the conclusions and guidelines from the FAO technical group (FAO, 1999),
- legislation already in place within the various jurisdictions, and
- other relevant instruments (such as WPA (Schedule 4) and MSC guidelines).

¹³ A list of the Bellagio Principles is located in Appendix 7, the full details are located at www.iisd.org/measure/1.htm

The ESD National Framework core objectives for sustainable fisheries¹⁴ are to:

- protect biodiversity and maintain essential ecological processes,
- enhance individual and community well-being by following a path of economic development that safeguards the welfare of current & future generations, and
- provide effective legal, institutional and economic frameworks for ecologically sustainable development.

Protect biodiversity and maintain essential ecological processes

The conservation of biodiversity and maintenance of ecological processes are of obvious relevance to fisheries management. Biological diversity includes the variety of all life forms, the genes they contain and the ecosystems of which they form a part. It is not static and is constantly changing – it is increased by genetic change and evolutionary processes and reduced by processes such as habitat degradation, major population declines in abundance and most notably by extinction.

Conserving biodiversity has a range of benefits, including meeting human needs for food and medicines, maintaining ecological processes and even climatic regulation. Maintaining biodiversity also addresses ethical issues such as respect for other forms of life.

Fisheries may adversely affect biodiversity by the capture of target and non-target species which could reduce their biomass to unviable levels, affecting population structure, changing their genetic composition and altering their behaviour. Whilst the maintenance of the target stocks has been the primary management goal for agencies, there is also the need to ensure that the non-target stocks are also not affected to the extent that they are reduced to non-viable levels.

Fishing may also impact on the broader ecosystem by directly affecting the marine landscape through damage caused by fishing gear but also by causing more indirect effects through possible changes to trophic structure from removals of predators and/or prey. Fisheries have the direct incentive to minimise these impacts because they rely on the maintenance of ecosystem structure and function to allow for the continued exploitation of many species. There is, however, also a need to protect and conserve these ecosystems for other uses such as non-extractive recreational activities, conservation and research purposes.

Finally, it is recognised that fishing is not the only activity that impacts on these ecological qualities. In many regions, fishing has only minor effects in comparison to other human impacts and natural variations. These non-fishery related impacts and links need to be documented and included when management decisions are made. Where possible, actions should be taken to involve other relevant agencies and industries in ameliorating any of their harmful effects.

Enhance individual and community well-being by following a path of economic development that safeguards the welfare of current & future generations

Fisheries contribute to human well-being by generating income, providing essential dietary needs and fulfilling cultural and recreational requirements. Fisheries resources may be of particular importance in meeting the cultural and economic needs of many indigenous communities.

¹⁴ Developed at Glenelg in June 2000 by the SCFA working group and ESD Reference group and subsequently ratified at SCFA 41

Within Australia, commercial marine fisheries, and their associated processing and marketing activities, provide significant regional economic and employment opportunities. The gross value of commercial fisheries production in 1999/2000 was about \$2.5 billion with a number of fisheries targeting high-value products for the export market (around \$2 billion). There are also significant recreational fisheries operating around the country which generate significant levels of expenditure. Eco-tourism is also an expanding industry. Aquaculture is increasing at about 10 per cent per annum and now makes up over 30 per cent of the total commercial value of seafood products.

Allocation amongst these various industries and sectors within an industry is a major issue that requires further policy development.

Provide effective legal, institutional and economic frameworks for ecologically sustainable development

This objective relates to determining the appropriate legal, institutional and economic instruments to enable the achievement of these ESD principles. The changes that need to be made within this area are neatly summarised by the points identified within the FAO technical report (FAO, 1999).

- Increased awareness of factors beyond the conventional realm of fisheries management
- Better integration of fisheries management into coastal area management
- Control of land-based activities that degrade the marine environment
- Stronger control of access to coastal resources
- Stronger institutions and legal frameworks (including clarity of access rights)
- Greater participation by all stakeholders in the fisheries management process
- Improved collection and sharing of information about fisheries and their environment
- Improved understanding of the socio-economic characteristics of fisheries
- Stronger systems of monitoring control and enforcement
- Measures to deal with uncertainty and variability in natural resource and ecosystem dynamics
- Strengthening community commitment to responsible use of natural resources

4.3 ESD Components

From these three core objectives, seven major goals were defined that covered the ecological, social, economic and legal areas to fully assess the contribution of a fishery to ESD.

Goals for Wild Capture Fisheries

The seven major goals for wild capture fisheries are:

Contribution to Ecological Well-being

1. Retained Species

To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining and optimizing long-term yields.

2. *Non-Retained Species*

To manage the fishery in a manner that does not threaten biodiversity and habitat via the removal of non-retained species (including protected species and ecological communities) and manage the take of non-retained species at ecologically viable stock levels.

3. *General Ecosystem*

To manage the impacts of fisheries such that only acceptable impacts occur to functional ecological relationships, habitat and processes.

Contribution to Human Well-being

4. *Indigenous Community Well-being*

To satisfy traditional (customary) fishing needs, cultural/economic development and sustainability of indigenous communities.

5. *Community and National Well-being*

To contribute to community, regional and national well-being, lifestyle and cultural needs.

Ability to Achieve

6. *Governance*

To ensure that ESD principles are underpinned by legal, institutional, economic and policy frameworks capable of responding and taking appropriate peremptory and remedial actions.

To allocate the resource to maximise/optimize community benefits.

7. *Impacts of the Environment*

To recognise the impacts of the environment on fisheries from both natural and non-fishery human induced sources and incorporate these within management responses.

Goals for Aquaculture

Obviously some of the ecological components for aquaculture industries are different to those for wild capture fisheries. Consequently, components specific to aquaculture were developed:

Contributions of Ecological Well-being

1. *Impacts within Facility*

Individual operations should maintain their impacts within the acceptable levels which take into account background levels and specific catchment issues/limits.

2. *Impacts within Catchment*

The total impact of all aquaculture facilities in each catchment should be kept within the agreed limits, given the assimilative capacity of the catchment and a recognition of impacts already occurring.

3. *Impacts on the General Environment*

To manage the impacts of aquaculture such that only acceptable impacts occur to functional ecological relationships, habitat and processes.

The remaining goals (4-7) are identical to those of the wild capture fisheries.

4.4 SCOPE

Defining the scope of an assessment is one of the key steps identified in any SDRS. The scope of the ESD framework was defined as *the contribution of the fishery/industry to ESD*, where the fishery/industry is as defined by the management agency. Within WA this would currently include each of the 43 managed commercial fisheries, six recreational fisheries and each of the aquaculture industries. Reporting at the fishery (or legislative entity) level allows a direct link between reporting on performance and the taking of management actions to improve performance (Chesson et al. 2000). It also minimises the difficulties in drawing boundaries as to what needs to be included in the assessment. The assessment of each fishery therefore becomes a ‘bite size’ chunk. This does not mean that impacts of other fisheries or other activities are ignored, but they are only assessed as to their impacts on this fishery or the ability of this fishery to meet the agreed objectives.

What is not yet explored is the relative benefit of one fishery compared to another fishery or to another industry/sector. Ultimately, when each of the individual fisheries has been assessed, examinations that assess the relative contributions and costs of all fisheries in a bioregion will be possible. Similarly, when all fisheries (and their interactions) have been assessed, comparisons with, and interactions among, other sectors can be explored. The frameworks to deal with these cross-sectoral issues will be developed and added to this policy at a later date.

5.0 NATIONAL ESD REPORTING FRAMEWORK*

5.1 Ensuring Reporting Consistency

Having a conceptual framework for ESD is only the beginning. It is also necessary to have a framework to measure and assess the performance of a fishery, including its positive and negative contributions in both the long and short terms against the agreed high level ESD objectives. In doing so, these assessments will also address issues that are covered under other relevant legislation (such as the *Environmental Protection and Biodiversity Conservation Act 1999*) and possibly assist in gaining some form of environmental accreditation (see above). Consequently, a major factor in determining the successful development of a national system for reporting on ESD is the reporting framework and terminology¹⁵ that will be used. The system needs to be sufficiently flexible to allow for the specific issues that affect different fisheries to be addressed whilst recognising the need to ensure that where possible, issues are treated in a consistent manner.

The reporting arrangements were originally developed by the SCFA working group in conjunction with the reference group as part of a FRDC funded study which used information and processes already available from previous studies, in particular the work that has been done by the Bureau of Rural Sciences (see Chesson and Clayton 1998, Whitworth and Chesson 2000) and the FAO (Sustainability Development Reference System for fisheries). The reporting arrangements already in place within many jurisdictions were also used.

To assist in this process, the SCFA and the ESD Reference group agreed on the factors that need to be considered when reporting on any of the components in an assessment.

Factors to be considered/addressed when reporting on issues

- Does performance on the issue ensure that the options available to future generations are not unreasonably constrained?
- What information/understanding do we have about the issue?
- What research/monitoring system do we have in place to address the information/understanding gaps?
- What management systems are in place to address the issue in the light of existing information/understanding?
- What external drivers impact upon this issue, for example, habitat degradation, water quality and exotic species and how are these impacts addressed through the management system for the fishery, or other management systems?

Additional issues that also need to be considered include:

- determining the relative risk and prioritisation of issues, and
- the cost effectiveness of undertaking any proposed management action – including collecting research information and the costs associated with compliance.

* A 'How to Guide' is now available for these reporting methods at www.fisheries-esd.com

¹⁵ Agreed Terminology is located in Appendix 8

This National ESD reporting process has now been road tested through a series of eight case studies that covered a variety of fishing methods, target species and jurisdictions. The experiences encountered during these case studies and the discussions held at the Case Study Workshop resulted in a set of revised reporting guidelines that should meet the needs of all jurisdictions and provide the information required by all third parties (such as Environment Australia and the Great Barrier Reef Marine Park Authority).

5.2 Reporting Process

There are three parts to the reporting framework.

1. A set of component trees identifies the issues specific to each fishery by sub-dividing each component until it reaches a level where operational objectives, indicators and performance measures could be specified.
2. A risk assessment/prioritisation process objectively determines which of these issues are sufficiently significant to warrant management actions and hence a report on performance. The justifications for assigning low priority or low risk should, however, be recorded.
3. An assessment of performance for each of the lowest level components uses a standard set of report headings.

5.3 Component Trees

In order to develop indicators, the components/criteria will have to be further broken down into more specific sub-components for which ultimately operational objectives can be developed. The method being adopted to facilitate this flexibility is the BRS component tree design. This design is very flexible and has already been shown to be applicable to completing reports on ESD for commercial fisheries (Whitworth and Chesson 2000).

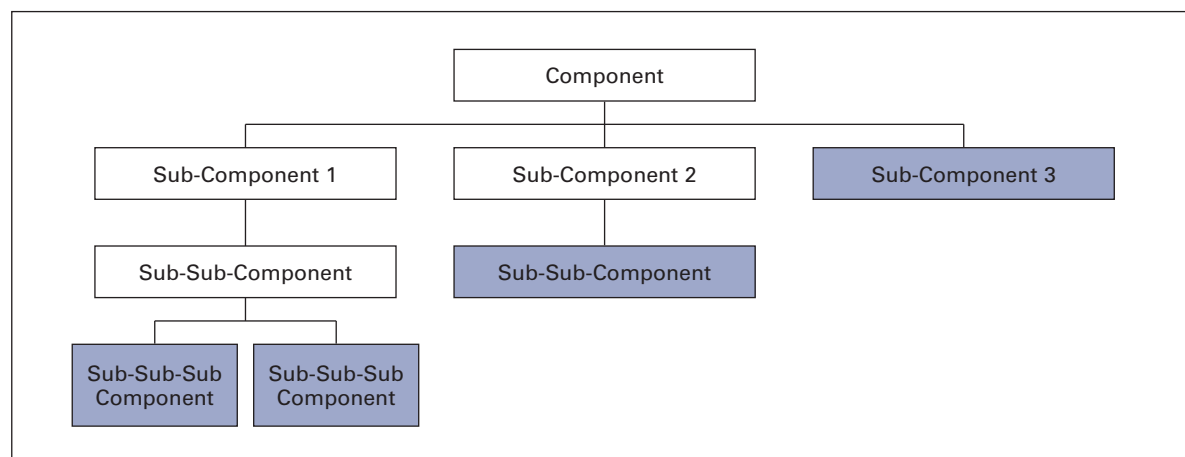


Figure 2. BRS Component, Sub-component Tree Structure

The eight major components fall into three categories of the ‘Contributions to Ecological Well-being’, ‘Contributions to Human Well-being’ and the ‘Ability to Achieve’ (see below). The seven ESD components discussed so far are joined by ‘National Economic Issues’ under the ‘Contribution to Human Well-being’ to make eight. Each of these eight major components is broken down into more specific sub-components for which ultimately operational objectives could be developed.

