NATIONAL ESD FRAMEWORK PROJECT

Information Package

Ecological Risk Assessment
Version 4

OCTOBER 2004

Australian Government

Fisheries Research and Development Corporation

Ecologically Sustainable Development

Catching Sustainability

FRDC – Subprogram

This set of Case Study Guidelines is part of an on-going process do develop a reporting framework for ESD and fisheries within Australia. Changes are made regularly after studies have shown areas where improvements can be made.

Whilst this project is being run under the auspices of the AFMF, it should not be seen as being the policy of any one fisheries management agency.

The full version of this material is located in the How to guide that can be downloaded from the subprogram website www.fisheries-esd.com.

Version 1 July 2001
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Current Project Team

W. Fletcher
K. Sainsbury
J. Chesson
T. Hundloe

Background

National ESD Reporting Framework

Ecologically Sustainable Development (ESD) is:

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

Achieving ESD requires the integration of short and long-term economic, social and environmental effects in all decision-making. Fisheries agencies in Australia are committed to incorporating the principles of ESD into their management of fisheries resources - an important element of which is the ability to report on performance. Consequently, fisheries need a framework that enables them to report on their performance with respect to ESD.

In early 2000, the Fisheries Research and Development Corporation (FRDC) funded a study to develop an ESD reporting framework for Australian fisheries. One of the major outcomes required from this project was the production of a 'How To' Guide to assist individuals, agencies and the industry to provide comprehensive accounts of the current performance of their fisheries. This manual has been created to assist participants in meeting designed to complete all or part of the ESD process- particular those involved in the Risk Assessment stage. To gain a full understanding of ESD, the entire How To Guide should be read.

There are four main elements in the process to complete an ESD report which include:

(1) identifying the issues relevant to the fishery;
(2) prioritising these issues;
(3) completing suitably detailed reports on the performance of the fishery for each issue (dependent upon their priority and complexity); and also
(4) the compilation of summary background material on the fishery, the major species affected and the environments that the fishery operates within. This enables the reader to put the material within the assessment report into an appropriate context.

A number of tools have been developed to assist completing each of the four elements. A feature of these tools is the high level of involvement and input from each of the major stakeholder groups. Some of these tools can be used without completing the entire process – eg steps one and two can be used to complete a risk assessment as used in this manual.

SUMMARY OF PROCESS

Step 1. How are the Issues Identified?

The first step in the ESD reporting process is to identify the relevant issues for the fishery under consideration. This is assisted through the use and modification of a set of "*generic component trees*".

There is one *generic component tree* for each of the eight components of ESD (see appendix for details). Each of these trees was developed by the ESD Reference group to cover the suite of issues that are relevant to fisheries.

Each of these components is broken down into more specific sub-components for which ultimately operational objectives could be developed.

The generic component trees are used as a starting point, with each fishery tailoring them to suit their individual circumstances, expanding some sub-components and collapsing or removing others, depending upon the fishing methods areas of operations and the species involved.

Using these component trees assists the process of issue identification by moving through each of the ecological components of ESD in a comprehensive and structured manner, maximising consistency and minimising the chances of missing issues.

Step 2. How are the Issues Prioritised - Risk Assessment

Tailoring the component trees to a fishery often results in a large number of issues being identified, the importance of which varies greatly. In many cases, it will be helpful to prioritise the issues so that the level of management actions and the details of the reports generated are aligned with the importance of the issue.

To determine the priority of issues and the appropriate level of response, Risk Assessment methodology can be used to assist this process. This methodology operates by completing an assessment of the "Risk" associated with each of the identified issues as an initial screening exercise. For many issues, however, this initial screening is likely to be just the first step in a hierarchical process for determining what actions need to be taken.

The Risk Analysis tool used in this ESD process is based upon the AS/NZ Standard, but adapted for use within the fisheries context. It works by assigning a level of consequence (from negligible to catastrophic) and the likelihood of this consequence occurring (from remote to likely) for each issue.

