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# PAM 01 – Precautionary Approach Conceptual Framework (Consultation Draft)

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**Abstract**

This document presents a consultation draft of the Precautionary Approach Framework (PAF) Conceptual Framework for SIOFA, designed to implement its obligations to apply a precautionary approach to fisheries management. The Framework addresses SIOFA's unique management challenges, including oversight of diverse fisheries with varying data availability, from well-studied high-value stocks to data-poor, low-value fisheries.

The Framework operates through three interconnected components: (1) an Information Classification System that categorizes stocks as high, medium, or low information based on data availability; (2) a Three-Zone Stock Status System that classifies stocks into Healthy, Cautious, or Critical zones based on biological condition relative to reference points; and (3) Management Procedures that serve as pre-agreed, science-based decision rules automatically adjusting fishing opportunities based on stock status and information level.

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[2] Documents available only to members invited to closed sessions.

Complementary Technical Guidelines are currently being developed to provide detailed implementation guidance for the Framework's application.

The Framework establishes Management Procedures as the default management approach for all stocks, with three methodological tiers: full quantitative model-based procedures for high-information stocks, simplified empirical procedures for medium-information stocks, and qualitative knowledge-based procedures for data-poor fisheries. A fundamental principle is risk equivalency, ensuring all stocks face similar conservation risk levels regardless of data availability or economic value through appropriate precautionary buffers and reference points.

Implementation follows a progressive approach, prioritizing stocks in the Critical Zone and primary species of highest importance. The Framework aligns with international best practices while being tailored to SIOFA's operating environment, providing clear pathways for upgrading management approaches as information improves and ensuring comprehensive coverage across all SIOFA stocks.

**Recommendations** (for proposals and working papers only)

- **R1**: Review and comment on the conceptual approach of the proposed Three-Zone Stock Status System (Healthy, Cautious, Critical zones) as a framework for categorizing stock status and triggering appropriate management responses.
- **R2**: Review and provide advice on the proposed three-tier Information Classification System (high, medium, low information) and whether this approach appropriately captures the data availability spectrum across SIOFA stocks.
- **R3**: Review and provide advice on the proposed Management Procedure approach as the default management framework for all SIOFA stocks, including the three methodological tiers (quantitative model-based, simplified empirical, and qualitative knowledge-based procedures).
- **R4**: Comment on the overall Framework architecture and identify any major conceptual issues or implementation challenges that should be addressed in further development of the Framework and its Technical Guidelines.

# PAM 01 - Development of a SIOFA Precautionary Approach Framework Conceptual Framework

Consultation Draft

About this document:
This is a consultation draft for PAM 01 for a Precautionary Approach Framework 'Conceptual Framework'

In preparing this draft, the consulting team has reviewed precautionary approach frameworks, as well as decisions made by the MOP. We are conscious that many stocks in SIOFA are likely to be low information, but we aim to draft an enduring framework that will allow you to ensure all fisheries are within a healthy zone, even if their information status does not improve.

We have made annotations in text boxes across certain sections where we have taken inspiration from other frameworks, have options or discussion questions to pose, and also noted where we are integrating existing MOP decisions into the framework.

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# Executive Summary

This Precautionary Approach Framework (the Framework) provides a structured approach for the Southern Indian Ocean Fisheries Agreement (SIOFA) to implement its obligations to apply a precautionary approach, as is required under international law. It is designed to assist SIOFA to facilitate the long-term conservation and sustainable use of fishery resources within the Agreement Area.

SIOFA operates in a uniquely complex management environment among regional fisheries management organisations (RFMOs), overseeing a wide diversity of fisheries, many of which are data-limited or poorly understood. This diversity, combined with significant scientific uncertainty and ecological variability, underscores the need for a robust precautionary approach.

This Framework will enable management decisions to account for uncertainty and avoid potentially irreversible impacts, particularly in cases where data is insufficient to support full stock assessments. It will reduce the risk of overexploitation, help preserve ecosystem function, and support greater long-term stability and resilience to SIOFA fishery resources and the ecosystems in which they live.

This Framework is aligned with international best practices—particularly the UN Fish Stocks Agreement and FAO guidelines—which promote proactive management, science-based decision-making, and adaptive governance. SIOFA's relatively recent establishment offers a strategic opportunity to embed these principles from the outset.

This Precautionary Approach Framework operates through three interconnected components that work together to ensure sustainable fisheries management. First, an **Information Classification System** categorizes each stock as high, medium, or low information based on data availability and assessment capability, ensuring that management approaches are appropriately matched to what is known about each fishery. Second, a **Three-Zone Stock Status System** classifies stocks into Healthy, Cautious, or Critical zones based on their biological condition relative to scientifically-established reference points, providing clear signals about conservation status and management urgency. Third, **Management Procedures** serve as the primary implementation tool, establishing pre-agreed, science-based decision rules that automatically adjust fishing opportunities based on stock status and information level, ensuring consistent and transparent management responses. These components are supported by robust monitoring systems, regular performance reviews, and adaptive

management processes that allow the framework to evolve with improving knowledge and changing conditions. Together, these elements create a comprehensive system that maintains equivalent levels of conservation risk across all SIOFA stocks, regardless of their data richness or economic importance.

This framework positions SIOFA to fulfil its mandate effectively, promoting responsible stewardship of Southern Indian Ocean fisheries.

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To be completed

# Part I: Foundation

# Introduction

## What is a precautionary approach framework?

A precautionary approach framework in fisheries management is a comprehensive decision-making system designed to address scientific uncertainty and natural variability while ensuring the long-term sustainability of fish stocks and fisheries. At its core, this framework establishes a structured methodology that enables the Meeting of the Parties to make decisions consistently, based on a fishery's performance and the information available to guide its management.

Beyond reference points and control rules, a precautionary approach framework includes robust monitoring strategies to collect relevant data, assessment processes to evaluate fishery performance against objectives, and performance indicators that provide clear signals about stock status and management effectiveness. This systematic approach ensures that management responses are both predictable and scientifically defensible, providing greater certainty and planning.

## Why have a Precautionary Approach Framework?

The implementation of a precautionary approach framework addresses several critical challenges inherent in modern fisheries management. Foremost among these is the need to manage fishing pressure, natural variability and scientific uncertainty effectively. Fish populations are subject to complex ecological dynamics, environmental fluctuations, and measurement uncertainties that can mask true population trends. A precautionary framework provides a systematic method for incorporating these uncertainties into management decisions, ensuring that uncertainty translates into management for sustainability rather than increased risk-taking.

A Precautionary Approach Framework can enhance the sustainability and profitability of fisheries by preventing overfishing before stocks become severely depleted and in

ensuring management attention is directed where it is needed. Establishing clear limits and associated management response provides a scientific and technical basis for rebuilding depleted stocks in a timely manner where needed, and in managing stocks out of biologically unsafe levels. This proactive approach is far more cost-effective than reactive management, which often requires more severe restrictions and longer recovery periods once stocks have collapsed.

From an operational perspective, precautionary approach frameworks reduce the time needed to make management decisions by pre-establishing decision rules and response protocols. This streamlined approach eliminates lengthy debates about appropriate management responses during stock assessments, as the framework provides clear guidance on what actions should be taken given specific stock conditions. The predictability of this approach also allows stakeholders in the fishery to better anticipate management changes and plan accordingly.

This Framework accounts for risk systematically by explicitly defining acceptable levels of risk to meet management objectives. This transparent approach to risk management ensures that stakeholders understand the probability of different outcomes and the rationale behind management decisions.

Finally, implementing a precautionary approach framework aligns fisheries management with international best practices and standards required by certification agencies and international management authorities. This alignment is increasingly important for market access and maintaining social licence to operate, particularly as consumers and retailers demand evidence of sustainable fishing practices. The framework demonstrates a commitment to responsible stewardship that extends beyond compliance with minimum legal requirements to embrace global standards for sustainable fisheries management.

Globally, there are numerous examples of precautionary approach frameworks, sometimes called harvest strategy frameworks, from which SIOFA has taken inspiration. Internationally, these include NAFO's precautionary approach framework (NAFO 2024; 2024), ICES advice (Lassen et al. 2012), and FAO technical guidance (Food and Agriculture Organization of the United Nations 1996), which provide comprehensive models for implementation. There are less detailed examples contained in ICCAT (Recommendation 15-07 2015a; Resolution 15-12 2015b) and IOTC resolutions that demonstrate regional adaptation of the precautionary approach (Resolution 12/01 2012). IATTC and IPHC have also discussed developing precautionary approach

frameworks, indicating the growing recognition of their importance across fisheries management organizations (2010; Hicks et al. 2025). Domestically, Canada, New Zealand, and Australia all have established frameworks that have provided relevant inspiration for the SIOFA framework, offering practical insights into national-level implementation of precautionary management approaches (Ministry for Primary Industries 2008; Ministry of Fisheries 2011; Department of Agriculture and Water Resources 2018a; 2018b; Fisheries and Oceans Canada 2009).