The Eight Main ESD Reporting Components

Contribution to Ecological Well-being

1. Retained Species
2. Non-Retained Species
3. General Ecosystem

Contribution to Human Well-being

4. Indigenous Community Issues
5. Community Issues
6. National Social and Economic Issues

Ability to Achieve

7. Impact of the Environment on the Fishery
8. Governance

To maximize the consistency of approach amongst different fisheries, the issues that were raised by the SCFA and the ESD reference group under each of the major components were arranged into a series of generic component trees (Appendix 3). These generic trees are to be used as the starting point for each of fishery assessment which are subsequently adapted into trees specific during an open consultative process involving all stakeholder groups. This is achieved by expanding (splitting) or contracting (removing/lumping) the number of sub-components as required. For example, an abalone fishery is unlikely to require the same number of sub-components as a trawl fishery.

5.4 Risk Assessment/Prioritisation Process

After the components/issues are identified, a process to prioritise each of these may need to be completed. For all of the environmental issues in the four relevant component trees, this can be done using a formal risk assessment process. The risk assessment framework that could be applied should be consistent with the Australian Standard AS/NZS 4360:1999 Risk Management. This Risk Assessment process is well documented but in summary, it considers the range of potential consequences of an issue/activity and how likely those consequences are to occur. The combination of the level of consequence and the likelihood is used to produce an estimated level of risk associated with the particular hazardous event/issue in question.*

A realistic estimate should be made by the group of the possible consequence level of an issue. This level can be from 0-5, with 0 being negligible and 5 being catastrophic/irreversible (see Appendix 4 for details of consequence tables). This assessment needs to be based upon the combined judgement of the participants at the workshop who collectively should have considerable expertise in the areas examined.

The level of consequence needs to be determined at the appropriate scale for the issue. Thus for target species you assess the consequence of a fishery on the population not at the individual level – obviously catching one fish is always catastrophic for the individual but generally not for the population. Similarly, when assessing

* This concept is explained more fully in the 'How-to Guide' located on the fisheries-esd.com website.

possible ecosystem impacts this should be done at the level of the whole ecosystem or at least in terms of the entire extent of the habitat, not at the level of an individual patch or individuals of non-target species.

The likelihood of a consequence occurring is assigned to one of six levels from remote to likely. In doing so, you should again consider the likelihood of the ‘hazardous’ event (consequence) actually occurring based upon the collective wisdom which includes an understanding of the scale of impact required.

From these two figures (consequence and likelihood), the overall risk level, which is the mathematical product of the consequence and likelihood levels ($\text{Risk} = \text{Consequence} \times \text{Likelihood}$), can be calculated. Finally each issue can then be assigned a *Risk Ranking* within one of five categories: Negligible, Low, Moderate, High and Extreme (see Table 4).

RISK	Rank	Likely Management Response	Reporting
Negligible	0	Nil	Short Justification Only
Low	1	None Specific	Full Justification needed
Moderate	2	Specific Management Needed	Full Performance Report
High	3	Possible increases to management activities needed	Full Performance Report
Extreme	4	Likely additional management activities needed	Full Performance Report

Table 4. Risk Ranking Definitions

This process should be completed for each of the identified issues with a risk ranking developed and the rationale for assigning these rankings recorded.

Only issues of sufficient risk (Mod-Extreme), which should include all issues that require specific management actions, need to have full performance reports completed. Nonetheless, the rationale for classifying issues as low risk or even negligible risk needs to be documented and form part of the ESD report. This documentation allows all stakeholders and interested parties to see why issues were accorded these ratings. This process and its relationship with other reporting requirements is summarized in Figure 3.

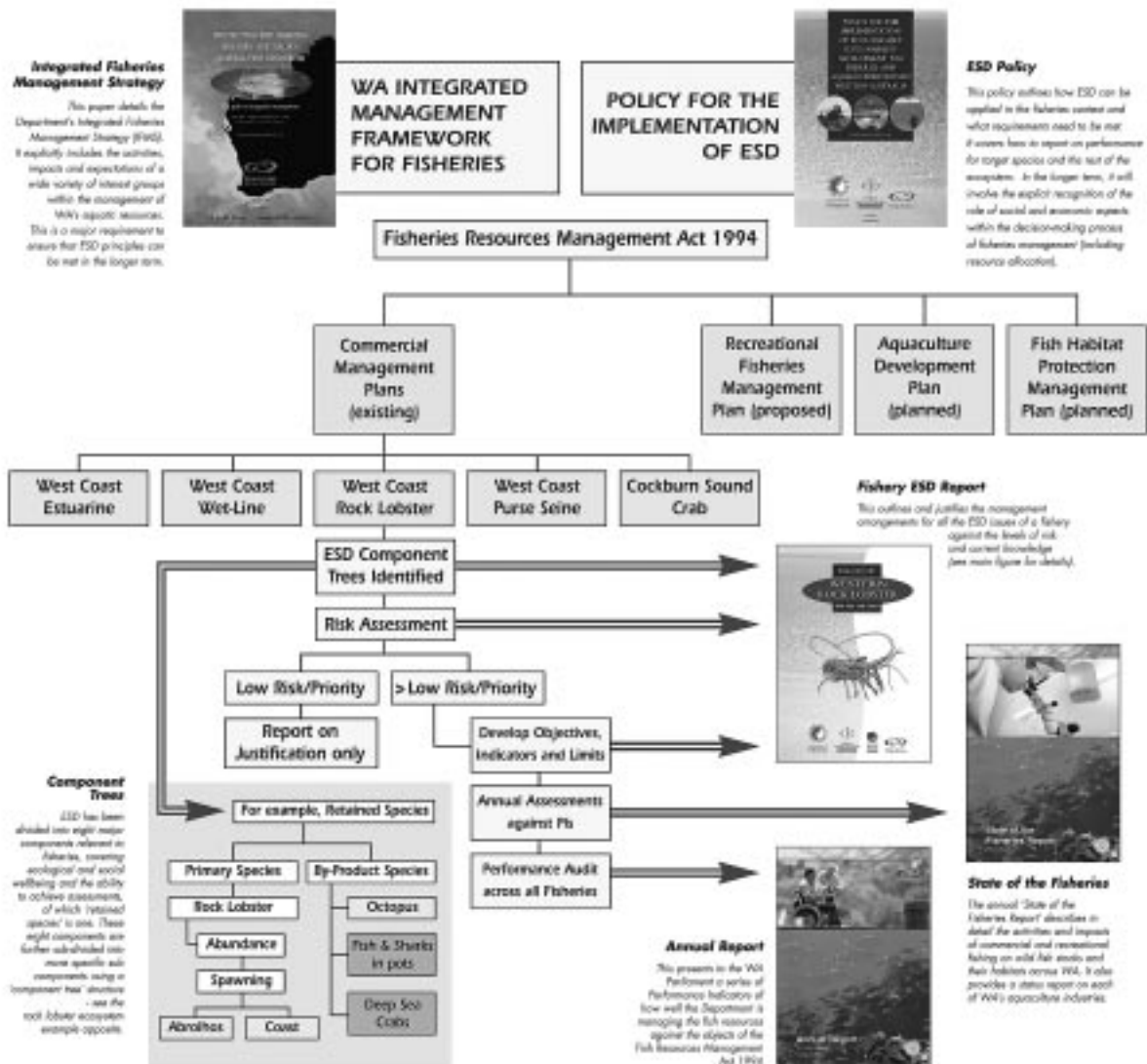


Figure 3. Summary of Process for Completing ESD Reports (and the relationship with annual State of the Fishery Reports). Ultimately, all fisheries within a Bio-region will be completed, which will be of significant value to regional marine planning.

5.5 Component Reports

For each of the lowest level sub-components (assessed as being of sufficient risk/priority to manage), a detailed assessment is generated. The SCFA Working Group in conjunction with the ESD Reference Group has agreed upon a set of 10 standard headings that each needs to be addressed.

The list of agreed ESD report headings¹⁷ and their relationship to State of Fisheries Reporting¹⁸	
1.	Operational Objective (+ justification)
2.	Indicator
3.	Performance Measure (+ justification)
4.	Data Requirements
5.	Data Availability
6.	Evaluation
7.	Robustness
8.	Fisheries Management Response
	– Current
	– Future
	– Actions if Performance Limit exceeded
9.	Comments and Action
10.	External Drivers

Using the same reporting headings for each of the sub-components will:

- assist in a consistency of focus and attention across all components/sub-components (especially for components/criteria where there is little existing experience with assessment),
- allow for the separation of the discussions concerning performance measures from the discussions about the actual indicator,
- allow for separation of what indicators can be used from the discussion of the adequacy of their measurement etc, and
- require specific documentation of the management responses to achieve the objective. This allows for situations where little data is being collected and assessed under a management strategy that can be shown to be safe (that is, precautionary or robust).

It also provides a direct comparison between

- the level of understanding of an issue,
- the risks associated with alternative management actions, and
- the level of precaution currently being applied.

¹⁷ A full description of the information required under each of these headings is located in Appendix 3

¹⁸ Headings in relate to the process and justification for the objectives, indicators and performance measures chosen. In most cases these would only need to be completed every five years and would only appear in the ESD reports. The headings in are those that will need to be reported annually in State of Fisheries Reports. The headings in may need to be reported in State of Fisheries but only if relevant.

The first step is to specify an operational objective for each sub-component (noting that by setting one objective you are probably influencing the performance of a number of other components). This objective needs to have a direct and practical interpretation in the context of the management of the fishery and, most importantly, performance needs to be measurable and auditable. This objective should also be consistent with, and clearly linked, to higher-level objectives that might appear in legislation, policy statements or management plans (provide the justification for selecting this objective compared to any other given the higher level objectives).

The indicator is the measure that is to be used to track changes with respect to an operational objective. The performance measure provides the information to enable interpretation of the indicator and can be expressed in terms of one or more reference points (for example, biomass should remain as close as possible to x but no lower than y) or simply in terms of a trend (for example, increasing is desirable, decreasing is undesirable).

The operational objective, indicator and performance measure are a package. All three are needed before any one of them is useful. Indicators by themselves (as used in some reporting schemes) are of little value because without an objective and performance limit, you cannot interpret performance.

In addition to stating the operational objective, indicator and performance measure, there are headings for data quality and availability, robustness of the indicator, management response, and external drivers. The inclusion of 'management response', particularly when it is discussed in relation to the data available, makes the explicit link between the operational objective, the measurement and reporting of performance and the action to be taken to maintain or improve that performance. This is an important distinction, and advantage of the National framework, compared to other systems (Chesson *et al.*, 2000).

Summary of Reporting Method

Can you justify that the management actions you currently have in place are appropriate, given the level of risk and current knowledge of the issue?

It is envisaged that this reporting scheme for fisheries and aquaculture will evolve over time as experience and understanding of the issues increases. This process is unlikely to end quickly given that having been underway for over half a century, the standards and policies used to report on financial issues are still being modified to make them more relevant and effective. Effective fisheries indicators are unlikely to be less elusive.

6.0 IMPLEMENTATION IN WA

The initial actions that will need to occur for the implementation of ESD within each WA fishery sector include changes to consultation, the reporting and assessment regimes, the content of management plans, and development of further ESD policies. In particular, the second phase of ESD development will involve the integration across sectors as suggested within the Integrated Fisheries Management Policy.