From the combination of consequence and likelihood, an overall level of *Risk* is generated. This *Risk* can then be used to assist in deciding whether an issue requires specific management or not.

To be of value it is not sufficient to only quote the levels of consequence and likelihood levels chosen and the subsequent risk ratings generated. Instead,

appropriately detailed justifications for why these levels were chosen and why any decisions were made are also needed. The key element is that other parties who were not part of the process to generate the report need to be able to see the logic and assumptions behind the decisions that were made.

Step 3 How are Performance Reports Completed (note this is not a formal part of the Risk Assessment process but an outcome)?

Two levels of reporting are suggested, depending on the appropriate level of management response:
(1) Where specific management is not needed (ie low or negligible risk) reports only need to justify this conclusion. In some cases, only a few lines or a few paragraphs may be needed to achieve this. However, in other cases, this may require a number of analyses and several pages of justification.
(2) Where specific management actions are needed, a full performance report that details all elements of the management system is probably required. .

Step 4 What Background Material is Necessary?

An appropriate level of background material on the fishery is necessary to put the other sections of the report into context. The material presented should include a detailed description of the history of the fishery, its area of operation, fishing methods used and species targeted.

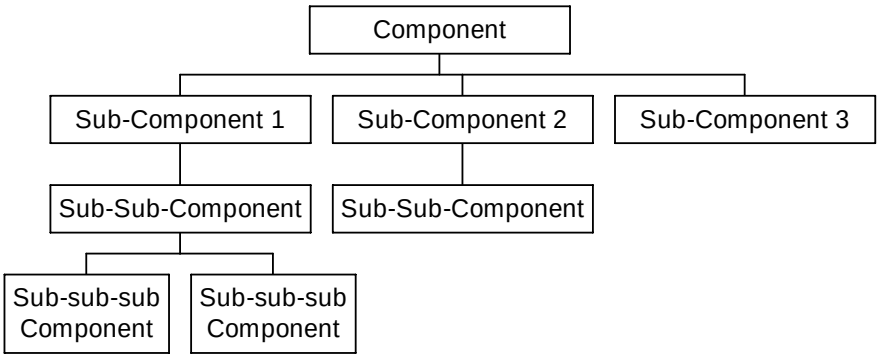
A summary of the biological and ecological characteristics of the main species and habitats that are affected by the fishery should also be provided.

Step 1 Identifying Issues - Component Trees

In order to complete a risk assessment and possibly develop sensible objectives, issues within the various categories of ESD need to be identified at an appropriate level. The method 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).

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 eight main components were arranged into a series of "generic" component trees (see Appendix 1). These generic trees are used as the starting point for each assessment and are subsequently adapted into trees specific for each fishery 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 a number of the generic sub-components (e.g. bait collection, ghost fishing). Whereas a trawl fishery may require the impacts on benthic biota to be assessed by dividing this issue into different habitat categories.



Modifying Trees

1. The group will need to modify the generic structure to meet specific issues for the fishery by adding issues not covered already and deleting issues that are not relevant. If any of the generic sub-components are removed, you should provide written justification as to why they are not applicable to this fishery. For a sub-component to be removed this requires the issue to not be significant, not just that you have no data.

2. Remember, at this stage of the process, it is about issue identification, not prioritisation so there should be virtually no discussion of how important an issue is unless someone raises an issue that is absolutely wrong. Even this may be useful to document. In many cases the articulation of what is NOT important is more valuable than what is. So if someone thinks it is an issue, deal with it.

Step 2 Risk Assessment/Prioritisation Process

After the components/issues are identified, a process to prioritise each of these needs to be completed. The risk assessment framework that could be applied at the workshop should be consistent with the Australian Standard AS/NZS 4360:1999 Risk Management, concentrating on the risk assessment components. 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.

What is Risk?

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

For a fisheries agency/department, 'risk' is associated with the chance of something affecting the agency/department's performance against the objectives in their relevant legislation. In contrast, for the commercial fishing industry, the term 'risks' generally relates to the potential impacts on their long-term profitability, while for the general community, 'risk' could relate to a possible impact on their enjoyment of the marine environment. The aim for each of these groups should be to ensure that the 'risk' of an unacceptable impact is kept to an acceptable level.