# Legal basis to adopt a PAF

## Requirement to apply a precautionary approach

Article 4(c) of the SIOFA Agreement ("SIOFA" SIOFA 2006) requires the Meeting of the Parties to apply the the Precautionary Approach in accordance with the FAO Code of Conduct[1] and the 1995 Agreement[2], whereby absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures.

Article 4 of the SIOF Agreement sets out the principles that CCPs are required to apply, including a requirement to manage the fishery resources so that they are maintained at levels that are '*capable of producing the maximum sustainable yi*eld (MSY) and depleted stocks of fishery resources are rebuilt to the said levels' (emphasis added).

The functions of the Meeting of the Parties (MOP), set out in Article 10 of SIOFA, include requirements to review the state of fishery resources, evaluate the impact of fishery resources on the marine environment and formulate and adopt conservation and management measures (CMM) necessary for ensuring the long-term sustainability of fishery resources.

[1] The general principles and Article 6.5 of the 1995 FAO International Code of Conduct for Responsible Fisheries urge States and subregional and regional fisheries management organizations to apply a precautionary approach to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment

[2] Article 6 of UNFSA set out elements of a precautionary approach to the conservation and management of straddling and highly migratory fish stocks in order to protect the living marine resources and preserve the marine environment.

The MOP carries out these functions through its annual ordinary meetings, based on advice from its subsidiary bodies, the Scientific Committee and the Compliance Committee, in accordance with their respective terms of reference.

This Framework seeks to support the operationalisation of those legal requirements through consistent, responsible and transparent decision-making. In the SIOFA context, this includes reversing the burden of proof, systematic evaluation of biological and environmental risks, regardless of the size or value of the fishery, and adaptive management that is prepared to respond to new information and changing conditions. Nothing in the Agreement prevents the Meeting of the Parties from managing to more conservative levels. Accordingly, this Precautionary Approach Framework aims to manage fishery resources to *at least* MSY.

## Relationship between this Framework, its Technical Guidelines, the Agreement and CMMs

This Framework is intended to be a non-binding framework to support the MOP in carrying out its functions under the Agreement. Notwithstanding this, elements of this framework are based on relevant rules of international law as reflected in the 1982 Convention, the 1995 Agreement and the SIOF Agreement. Additionally, certain provisions of this Framework may have already been given binding effect through MOP decisions (such as CMMs).

In this respect, the Framework should be taken into account in planning for, and in taking, decisions. Departure from this Framework, while discouraged, should be justified and documented.

# Principles

The precautionary approach framework is founded on the following principles.

**As a Framework to support decision making it is:**

- **Pragmatic and Accessible**: The framework needs to be practical to implement and easy to understand by all stakeholders, ensuring broad comprehension and effective application across SIOFA's diverse fisheries
- **Cost Effective**: SIOFA is a resource-constrained RFMO. Management needs to deliver optimal conservation and management outcomes while utilizing available resources efficiently and proportionately to the value and risk associated with each fishery.
- **Transparent**: All management decisions, processes, and underlying scientific rationale need be open to the same level of scrutiny as with any other SIOFA instrument, with clear documentation of decision-making pathways and rationale across all elements of the framework.
- **Enduring**: The framework needs to be robust and flexible enough to accommodate new fisheries as they come online and evolve with changing management needs, ensuring consistent application across all fishing activities over time.

**Decision-making under this framework should take into account**

- **Reversal of Burden of Proof**: The onus lies on demonstrating that proposed fishing activities and management measures will not cause harm to fish stocks or marine ecosystems, rather than requiring proof of damage after it has occurred. This includes demonstrating that:
    - Proposed catch levels will not lead to overfishing or stock depletion
    - Management measures are adequate to prevent serious harm
    - New or expanded fisheries will not adversely impact stock sustainability
    - The cumulative impact of all fishing activities remains within sustainable limits(Food and Agriculture Organization of the United Nations 1996)
- **Precautionary**: Decisions should err on the side of caution, particularly when scientific uncertainty exists, ensuring that the absence of adequate scientific information does not postpone measures to prevent stock depletion or ecosystem degradation.
- **Adaptive**: new information, changing environmental conditions, and evolving understanding of stock dynamics and ecosystem interactions.
- **Scientifically Defensible**: decisions must be grounded in the best available scientific evidence and be appropriate to the known biology, life history characteristics, and ecological role of primary and stocks.
- **Ecosystem-Based**: Management decisions must consider to the extent possible the broader ecosystem context, including:

- Multi-species interactions and food web effects
- Habitat requirements and ecosystem services
- Cumulative impacts of fishing on ecosystem structure and function
- Associated and dependent species (ETP species, bycatch)
- Climate change impacts on ecosystem productivity and species distributions

# Scope

All fishery resources, as defined in SIOFA are in the scope of this Framework.

# Transparency and decision-making

Decisions made pursuant to this framework should be made in accordance with the Rules of Procedure of the Meeting of the Parties.

# Part II

# Framework Architecture

## Overview

This Framework is built around three interconnected components that work together to deliver consistent, science-based fisheries management across SIOFA's diverse portfolio of stocks. The framework is designed to handle the reality that SIOFA manages fisheries ranging from well-studied, high-value stocks to data-poor, low-value fisheries, while maintaining equivalent levels of conservation protection across all stocks.

The framework operates through a systematic decision-making process that moves from understanding what is known about each stock, to assessing their biological condition, to implementing appropriate management responses. This structured approach ensures that management decisions are predictable, transparent, and scientifically defensible, regardless of data availability or stock value.

# The Three Core Components

## Component 1: Information Classification System

The foundation of the Framework is a systematic approach to categorizing each stock based on the quality and quantity of available data. Every SIOFA stock is classified as **High**, **Medium**, or **Low** information, based on the availability of data.

This classification serves multiple critical functions:

- **Matches management tools to data availability** - ensuring that sophisticated management approaches are only applied where data can support them
- **Determines appropriate levels of precaution** - with lower information stocks receiving more conservative management due to higher uncertainty
- **Guides resource allocation** - helping SIOFA prioritize monitoring and research investments
- **Sets realistic expectations** - ensuring management approaches are feasible given available information

Importantly, the goal is to provide a pathway for all stocks to graduate to higher information categories over time through targeted data collection and research.

### Component 2: Three-Zone Stock Status System

The second component assesses the biological condition of each stock relative to scientifically-established reference points. Every stock is classified into one of three zones based on their conservation status:

- **Healthy Zone** - stocks that can support sustainable exploitation without conservation concern
- **Cautious Zone** - stocks requiring enhanced monitoring and conservative management measures
- **Critical Zone** - stocks necessitating immediate rebuilding measures and minimal fishing pressure

These zones are defined by reference points that establish clear boundaries between acceptable and unacceptable levels of stock depletion. The zone system provides an immediate visual signal of conservation priority and triggers specific management responses appropriate to each stock's biological condition.

### Component 3: Management Procedures

The third component translates stock information and biological status into specific management actions through Management Procedures - pre-agreed, science-based decision rules that automatically adjust fishing opportunities based on stock status and available information.

Management Procedures serve as the primary implementation tool of the framework, providing:

- **Predictable responses** to changing stock conditions
- **Transparent decision-making** processes that stakeholders can understand and plan for
- **Risk-equivalent management** across stocks with different information levels
- **Adaptive management** that evolves with improving knowledge

The framework includes three types of Management Procedures scaled to match information availability, from full quantitative model-based approaches for high-information stocks to simplified knowledge-based procedures for data-poor fisheries.

## How the Components Work Together

The three components operate through an integrated decision-making process:

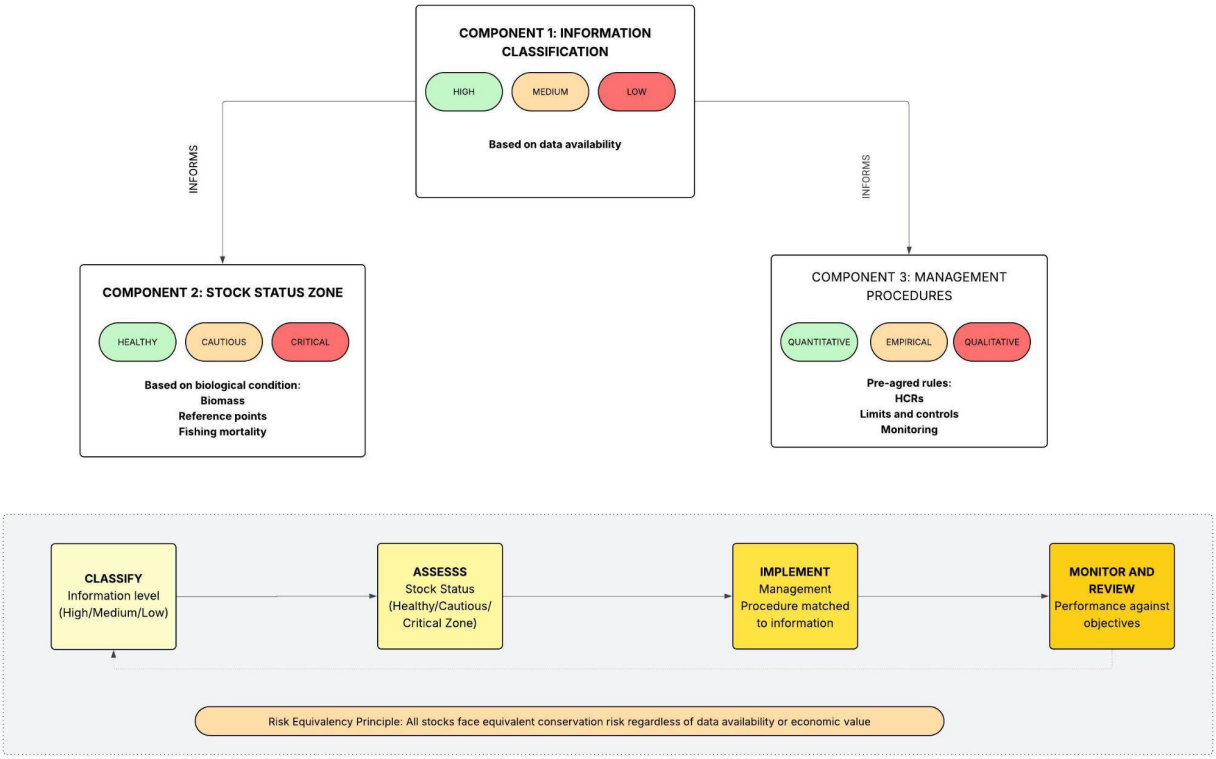
**Step 1: Information Assessment** Each stock is classified based on available data, determining which management tools and approaches are feasible and appropriate.

**Step 2: Status Evaluation** Stock condition is assessed using the best available methods appropriate to the information level, and stocks are placed in the appropriate zone (Healthy, Cautious, or Critical).

**Step 3: Management Response** A Management Procedure appropriate to both the information level and biological status is implemented, with harvest control rules that automatically adjust management measures based on stock performance.

**Step 4: Monitoring and Review** Performance is monitored against objectives, with regular reviews that can adjust information classification, reference points, or Management Procedures as conditions change or knowledge improves.

Figure X - Representation of how Framework components work together




# Risk Equivalency Principle

A fundamental principle underlying the framework architecture is **risk equivalency** - ensuring that all stocks face similar levels of conservation risk regardless of their information status or economic value. This is achieved by:

- Applying more conservative reference points and management measures to stocks with higher uncertainty
- Requiring larger precautionary buffers between target and limit reference points for low-information stocks
- Triggering management responses at higher biomass levels when assessment uncertainty is greater
- Maintaining consistent probabilities of achieving conservation objectives across all stocks

## Framework Benefits

This integrated architecture delivers several key advantages:

**Comprehensive Coverage**: Every SIOFA stock receives appropriate management attention, with no fisheries falling through regulatory gaps due to data limitations.

**Proportionate Approach**: Management intensity and cost are matched to stock value and risk, ensuring efficient use of SIOFA's limited resources.

**Adaptive Management**: The framework provides clear pathways for upgrading management approaches as information improves or stock importance changes.

**Transparency**: The systematic approach ensures that stakeholders understand how management decisions are made and can anticipate responses to changing conditions.

**International Alignment**: The framework structure aligns with international best practices while being tailored to SIOFA's unique operating environment.

#### Implementation Pathway

The framework is designed for progressive implementation, recognizing that developing Management Procedures for all stocks will take time. Priority should be given to:

1. Stocks in the Critical Zone requiring immediate attention
2. Primary species of highest economic or ecological importance
3. Stocks where SIOFA already has substantial management infrastructure in place

This approach allows SIOFA to begin realizing framework benefits immediately while building institutional capacity for broader implementation over time.

# Part III

# Information Classification

One of the first important steps is to categorise stocks into high, medium and low so that there is a consistent basis moving forward to select appropriate methods and approaches for each stock concerned.

One option is to align SIOFA's definitions with those used by the Marine Stewardship Council's 'Information and Monitoring' requirements for the harvest strategy requirement (see SA2.6 of MSC Standard 3.1). While MSC is not a government framework, it is what industry(ies) are working towards and it has been heavily researched and consulted on. ICES provides a 7 point approach which may be too complicated for SIOFA. Some frameworks, such as the Australian strategy , offered tiered approaches to stock assessments but not an information classification. Other definitions are more binary (data rich/data poor) but we felt a three-piece option would work better for SIOFA given its general data paucity.

Understanding the information level of a fish stock is crucial for fisheries management. This Framework seeks for each SIOFA stock to be classified as high, medium or low information. The amount of data available for a fishery will not necessarily be well-correlated with the amount of useful information contained in those data. Information classification should depend on the type of data available and the credibility and robustness of any existing assessment models. This is an essential step to be taken before a stock can be assessed.

An overarching goal of this framework is to improve the information available for each fishery and to graduate all stocks to at least medium, if not high, information availability.

This will support:

- **Matching management tools to data availability:** Different management approaches require different types and amounts of data. High information stocks can support sophisticated Management Procedures with detailed harvest control rules, quantitative stock assessments, and precise reference points. Low information stocks can still be managed using Management Procedures, but may require simpler inputs that don't rely on detailed population models.
- **Risk management and precautionary measures:** The level of available information directly determines the appropriate level of precaution needed. Low information stocks require much more conservative management approaches because uncertainty is higher. High information stocks can support more optimized fishing levels because managers have greater confidence in stock assessments and projections.
- **Resource allocation and cost-effectiveness:**Understanding information levels helps prioritise where to invest limited research and monitoring resources. High-value fisheries with low information may justify significant investment in data

collection and assessment development. Low-value fisheries with low information might be better managed with simple, cost-effective approaches rather than expensive data collection programs.

- **Stock assessment approaches**: High information stocks can support detailed, quantitative stock assessment. Medium information stocks may only be able to support empirical assessments using indicators like CPUE trends. Low information stocks may only be able to support basic assessments using catch trends or other simple indicators.
- **Expectation management**: Classifying information levels ensures SIOFA sets realistic expectations for management choices.
- **Adaptive Management**: Information levels guide the development of adaptive management. For medium or low stocks, management can include additional mechanisms for improvement over time, including additional data collection, that can improve its information status and possibly support less conservative management. Additionally, Management Procedures include a scheduled review cycle that incrementally incorporates additional levels of complexity as data becomes available.

# Classification Criteria

## High Information Stocks

A comprehensive range of information (on stock structure, stock productivity and life history, fleet composition, stock abundance, removals and other information such as environmental information including predator-prey relationships and habitat requirements), including some that may not be directly relevant to the current Management Procedure is available.

## Medium Information Stocks

Sufficient relevant information related to stock structure, stock productivity and life history, fleet composition and other data are available to support a Management Procedure. Some ecosystem context and species interaction data.

## Low Information Stocks

Some relevant information related to stock structure, stock productivity and life history, and fleet composition is available to support a limited or qualitative Management Procedure. Basic understanding of ecosystem role and habitat requirements

## Classification Process and Review

Classification should be undertaken for all stocks by the Scientific Committee on the basis of available information.

A stock's information classification should be reviewed following any substantial changes to the fishery or data availability, or otherwise as regularly as is required, particularly if SIOFA has set an objective to improve a particular stock's information status. Stocks can transition between categories where appropriate.

# Part IV

# Stock Status Zones

Both the Canadian example and NAFO's PAF take the approach of classifying stocks into three zones- healthy, cautious and critical zone. We think this is a helpful approach generally for ordering/grouping stocks according to their status as it will assist the MOP to direct its attention where it is most required and assist in directing management responses that are most appropriate to each stock's condition.

