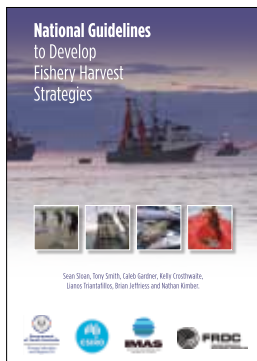


NATIONAL GUIDELINES TO DEVELOP FISHERY HARVEST STRATEGIES

A SUMMARY





National Guidelines to Develop Fishery Harvest Strategies

FRDC Project No. 2010/061

Sloan, SR, Smith, ADM, Gardner, C, Crosthwaite, K, Triantafillos, L, Jeffries, B and Kimber, N (2014) *National Guidelines to Develop Fishery Harvest Strategies*. FRDC Report – Project 2010/061. Pp 1-80.

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ISBN: 978-0-9924621-5-4

Design: coretext.com.au

Illustrations: Paul Dickenson

Photos: PIRSA; **Cover Photo:** Paul Jones

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The Fisheries Research and Development Corporation plans, invests in and manages fisheries research and development throughout Australia. It is a statutory authority within the portfolio of the federal Minister for Agriculture, Fisheries and Forestry, jointly funded by the Australian Government and the fishing industry.

WHAT IS A HARVEST STRATEGY?

A harvest strategy brings together all of the key scientific-monitoring, assessment and management components used to make decisions about the intensity of fishing activity to be applied, or catch to be removed from, a fish stock or fishery. When all of these components are brought together to form an integrated package, they create a formal harvest strategy.

“A harvest strategy is a framework that specifies the pre-determined management actions in a fishery for defined species (at the stock or management unit level) necessary to achieve the agreed ecological, economic and/or social management objectives”.

This formal definition should be read in conjunction with the ‘Key elements of a harvest strategy’, outlined in section 5.2 of the National Harvest Strategy Guidelines.



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In its simplest form, a harvest strategy provides a framework to ensure that fishery managers, fishers and key stakeholders think about, and document, how they will respond to various fishery conditions (desirable or undesirable), before they occur.





HOW WILL A FISHERY BENEFIT FROM A HARVEST STRATEGY?

Harvest strategies offer an effective tool to integrate the ecological, social and economic dimensions of fisheries management into a single framework for decision making. Harvest strategies represent a best-practice approach to fisheries management decision making, as demonstrated by their wide use internationally and throughout Australian jurisdictions.

Harvest strategies, in various forms, have been adopted in the United States (US), Canada, Iceland, New Zealand, Norway and South Africa. They are a required component for certification by the Marine Stewardship Council. Formal harvest strategies are also used internationally in some Regional Fisheries Management Organisations (RFMOs).

One of the main benefits of adopting a harvest strategy is the increased level of certainty and transparency provided for all fishery stakeholders, particularly in relation to how decisions are made in fishery management.

Creating improved certainty and transparency has several advantages for a fishery:

- It contributes to creating a climate of trust between fishery stakeholders;
- It reduces tensions between stakeholder groups;
- It allows fishery managers and fishers to operate with greater confidence and efficiency; and
- It allows for greater business planning by commercial fishers, as the fishery management responses to various levels of fishery performance are documented and more predictable.

The adoption of a well constructed harvest strategy allows for more efficient and proactive decision making to be adopted, in the face of the uncertainty which is inherent to fisheries management.

In Australia, the Commonwealth Fisheries Harvest Strategy Policy, implemented in 2007, provided a good foundation from which to base a consistent national approach. However, because of the inconsistent approach to harvest strategy development across jurisdictions, the Australian Fisheries Management Forum (AFMF) identified the need for a consistent national framework to be developed.

The Australian Fisheries Management Forum (AFMF) and the Fisheries Research and Development Corporation (FRDC), supported the development of national guidelines to assist Australian fisheries management agencies, fishers and key stakeholders in the development of consistent harvest strategies. The national guidelines also aim to facilitate a consistent approach to the development of over-arching jurisdictional level harvest strategy policies by providing definitions, common language and important contextual information for stakeholders to better understand the purpose of harvest strategies and how they are applied.