What is Risk Analysis?

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

The combination of the level of consequence and the likelihood of this consequence is used to produce an estimated level of risk associated with the particular hazardous event/issue in question. Determining the levels of consequence and likelihood should involve an assessment of the factors that may affect these criteria, but this should be done in the context of what existing control measures - management arrangements - are already in place. For example, in determining the risks from fishing for the spawning biomass of a species of prawn, you would need to take into account the current management regime (such as whether there are any restrictions on boat numbers, closed seasons and areas, etc) in assigning the appropriate likelihood and consequence values.

You should come up with very different values depending upon whether management is, or is not, included (if not, either you don't need management or your current management is having little effect). However, as the whole point of this exercise is to

see whether current management is acceptable or not, the assessment *must* include the arrangements that are currently being used.

The overall risk level for each hazard is generally calculated as the mathematical product of the consequence and likelihood levels (Risk = Consequence x Likelihood). From this product, which is called the *Risk Value*, each issue can be assigned a *Risk Ranking*, depending upon where a risk value falls within one of a number of predetermined categories.

In this *Guide*, five levels of risk have been suggested: 'Extreme', 'High', 'Moderate', 'Low' and 'Negligible'.

For the purposes of this exercise, we need to take a relatively high level approach, based on asking what is the risk to each issue of 'having a fishery'. In doing this, we need to recognise that this is actually integrating a large number of elements into an overall estimate of risk for the fishery.

If the overall level of risk for an issue were low, it would be unnecessary to complete a finer scale assessment. However, if the overall level of risk is high enough for specific management to be required, a second-phase risk assessment may be necessary, in order to identify the relative risks associated with each of the specific elements that led to the overall rating.

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 3 for details). 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 not always for the population. Similarly, when assessing 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, the workshop group should again consider the likelihood of the "harzardous" event (consequence) actually occurring based upon their 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 (Risk = Consequence x Likelihood), can be calculated. Finally each issue can then be assigned a *Risk Ranking* within one of five categories: Extreme, High, Moderate, Low and Negligible (see Table 1)

Table 1 Risk Table

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

Table 2– Risk Ranking Definitions

RISK	Reporting	Management Response
Negligible	0 Short Justification Only	Nil
Low	1 Full Justification needed	None Specific
Moderate	2 Full Performance Report	Continue Current Arrangements
High	3 Full Performance Report	Probable Increases to management
Extreme	4 Full Performance Report	Substantial additional management needed

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

Output from the Risk Assessment

The actual risk assessment is not just the scores generated during the assessment process but needs to include the appropriate level of documentation/justification for the categories selected.

Step 3 - Component/Performance Report Headings (not a formal part of Risk Assessment but may be useful for the outcomes)

For each issue identified as greater than a low risk/priority[1], a detailed assessment report could be generated. The National ESD Framework uses a set of 11 standard headings that each needs to be completed.

Performance Report Heading	***Description***
1. Rationale for inclusion	*Summary outcome of Risk Assessment*
2. Operational Objective (plus justification)	*What are your trying to achieve and why?*
3. Indicator	*What are you going to use to measure performance?*
4. Performance Measure/Limit plus (justification)	*What levels define acceptable and unacceptable performance and why?*
5. Data Requirements/Availability	*What monitoring programs are needed?*
6. Evaluation	*What is the current performance of the fishery for this issue?*
7. Robustness	*How robust is the indicator & or the performance measure in assessing performance against the objective?*
8. Fisheries Management Response	
- Current	*What are the management actions currently being used to achieve acceptable performance?*
- Future	*What extra management is to be introduced?*
- Actions if Performance Limit is exceeded	*What will happen if the indicator suggests performance is not acceptable?*
9. Comments and Action	*Summarise what actions will happen in the coming years*
10. External Drivers	*What factors, outside of the fisheries control may affect performance against the objective?*