## Three-Zone Framework

This Precautionary Approach Framework establishes three distinct stock status zones:

A. **Healthy Zone** - Stock biomass levels that support sustainable exploitation (i.e. not overfished and no overfishing occurring)
B. **Cautious Zone** - Stock biomass levels requiring enhanced monitoring and conservative management (i.e. one of overfishing or overfished is occurring)
C. **Critical Zone** - Stock biomass levels necessitating immediate rebuilding measures (i.e. both overfished and overfishing occurring)

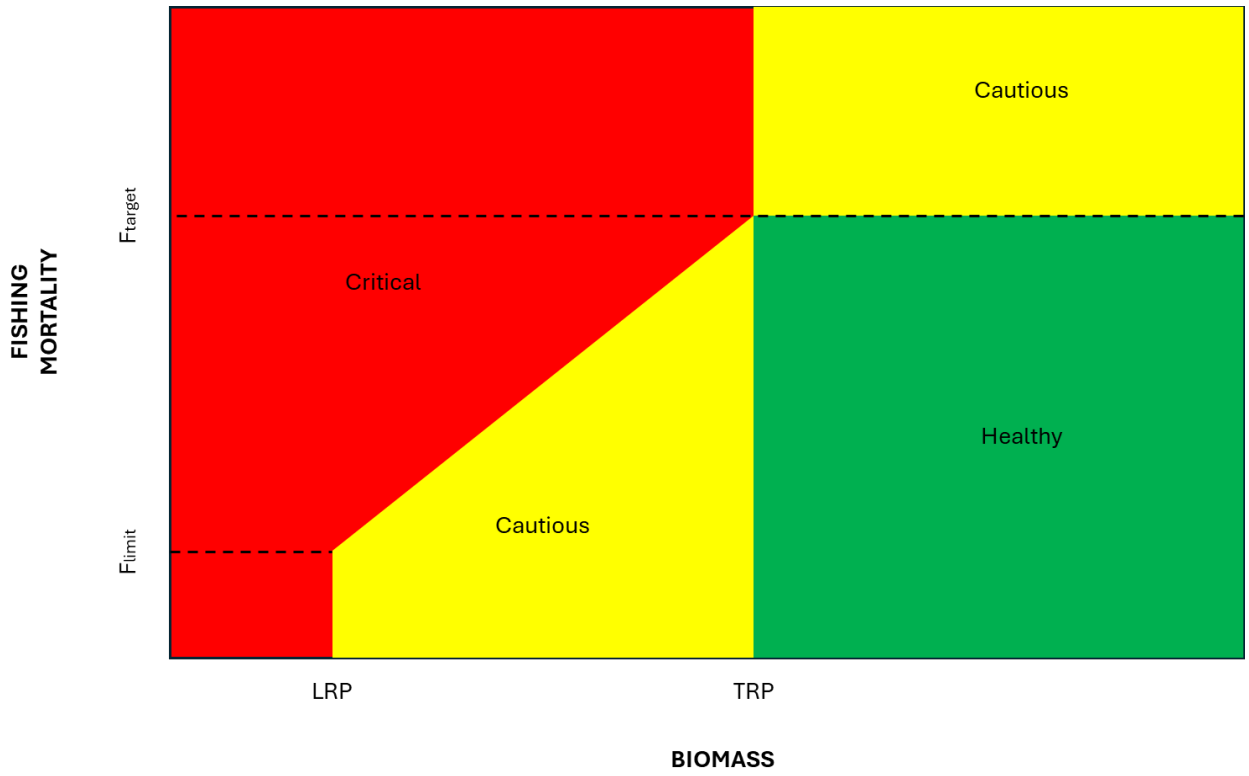



Figure X: Generic representation of the three stock status zones. The stock specific zone shapes will be dependent on the relevant stock HCR. These zones are delineated by two critical reference points (discussed later in this Framework): the limit reference point and the target reference point.

An overarching objective of this Precautionary Approach Framework is to prevent stocks from declining into the Critical Zone. However, for stocks that have been historically depleted and currently exist within the Critical Zone, the development and implementation of formal rebuilding plans is an essential component of framework implementation.

Each zone operates under distinct management principles designed to achieve specific conservation and management objectives.

**Reference Points and Zone Boundaries**

The three stock status zones are defined by scientifically-established reference points that serve as quantitative benchmarks for stock condition. These reference points create clear boundaries between zones and trigger specific management responses when crossed.

**Types of Reference Points**

These could also just be moved to glossary - we included here as we had not yet explained what reference points are.

**Target Reference Point (TRP)**: The biomass level that management aims to maintain or achieve. This represents the optimal stock size that can support sustainable fishing while providing for productive fisheries. The TRP typically corresponds to biomass levels that can produce optimal socio-economic productivity benchmarks such as maximum economic yield (MEY).

**Limit Reference Point (LRP)**: The minimum biomass level below which stocks are considered to be in a biologically unsafe condition. When stock biomass falls below the LRP, there is significant risk of recruitment impairment and potential stock collapse. Crossing this boundary triggers immediate and substantial management intervention.

**Trigger Reference Point**: An intermediate reference point, which can be between the TRP and LRP, or the TRP itself, that triggers a management action.

Detailed guidance on setting reference points is provided in the Technical Guidelines.

# Part V

# Management

With the foundations set, the Framework moves into management. Here we are proposing some general principles across fisheries as well as specific management principles for each of the three key 'zones' in the framework.

This risk-equivalence way of thinking has been implemented in systems like Australia's Harvest Strategy Policy, as well as various U.S. regional fishery management councils (see for e.g here and here. It is an explicit component in Australia's harvest strategy policy, and it is a legal requirement under USA Magnuson-Stevens Act.

## Management Principles

As a general management principle, risk equivalency should be maintained across stocks and zones, regardless of data quality or assessment uncertainty. This provides for management should be more precautionary when there is greater uncertainty about stock status, while allowing less restrictive measures when stock assessments are highly reliable. This approach ensures equivalent risk levels across all managed stocks, preventing the inadvertent application of riskier management to poorly-studied species simply due to lack of information.

Risk Equivalency is implemented through several key mechanisms.

- Stocks are classified into information tiers based on data richness, using the classification system identified above.
- Reference points are adjusted according to assessment uncertainty, with low information stocks receiving larger precautionary buffers between target and limit reference points.
- Harvest control rules incorporate this uncertainty explicitly, triggering management responses at higher biomass levels or lower fishing mortality rates for stocks with greater assessment variability.

The system maintains a consistent probability of stock depletion or overfishing across all stock.

In practical terms, precautionary management may translate to substantial differences in exploitation levels. High information stocks might operate at a much higher proportion of their theoretical maximum sustainable catch while low information stocks may face much more conservative fishing opportunities.

This Framework focuses on **both** risk assessment (through stock status evaluation) and risk management (through Management Procedures).

# Zone-Specific Management

## Healthy Zone Management

In the **Healthy Zone**, fish stock status is considered optimal, and fisheries management decisions are designed to maintain stocks within this zone through sustainable management. Management focuses on optimising yield while ensuring long-term stock stability. Management considers ecosystem-level impacts and maintains fishing at levels that preserve ecosystem structure and function

When establishing fishing mortality (F) for stocks within the Healthy Zone, management decisions should be informed by a comprehensive range of options at, above, and

below Ftarget. These options, along with their associated risks, should be provided by the Scientific Committee with the objective of maintaining stock status within the Healthy Zone.

### Cautious Zone Management

In the **Cautious Zone**, management decisions and strategies prioritise stock rebuilding and/or decreased fishing pressure to return biomass levels to the Healthy Zone. A precautionary approach is applied with progressively more conservative measures as biomass approaches the lower boundary. Enhanced monitoring may be required and include ecosystem indicators and consideration of cumulative fishing impacts

Fishing mortality should be managed to remain least within the ‘cautious zone’ boundaries and ideally towards the ‘healthy zone’ boundaries. Fishing mortality rates should be set that achieve specific management objectives based on stock trajectory and relative position within the Cautious Zone. Management actions should be designed to articulate increasing risk avoidance as stock biomass approaches Blim, with the overarching intent of preventing biomass from falling below the limit reference point.

### Critical Zone Management

In the **Critical Zone**, management emphasis shifts to promoting stock growth through minimising removals to the lowest possible level. Immediate intervention is required to prevent further stock decline and facilitate recovery.

Fishing mortality should be set at the lowest possible level. Management decisions should be informed by the full range of options and associated risks provided by the Scientific Committee. When a stock has declined to the Critical Zone, a formal rebuilding plan must be implemented with the objective of achieving a high probability of stock recovery from the Critical Zone within a reasonable timeframe. See Section [X] of the Technical Guidelines specific guidance on Rebuilding Plans. Rebuilding plans must consider ecosystem recovery, including restoration of the stock's ecological role Comprehensive guidance on developing, implementing, and monitoring rebuilding plans is provided in the Technical Guidelines"

# Straddling Stocks

Where stocks are, or are likely to, straddle a coastal State’s exclusive economic zone and/or an area of the high seas managed by another regional fisheries management organisation (or equivalent), every effort should be made to ensure that management is compatible for the portion of the stocks occurring in the SIOFA Area.

# Ecosystem Considerations in Management

The precautionary approach framework recognizes that fishery resources exist within complex marine ecosystems and that effective fisheries management must consider the broader ecological context in which fishing occurs. This section outlines how ecosystem considerations are integrated throughout the framework's implementation.

## Ecosystem-Based Management Principles

Sustainable fisheries management requires understanding that:

- **Fish stocks are ecosystem components**: Target species play specific ecological roles as predators, prey, competitors, and habitat modifiers that must be maintained for ecosystem health
- **Fishing has ecosystem-wide effects**: Removal of species affects food webs, habitat structure, and ecosystem processes beyond the target species
- **Environmental variability affects stock productivity**: Climate, oceanographic conditions, and habitat quality directly influence both target and non-target species population dynamics and carrying capacity
- **Cumulative impacts matter**: The combined effects of multiple fisheries, together with other human activities, can alter ecosystem structure and function in ways that single-species management cannot address.