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Overall, the adoption of a consistent national approach to harvest strategy development is expected to lead to better managed fisheries across Australia. This is because decisions on ecologically sustainable harvest levels will be made in a more transparent, timely and predictable manner, with the support and understanding of fishers and key stakeholders.

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“In the Heard Island and McDonald Island Fishery, with the clarity of an agreed harvest strategy, which incorporates both target and limit reference points, we are able to rely directly on the science outcomes from our stock assessments. These findings then drive our management decisions on setting Total Allowable Catch in the toothfish and icefish fisheries. This provides certainty for us in knowing our stocks are well managed; allows us to invest for the future on the basis of good science; and ensures we don't have big changes overnight in our fishery management regimes.”

MARTIN EXEL, GENERAL
MANAGER ENVIRONMENT
AND POLICY, AUSTRAL
FISHERIES PTY LTD

WHERE DOES A HARVEST STRATEGY FIT WITHIN THE BROADER FISHERY MANAGEMENT FRAMEWORK?

To understand the role of harvest strategies in fishery management, it is important to consider how they fit within the broader fisheries management framework. At the higher level, fisheries management is guided by international obligations contained in treaties such as:

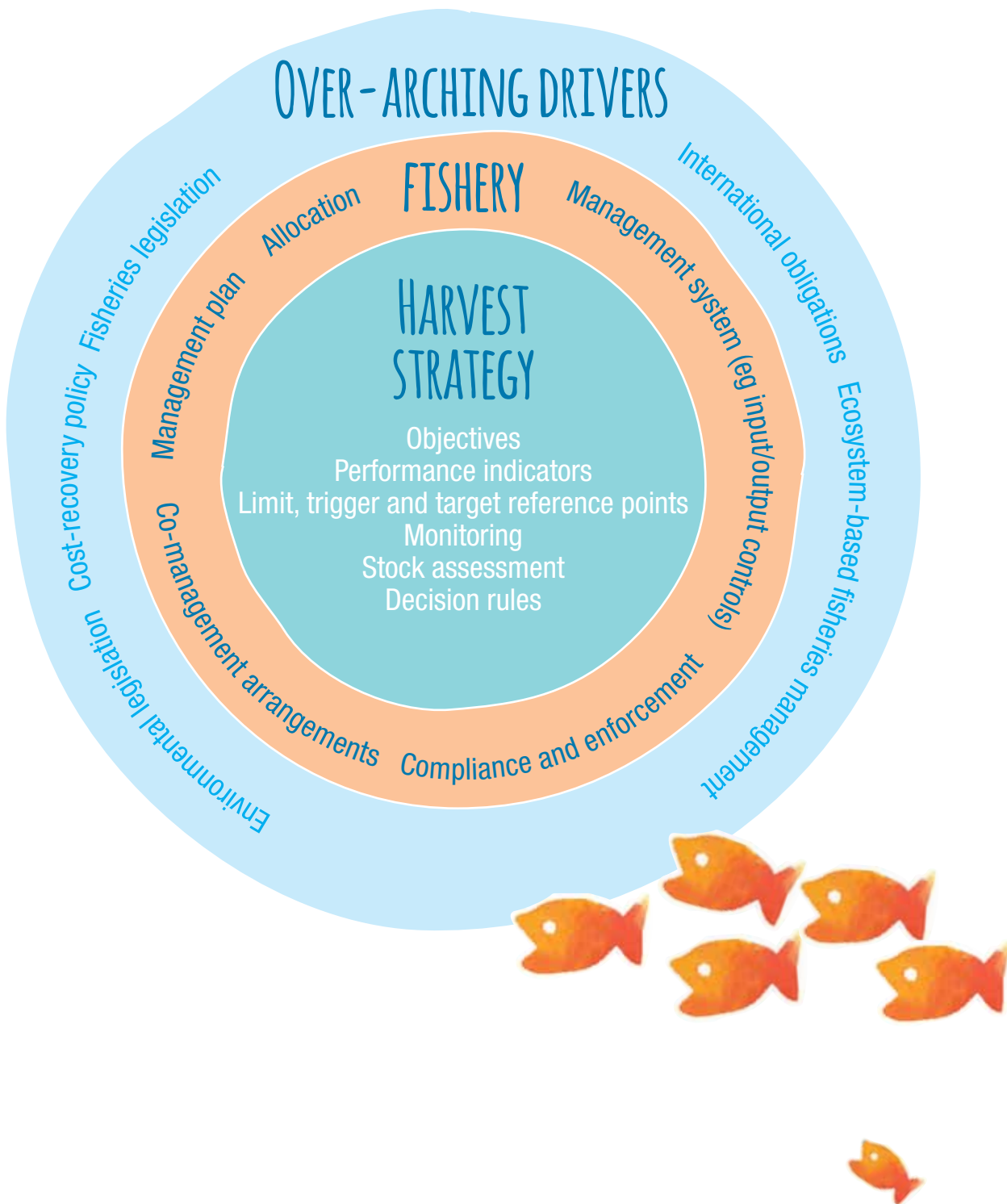
- the United Nations (UN) Convention on the Law of the Sea (1982) and the UN Straddling Fish Stocks Agreement (UNCLOS 1995);
- the FAO Code of Conduct for Responsible Fisheries (FAO 1995);
- specific fisheries legislation (Fisheries Acts) in each jurisdiction;
- Commonwealth, State and Territory environment legislation; and
- broad policy frameworks directed at addressing issues such as ecologically sustainable development (ESD), by-catch reduction, ecosystem based fisheries management and cost recovery.