6.1 Consultation

WA ESD Fisheries Reference Group

To ensure the effective development and implementation of this ESD policy, support, and hopefully ownership will be required by all affected stakeholders and the general community. This support is facilitated by the formation of an effective stakeholder group through which consultation and discussion can be directed and focussed. The WA ESD Fisheries Reference Group was established in September 2000 and held its first meeting in October. The continuation of this group is an essential task in the successful implementation of ESD within the fisheries of Western Australia. This group contains representatives from

- the Department of Fisheries staff (relevant members from management, planning, habitat and research),
- the Department of Environmental Protection,
- the Office of the Auditor General,
- the peak recreational body (Recfishwest),
- the commercial fishing industry peak body (WA Fishing Industry Council, WAFIC),
- the aquaculture and pearling industries,
- the Conservation Council of WA, and
- the indigenous community (through the Department of Indigenous Affairs).

This group will be involved in the development of the ESD policy and its review at regular intervals. The group could also be a resource for the national ESD reference group and monitor the implementation of ESD within each of the fisheries to ensure a consistent approach is being taken. The terms of reference for this group are currently being developed.

Within Each Fishery

The members of the Management Advisory Committees (MAC) plus other relevant stakeholders if not represented on the MAC (commercial industry, recreational groups, environmental and indigenous groups and other relevant government agencies) should be involved in the development of issues, objectives and performance measures through the initial assessment and reporting process.

The general public will be given the opportunity to be involved in the development of ESD reports through the establishment of formal public comment periods in the planning process. This will be facilitated by making the reports available for review on the Internet and distributed widely.

6.2 Reporting and Assessment

All fisheries need to be assessed against the ESD objectives and goals with the report made available for public comment. The reporting framework that will be used is the National ESD Framework for Fisheries outlined above which is based on the NSESD. This will allow for a uniform assessment protocol to be developed through the identification of benchmarks and performance standards. The standard structure for a complete ESD report, including the headings that should be used and the material that should be included is outlined in Appendix 9.

Initially, these activities will focus on the commercial fisheries, particularly those that have a substantial export component. This will allow the gathering of information to meet the requirements of EA and their EPBC assessments¹⁹. Due to the urgency to complete these assessments, they will only cover the environmental and governance components of the ESD; the social and economic components will be assessed later.

The reporting of performance for each fishery will be the responsibility of the Department of Fisheries in conjunction with the relevant MAC and associated stakeholders. The relationship between the full ESD reports, which will only be completed at approximately five-year intervals, and the annually produced *State of the Fishery* report is shown in Figure 3. In summary, the SOF reports will report on the evaluation of performance against the objectives and performance measures documented in the ESD reports. Management would largely report in the SOF on governance aspects and only document strategies if alternative actions were required.

Timetable for Actions

May-Dec. 2001 – Complete assessments of the environmental and governance components of ESD for the Rock Lobster, Shark Bay Prawn, Shark Bay Scallop, Exmouth Gulf Prawn, Abalone, Pearl Oyster and Shark Bay Snapper fisheries enabling applications to be sent to EA for continued export approval for these cost recovered fisheries.

2002 – Complete assessments of the environmental and governance components of ESD for the majority of the State's export-based fisheries.

2003 – Finish all ESD assessments for the commercial fisheries

Begin the assessment of recreational fisheries and aquaculture industries.

It is planned that all of those fisheries with an export component will be assessed with application based on material having been submitted to EA for the EPBC assessments before the December 2003 deadline.

The development of appropriate indicators for the social and economic components of ESD are being undertaken as part of current research projects. Once these methods have been established, a second phase assessment of these components will be completed for the commercial fisheries.

Finally, the recreational fisheries and aquaculture industries will also be assessed. Initiation of this phase of ESD implementation will be delayed until the bulk of the commercial fisheries have completed their applications for export approval.

¹⁹ To this end, specific EA application section has been developed that will be used as the 'front end' to these submissions. (see fisheries-esd.com.au for details).

6.3 Accountability

Verification of the reporting and assessment outcomes is critical to ensuring that this process is viewed as transparent, objective and robust. This will require the development of appropriate third party auditing of the processes involved in generating the reports, the level of performance achieved by the fishery against the documented standards, and finally the analysis of the standards themselves. A tripartite Memorandum of Understanding is being developed between the Department of Fisheries, the EPA and the Office of the Auditor General, which will define the roles and responsibilities of each party.

It is anticipated that auditing of the processes involved within reporting on the performance of each fishery will be assessed annually. This will ensure that each fishery is continuing to meet the agreed performance levels and where it is not, that specified or appropriate actions are being taken.

Every five years there should be auditing of the outcomes and the justification for each of the objectives and performance measures (standards) within the ESD reports and management plans to ensure that they are soundly based on best practice principles. This would involve a selection of fisheries being assessed by a panel of independent experts who would examine the basis behind each of the objectives and ensure that the most appropriate methods were being effectively used.

This panel should be expertise-based covering at least three of the disciplines of fisheries science, ecology, social science, economics and administrative law.

6.4 Management Arrangements

The major administrative tool to implement ESD within fisheries is the fishery management plan and its associated guidelines. What is currently contained within the management plan, as defined below, is narrow in scope but the legislation does not constrain the agency from being more progressive. Thus, the contents of a management plan, or within accompanying guidelines, needs to be expanded to include the specific operational objectives for at least the components/issues that are within the scope of the FRMA. There is also a need to recognise that some components may only be addressed by other non-legislative instruments – such as industry codes of practice and Environmental Management Systems – and many of the social and economic issues are outside of the scope of the FRMA to directly address by legislation.

Thus each set of management arrangements²⁰ should include:

1. explicit description of the management unit,
2. the issues addressed by the plan,
3. descriptions of the stocks, their habitat and the fishing activities,
4. clear operational (measurable) objectives and their associated performance measures and indicators,
5. clearly defined rules, including what actions are to be taken if performance measures are triggered,
6. economic and social characteristics of the groups involved in the fishery,
7. management and regulatory details for the implementation of the actual management plan,
8. the reporting and assessment arrangements,

²⁰ These may include the management plan, as defined in Part 6 of the *FRMA*, relevant regulations, notices and any other supporting guidelines.

9. how and when reviews of the plan will occur (including consultation mechanisms), and
10. a synopsis of how each of the ESD issues are being addressed.

In the initial phase, a very flexible legislative framework needs to be adopted. The arrangements that describes the process, objectives, performance benchmarks, reporting needs and so on, as outlined above needs to be written in plain English and not form part of the legal instrument which sets the regulatory framework. These will form a set of guidelines and principles against which ESD performance for each fishery can be assessed. Matters of law will still need to be dealt with in the legal prescription of management arrangements but supported by this additional ESD documentation which will use prescribed headings to ensure consistency of approach (and ultimately standards).

Such a system will greatly increase the transparency and stakeholder involvement in the management process. Moreover, by having explicit objectives and ranges of acceptable conditions within the plan should help to insulate the process against political pressures both when difficult decisions have to be made (declines in stock abundance) and when they are not necessary (perception-driven concerns). This should add a degree of stability for all stakeholders by working to ensure that the longer term ESD related issues are not traded off for shorter-term agendas.

6.5 Costs of Implementations

The implementation of the first phase of this ESD policy will, for the larger commercial fisheries, mainly involve changing the processes used in monitoring and reporting rather than increasing the number of tasks that need completing. Consequently, it should involve only minimal levels of additional expenditure for cost recovered fisheries.

For the minor commercial fisheries and the other non-cost recovered sectors, the methods used for the implementation of this policy will need to be appropriately cost effective and completed over a timeline that will enable these to be done within existing resources.

6.6 Policy Development

A number of additional policies that relate to ESD will also need to be developed

- There is a need to transform the reporting scheme outlined above into an assessment scheme by the development and inclusion of a series of best practice standards for each of the major components.
- A framework for Integrated Fisheries Management is required to enable assessments across fishery sectors to be made. This would include assessments amongst the various commercial fisheries and between the commercial and recreational sectors. In particular, an effective and robust system to assist in determining effective allocation and re-allocation decisions is needed. This is currently being progressed through a committee chaired by Justice Toohey. A major part of this process will entail the measurement of whether the performance decided for each sector is being achieved.
- Finally, a cross-agency framework needs to be developed for broad-scale integrated marine planning. This process will require whole-of-government responses to assess the relative impacts and benefits with other sectors (such as agriculture and housing). To be effective, such a process requires the assessments at the previous three levels for all industries to have already been completed.

7.0 CONCLUSIONS

This process of implementing ESD will result in a sea-change within agencies. The broader concepts involved will require innovation in the collection of new data, using new methodologies to deal with these issues and even the types of participants involved in the process. There will not, therefore, be instant solutions available and for many of components, even if a suitable objective and indicator can be identified, the data will often not be available to complete analyses. Nonetheless, even the identification of the issues should be seen as a substantial improvement and therefore a large step forward in the process of implementing ESD. If initiation were to be delayed until all required data were available, then the process would never begin.

This framework needs to become the core business for the agency, not some adjunct or only affecting some aspects of operations, because there is no activity that is undertaken that does not have some relevance to ESD. The high level of discipline required to complete this task should also lead to a process of continuous improvement and therefore the achievement of best practice performance for fisheries management. Moreover, the high levels of transparency in the decision making processes that are a major part of this process should significantly reduce the level of routine enquiries about regulatory decisions that currently consume considerable levels of management resources.

It is, therefore, with an understanding of both the difficulties that will be encountered along with the longer-term benefits that will flow, that we initiate full implementation of ESD for fisheries within WA. It is expected that the process will take a number of years to implement during which time it will evolve as more experience is gained and even within a fishery, the concepts used, along with the values and expectations of stakeholders are likely to change. As with many complex and transforming activities, beginning is always the hardest part.

8.0 ABBREVIATIONS AND ACRONYMS USED

- ATSIC – Aboriginal and Torres Strait Islander Commission
- ASIC – Australian Seafood Industry Council
- CoA – Commonwealth of Australia
- COAG – Committee of Australian Governments
- COFI – United Nations Commission on Fisheries
- CSD – United Nations Committee on Sustainable Development
- EA – Environment Australia
- EPBC – *Environment Protection and Biodiversity Conservation Act, 1999*
- ESD – Ecologically Sustainable Development
- FAO – Food and Agriculture, Organization of the United Nations
- FRDC – Fisheries Research and Development Corporation
- FRMA – *Fisheries Resources Management Act, 1994 of Western Australia*
- GDP – Gross Domestic Product
- IISD – International Institute for Sustainable Development
- MAC – Management Advisory Committee
- MCFFA – Ministerial Council for Forestry, Fishing and Aquaculture
- MoE – Ministry of the Environment, New Zealand
- NGO – Non Government Organization
- NRMSC – Natural Resource Management Standing Committee
- NSESD – National Strategy for ESD
- PC – The Productivity Commission
- SCFA – The Standing Committee for Fisheries and Aquaculture
- SDRS – Sustainable Development Reporting System
- SOF – State of the Fisheries Reports
- UN – United Nations
- UNCED – United Nations Conference on Environment and Development
- UNCLOS – United National Convention on the Law of the Sea
- UNHE – United Nations Commission on Human Environment.
- WA-ESD – The West Australian ESD Reference group for fisheries
- WCED – World Commission on Environment and Development
- WPA – *The Wildlife Protection (Regulation of Exports and Imports) Act, 1982*
- WWF – The World-Wide Fund for Nature