## Associated and Dependent Species

The framework explicitly addresses the management of associated and dependent species (including ETP species) through:

- **Risk-based approaches**: Species with higher ecological vulnerability receive more conservative management, regardless of their commercial value, using ERA outcomes to inform management responses.
- **Integrated monitoring**: Data collection systems that capture information on bycatch, associated species, and ecosystem indicators alongside target species data.
- **Precautionary measures**: When target species management may affect ETP species or critical ecosystem components, management procedures incorporate additional safeguards and monitoring requirements.

## Habitat and Environmental Considerations

Management decisions should account for:

- **Essential habitats**: Protection of spawning areas, nursery grounds, and other critical habitats necessary for stock productivity and ecosystem function.
- **Climate variability**: Recognition that environmental conditions affect stock productivity, with management procedures designed to be robust to climate-driven changes in fish distribution and abundance.
- **Ecosystem services**: Consideration of the broader ecosystem services provided by healthy fish populations, including their role in maintaining ecosystem structure and supporting other marine life.

## Implementation Approach

Given SIOFA's data limitations, the framework takes a pragmatic approach to ecosystem integration:

- **Use available information**: Leverage existing ecological risk assessments, environmental monitoring, and regional ecosystem knowledge to inform management decisions.
- **Precautionary buffers**: Where ecosystem data are limited, apply additional precautionary measures to account for ecosystem uncertainty and potential indirect effects of fishing.
- **Adaptive management**: Design monitoring systems to detect ecosystem-level changes and adjust management measures accordingly.
- **Regional coordination**: Coordinate with other management bodies and research institutions to share ecosystem information and align management approaches across jurisdictions.

# Proactive Management: Management Procedures

Each of the frameworks we read relied on management procedures as the tool to implement the precautionary approach. Between these frameworks, there was no dispute on the benefits of this approach nor on the core elements of a management procedure.
SIOFA’s circumstances are unique compared to other RFMOs in that there is a wide variety of resources, some with very limited effort, and many with limited data. That makes management difficult, but there are substantial risks to stocks left unmanaged.

We look at finding an approach that could cater to these circumstances. Many frameworks, as well as scientific literature, discuss management procedures being applied to data limited stocks.
Our focus here as been to examine how SIOFA could proactively manage its fisheries, even the data limited ones. We acknowledge in doing so that management objectives will vary (from resource optimisation to simply managing the risk of overfishing for lower value stocks) so we propose this framework to support SIOFA doing that.

## Default Management Approach rationale

As a default approach, all stocks should be managed under a Management Procedure. A Management Procedure is a pre-agreed framework for making fisheries management decisions, including the establishment of catch limits and other management measures, in a fishery for defined stock necessary to achieve its agreed ecological, economic and/or social management objective

Management Procedures provide a proactive approach to achieving long-term sustainability by establishing transparent, science-based decision-making processes that reduce uncertainty and improve management effectiveness. Pre-agreed, risk-based management actions provide clear guidance for harvest rate decisions under varying stock status conditions. International experience shows that harvest control rules provide a convenient framework for conducting management evaluations, allowing managers to agree on specific management actions that are triggered according to stock status relative to predefined reference points(see for e.g De Bruyn et al. 2013).

For low information stocks where even empirical management procedures may not be possible, management procedure principles can still be applied via a qualitative MP. Qualitative MPs draw on expert opinion to assess the efficacy of candidate MPs rather than mathematical models. By drawing on expert opinion to bridge data gaps, management recommendations can still be made for foreseeable future scenarios, enabling the benefits of the proactive nature of MPs, pre-agreeing action rather than the reactive nature of traditional management.

This Framework recognizes that not all fishery management approaches deal equally well with risk, with some potentially compounding rather than reducing risk(see for e.g Hilborn et al. 2001). The systematic approach provided by Management Procedures is designed to explicitly manage risk rather than merely assess it.

# Core Elements of Management Procedures

We understand that a stock assessment framework was discussed several years ago but may not be operational today - at least not for all stocks. We welcome your advice on its status, otherwise, we suggest allowing for stocks to be assessed on the basis of the best available information available, using biologically appropriate methods.

We note the MOP has already made decisions that are relevant to the below for ORY and TOP. We further note the MOP has already decided that:

- SC should provide advice on the SIOFA species that would be amendable to the development of monitoring programmes and harvest strategies; and
- the development of breakout rules would be a key part of the development of harvest strategies, and that criteria would be developed as part of this process

Each Management Procedure must incorporate the following fundamental components:

**Fishery Definition** - Clear specification of the fishery to which the Management Procedure applies. New or exploratory fisheries require an inherently more precautionary approach.

**Management Objectives** - Articulation of measurable management objectives that establish the vision for the fishery.

**Performance Indicators and Reference Points** - Identification of indicators that measure performance against management objectives, fishery status and population health, with associated target, limit and threshold/trigger reference points and specification of acceptable levels of risk for achieving management objectives. Reference points should give consideration to environmental and climate factors. Fishery-specific reference points should be established where possible, otherwise the default limit reference point should be adopted.

**Stock Assessment** - Assessment to estimate stock status relative to established reference points . Stock assessments may range from comprehensive quantitative model-based assessments to less complex empirical methods, as outlined in the [SIOFA Stock Assessment Framework]. The Meeting of the Parties should determine how frequently an assessment should be undertaken, based on Scientific Committee advice.

**Monitoring and Performance Assessment** - Establishment of monitoring programs to collect relevant data and performance assessment processes to evaluate indicators against reference points and management objectives.

**Harvest Control Rules** - Development of harvest control rules that determine fishing opportunities, including but not limited to catch limits, effort controls, and technical measures, based on indicator values relative to reference points, and supported by appropriate simulation testing, preferably through management strategy evaluation. Harvest Control Rules should be appropriate for the stock's zone and specify management actions if reference points are breached.

**Performance Monitoring and Review** - Implementation of ongoing performance monitoring and periodic review processes to evaluate Management Procedure effectiveness and identify necessary adjustments.

This approach enables strategic decision-making regarding the level of investment required for monitoring and assessment activities for specific fisheries. The catch-cost-risk trade-off becomes a critical consideration in this context, requiring careful evaluation of the balance between fishing opportunities, monitoring costs, and conservation risks, as detailed in the Technical Guidelines.

Annex X Management Procedure Development and Implementation sets out how the framework components integrate to develop a management procedure.

## Choosing which Management Procedure to use

Different methodological approaches may be required based on the information available and the economic or ecological importance of the stock to SIOFA. Annex X provides for a Management Procedure decision framework using three possible approaches which all incorporate the components of a management procedure to a greater or lesser extent:

- Full, Quantitative, Model-based Management Procedures
- Simplified Empirical Management Procedures
- Qualitative, Knowledge-based Procedures

In determining which type of Management Procedure to use, the following questions may be considered:

- Is adequate information available to support the proposed management procedure type?
- Can SIOFA support, and financially support, the proposed management procedure complexity?
- For secondary stocks with medium or high information: Is the cost proportional to value and risk?
- Are adequate data collection systems in place?
- Can the stock be monitored to the degree required by the management procedure?

Regardless of the  type of Management Procedure selected, all Management Procedures must:

- Be scientifically defensible
- Maintain precautionary approach appropriate to uncertainty level
- Take into account the productivity characteristics of the stock being managed
- Take into account, where known, both the potential influence of the environment on fish productivity, and any environmental or climate variables.
- Comply with the Agreement

Annex X sets out the essential and additional requirements for each type of Management Procedure.

### Transition Pathways: Upgrading to (more) quantitative Management Procedure Approaches

Upgrading to a (more) quantified management procedure approach should be an overarching goal. Upgrading is warranted where:

- Stock importance increases significantly such that the cost/benefits of investing further in that fishery have changed
- Information availability improves substantially
- Additional resources become available for enhanced management

This approach is particularly critical for addressing SIOFA where many stocks are, and will likely remain without serious data collection intervention, characterized by low information availability. Rather than allowing this reality to become a barrier to effective management, the framework provides structured options that scale appropriately with available information while maintaining a precautionary approach.

## Management Procedures to be applied progressively

Management Procedures should be considered for all stocks.  However, recognising that implementation of this Framework takes time, it could be applied progressively, according to areas of the highest risk or to stocks of highest importance.

### Monitoring exceptional circumstances and suspension of the management procedure

Certain circumstances may warrant the suspension of a management procedure. Suspension may lead to temporarily halting or modifying the management procedure, interim precautionary management controls or a suspension of fishing.

In recognition of this, management procedures should identify the exceptional circumstances (breakout rules) that may trigger departure from, or suspension of, the management procedure. As such, an exceptional circumstances protocol should be developed to guide SIOFA in deciding if circumstances warrant suspension of a management procedure. The protocol should not be overly prescriptive to avoid a lack of guidance for unforeseen situations.

## Performance Assessment, Review and Reporting

The ongoing performance of each management procedure  must be assessed against its established objectives and publicly reported. To facilitate effective performance assessment, the MOP should specify the data to be collected and maintained through adequate record-keeping systems. This includes data used in and the outputs from stock assessments and comprehensive information documenting how the management procedure has been performing for each stock. Detailed record-keeping requirements and performance monitoring protocols are specified in the Technical Guidelines.