Sitting beneath these higher-level obligations, each fishery has a specific management framework, such as quota or effort control systems. These provide a set of management controls, which are usually described in regulations, a fishery management

A harvest strategy provides the 'nuts and bolts' of a fishery management plan and should form the basis of the adaptive management cycle.

plan or a fishery management policy. The focus of these plans or policies is on the broader set of controls necessary to manage that fishery, including allocation arrangements, co-management arrangements, education and extension strategies, research strategies and compliance monitoring and surveillance strategies.

These documents provide a high level of certainty and accountability for all stakeholders involved.





THE NATIONAL GUIDELINES
RECOGNISE THAT 'ONE SIZE
DOES NOT FIT ALL'

WHAT PRINCIPLES SHOULD BE APPLIED WHEN DEVELOPING A HARVEST STRATEGY?

Because of the diverse and dynamic nature of fisheries management, one size does not fit all and there will always be situations within the fishery that do not fit the guidelines. For this reason a set of design principles has been developed to promote a pragmatic and common sense approach to developing harvest strategies.

- a) Consistent with legislative objectives, including the principles of Ecologically Sustainable Development;
- b) Pragmatic and easy to understand;
- c) Cost effective;
- d) Transparent and inclusive;
- e) Unambiguous;
- f) Precautionary; and
- g) Adaptive.

a) Consistent with legislative objectives, including the principles of Ecologically Sustainable Development (ESD)

ESD is a common high-level legislative objective across Australian fishery management jurisdictions and is also

The National Guidelines aim to cover all of the main issues and challenges encountered when developing harvest strategies in the diverse Australian fisheries context.

incorporated in the *Guidelines for the Ecologically Sustainable Management of Fisheries*, to support fishery assessment for export under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*. In this context, Australian harvest strategies should adopt a holistic ESD approach, to incorporate the ecological, social and economic dimensions of fisheries management.

b) Pragmatic and easy to understand

For harvest strategies to be effective, they need to be easily understood and accepted by fishers and key stakeholders. They also need to take into account and be adapted to the current context of a fishery. This includes considering the data and information available to monitor and assess the fishery and the performance of the harvest strategy.

c) Cost effective

Cost effective management is a common objective included in most fisheries legislation. Therefore, harvest strategies should involve careful analysis of the costs and benefits of alternative strategies and explicitly recognize the ongoing and future data and monitoring requirements associated with a particular approach (eg. consider the catch/cost/risk trade-offs).

d) Transparent and inclusive

Transparency and inclusiveness is a principle that should be applied to all facets of fisheries management, including harvest strategy development. The process used to develop harvest strategies and the steps involved in implementation and ongoing application should be transparent and involve fishers and key stakeholders that are affected by the harvest strategy. In simple terms, this requires consultation and full disclosure of information with fishers and relevant key stakeholders during the design and implementation process. Doing this will lead to stronger stakeholder understanding and ownership of the harvest strategy, and the outcomes of decisions made in line with them.