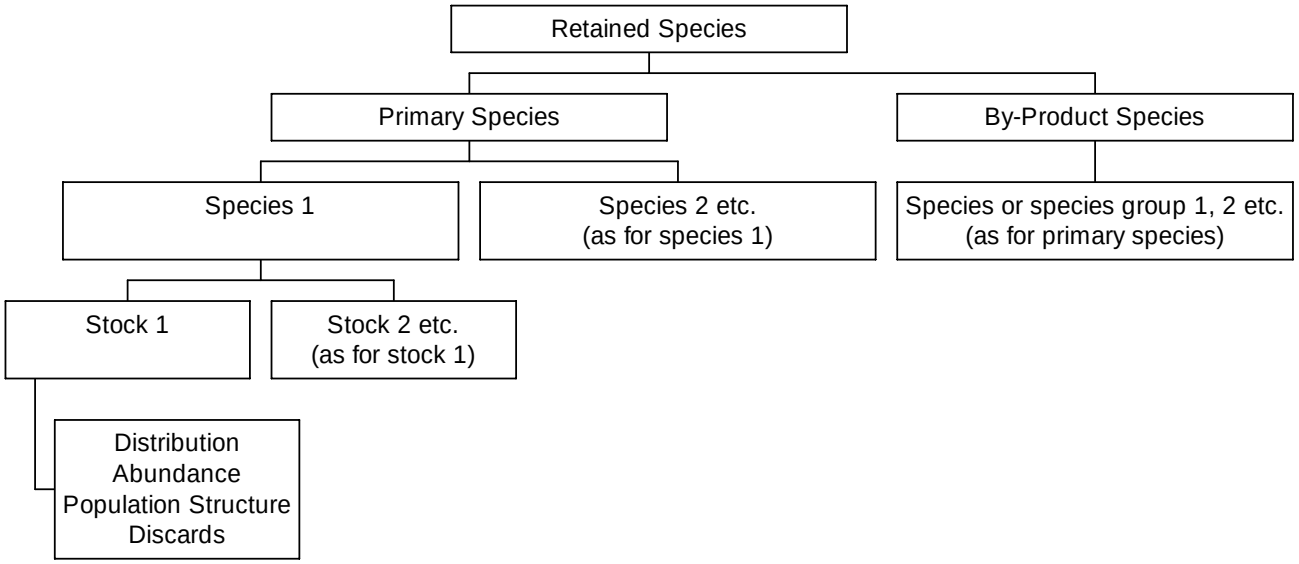
- In summary, this ESD Reporting process provides a logical framework for a management agency to justify that the current and proposed management actions (or inactions) appropriately address the issues, given the levels of risk and current knowledge available.

For more details see How To Guide.

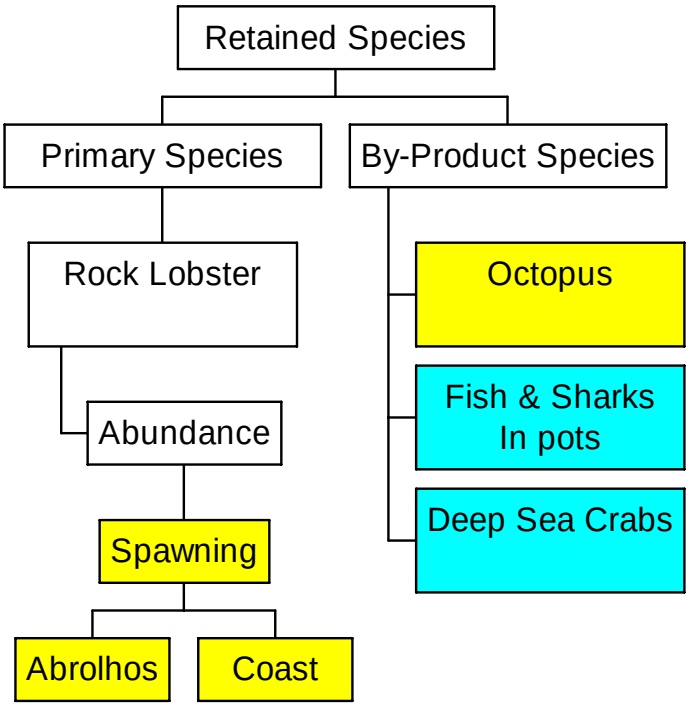
[1] Note, some low risk issues may still need to be reported because they are of high public concern