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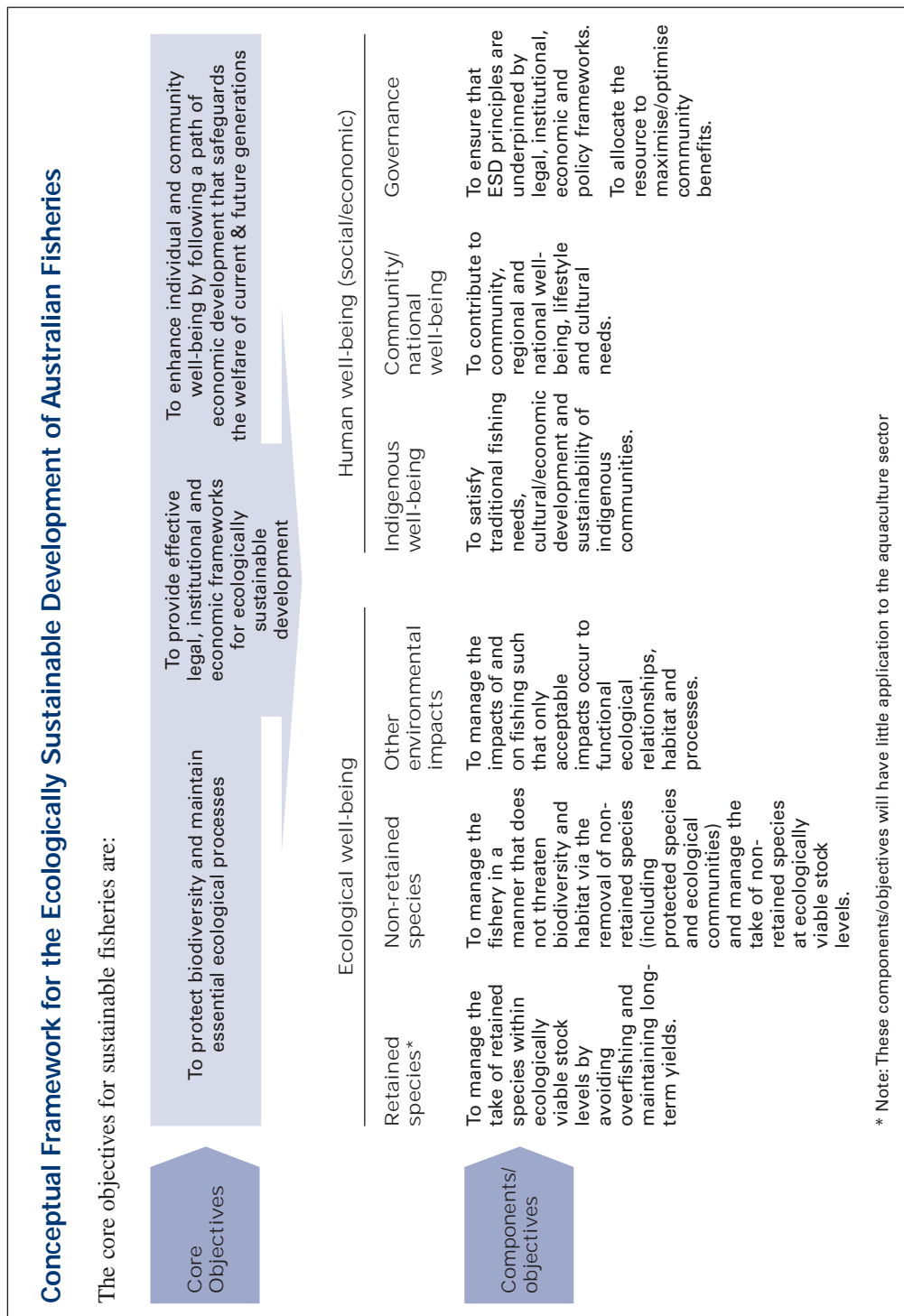
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APPENDIX 1

Diagram of the Conceptual Framework for ESD of Australian Fisheries



APPENDIX 2

NSESD Definition, Objectives and Guiding Principles

The definition of ESD within the NSESD recognises the need to integrate short and long term economic, social and environmental aspects such that we should be:

‘using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased’.

The core objectives of the National Strategy on Ecologically Sustainable Development are:

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

The Strategy embraces the following guiding principles

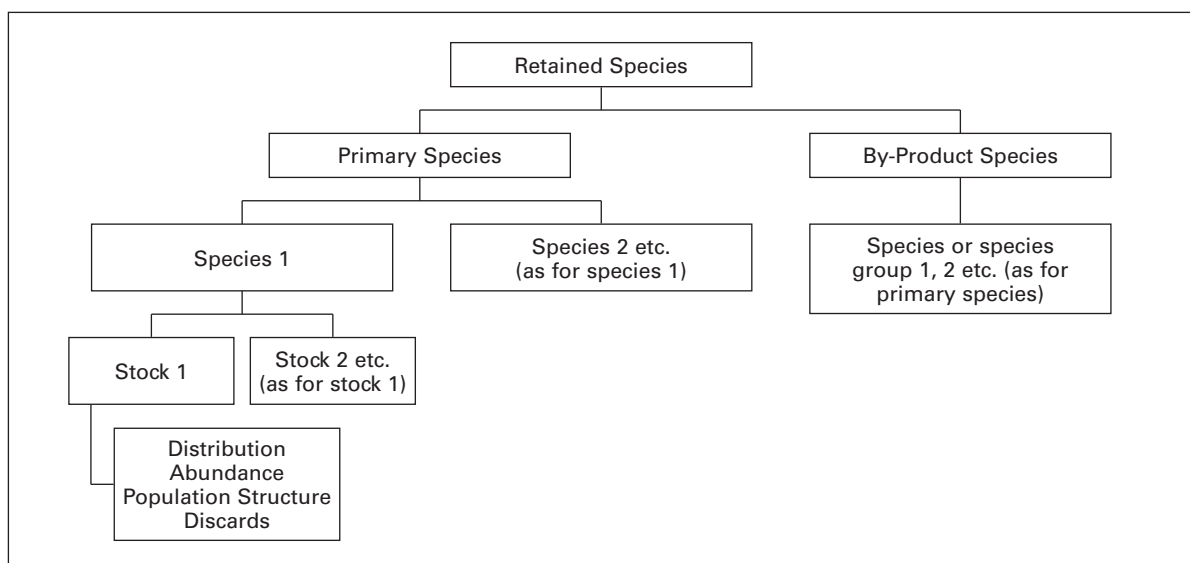
- Decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations.
- Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- The global dimension of environmental impacts of actions and policies should be recognised and considered.
- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be encouraged.
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised.
- Cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms.
- Decisions and actions should provide for broad community involvement on issues which affect them.

These guiding principles and core objectives need to be considered as a package. No objective or principle should predominate over the others. A balanced approach is required that takes into account all these objectives and principles to pursue the goal of ESD.

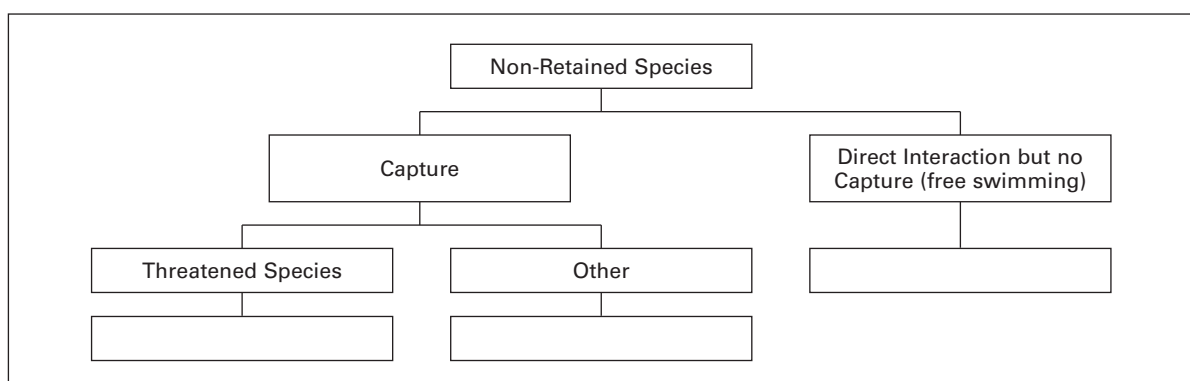
APPENDIX 3

National ESD Reporting Framework: Generic Component Trees – (to download the latest versions see website www.fisheries-esd.com)

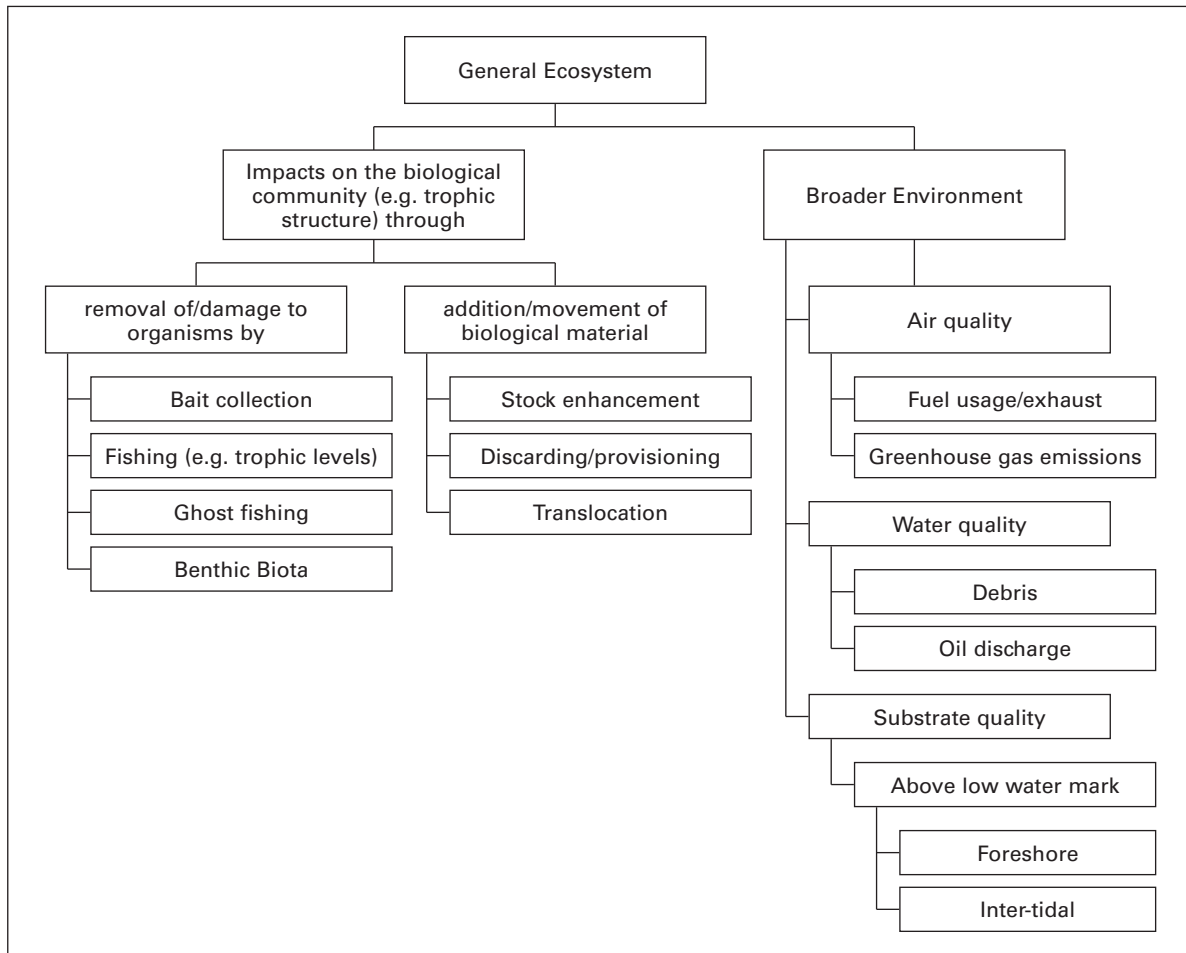
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Issues related to the retained species



