Fisheries Ecological Risk Assessment & Management

What are Fisheries Ecological Risk Assessments?

As part of its commitment to an ecosystem based approach to fisheries management, the Australian Fisheries Management Authority (AFMA) has developed an Ecological Risk Management (ERM) framework that assists decision makers in developing fisheries policy, regulations and management arrangements. This framework uses an Ecological Risk Assessment for the Effects of Fishing (ERAEF) as the primary means of assessing the risks a fishery poses to the marine ecosystem.

The ERAEF differs significantly from traditional fisheries management techniques. Whilst in the past fisheries managers have concentrated on target species and used measures such as population size and maximum sustainable yield estimates to manage fisheries, the ERAEF considers risks to all ecosystem components affected by a fishery. This can include risks posed by fishing pressure, as well as risks from external impacts such as bait collection, vessel pollution and coastal development.

Since the ERAEF enables fishery managers to examine the risks posed by a fishery in a holistic manner, management responses are more aligned with the requirements of ecosystem-based fishery management. This was an important development in AFMA's management of Commonwealth fisheries as the *Fisheries Management Act 1991*, the *Torres Strait Fisheries Act 1984* and the *Environment Protection and Biodiversity Conservation Act 1999* all require AFMA to pursue Ecologically Sustainable Development (ESD).

Why was the ERAEF developed?

The ERAEF was designed to support the implementation of ESD in Commonwealth fisheries, which considers the impacts of fishing on five components of the marine ecosystem

- commercial species
- byproduct species
- bycatch species
- protected species
- habitats and communities.

Risks to most of these components are already addressed to some extent by existing policies implemented by AFMA. For example target species and some byproduct species are managed under fishery specific harvest strategies. These set out the management actions necessary to achieve the objectives of the *Commonwealth Harvest Strategy Policy and Guidelines 2007*, including processes for monitoring and conducting assessments. The *Commonwealth Policy on Fisheries Bycatch 2000* aims to minimise fishing related impacts on bycatch species, defined as species that interact with a fishery but are not retained. This includes general bycatch species and protected species.

However, fully implementing ESD means considering the risks to **all** components of the ecosystem, so AFMA needs to develop a practical and defensible way to assess the risks to all five components, despite having different levels of information available for each.

What are the benefits of the ERAEF?

Ecological risk assessments are used to identify which species, habitats and communities are at risk from the effects of fishing. The ERAEF allows a much broader range of species to be assessed under a single framework, many of which lack the required data to undergo more traditional assessment techniques.

The ERAEF is a time and cost-efficient process that allows managers to make more informed decisions without requiring exhaustive data collection and assessments on all species of interest. ERAEF provides a basis for developing a Fishery Management Strategy for each fishery that includes:

- fishery specific harvest strategies (focused mainly on key and secondary commercial species)
- fishery specific ERM (focused on byproduct and bycatch including protected species)
- fishery specific Bycatch and Discard Action Plans
- 5 year Research Strategies.

Previously, these strategies and plans each had their own management objectives and were developed via independent processes. This increased the risk of inconsistency and inefficiency in how AFMA pursues its legislative objectives.

With the implementation of the ERAEF leading to the development of a single combined Fishery Management Strategy management objectives will be more coherent. Further, it will ensure greater consistency, clarity, transparency and cost efficiency in how AFMA develops, documents and implements its management processes and will better explain the linkages between these processes. In addition, it will result in one document that addresses statutory reporting requirements under the *Commonwealth Harvest Strategy Policy and Guidelines 2007* and the *Environment Protection and Biodiversity Conservation Act 1999*.

How does the ERAEF work?

The ERAEF involves a hierarchy of risk assessment methodologies progressing from a qualitative analysis at Level 1 to a more detailed and quantitative analysis at Level 3. This approach provides a way of screening out low risk components and focusing more detailed analyses on high risk components. Whilst providing an efficient form of risk assessment, this approach is also precautionary because data deficient species are assessed as high risk and may require further information to be collected. The stages of the ERAEF are as follows:

- **Scoping** - This provides a characterisation of the fishery, collating information such as fishery context, species lists, ecological sustainability objectives, and hazards (fishery activities that may impact the ecosystem).

- **Level 1** (Scale, Intensity, Consequence Analysis - SICA) - A comprehensive but qualitative analysis of risk in which the most vulnerable "unit" in each component is assessed. This stage serves to exclude "low risk" components from analysis at Level 2 or beyond, since if the most vulnerable species is low risk, other less vulnerable species will be as well.
- **Level 2** (Productivity and Susceptibility Analysis – PSA/Sustainability Assessment of Fishing Effects – SAFE) - A species specific (or habitat/community specific) semi-quantitative approach which assesses fishery risks to each unit (eg. species) carried forward from Level 1. Relative to the PSA approach, the SAFE approach is a more quantitative approach, requires less productivity data than the PSA and is able to account for cumulative risk. Units assessed to be at high risk at Level 2 can either be managed directly or carried forward to Level 3 for fully quantitative assessment.
- **Level 3** - A unit-specific, quantitative approach that accounts for spatial and temporal dynamics of units and fisheries and quantifies uncertainties around stock status.