Appendix 1. COMPONENT TREES

1. GENERIC COMPONENT TREE for IMPACTS OF THE FISHERY ON RETAINED SPECIES

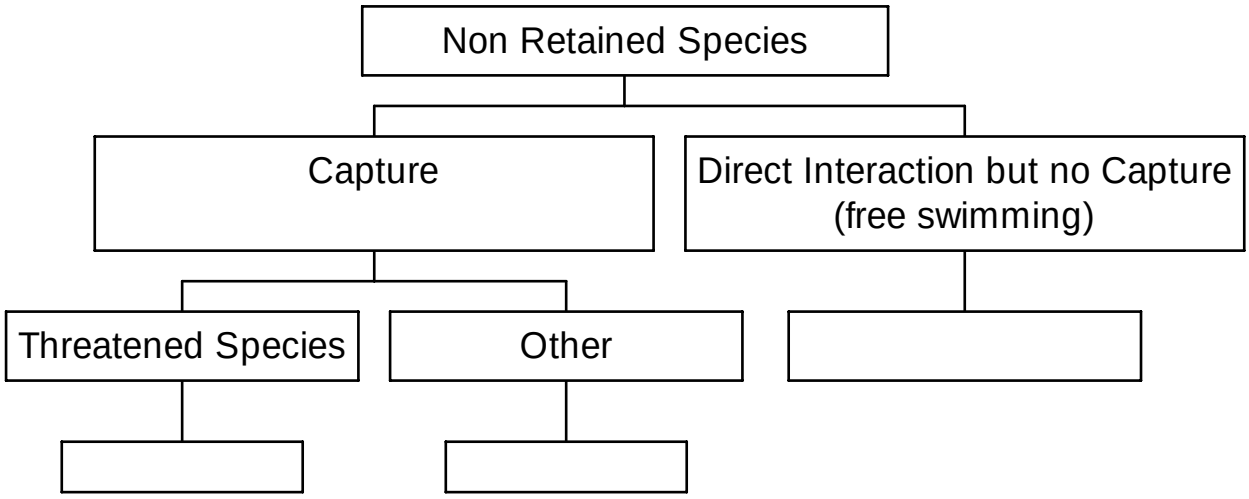


Example of Completed Tree

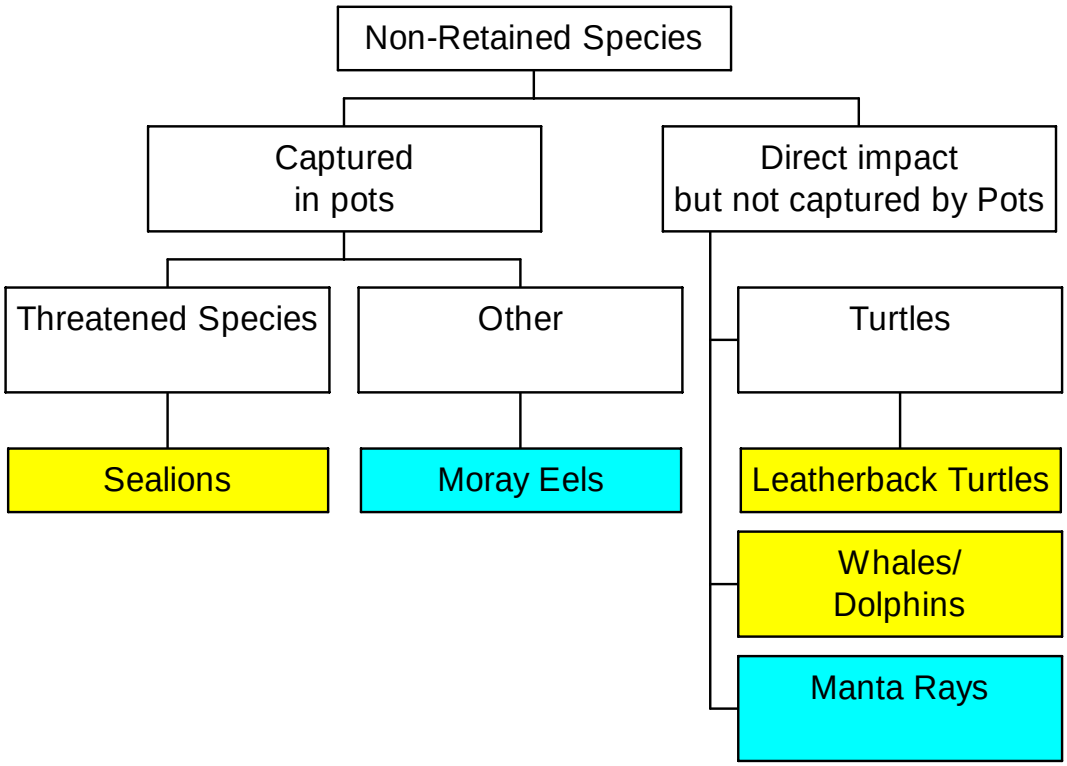


No major Generic Components were deleted from this tree when it was developed at the August 2000 workshop.
Yellow boxes indicate that the issue was considered high enough risk at the January 2001 Risk Assessment workshop to warrant having a full report on performance, Blue boxes indicate the issue was rated a low risk and only this justification is presented.

2 GENERIC COMPONENT TREE for IMPACTS OF THE FISHERY ON NON-RETAINED SPECIES (May need separate trees for the different catching sectors)