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A tailored approach to harvest strategy development is required to meet each fishery's specific circumstances. The guidelines have been designed to assist fishery managers, fishers and key stakeholders in the development of harvest strategies across the diverse range of Australian fisheries, particularly where key challenges exist, such as multi-jurisdictional, data-poor and multi-sector fisheries.

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e) Unambiguous

The main purpose of harvest strategies is to provide for a structured decision making framework. Therefore harvest strategies should avoid being ambiguous, to limit the scope for different interpretations of their application or meaning. This is particularly important when developing the operational objectives and decision rules. Ideally, all of the possible decision making scenarios that could emerge in a fishery, in its current or future state, should be considered during the design of the harvest strategy, to avoid unanticipated issues emerging.

f) Precautionary

The precautionary principle requires that if there is a threat of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason to postpone preventive measures. In the context of harvest strategy development, the precautionary principle helps to guide how risk is managed, particularly when a high degree of uncertainty exists or when stocks are being recovered from overfishing. The precautionary principle can also help to guide the development of limit reference points, as part of harvest strategies, to avoid the scope for fish stocks to become overfished.

g) Adaptive

A key function of harvest strategies is to provide for increased certainty and predictability in the management of fisheries. However, this must also be balanced with the need for flexibility to allow for changing circumstances and for new information to be considered. It is important to note that this does not imply that harvest strategies should automatically be reviewed when decision rules trigger catch or effort reductions.

KEY STEPS TO DEVELOP AND IMPLEMENT A HARVEST STRATEGY

The following key steps are suggested when developing a harvest strategy, noting that some steps may not be necessary, or may vary, if comprehensive management arrangements already exist.



- | | | |
|---|--------------------------------------|---|
| 1 | Define the fishery | Define the fishery to which the management plan or harvest strategy applies |
| 2 | Engage stakeholders | Establish a mechanism to engage stakeholders in the process |
| 3 | Legislation and policy | Identify relevant legislation and over-arching policy objectives |
| 4 | Determine objectives | Develop defined conceptual management objectives |
| 5 | Establish ESD context | Determine the ESD status and context of the fishery |
| 6 | Harvest strategy construction | Build the technical elements of the harvest strategy |
| 7 | Testing | Test the robustness of the harvest strategy |
| 8 | Review | Periodically review and update the harvest strategy |

1. Defining the fishery to which the harvest strategy applies



Clearly defining the fishery to which the harvest strategy will apply is a critical initial step in determining the scope of the harvest strategy to be developed. This step involves compiling and reviewing all available information on the fishery (for example, identifying the target species, fishing type, location, jurisdictions, and user groups) to build a clear picture of what the harvest strategy will apply to.



DETERMINE AN APPROPRIATE MECHANISM TO ENGAGE FISHERS AND RELEVANT KEY STAKEHOLDERS IN THE DESIGN PROCESS

2. Establishing a mechanism to engage stakeholders in the process

An key step in designing the harvest strategy is to determine an appropriate mechanism to engage fishers and relevant key stakeholders in the process. How this is done will need to be assessed on a case by case basis and will be influenced by the type and size of the fishery, the resources available and the existing institutional arrangements in each jurisdiction (for example, whether or not management advisory committees are used).

3. Identify relevant legislation and over-arching policy objectives

It is important at the beginning of the process to identify the high level over-arching legislative and policy objectives that will influence and shape the nature of the harvest strategy for the fishery. These may vary between fishery and in each jurisdiction. These high-level objectives need to be taken into account when developing the conceptual and operational management objectives for each fishery.