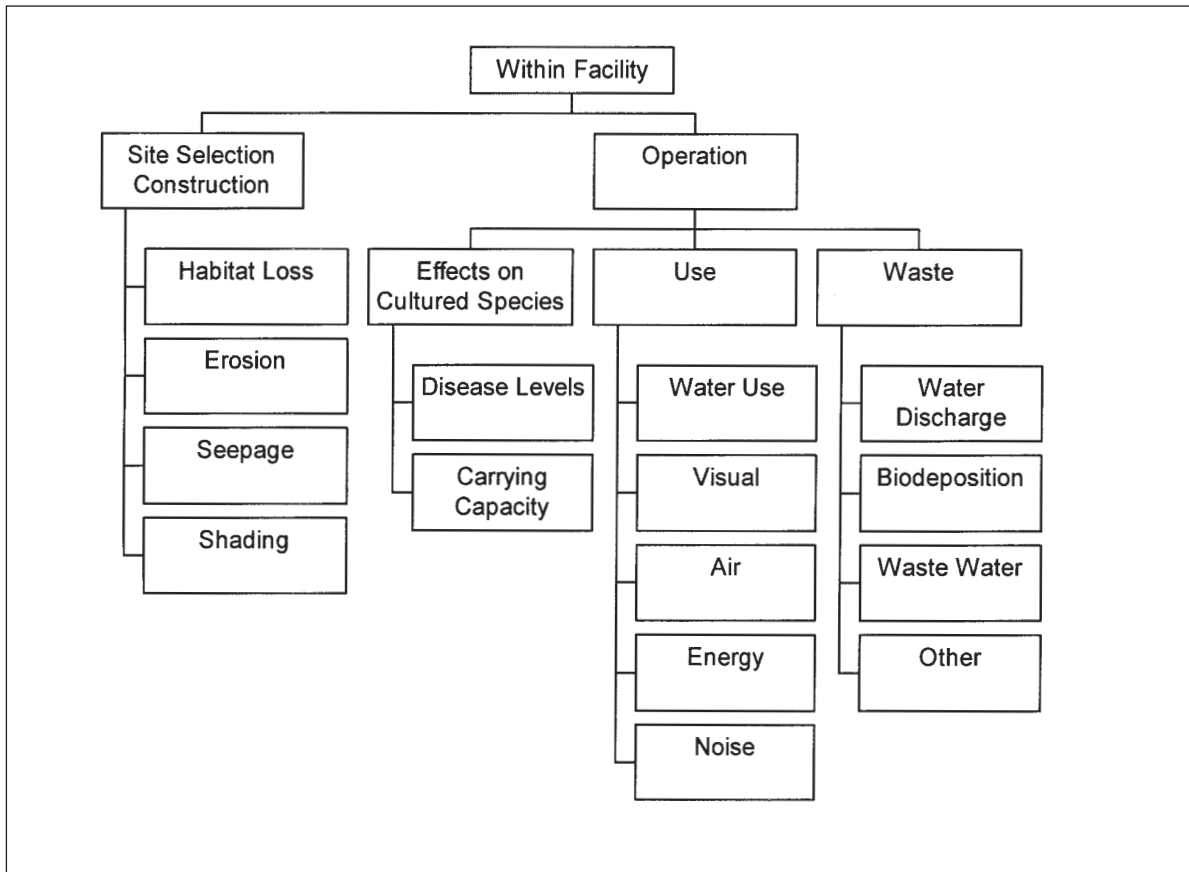
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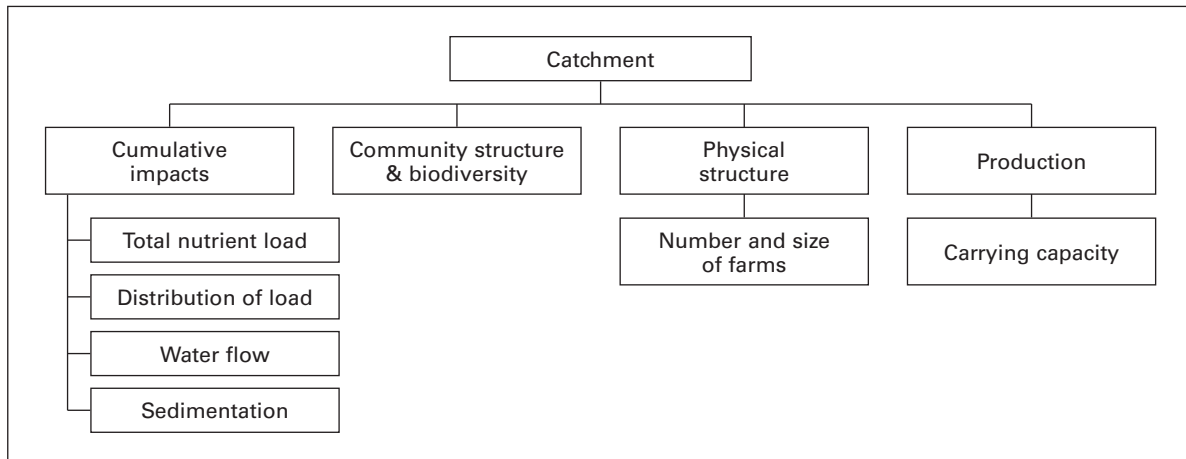
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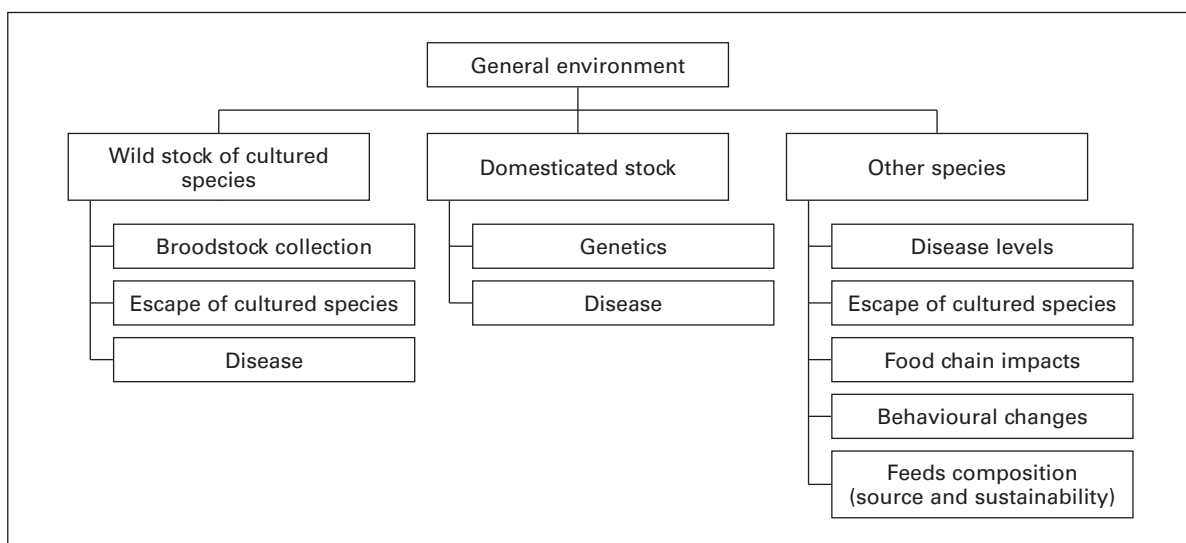
Contribution to Ecological Well-being within Aquaculture Facilities



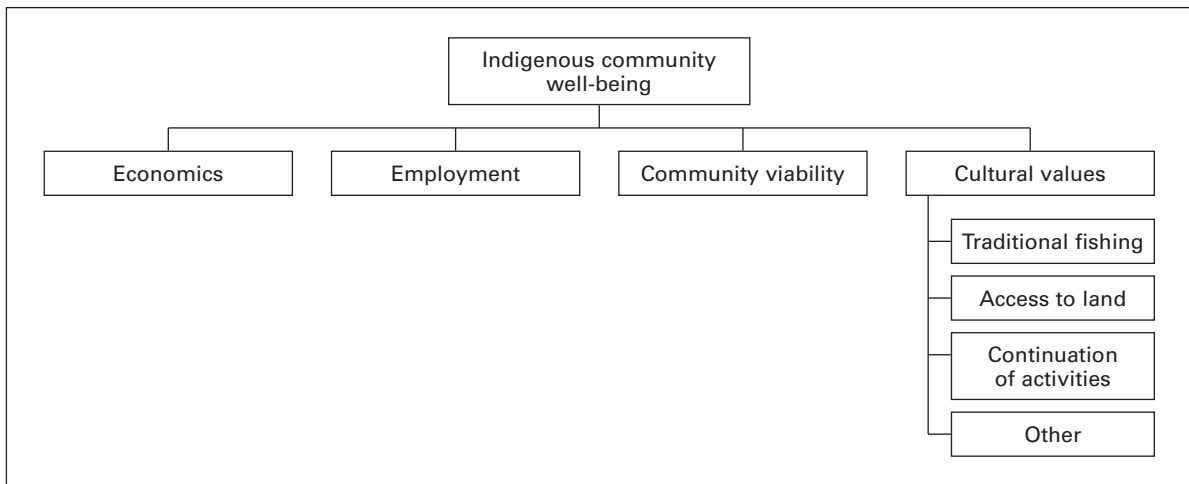
**Contribution to Ecological Well-being:
Aquaculture facilities within catchments**



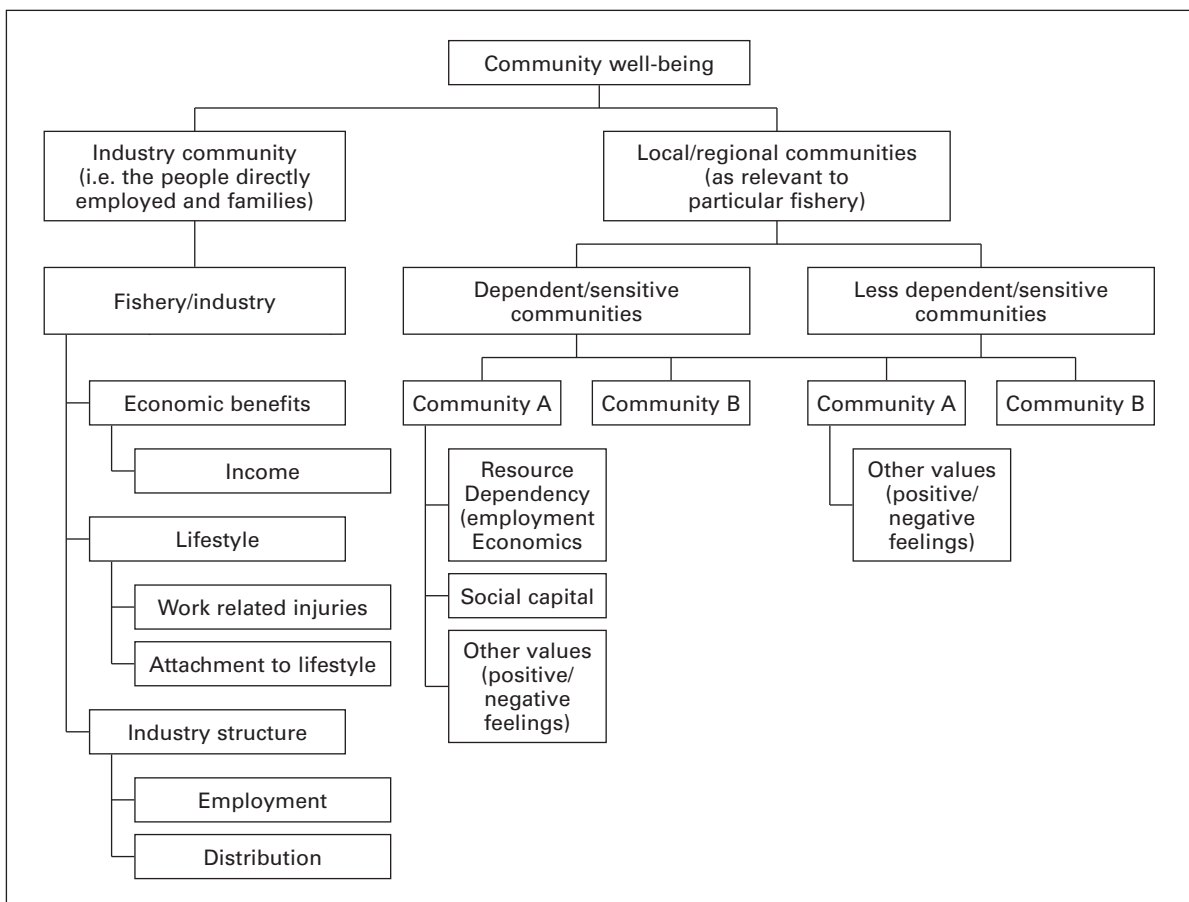
**Contribution to Ecological Well-being:
Issues for the aquaculture industry on other aspects of the environment**