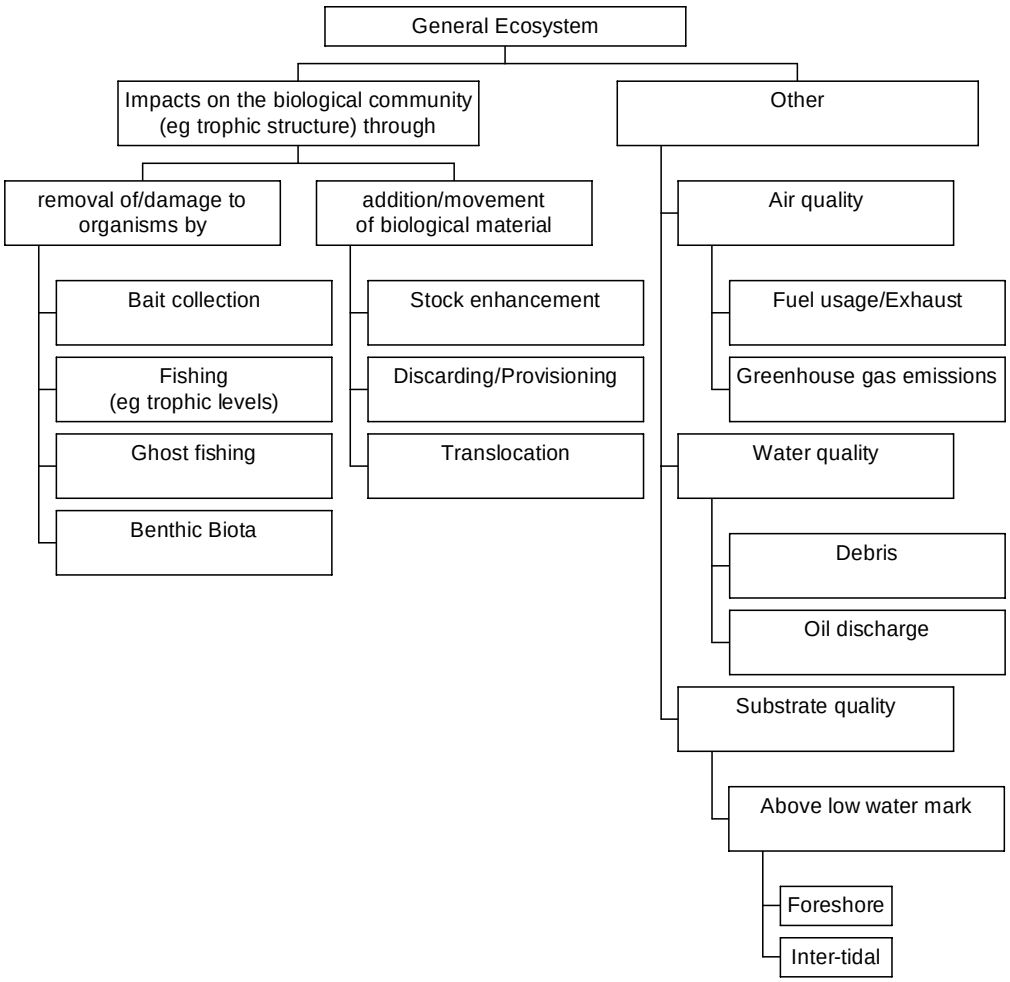


Rock Lobster Example

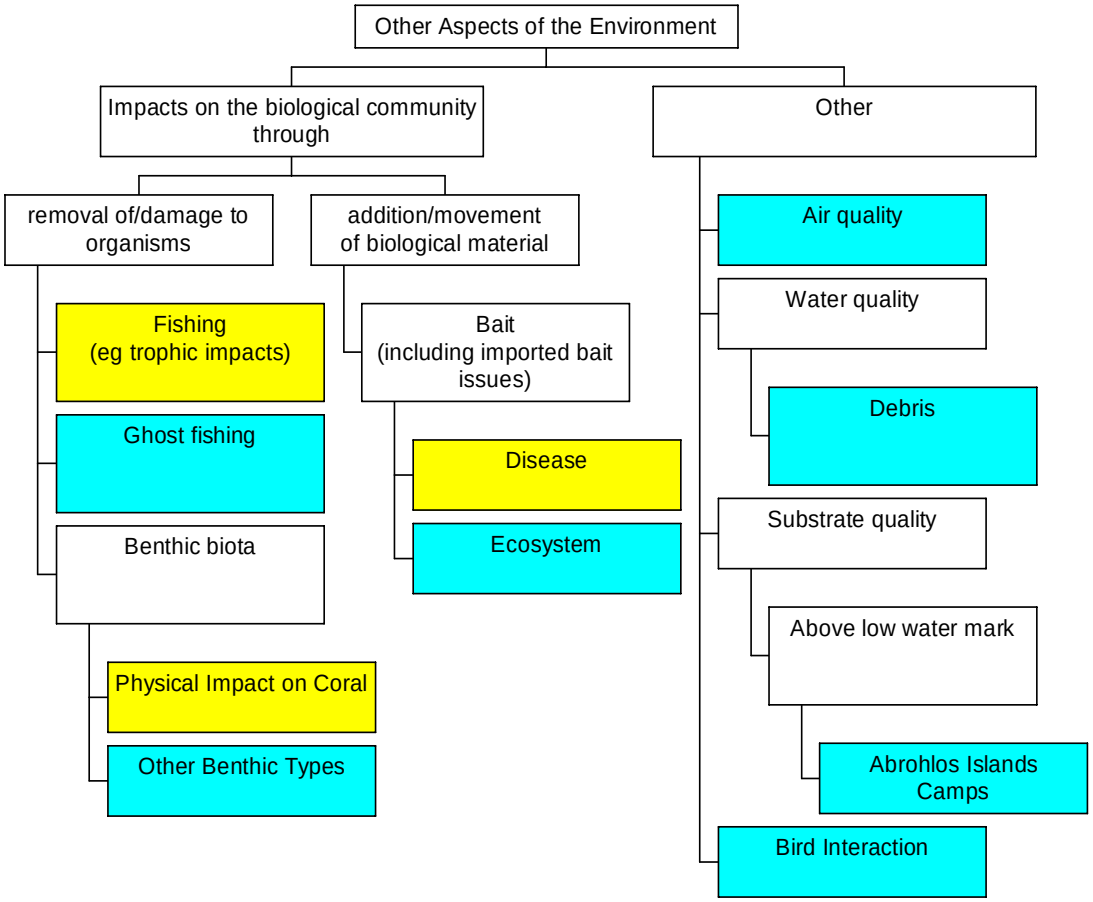


(nb - No major Generic Components were deleted from this tree when it was developed at the August 2000 workshop).
Yellow boxes indicate that the issue was considered high enough risk at the January 2001 Risk Assessment workshop to warrant having a full report on performance, Blue boxes indicate the issue was rated a low risk and only this justification is presented.

3. GENERIC COMPONENT TREE FOR IMPACTS OF THE FISHERY ON THE GENERAL ECOSYSTEM



3b. Specific Example for the impact of the “Rock Lobster Fishery” on other aspects of the environment



nb The Generic Components deleted from this tree included impacts of Bait collection (another fishery), Stock Enhancement (does not occur), Translocation (does not occur). Yellow boxes indicate that the issue was considered high enough risk at the January 2001 Risk Assessment workshop to warrant having a full report on performance, Blue boxes indicate the issue was rated a low risk and the justification for this rating is presented.

Appendix 2 Risk Assessment Tables

Table A2.1 Consequence categories for the Major Retained/Non-Retained Species

Level	Ecological (Retained: target/Non-retained: major)
Negligible (0)	Insignificant impacts to populations. Unlikely to be measurable against background variability for this population.