4. Develop defined conceptual management objectives

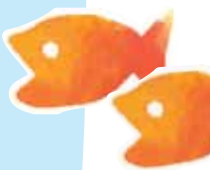
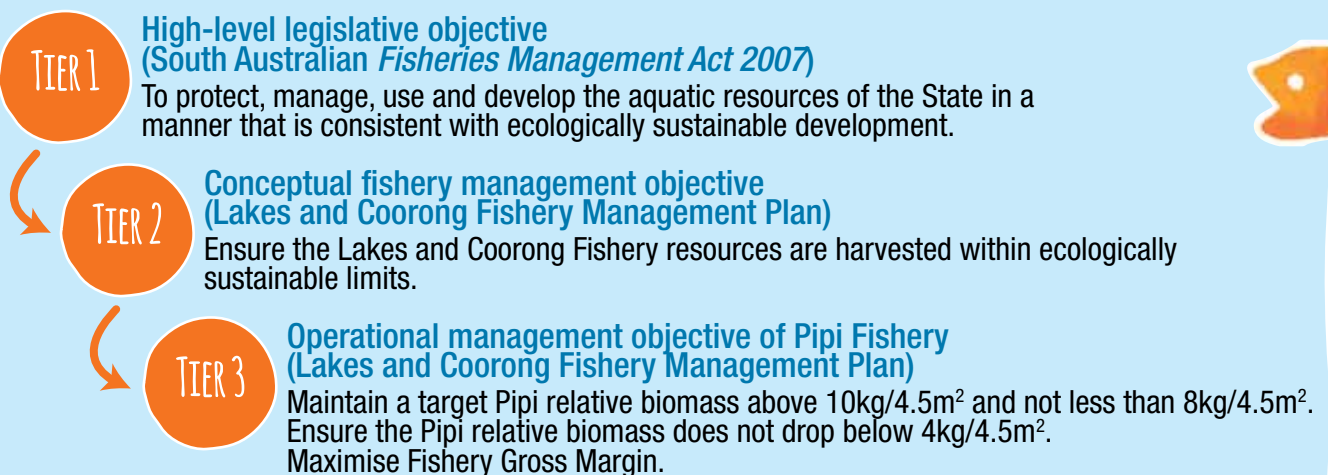
High-level objectives contained in legislation are often expressed in broad terms and are typically too vague to be useful as measurable targets for a harvest strategy. These ‘high-level objectives’ need to be translated into ‘conceptual objectives’ to be relevant at the fishery level.

The formation of an effective harvest strategy depends on having well defined conceptual fishery management objectives that will guide the overall outcomes that the harvest strategy will work to achieve. These conceptual objectives should clearly identify the species, fish stock or fisheries management unit that they apply to and need to be developed in the context of the existing fisheries legislation, over-arching policy objectives and any relevant ministerial directives. These conceptual objectives should be defined and agreed upon by the various stakeholders early on in the development of a harvest strategy because they directly influence the management options suitable for the fishery.



The conceptual objectives referred to here then need to be broken down further into ‘operational objectives’ for the fishery, usually at the species level, which are very precise, easily measured and linked to performance indicators, reference points and decision rules in the harvest strategy. In this sense, there are commonly three tiers of management objectives that need to be considered, as per the example below for the South Australian Pipi Fishery.

An example of the linkage between ‘high-level’ legislative objectives, ‘conceptual’ fishery management objectives and ‘operational’ management objectives for the South Australian Pipi Fishery.



INDICATORS OF FISHERY PERFORMANCE RELATED TO THE OBJECTIVES

Once the operational objectives are established, performance in achieving them needs to be closely monitored. Performance is measured by comparing where a performance indicator sits in relation to a reference point. An example of a commonly used performance indicator is yearly commercial catch per unit of effort (CPUE).

It is important that when choosing performance indicators, the data used to estimate them is also defined. A combination of the operational objective, performance indicator, and reference point form a package.

Reference points for performance indicators

Reference points are set for specific levels of a performance indicator. They provide a 'benchmark' from which to evaluate the level of performance. Measurement against this 'benchmark' will tell you how a fishery is performing – either 'as expected', 'better than expected' or 'worse than expected'. There are three main types of reference points:

target

trigger

limit.

A **target reference point** helps to define 'where we want to be' and can be linked to decision rules that allow for increases in exploitation or catch levels.

A performance indicator is a quantity that can be measured and used to track changes with respect to achieving an operational objective.