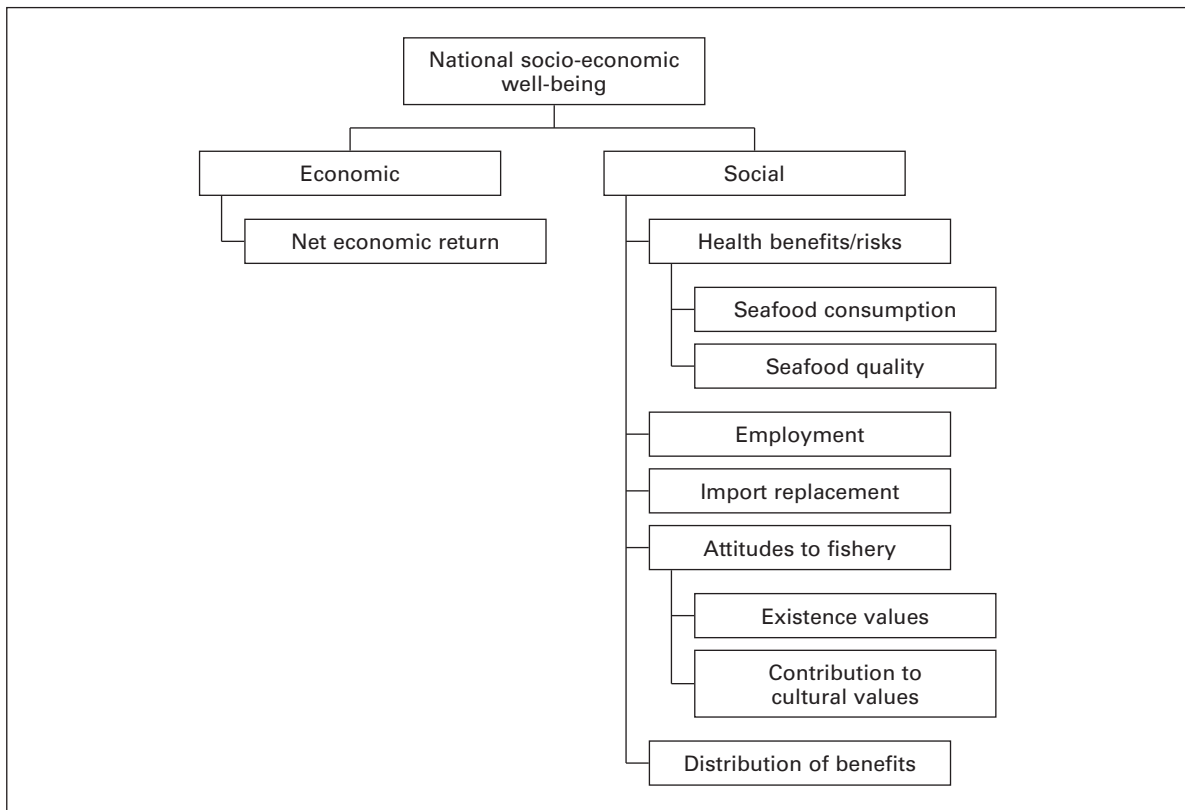
Contribution of the Industry/Fishery to Indigenous Well-being



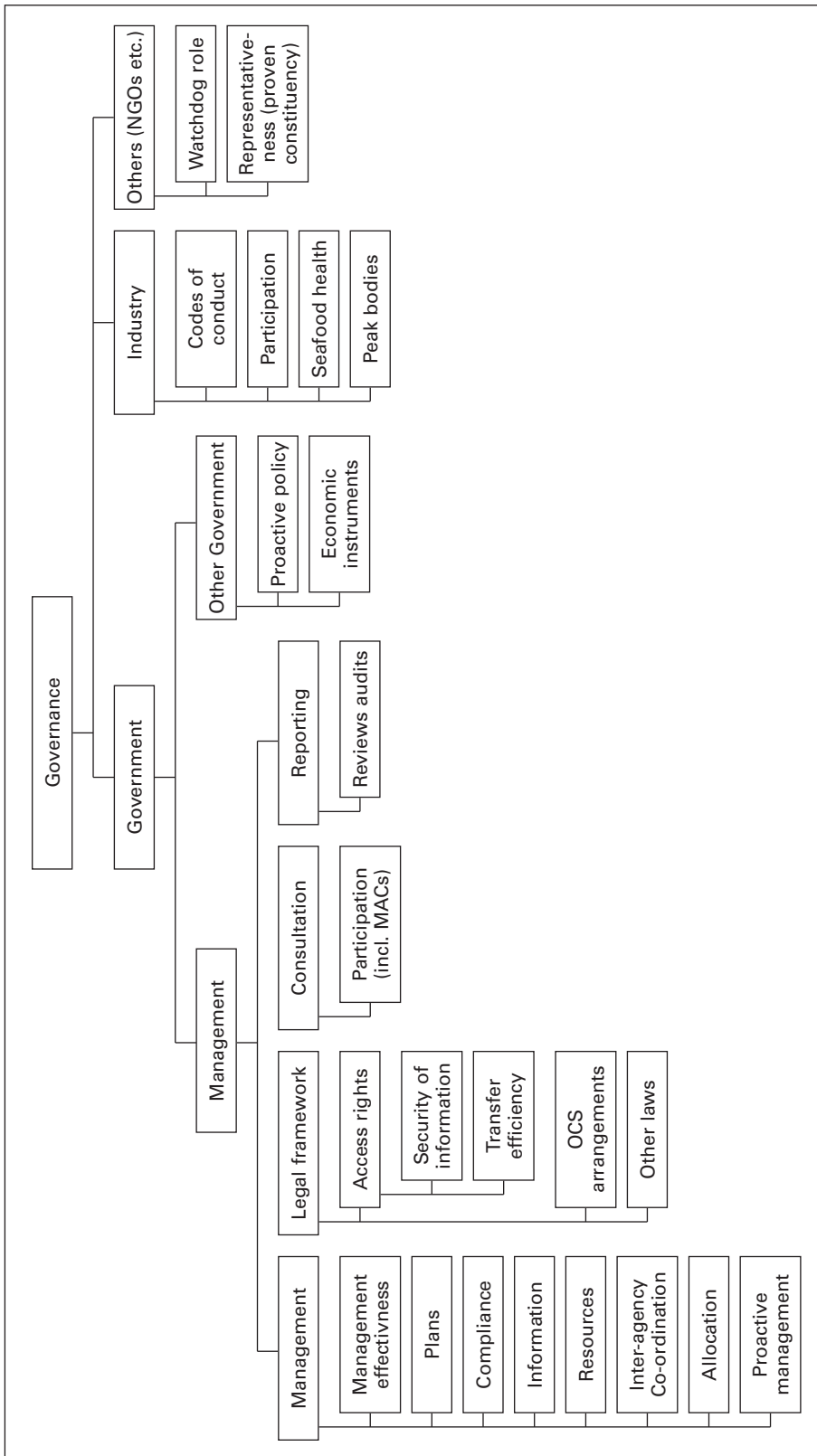
Contribution of the Industry/Fishery to Community Well-being



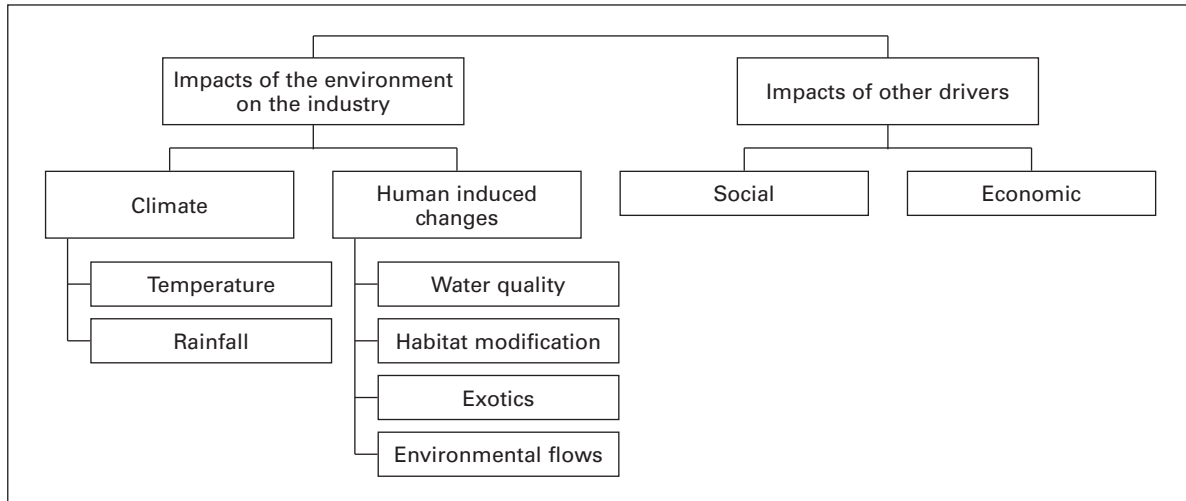
Contribution of the fishery/industry to National Socio-economic Well-being



Ability of the Fishery/Industry to Achieve through Governance



Ability to achieve from Impacts of the Environment and other issues on the Fishery/Industry



APPENDIX 4

National ESD Reporting Framework: Consequence Levels and Likelihood Definitions for Risk Assessment

(see www.fisheries-esd.com for full details of the latest Risk Assessment Process)

Scope

- Retained/Non Retained/Protected species – assessed at level of locally reproducing population – unit stock
- Ecosystem – indirect impacts due to flow on effects on food chain assessed at the Regional/Bioregional level
- Habitat (attached species – e.g. seagrass) assessed at the regional habitat level defined as the entire habitat equivalent to that occupied by the exploited stock.