Minor (1)	Possibly detectable, but minimal impact on population size and none on dynamics.
Moderate (2)	Full exploitation rate, but long-term recruitment/dynamics not adversely impacted.
Severe (3)	Affecting recruitment levels of stocks/or their capacity to increase.
Major (4)	Likely to cause local extinctions, if continued in longer term (i.e. probably requiring listing of species in an appropriate category of the endangered species list (eg IUCN category).
Catastrophic (5)	Local extinctions are imminent/immediate

Table A2.2 Consequence categories for the By-Product Species/Minor Non-retained species

Level	Ecological (RETAINED: By-product/Non-retained: other)
Negligible (0)	Area where fishing occurs is negligible compared to where the relevant stock of the species resides (< 1%)
Minor (1)	Take in this fishery is small (< 10%), compared to total take by all fisheries and these species are covered explicitly elsewhere. Take and area of capture by this fishery is small, compared to known area of distribution (< 20%).
Moderate (2)	Relative area of, or susceptibility to capture is suspected to be less than 50% and species do not have vulnerable life history traits.
Severe (3)	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 Relative levels of capture/susceptibility suspected/known to be greater than 50% and species should be examined explicitly
Major (4)	N/A Once a consequence reaches this point it should be examined using Table A1.
Catastrophic (5)	N/A (See Table A1).

Table A2.3 Consequence levels for the impact of a fishery on the general ecosystem/trophic levels.

Level	Ecological (ECOSYSTEM)
Negligible (0)	General - Insignificant impacts to habitat or populations, Unlikely to be measurable against background variability Ecosystem: Interactions may be occurring but it is unlikely that there would be any change outside of natural variation
Minor (1)	Ecosystem: Captured species do not play a keystone role – only minor changes in relative abundance of other constituents.
Moderate (2)	Ecosystem: measurable changes to the ecosystem components without there being a major change in function. (no loss of components).
Severe (3)	Ecosystem: Ecosystem function altered measurably and some function or components are locally missing/declining/increasing outside of historical range &/or allowed/facilitated new species to appear. Recovery measured in years.
Major (4)	Ecosystem: A major change to ecosystem structure and function (different dynamics now occur with different species/groups now the major targets of capture) Recovery period measured in years to decades.
Catastrophic (5)	Ecosystem: Total collapse of ecosystem processes. Long-term recovery period may be greater than decades.

Table A2.4 Likelihood Definitions

Level	Descriptor
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