# Alternative management approaches: If a full Management Procedure is not preferred

Management Procedures are the preferred, default management approach, including for ‘low information’ stocks.

However, if, based on the Scientific Committee’s advice, the Meeting of the Parties determines that a Management Procedure should not be developed at that time, or is not a practical tool to address risks in a particular fishery or for a particular stock other scientifically defensible approaches may be considered -’no management’ is not a reasonable alternative.

In such cases:

- Reasons for pursuing alternative management approaches should be documented;
- All available data should be considered and used to inform management strategies and controls that are robust to the uncertainties in the fishery;
- The Meeting of the Parties should draw on the elements outlined above (assessment, establishing reference points, pre-determined management responses and performance monitoring) and scientifically appropriate methods driven by the management aims should be deployed.
- The Meeting of the Parties should establish a clear timeline for review, including to consider whether a Management Procedure is feasible at a later point.

- A biologically appropriate  limit reference point should be adopted for all stocks that are not, or will not, be managed under a Management Procedure

## Management Procedure Review Schedule

Individual management procedures should be reviewed at minimum every six years (i.e two standard stock assessment cycles) as part of a structured adaptive management approach. This regular review schedule introduces future-proofing mechanisms that allow strategies to evolve with changing conditions and improved understanding.

Reviews should also be conducted when significant changes in fishery conditions occur or when new scientific knowledge emerges regarding species biology. This adaptive management philosophy ensures that harvest strategies remain current and effective over time.

Major amendments to management procedure are not anticipated to occur frequently. However, when significant amendments or development of new management procedures becomes necessary, such changes must be based on current scientific and economic analysis.

Earlier review may be necessary under the following conditions:

- Stock Changes - Marked changes in a stock, its importance to SIOFA CCPs or its information classification
- New Scientific Information - Emergence of new information that substantially changes understanding of the fishery, resulting in revised estimates of indicators relative to reference points.
- External Risk Factors - Unexpected increases in fishery and fish stock risk due to external drivers, including environmental or climate factors that have substantially altered stock productivity characteristics such as growth or recruitment patterns.
- Performance Indicator Failures - Performance indicators demonstrating that harvest strategies are not functioning effectively and that the intent of the management procedure is not being achieved.
- Inadequate Testing - When Management Procedures are implemented without formal testing or evaluation using methods such as MSE.
- MSE Limitations - When MSE testing did not adequately account for changes in risk factors subsequently observed in the fishery.
- Indicator Bias or Uncertainty - When subsequent estimates of performance indicators used in Harvest Control Rules are biased or uncertain to the extent that application of the control rule fails to appropriately adjust fishing pressure.

- ‘Exceptional Circumstances’ or other review triggers are met - such as when there are significant and unexpected changes in fishery conditions outside the ranges previously tested. This includes situations where stock biomass has declined below the Limit Reference Point while subject to a Management Procedure, indicating that stock productivity has been overestimated or that the control rule is not responding adequately to declines in performance indicators.

If a management procedure is amended as a result of a view, it should be re-tested to ensure it maintains a high likelihood of achieving its specific objectives under the revised circumstances.

## Rebuilding Plan Reporting

For any stock in the critical zone, reporting against implementation of rebuilding plans should flow naturally from the management procedure components. At minimum, reporting on rebuilding plan implementation must include:

- **Performance Against Objectives** - Assessment of rebuilding plan performance against established objectives, targets, and timeframes, specifically evaluating the extent to which implemented actions have delivered against articulated strategy goals.
- **Analysis of Recovery Shortfalls** - Where recovery has not occurred as expected or intended, comprehensive analysis of the reasons for this occurrence, including evaluation of the extent to which incidental or unavoidable catch has been minimised.
- **Amendment** - Identification of any anticipated or suggested amendments to the rebuilding plan that may better deliver against established objectives, targets, and timeframes.

# Roles and Responsibilities

## CCPs

- Submit required data in standardized formats according to established timelines
- Contribute research and expertise, where possible, to support implementation of this framework to primary and secondary species
- Apply and enforce conservation and management measures to flagged vessels

## Scientific Committee

- Categorize and classify stocks in accordance with this framework
- Conduct regular assessments of using best available methods
- Provide clear, timely advice to the Meeting of the Parties on the implementation of the Framework
- Provide best estimates and confidence intervals for current biomass and/or fishing mortality (or related biological reference points)
- Provide options for limit, target and trigger reference points, and associated harvest control rules
- Develop rebuilding plans for stocks when required
- Investigate the implications of management responses taken under this Framework.
- Oversee MSE processes
- Continuously improve assessment methods and approaches

## Compliance Committee

- Provide general advice on implementation challenges of this framework
- Provide advice on information CCPs need to collect to support monitoring the performance of the management procedure.

## Meeting of the Parties

- Determine pre-agreed management actions based on different biological scenarios
- Act on, and support generation of, best available science
- Act without delay if the Limit Reference Point is breached
- Adopt conservation and management measures, or other decisions, to implement this framework based on Scientific Committee advice
- Periodically review and update this Framework
- Ensure adequate budgetary and other resources are provided to support the implementation of this Framework

## Secretariat

- Support oversight and implementation of this Framework, including awareness raising and capacity assistance where required.
- Maintain records relating to the implementation of this Framework

- Produce regular reports on the Framework's implementation and effectiveness, as well as any emerging issues
- Maintain a stock assessment schedule

# Review

This framework should be reviewed every 5 years to ensure it remains fit for SIOFA's purposes, or more often if required. The framework should be updated where there is new information to support its implementation.

# Amendment

This framework may be amended by the Meeting of the Parties in accordance with its usual decision-making procedures.

# Conclusion

This Framework provides SIOFA with a comprehensive, flexible system for implementing precautionary fisheries management across all stocks, regardless of data availability. The framework's success depends on strong commitment from all CCPs, adequate resources for implementation, and continuous adaptation based on new information and experience.

The framework directly addresses SIOFA Performance Review Recommendations 1 and 10 by providing clear guidelines for precautionary management and establishing systems for continuous improvement.

# Annexes

Annex 1: Glossary
Annex 2: Management Procedure Development Process
Annex 3: List of Primary and Secondary Species
Annex 4: Management Procedure Decision Framework
Annex 5: UNFSA Requirements

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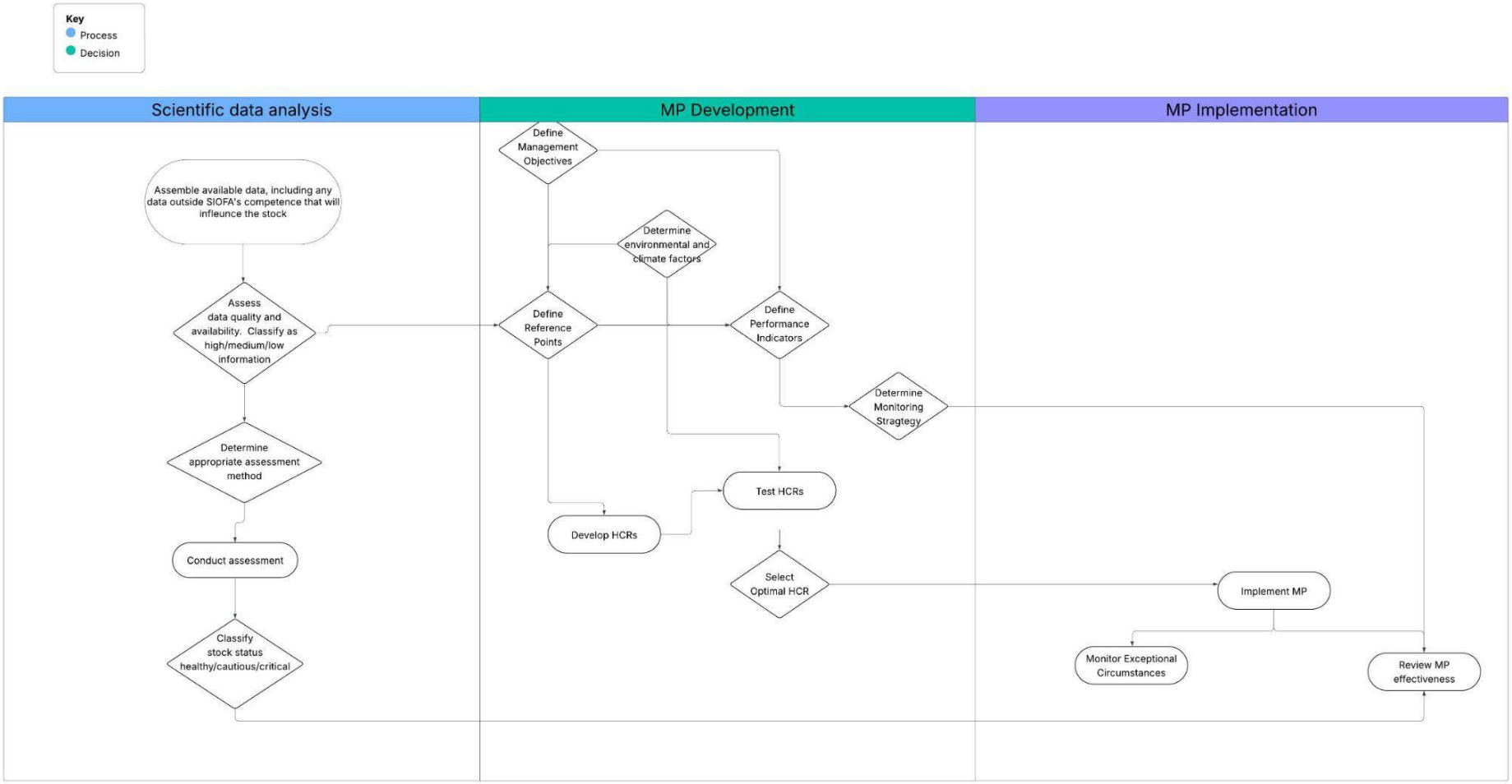
# Annex X