Table A4-1. Risk Matrix

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

Table A4-2. Summary Consequence Definitions

Level	Ecological
Negligible	<p>General – Insignificant impacts to habitat or populations, unlikely to be measurable against background variability</p> <p>Target Stock/Non-retained: undetectable for this population</p> <p>Byproduct/Other Non-Retained: area where fishing occurs is negligible compared to where the relevant stock of these species reside (< 1%)</p> <p>Protected Species: relatively few are impacted.</p> <p>Ecosystem: interactions may be occurring but it is unlikely that there would be any change outside of natural variation</p> <p>Habitat: affecting (< 1% of area of original habitat area)</p> <p><i>No recovery time needed</i></p>
Minor	<p>Target/Non-Retained: possibly detectable but little impact on population size and none on their dynamics.</p> <p>By-Product/Other non-retained: take in this fishery is small (< 10% of total) compared to total take by all fisheries and these species are covered explicitly elsewhere.</p> <p>Take and area of capture by this fishery is small compared to known area of distribution (< 20%).</p> <p>Protected Species: some are affected but there is no impact on stock</p> <p>Ecosystem: captured species do not play a keystone role – only minor changes in relative abundance of other constituents.</p> <p>Habitat: possibly localised affects (< 5% of total habitat area)</p> <p><i>Rapid recovery would occur if stopped – measured in days to months.</i></p>
Moderate	<p>Target/Non Retained: full exploitation rate where long term recruitment/dynamics not adversely impacted</p> <p>By-Product: relative area of, or susceptibility to capture is suspected to be less than 50% and species do not have vulnerable life history traits</p> <p>Protected Species: levels of impact are at the maximum acceptable level</p> <p>Ecosystem: measurable changes to the ecosystem components without there being a major change in function. (no loss of components)</p> <p>Habitat: 5-30 % of habitat area is affected, or, if occurring over wider area, level of impact to habitat not major</p> <p><i>Recovery probably measured in months – years if activity stopped</i></p>
Severe	<p>Target/Non Retained: affecting recruitment levels of stocks/ or their capacity to increase</p> <p>By-Product/Other Non-Retained: no information is available on the relative area or susceptibility to capture or on the vulnerability of life history traits of this type of species</p> <p>Relative levels of capture/susceptibility greater than 50% and species should be examined explicitly.</p> <p>Protected Species: same as target species</p> <p>Ecosystem: ecosystem function altered measurably and some function or components are missing/declining/increasing outside of historical range and/or allowed/facilitated new species to appear.</p> <p>Habitat: 30-60 % of habitat is affected/removed.</p> <p><i>Recovery probably measured in years if stopped</i></p>

Level	Ecological
Major	<p>Target/Non Retained: likely to cause local extinctions (i.e. listing on the threatened species lists)</p> <p>By-Product: other non-retained:N/A</p> <p>Protected Species: same as target species</p> <p>Ecosystem: a major change to ecosystem structure and function (different dynamics now occur with different species/groups now the major targets of capture)</p> <p>Habitat: 60-90% affected</p> <p><i>Recovery period measured in years to decades if stopped.</i></p>
Catastrophic	<p>Target/NonRetained: local extinctions are imminent/immediate</p> <p>By-Product/Other Non-retained: N/A</p> <p>Protected Species: same as target</p> <p>Ecosystem: total collapse of ecosystem processes.</p> <p>Habitat: > 90% affected in a major way/removed</p> <p><i>Long-term recovery period will be greater than decades or never, even if stopped</i></p>

Table A4-3. Likelihood Definitions

Level	Ecological
Likely	It is expected to occur
Occasional	May occur
Possible	Some evidence to suggest this is possible here
Unlikely	Uncommon, but has been known to occur elsewhere
Rare	May occur in exceptional circumstances
Remote	Never heard of, but not impossible

APPENDIX 5

National ESD Reporting Framework: Component Report headings*

1. Operational Objective

Each of the sub-components requires an agreed operational objective. What, specific to this component for this fishery, do you wish to achieve? Thus, it is not how you will achieve it, nor what you will need to achieve it. Most importantly, performance against this objective must be able to be measured.

- This could involve just the recording of an existing objective listed in current management arrangements,
- This may involve turning an implicit objective into an explicit objective,
- This may involve developing a series of alternative objectives for consideration and consensus at a later stage.

Irrespective of which method is used to generate the objective, the justification for choosing this objective must be recorded. This justification should also provide specific information as to how it relates to the higher-level objective.

2. Indicator

For each operational objective under each of the components there should be an indicator developed. This can be a direct measurement of performance (such as employment numbers) or a surrogate (catch for abundance). Generally having more than one indicator is often not helpful because they would need to be combined somehow to form an assessment but often a composite indicator can be used to provide greater confidence of the result.

In some cases having more than one indicator indicates that different aspects are being addressed, hence you need more operational objectives – one for each indicator. There is no definitive limit to the number of sub-components and hence operational objectives that can be developed.

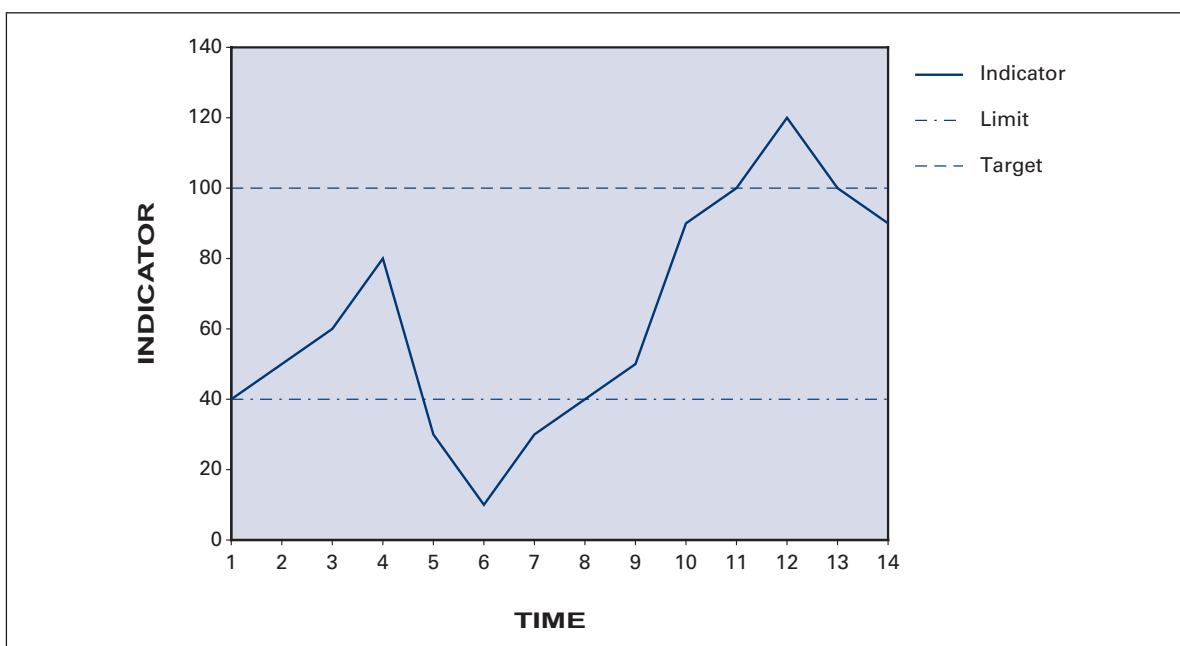
3. Performance Measure

Defines whether performance against the objective is acceptable or not – that is, how do you interpret what the indicator is suggesting? Again, this may involve:

- recording a performance measure already available from a current management plan/arrangement,
- agreeing to a proposed performance measure for later ratification, or
- listing a series of potential measures for later consultation (if possible recording the justification for the proposals made).

It is vitally important that the justification for choosing the level/limit/trend is provided. This ultimately is the most important decision made for the management of this issue and hence the reasons why it was chosen, including any assumptions used, needs to be articulated clearly.

* latest details on each of these headings and suggestions for use available on the website www.fisheries-esd.com



A summary of the relationships between the indicator with limit and target performance measures.

4. Data Requirements for Indicator

What data do you need to measure the indicator?

5. Data Availability (past – current – future)

What data are currently available and how accurate are the data that will be used?

What data will be available in the future?

6. Evaluation

If data are available what did the indicator tell us about the objective?

Usually a graph such as in Figure 10 is needed. This should be accompanied by a description of the information and an explicit statement as to the current performance of the fishery.

7. Robustness

What is the robustness of the current indicator/evaluation? This should involve both a textual description and choosing the summary level (High/Medium/Low) from Table 4 (see below for more details).

Evaluation/Indicator Robustness

An attempt will be made to develop a generic classification system to assist in the assessment of robustness for each of the evaluations. The classification will use the level of robustness and precision of the indicator in measuring the operational objective and the way it has been used during the evaluation. It is an assessment of how well the indicator is measuring what you want to know. Thus, if your objective relates to levels of employment and your indicator is employment numbers then this is robust. If, however, your objective relates to bycatch but the indicator available is only fishing effort, then this will be less robust.

Having robustness scores for all sub-components would enable an overall score for the entire assessment such as, for example, the percentage of indicators with scores > Low.

Level	Description
HIGH	The indicator is a direct measure of the objective, or if indirect, is known to closely reflect changes in the issue of interest.
MEDIUM	The indicator is suspected to be reasonably accurate measure against the objective, or the known error is in the conservative direction.
LOW	The degree to which the indicator measures against the objective is largely unknown, or known to be low. Often this will involve surrogate indicators.

Table 4. Robustness Classifications

8. Fisheries Management response

- Current*

What are the current management arrangements that are in place to affect the level of the indicator against the objective and ensure adequate performance? The types of responses should particularly note the level of information available and the reliability of the evaluation.
- Future*

What, if any, are the proposed (extra or different) management arrangements/options (such as harvest strategies), including any possible changes to current arrangements. These should again note the current level of the indicator (current performance), the level of information available and reliability of the evaluation.
- What will be done if Performance Measure is exceeded (Performance Unacceptable)?*

What will be the management/industry response if the performance targets/limits etc indicate that performance is unacceptable?
- Issues for other agencies*

Some indicators may require informing other relevant government agencies.

9. Comments and Action

Provides an overview for this indicator including what are the future actions that need to be done (begin new monitoring, alter management plan and so on). In particular this section should include an explicit demonstration as to how the intergenerational equity issue is being addressed.

10. External Driver Check List

External drivers (currency exchange rates, land based pollution) affecting this indicator need to be noted here. NB: The impacts of environmental external drivers are also a major component within the generic tree structure.

APPENDIX 6

Comparison of Commonwealth 'Sustainable Fisheries' (EA) Guidelines with the National ESD Reporting Framework

EA Guidelines	ESD Reporting Framework
<p>PRINCIPLE 1. A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover.</p>	<p>Covered as part of Core Objective 1</p>
<p>Objective 1. The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability</p>	<p>SCFA Objective – Retained Species: To manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining long-term yields</p> <p>Objective for each component (stock/species/species group) to be stated. Indicator and performance measure defined so that it can be demonstrated that stock level is being maintained within an agreed range over time.</p>
<p>1.1.1 There is a reliable data collection system in place appropriate to the scale of the fishery. The level of data collection should be based upon a mix of fishery independent and dependent research and monitoring.</p> <p>1.1.2 There is a robust assessment of the dynamics and status of the species/fishery and periodic review of the process and the data collected. Assessment should include a process to identify any reduction in biological diversity and/or reproductive capacity. Review should ideally take at regular intervals but at least every three years.</p> <p>1.1.3 The distribution and spatial structure of the stock(s) has been established and factored into management responses.</p> <p>1.1.4 There are reliable estimates of all removals, including commercial (landings and discards), recreational and indigenous, from the fished stock. These estimates have been factored into stock assessments and target species catch levels.</p>	<p>Covered in Data Requirements and Data Availability sections of each component</p> <p>Covered in Data Evaluation and Data Reliability sections of each component</p> <p>Covered in the specification and justification of the structure of the component tree for retained species (e.g. separate or common stocks, multiple or single regions)</p> <p>Covered in Data Availability and Data Reliability sections of each component</p>

EA Guidelines	ESD Reporting Framework
<p>1.1.5 There is a sound estimate of the potential productivity of the fished stock/s and the proportion that could be harvested.</p> <p>Management Responses</p> <p>1.1.6 There are reference points (target/limit), that trigger management actions including a biological bottomline and/or catch or effort upper limit beyond which the stock should not be taken.</p> <p>1.1.7 There are management strategies in place capable of controlling the level of take.</p> <p>1.1.8 Fishing is conducted in a manner that does not threaten stocks of by-product species. Where possible guidelines 1.1.1 to 1.1.7 should be applied to byproduct.</p> <p>1.1.9 The management response, considering uncertainties in the assessment and precautionary management actions, has a high probability of achieving the objective.</p>	<p>Covered in Data Requirements section. May argue in some cases that such an estimate is not necessary to achieve Objective 1.</p> <p>Covered in the statements of objective/indicator/performance measure/management action</p> <p>Covered in the statements of Management Response</p> <p>These species are treated the same as any retained species. The objective is : to manage the take of retained species within ecologically viable stock levels by avoiding overfishing and maintaining long-term yields.</p> <p>Covered by the statements in the management responses and the reliability sections.</p>
<p>Objective 2. Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes.</p> <p>1.2.1 A precautionary recovery strategy is in place specifying management actions, or staged management responses, which are linked to reference points. The recovery strategy should lead to the recovery of the stock within a specified period of time, or until the species recovers.</p> <p>1.2.2 If the stock is estimated as being at or below the biological and/or effort bottom line, management responses such as a zero targeted catch, temporary fishery closure or a ‘whole of fishery’ effort or quota reduction is implemented.</p>	<p>Covered in the Management Response section of each component (what will be the response if a performance measure shows that the operational objective is not being achieved?) or if the stock is currently below a defined reference point, by the statement of operational objective/indicator/performance measure/management action for that stock. There is an explicit heading related to what management response will be taken if a performance measure is breached.</p>