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5. Determine the ESD status and context of the fishery

Because the operational objectives used could vary based on fishery or stock status, there is a need to determine the status of the fishery being managed. The economic and social dimensions of each fishery should also be considered, where appropriate. Conducting an ESD risk assessment will help to identify and prioritise the full suite of ecological, economic and social issues

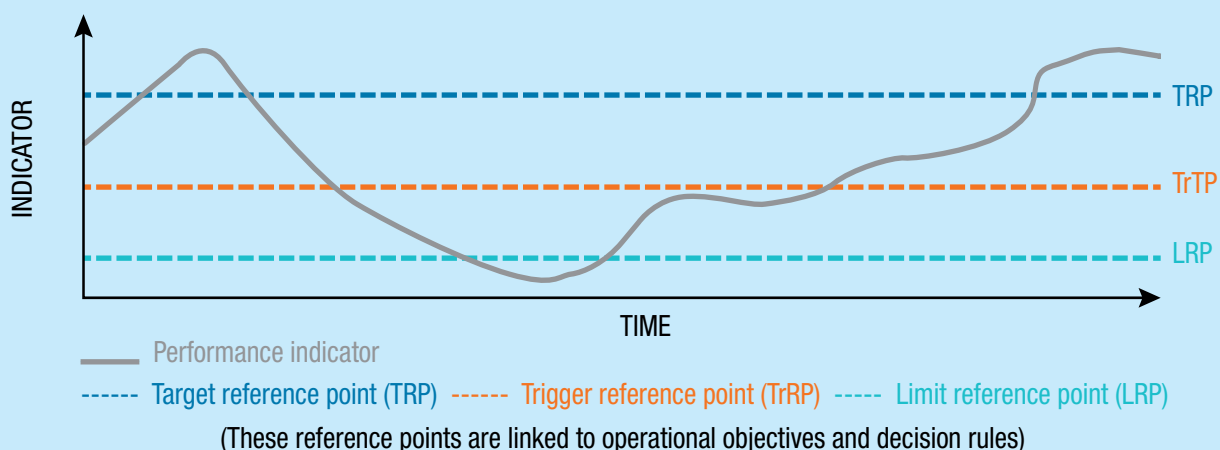
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A **trigger reference point** can be used as an ‘early warning system’ to trigger management actions to avoid a fishery reaching a limit reference point which is ‘where you don’t want to be’.

A **limit reference point** triggers significant management actions to return the fishery performance to an acceptable level.

The relationship between a performance indicator (shown as dark grey line), the three types of reference points, operational objectives and decisions rules is provided in Figure 1. Reference points should be linked to clear decision rules, so that when a stock or fishery performance reaches a target, trigger or limit reference point, management actions are implemented.

Figure 1 The relationship between a performance indicator, the different types of reference points, operational objectives and decision rules.



in the fishery and help inform harvest strategy development in the context of achieving ESD outcomes for the fishery.

In model-based stock assessments, the risk of not meeting objectives may be assessed using probability thresholds for meeting target reference points and/or avoiding limit reference points. By doing this, harvest strategies provide direction on the level of risk acceptable to managers in relation to the stock status of a fishery. As the status of stocks relative to reference

“The development of a well structured harvest strategy that has had fisher involvement and influence on determining the most critical factors to measure optimum fishery performance with a clear and transparent set of decision rules has been key to industry support and acceptance of the Pipi Harvest Strategy”

NEIL MACDONALD,
EXECUTIVE OFFICER
OF THE SOUTHERN
FISHERMEN'S
ASSOCIATION



points (and ultimately relative to operational objectives) can often be uncertain, individual harvest strategies (or ideally, over-arching harvest strategy policies) should define acceptable levels of risk associated with breaching reference points, particularly limit reference points.

6. Building the technical elements of the harvest strategy

Building the actual harvest strategy requires consideration of each key technical element listed in the national guidelines, to form an integrated package. These key technical elements should be put together to create and build the harvest strategy.

Harvest decision rules are pre-determined management actions linked directly to the biological, economic and/or social performance of the fishery, relative to reference points.

Harvest decision rules should work in such a way that a pre-determined management action (for example, a quota/effort decrease or increase) is implemented promptly when a reference point is reached, as identified through the assessment. It should also be noted that decision rules may link to a range of management responses, including for example, increased monitoring or data collection.

7. Testing the robustness of the harvest strategy

An evaluation of whether the proposed harvest strategy is likely to work should be undertaken prior to implementation. This is in recognition of the inherent uncertainty in knowledge of the past and current status of fish stocks or fisheries, and their response to different levels of harvest and their current and future productivity. Such testing is particularly important when information is

A critical step in the development of a harvest strategy is to determine harvest decision rules that are designed to achieve the operational objectives of a harvest strategy.