## Glossary

To be completed

# Annex X Management Procedure Process



Could the Secretariat kindly provide us with the current list (in word file preferably)

# Annex [X]

# List of Primary and Secondary Species[3]

## The interim definitions to prioritise species for work including primary, secondary and ETP species as follows:

*Primary species: Species for which management tools and measures should be in place and the achievement of stock management objectives is expected.* These species-gear encounters tend to encompass a high proportion of the fished area for that fishery. The Scientific Committee would be expected to undertake relevant biological studies and periodic stock assessments (quantitative, semi-quantitative or qualitative whichever is appropriate) for these species. These species should have SIOFA species specific fisheries summary reports compiled annually in years when no assessment is being undertaken.

*Secondary species: All other species that comprise 5 per cent or more of the total catch (determined using a 3-5 year average) or, for 'less resilient' species (most sharks etc., based on ERA), 2 per cent or more of the total catch, or otherwise as designated by the Scientific Committee.* The Scientific Committee would be expected to undertake periodic evaluations, to assess trends in catch and effort, for these species. Information on trends for these species could be included in a future general fishery summary report.

*Endangered, Threatened or Protected (ETP species)*: *All reptiles, birds, and mammals, as well as any species listed as endangered, threatened or* protected *by a CCP's national legislation, international agreements, or relevant international instruments (e.g., IUCN Red List as vulnerable, endangered or critically endangered) once designated by SIOFA.* The Scientific Committee would be expected to undertake catch and impact evaluations, on the incidental catch of these species from time to time or undertake risk-based analyses. Information on trends for these species should be included in general ETP species summary report.

The following definitions were adopted for SC planning and prioritisation:

[3] As adopted at MOP10

I. Target: Target species are declared by the skipper in logbook catch returns as required in Annex A of CMM 2022/02.

II. Targeted species: the intended catch and other valuable species landed in sets aimed at the intended catch. These species usually consist of 50% or more of the species composition of the retained catch, but in some highly diverse fisheries (e.g., shallow water tropical fisheries) these may make up as little as 15% of the retained catch. Targeted species are usually landed in consecutive sets within a trip, where there may be more than one intended target, and as such are not limited to those listed on set and haul declarations. Targeted species that are damaged or of an undesirable size are, from time to time, discarded by some vessels.

III. Bycatch: Fishery resources that are not target nor targeted typically in the taxonomic classes Chondrichthyes and Actinopterygii and infraphylum Agnatha and class Cephalopoda and Crustacea, that are part of the catch which is not the target.

IV. Retained bycatch: Species that are less valuable than the target species and often caught and retained, or retained often but in low proportions and have commercial value.

V. Discarded bycatch: Unwanted species that have little or no commercial value and are usually discarded. Species that are not allowed to be retained.

| Fishery | Target/Targeted | Bycatch | |
|---|---|---|---|
| | | Retained | Discarded |
| Deepwater bottom trawl (CK, AU) | BYS-Splendid alfonsino | ORD-Oreos nei. | All elasmobranchs |
| | ORY-Orange roughy | BOE-Black oreo | HYD-Ratfishes nei. |
| | SSO-Smooth oreo dory | BOR-Boarfishes nei. | ONV-Spiky oreo |
| | EPI-Black cardinal fish | BEO-Crested sculpin | SQU-Squid |
| | EDR-Pelagic armourhead | | |
| Deep mid-water trawl (CK) | BYS-Splendid alfonsino | ORD-Oreos nei | All elasmobranchs |
| | ORY-Orange roughy | BOE- Black oreo | OIL-Oilfish |
| | CDL-Cardinal fishes | BNS-Smallfin lanternfish | ONV-Spiky oreo |
| | BWA-Bluenose warehou | BOR- Boarfishes nei. | HYD-Ratfishes |
| | EPI-Black cardinal fish | EMM-Cape bonnetmouth | SQU-Squid |
| | EDR-Pelagic armourhead | BBY-White-ribbed toadfish | |

| | | | |
|---|---|---|---|
| | SEY-Violet warehou | WHA-Hapuku wreckfish | |
| | | ONV-Spiky oreo | |
| Mid-water trawl (JP,) | BYS-Splendid alfonsino | WHA-Hapuku wreckfish | CDL-Cardinal fishes |
| | SEY-Violet warehou | EDR-Pelagic armourhead | EMM-Cape bonnetmouth |
| | | BWA-Bluenose warehou | RGY-Narrowbanded sole |
| | | BXD-alfonsino | |
| | | EPI-Black cardinal fish | |
| | | ONV-Spiky oreo | |
| | | SEY-Violet warehou | |
| | | WRF-Wreckfish | |
| | | PRP-Roudi escolar | |
| | | SFS-Silver scabbardfish | |
| Shallow bottom trawl (TH) | LIB-Brushtooth lizardfish | SUN-Angel shark | SCO-Scorpion fish |
| | RUS-Indian scad | SDV-Mustelus species | FIP-Red cornetfish |
| | KZJ-Thredfin bream | CWZ-*Carcharhinus* sharks nei. | CRS-Swimming crabs? |
| | UPM-Goldfin goatfish | | |
| | DCC-Shortfin scad | | |
| | LTQ-Sky emperor | | |
| | BIS-Bigeye scad | | |
| | YBS-bigeye barracuda | | |
| Bottom longline (AU, EU, FR-OT) | TOP-Toothfish | CYO-Portuguese dogfish | CYO-Portuguese dogfish |
| | WHA-Hapuku wreckfish | ANT-Violet cod | ANT-Violet cod |
| | RIB-Common mora | GRV-macrourids | SKX-skates |

| | | | |
|---|---|---|---|
| | | WHA-Hapuku wreckfish | BYR-Sandpaper skate |
| | | RFA-Whiteleg skate | RFA-Whiteleg skate |
| | | | COX-Congor eels |
| | | | BSF- Black scabbard fish |
| Surface longline (TW) | OIL-oilfish | BIL- Billfish* | GES-Snake mackerel |
| | LEC-Escolar | TUN-Tuna * | CUT-Scabbard fishes |
| | | BSH-blue shark | ALV-Common thresher shark |
| | | FAL-Silky shark | PTH-Pelagic thresher |
| | | MAK-Mako sharks | BTH-Bigeye thresher |
| | | DOL-Mahi mahi | THR-Thresher sharks |
| | | WAH-Wahoo | RMB-Giant manta |
| | | COM-Spanish mackerel | RMV-*Mobula* spp. |
| | | BAC-Pickhandle barracuda | OCS-Oceanic whitetip shark |
| | | LAG-Opah | |
| Handline shallow water (MR) | LTQ-Sky emperor | ARV-Green jobfish | |
| | LHN-Spangled emperor | | |
| | LHB-Spotcheak emperor | | |
| Lines (Mechanised) deep water (MR) | ETC-Deepwater red snapper | PLM-Spotted coral grouper | |
| | ETA-Deepwater longtail red snapper | VRL-Yellow edged lyretail | |
| | LWA-Goldflag jobfish | ARV-Green jobfish | |
| | PFM-Crimson jobfish | | |
| | OXR-Frenchman seabream | | |

| | | | |
|---|---|---|---|
| | EEP-Comet grouper | | |
| Handline (TH, MR) | NGU-Yellow spotted trevally | CCF-Pigeye shark | YFT-yellowfin tuna |
| | NGY-Bludger | | MTM-Eagle ray |
| | NGX-*Carangoides* species | | KAW-Kawakawa |
| | EMN-Marbled coral groper | | |
| | LTQ-Sky emperor | | |
| | LUB-Emperor red snapper | | |
| | LJB-Two-spot red snapper | | |

* These species are managed by, and reported at the species level to, IOTC.