EA Guidelines	ESD Reporting Framework
<p>PRINCIPLE 2. Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.</p>	<p>Core Objective 1</p>
<p>Objective 1. The fishery is conducted in a manner that does not threaten biological diversity via the removal of bycatch.</p>	<p>SCFA Objective – Non-Retained Species To manage the fishery in a manner that does not threaten biodiversity and habitat via the removal of bycatch (including protected species and ecological communities) and manage the take of bycatch species at ecologically viable stock levels</p>
<p>2.1.1 Reliable data, appropriate to the scale of the fishery, is collected on the composition and abundance of bycatch.</p> <p>2.1.2 There is a risk analysis of the bycatch with respect to its vulnerability to fishing.</p> <p>2.1.3 Measures are in place to avoid capture and mortality of bycatch species unless it is determined that the level of catch is sustainable (except in relation to threatened or protected species). Steps must be taken to develop suitable technology if none is available.</p> <p>2.1.4 An indicator group of bycatch species is monitored.</p> <p>2.1.5 There are decision rules that trigger additional management measures when there are significant perturbations in the indicator species numbers.</p> <p>2.1.6 The management response, considering the uncertainties in the assessment has a high chance of achieving the objective</p>	<p>Covered by Data Requirements and Data Availability Sections for each non-retained species component.</p> <p>Addressed in justification of structure of component tree for non-retained species and corresponding operational objectives etc. (More work needed here to determine what constitutes a ‘risk analysis’)</p> <p>Covered by Management Response sections for each non-retained species component</p> <p>Only if this is the most appropriate method of monitoring performance with respect to the operational objective</p> <p>Covered in Performance Measure and Management Response sections of each non-retained species component</p> <p>Covered in the Management Response and Reliability statements</p>

EA Guidelines	ESD Reporting Framework
<p>Objective 2. The fishery is conducted in a manner that does not threaten bycatch species avoids mortality of, or injuries to, threatened or protected species and avoids or minimises impacts on ecological communities.</p> <p>Information</p> <p>2.2.1 Reliable information is collected on the interaction with endangered, threatened or protected species and threatened ecological communities.</p> <p>Assessments</p> <p>2.2.2 There is an assessment of the impact of the fishery on protected or threatened species.</p> <p>2.2.3 There is an assessment of the impact of the fishery on threatened ecological communities.</p> <p>Management Responses</p> <p>2.2.4 There are measures in place to avoid capture and/or mortality of threatened or protected species.</p> <p>2.2.5 There are measures in place to avoid impact on threatened ecological communities.</p> <p>2.2.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.</p>	<p>SCFA Objective – Non Retained Species (Threatened Species Branch)</p> <p>To manage the fishery in a manner that does not threaten biodiversity and habitat via the removal of bycatch (including protected species and ecological communities) and manage the take of bycatch species at ecologically viable stock levels.</p> <p>Covered in Data requirements, availability and Reliability statements but only if there are any identified threatened or protected species or Communities affected by this fishery.</p> <p>Covered by the Evaluation Section.</p> <p>Covered by the Operational Objective/Indicator/ Performance Measure/Management Action and Reliability sections.</p>

EA Guidelines	ESD Reporting Framework
<p>Objective 3. The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally.</p>	<p>SCFA Ecosystem Objective: To manage the impacts of and on fishing such that only acceptable impacts occur to functional ecological relationships, habitat and processes.</p>
<p>2.3.1 Information appropriate for the analysis in 2.3.2 is collated and or collected covering the fisheries impact on the ecosystem and the environment generally.</p> <p>2.3.2 Information is collected and a risk analysis, appropriate to the scale of the fishery and its potential impacts, is conducted into the susceptibility of each of the following ecosystem components to the fishery</p> <ol style="list-style-type: none"> 1. Impacts on ecological communities <ul style="list-style-type: none"> • Benthic communities • Ecologically related species • Water column communities 2. Impacts on food chains <ul style="list-style-type: none"> • Structure • Productivity/flows 3. Impacts on the physical environment <ul style="list-style-type: none"> • Physical habitat • Water quality <p>Management Responses</p> <p>2.3.3 Management actions are in place to ensure significant damage to ecosystems does not arise from the impacts described in 2.3.1.</p> <p>2.3.4 There are decision rules that trigger further management responses when monitoring detects impacts on selected ecosystem indicators beyond a predetermined level, or where action is indicated by application of the precautionary approach.</p> <p>2.3.5 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective</p>	<p>Covered by the Data Requirements, Data Availability and Reliability sections.</p> <p>Covered by justification of the structure of ecosystem component tree and corresponding operational objectives, etc.</p> <p>Comparable Components in Generic Trees</p> <ul style="list-style-type: none"> • Bait Collection • Trophic Structure/Biodiversity • Benthic biota • Physical Structures • Provisioning • Translocation • Water Quality • Air Stock Enhancement <p><i>Note: operational objectives are more usefully expressed in terms of the activities carried out by the fishery (e.g. minimizing translocation of organisms) rather than in terms of impacts on, say, food chains.</i></p> <p>Covered by Operational Objective/ Indicator/Performance Measure/Management Response sections of each component</p> <p>Covered by Operational Objective/ Indicator/Performance Measure/Management Response sections of each relevant component</p>

In addition, the issues raised in the ‘benchmarks for environmental assessments’ relating to how the assessment process should be conducted – can all be covered in the components from the governance tree.

APPENDIX 7

Bellagio Principles of Assessing Sustainable development IISD (1997)

1. Guiding Vision and Goals

Assessment of progress towards sustainable development should:

- be guided by a clear vision of sustainable development and goals that define that vision.

2. Holistic Perspective

Assessment of progress towards sustainable development should:

- include a review of the whole system as well as the parts,
- consider the well-being of social, ecological, and economic sub-systems their state as well as the direction and rate of change of that state, of their component parts and the interaction between the parts, and
- consider both the positive and negative consequences of human activities in a way that reflects the costs and benefits for human and ecological systems, in monetary and non-monetary terms.

3. Essential Elements

Assessment of progress towards sustainable development should:

- consider equity and disparity within the current population and between present and future generations, dealing with such concerns as resource use, over-consumption and poverty, human rights and access to services, as appropriate,
- consider the ecological conditions on which life depends, and
- consider economic development and other, non-market activities that contribute to human/social well-being.

4. Adequate Scope

Assessment of progress towards sustainable development should:

- adopt a time horizon long enough to capture both human and ecosystem time scales thus responding to needs of future generations as well as those current to short term decision-making,
- define the space of the study large enough to include not only local but also long distance impacts on people and ecosystems, and
- build on historic and current conditions to anticipate future conditions – where do we want to go? where could we go?

5. Practical Focus

Assessment of progress towards sustainable development should include:

- an explicit set of categories or an organising framework that links vision and goals to indicators and assessment criteria,

- a limited number of key issues for analysis,
- a limited number of indicators or indicator combinations to provide a clearer signal of progress,
- standardising measurement wherever possible to permit comparison,
- comparing indicator values to targets, reference values, ranges, thresholds, or directions of trends, as appropriate.

6. Openness

Assessment of progress towards sustainable development should:

- make the methods and data that are used accessible to all and
- make explicit all judgements, assumptions, and uncertainties in data and interpretations.

7. Effective Communication

Assessment of progress towards sustainable development should:

- be designed to address the needs of the audience and set of users and
- be drawn from indicators and other tools that are stimulating and serve to engage decision-makers.

8. Broad Participation

Assessment of progress towards sustainable development should:

- obtain broad representation of key grass-roots, professional, technical and social groups, including youth, women, and indigenous people – to ensure recognition of diverse and changing values, and
- ensure the participation of decision makers to secure a firm link to adopted policies and resulting action.

9. Ongoing Assessment

Assessment of progress towards sustainable development should:

- develop a capacity for repeated measurement to determine trends,
- be iterative, adaptive, and responsive to change and uncertainty because systems are complex and change frequently,
- adjust goals, frameworks and indicators as new insights are gained, and
- promote development of collective learning and feedback to decision making.

10. Institutional Capacity

Assessment of progress towards sustainable development should:

- clearly assign responsibility and providing ongoing support in the decision making process,
- provide institutional capacity for data collection, maintenance, and documentation, and
- support development of local assessment capacity.

Assessing Sustainable Development: Principles in Practise (1997)

P. Hardi and T. Zdan editors. International Institute of Sustainable Development
Winnipeg CANADA

APPENDIX 8

National ESD Reporting Framework: Terminology

Confusion can occur if terms are not defined. There are a great many terms associated with ESD and these are often used interchangeably, sometimes in the same document. In particular, terms such as principles, objectives, goals and criteria are often used to mean the same thing. Moreover, confusion in terminology also arises when the adjective 'sustainable' is combined with other words to give terms such as sustainable fishery, sustainable stock, sustainable fishing, sustainable management, and sustainable catch. These terms need to be defined whenever they are used to avoid misunderstanding.

The aim of the section, developed by BRS, was to suggest a simple, minimalist terminology to assist communication during the implementation of the ESD initiative of the SCFA. Whilst alternative definitions are possible, for the purpose of this exercise the SCFA Working Group and the Reference Group have agreed on the following definitions.

Definitions for ESD Terms

Sustainable development/ ecologically sustainable development	Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased (National Strategy for Ecologically Sustainable Development, Council of Australia Governments, 1992).
Sustainable fishery	A fishery that is consistent with ecologically sustainable development (i.e. a fishery that uses, conserves and enhances the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.)
Fishery	A unit determined by an authority or other entity that is engaged in raising and/or harvesting fish. Typically the unit is defined in terms of some or all of the following: people involved, species or type of fish, area of water or seabed, method of fishing, class of boats and purpose of the activities.
Goal – Component	A major area of relevance to fisheries with respect to ESD (such as target species, bycatch species, marine environment, resource use/allocation, employment, income, lifestyle/culture and governance)
Sub-component, sub-sub-component, etc	Further sub-divisions of the components
Core objectives	Core ESD objectives for fisheries (also sometimes called principles)
Operational objective*²¹	An objective that has a direct and practical interpretation in the context of a fishery and against which performance can be evaluated (in terms of achievement)
Indicator*	A quantity that can be measured and used to track changes with respect to an operational objective. The measurement is not necessarily restricted to numerical values. For example, categorical values may be used.
Performance measure*	A function that converts the value of an indicator to a measure of management performance with respect to the operational objective
Reference point	The value of an indicator that can be used as a benchmark of performance against an operational objective.

* Note: the operational objective, indicator, and performance measure (or some other form of interpretation) are a package. Each of the three elements of the package is essential to properly define and interpret an indicator. One or more reference points may form part of the description of the performance measure.

²¹ An objective can be made into a criterion by re-wording and replacing 'to .. ' with 'should' or 'must'.

APPENDIX 9

Structure, Headings and Required Information for the ESD Reports

- 1.0 Overview
- 2.0 Rationale
- 3.0 Background
 - 3.1 Description of Fishery
 - 3.2 Biology of Species
 - 3.3 Summary of Management Objectives and Arrangements
 - 3.4 Major Environments – Physical, Economic, Social
- 4.0 Outline of Reporting Process
 - 4.1 Scope
 - 4.2 Report
 - 4.3 Component trees
 - 4.4 Risk Assessment
 - 4.5 Component Reports
- 5.0 Performance Reports
 - 5.1 Retained Species
 - 5.2 Non-Retained Species
 - 5.3 Other Impacts on the Environment
 - 5.4 Indigenous Well-being
 - 5.5 Community Well-being
 - 5.6 National Well-being
 - 5.7 Impacts of the Environment
 - 5.8 Governance
- 6.0 Bibliography
- 7.0 Appendices
 - 7.1 Attendees/Participants in Process
 - 7.2 Management Plan/Regulations