A strategy is needed to monitor if the operational objectives are being achieved.

incomplete and imprecise, and when the relationship between the harvest decision rule and management actions is complex. There are various quantitative, qualitative, empirical and experimental methods available to undertake an assessment of whether the harvest strategy is likely to be appropriate. Such assessments are often called Management Strategy Evaluation (MSE) and take place in two steps:

a) A monitoring strategy to collect relevant data to assess fishery performance


The form of monitoring required will depend on the choice of indicators and reference points used in the harvest strategy, as well as the scale and intensity of the fishery. For fisheries that use economic objectives and target reference points such as Maximum Economic Yield (MEY), economic data also need to be collected on a routine basis. Similarly, if social objectives are established, data would need to be collected to measure performance against these objectives as well.

b) A process for conducting assessment of fishery performance relative to objectives

A fundamental aspect of a harvest strategy is that the management responds to changes in the status of the resource. This requires some form of stock or fishery assessment, which can range, depending on the scale of the fishery and data availability, from a full quantitative model-based assessment to simple tracking of an empirical indicator (such as CPUE or mean length of landed fish), with a wide variety of methods in between.

Within the context of a harvest strategy, the main requirement of a stock assessment is that it estimates the status of a stock or fishery, relative to one or more reference points. These assessments will have different levels of precision and accuracy and it is important

“Recreational fishing has not been sufficiently considered in harvest strategy development to date. Much of the focus so far has been on high value commercial species. Harvest strategies help set the goal posts and give fishers confidence in how management decisions are made. These guidelines will inform development of harvest strategies for recreational fisheries, which will help ensure sustainable fisheries now and into the future.”



DALLAS D’SILVA, GENERAL
MANAGER VR FISH,
VICTORIAN RECREATIONAL
FISHING PEAK BODY

“The simple structured approach to setting harvest levels has taken the emotion and sectoral interests out of the process, and for the first time maximising profit from the fishery, within sustainable catch limits, is also embedded in the decisions. This has seen a shift in thinking to ways of improving business performance such as timing of harvest, marketing and value adding.”

ROGER EDWARDS,
INDEPENDENT CHAIR
OF THE GOOLWA
PIPI HARVESTERS
ASSOCIATION



that this is factored into the selection of the performance levels that are used as limits and targets.

It is also very important for an assessment to be able to estimate or describe any sources of uncertainty. Even for data rich fisheries, there can be many factors contributing to errors including observation error, process error and model error. It is important that the uncertainties are described, to inform managers and fishers using the assessment to make decisions.

8. Periodically review and update the harvest strategy

All harvest strategies should be periodically reviewed to ensure they are up to date and take into account the best available information, knowledge and understanding of a fish stock or fishery. Periodic amendments to harvest strategies ensure optimal decisions are likely to be made.

HINTS AND TIPS FOR A BETTER HARVEST STRATEGY

For harvest strategies to be effective, they need to be easily understood and accepted by key stakeholders. They also need to take into account the current context of a fishery and the data and information available to monitor and assess the fishery and the performance of the harvest strategy.

Harvest strategies also need to take account of the costs associated with any monitoring, assessment and management measures required as part of their implementation and these should be explicitly considered during the development process. This means that harvest strategies need to be adapted and tailored in a pragmatic way to suit the individual fishery needs and context. It is also important that the total catch from, or effect on, the stock is known or estimated so that each sector accessing the stock can be managed.

Importantly, harvest strategies do not need to rely on the outputs of complex mathematical procedures or model-based stock assessments to be effective. A range of practical and cost-effective ways exist to apply harvest strategies to a broad cross section of fisheries, including data-poor fisheries with limited information. However, it is important that harvest strategies of all types are tested for their robustness, and to ensure they will work, prior to implementation.

It is important to establish a process to have fishers and key stakeholders involved at the beginning. Actively involving fishers and other stakeholders cannot only bring otherwise unavailable local knowledge to the process, but it is more likely to result in harvest strategies that are respected and complied with willingly. This leads to improved trust between stakeholders and efficiency in decision making, as fishers and key stakeholders 'buy in' to the decisions that result from application of the harvest strategy.



FOR HARVEST STRATEGIES TO BE EFFECTIVE, THEY NEED TO BE EASILY UNDERSTOOD AND ACCEPTED SO THAT ALL STAKEHOLDERS CAN WORK WELL TOGETHER.

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