The results of the ERAEF will be used by fishery managers to inform appropriate management responses to identified high risks. Ecological risk assessments will be conducted on each Commonwealth fishery on a 5-year cycle unless changes trigger an earlier review. This will also enable managers to review the effectiveness of management arrangements within a fishery and to provide adaptive management where required.

Recent changes to the Ecological Risk Management Framework

AFMA's ERM framework was initially developed in 2007 and has since been successfully applied to a number of fisheries in Australia, and internationally. During and following implementation from 2007-2014, several areas of improvement were identified. In 2014 AFMA engaged the Australian Continuous Improvement Group to independently review the framework and sought recommendations from CSIRO for improvements to the ERAEF. As a result, key changes to the ERM framework have been made including:

- Input databases and species lists have been revised and updated (an ongoing process).
- Level 2 assessments have been revised to include PSA, SAFE and the residual risk analysis (RRA) process (with residual risk guidelines).
    - SAFE has been adopted as the preferred Level 2 approach where data and species biology allow.
    - The Level 2 SAFE approach has been further refined. Species assessed as high risk under base SAFE (bSAFE) method may be further assessed using the enhanced SAFE (eSAFE) method[1].

[1] SAFE has been developed in two forms – base SAFE (bSAFE) and an enhanced SAFE (eSAFE). eSAFE has greater data and resourcing (time and dollars) requirements than bSAFE and is recommended to only be used for species likely to be assessed as high risk by bSAFE.

- Where a Level 3 equivalent assessment already exists for a species (eg. via harvest strategies), Level 2 assessments will no longer be conducted.
- An ERA online interactive tool to assess the effects of management changes has been developed.

These changes have ensured that the new ERAEF framework is robust, efficient and cost-effective as well as precautionary.

Further amendments will be made to the ERAEF as new information becomes available. For example further work is being done on reassessment triggers, the consideration of cumulative risk and on developing ERA inputs and assessments for habitats and communities. This work is being overseen by AFMA's ERA Technical Working Group which will ensure the ERAEF continues to be a scientifically robust tool for fishery managers.

The Ecological Risk Management Guide

The ERM Guide has been produced to assist AFMA fishery managers to implement ERAEF in a consistent and transparent manner. It will also assist other agencies, advisory committees and stakeholders involved in ERM processes.

The ERM Guide outlines the process by which fishery managers can plan, implement, monitor and review fisheries to ensure they are being managed in an ecologically sustainable way. The Guide consists of five broad steps which outline ERAEF processes, key documentation, participants and their roles and responsibilities, and the integration of ERAEF with broader fisheries management.

- **Step 1 – Assess (re-assess) ecological risk**

Ecological risk assessment is undertaken for a fishery to identify at-risk units (fish species or stocks). For first time assessments, this occurs at step 1 however, once management measures are in place to mitigate against identified risks, subsequent re-assessments serve a monitoring role (step 4) to provide a measure of performance against sustainability objectives.

This step outlines key tasks in relation to undertaking an ERA including budget planning, contracting, data collation and the re-assessment process itself.

- **Step 2 – Develop ERM responses and amend Fishery Management Strategy and Annual Work Plans**

With risk levels now identified, managers must develop responses to mitigate them, starting with high risks. This involves consideration of a range of available management tools (eg: gear restrictions, spatial closures) with relevant stakeholder consultation. Once agreed, management responses must be included in relevant documentation, appropriate data collection and monitoring outlined and re-assessment triggers developed.

- **Step 3 – Implement Fishery Management Strategy**

This step involves the broader implementation of FMS and relevant amendments to documentation such as fishing concessions, permit conditions and closures as a result of ERA outcomes. This must be communicated to those that will be affected by these changes within the industry prior to their enforcement.

- **Step 4 – Performance monitoring and reporting**

This step outlines the development and monitoring of performance indicators based on the outcomes of ERA. This will allow managers to evaluate the effectiveness of any management responses implemented and whether any major shifts in the fishery have occurred that may necessitate re-assessment. Performance will be monitored and reported on an annual basis (unless otherwise required by legislation) in line with AFMA's corporate reporting requirements. This will be achieved through the monitoring of management processes, compliance, re-assessment triggers and ecological risk.

- **Step 5 – Strategy review, evaluation and improvement**

Key AFMA fishery documents will be critically reviewed and evaluated. This will occur on differing schedules, with Annual Work Plans each year and Fishery Management Strategies on a 5-year basis. An independent process undertaken by auditors as part of AFMA's Quality Management System is being developed supported with input from expert stakeholder groups.