# Annex [X]

# Management Procedure Decision Framework: A Graduated Approach for Proactive and Precautionary Fisheries Management

## Framework Intent

This Management Procedure (MP) decision framework is founded on proactive, precautionary fisheries management that recognizes the practical realities of SIOFA's data availability and the breadth of stocks within its remit, which have different levels of importance to CCPs.

The framework establishes management procedures as the default management option for all stocks as the preferred approach. However, it also acknowledges that different methodological approaches may be required based on the information available and the economic or ecological importance of the stock to SIOFA.

The fundamental intent of this framework is to ensure that all stocks receive appropriate management attention, regardless of their data status or value. Some stocks may necessarily require more conservative management than others. This framework provides a structured pathway that allows SIOFA to meet its precautionary approach obligation across its entire portfolio of stocks.

Central to this, reduced data availability does not justify reduced precaution. However, the methodological approaches to achieve that may vary across the gradient of data availability, the commitment to precautionary management remains constant.

## A Graduated Approach to Management Procedures

This Framework presents three possible methodological approaches to implementing a management procedure. It takes a graduated approach, beginning with established, model-based quantitative approaches to management procedures and working through a decision hierarchy if that is not achievable to less quantitative approaches.

All Management Procedures should to a greater or lesser extent, include the components specified in the Framework. However, these components are addressed in

different ways depending on the type of management procedure approach taken. All available data should be used, regardless of the approach data.

The three possible approaches are:

## 1. Tier One: Full, Model-Based Management Procedures

These represent the gold standard for fisheries, incorporating stock assessment based operating models to assess candidate management procedures robustness to potential future scenarios via management strategy evaluation. They require quantitative knowledge of population dynamics and life history characteristics, as well as detailed fishery data in order to simulate a range of future scenarios. While these MPs are data and computationally intensive, they represent the most reliable form of MP.

## 2. Tier Two: Simplified, Empirical Management Procedures

These management procedures are inherently less complex. Their procedures rely on simple rules based on observable trends and indicators, designed to be robust across a range of conditions without requiring detailed knowledge of the underlying population dynamics required for model-based approaches. They are designed for situations with moderate data availability. They provide a pragmatic middle ground that maintains quantitative rigor while reducing data requirements and analytical complexity. In these cases, empirical harvest control rules may be based on observable indicators, linking them to catch advice Catches could be regulated based on trend-based rules that adjust advice according to recent observations (e.g. catches or a relative biomass index). Candidate management procedures are still subject to simulation testing, for example testing a conservative constant catch scenario.

## 3. Tier 3:Qualitative, “Knowledge-Based” Management Procedures

The first two categories are well established approaches (See for e.g Geromont and Butterworth 2015b; 2015a; Dowling et al. 2015). This third category addresses the reality that many stocks will never justify or support even simplified quantitative approaches. These procedures harness expert judgment, and practical monitoring to provide proactive management for the most data-limited situations.

Some SIOFA fisheries may only be able to achieve this qualitative management procedure - not necessarily because of a lack of some inherent biological characteristics but because the fisheries are low in value.

While quantitative approaches are preferred, and their feasibility should be explored, this approach may be the best case situation for fisheries where:

- No quantitative data are available or feasible to collect
- They are low-value where data collection costs exceeds benefits
- No quantitative monitoring systems exist or are feasible
- Traditional scientific assessment methods are impossible
- Even simplified empirical indicators cannot be calculated and it is difficult to quantify performance

In these situations, management procedures will rely more heavily on qualitative analyses, such as:

- expert judgement applied to biological understanding from similar systems, such as life history knowledge
- Observable, qualitative indicators such as perceptual changes (fish are getting smaller, fish are harder to catch, species composition is changing) or changes in fleet behaviour (changes in fishing patterns, effort distribution, participation, gear) or other observable ecosystem changes.

Simple harvest control rules should be implemented. Management actions may, initially, be experiments, and need to be monitored and adapted. It may be helpful to define escalating levels of intervention or what constitutes ‘concerning’ changes to manage the risk of overfishing.

The graduated nature of this framework ensures that no stock falls through the management cracks due to data limitations. By providing appropriate tools for each level of data availability, the framework enables SIOFA to:

- **Maintain consistency** in applying the precautionary approach across all managed stocks
- **Optimize resource allocation** by matching analytical intensity to stock value and data availability
- **Provide clear pathways** for upgrading management approaches as data and resources become available
- **Ensure transparency** in management decisions regardless of the analytical approach employed

# Decision Pathway for Management Procedures

**Step 1: Fishery selection**

- Determine the fishery to which the management procedure will apply

**Step 2: Information Assessment**

- Determine whether the information base is high, medium or low

**Step 3: Management Procedure type selection**

**General guidance**

- For all stocks, the default, preferred option is a [quantitative, model-based] management procedure. If that is not possible the next best option [simplified empirical] management procedures should be considered before considering the qualitative approach. In other words, SIOFA should take a process of elimination approach based on advice from the Scientific Committee on the basis of risk and information available.

- It is likely that the quantitative, model-based management procedure will only be possible for high information or medium information primary stocks. Nevertheless, the below table sets out a general aspiration for the types of MPs that could, either now or into the future, be in place for primary and secondary stocks.

- Every Management Procedure, regardless of type, should contain the essential elements identified below in the Management Procedure Elements Matrix in a way that is appropriate to the Management Procedure's form and character.

**Table X**

| | High | Medium | Low |
|---|---|---|---|
| Primary | Quantitative, model based MP | Quantitative, model based (preferred where possible) | Full MP (preferred where possible) |
| Secondary* | Full MP (preferred | Full MP (preferred | Full MP (preferred |

| | | | |
|---|---|---|---|
| | where possible) | where possible) | where possible) |

*Decision based on cost vs value

# Management Procedure Elements Matrix

Bear in mind that the outcomes of PAM 02 and PAM 03 are relevant to the bracketed sections below

| Element | Full, quantitative MP | Simplified, empirical MP | Qualitative MP | Notes |
|---|---|---|---|---|
| **ESSENTIAL ELEMENTS** | | | | |
| Fishery Definition | ✓ Required | ✓ Required | ✓ Required | Basic requirement for all MPs |
| Management Objectives | ✓ Required | ✓ Required | ✓ Required | Primary: detailed; Secondary: basic sustainability |
| [Reference Points (LRP)] | ✓ [Default values unless otherwise determined] | ✓ [Default values unless otherwise determined] | ✓ [Default values unless otherwise determined] | [Can use default LRP for secondary stocks] |
| Stock Assessment | ✓ Regular schedule, regular intervals as defined in monitoring plan<br>✓ Assessment based on data availability | ✓ Regular schedule, regular intervals as defined in monitoring plan<br>✓ Assessment based on data availability | ✓ Regular schedule, regular intervals as defined in monitoring plan<br>✓ Assessment based on data availability | Use best assessment method available based on the data availability. Frequency of assessment determined based on scientific advice Forms part of the MP |

| | | | | |
|---|---|---|---|---|
| | | | | monitoring procedure |
| Harvest Control Rules | ✓ Required | ✓ Required | ✓ Required (can be qualitative for low data, secondary species) | HCRs appropriate to the fishery |
| Performance Monitoring | ✓ Comprehensive | ✓ Based on best available data | ✓ Essential indicators | Focus on key indicators for secondary; cost effective approach. |
| Exceptional circumstances protocol | ✓ Required | ✓ Required | ✓ Required | |
| Review of the MP | ✓ Typically every two cycles of the MP | ✓ Typically every two cycles of the MP | ✓ Typically every two cycles of the MP | |
| [Reference Points (TRP) | ✓ Required | ✓ Required | ✓ Required | May be across a range of values] |
| **ADDITIONAL ELEMENTS** | | | | |
| [Simulation testing | ✓ Model based MSE Testing | ✓ Model based MSE Testing | ✓ Expert judgement based MSE testing] | |
| **ENHANCED ELEMENTS** | | | | |
| Economic Analysis | ○ Optional | ○ Optional | ○ Not required | Primarily for high-value primary stocks |
| Ecosystem Indicators | ○ Encouraged | ○ Encouraged | ○ Encouraged | Where relevant and feasible |
| Climate Considerations | ○ Encouraged | ○ Encouraged | ○ Encouraged | Where relevant and feasible |

**Legend**: ✓ Required ◦ Optional

# Annex

# UNFSA Requirements

Article 6

Application of the precautionary approach

1. States shall apply the precautionary approach widely to conservation, management and exploitation of straddling fish stocks and highly migratory fish stocks in order to protect the living marine resources and preserve the marine environment.

2. States shall be more cautious when information is uncertain, unreliable or inadequate. The absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures.

3. In implementing the precautionary approach, States shall:

(a) improve decision-making for fishery resource conservation and management by obtaining and sharing the best scientific information available and implementing improved techniques for dealing with risk and uncertainty;

(b) apply the guidelines set out in Annex II and determine, on the basis of the best scientific information available, stock-specific reference points and the action to be taken if they are exceeded;

(c) take into account, inter alia, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities on non-target and associated or dependent species, as well as existing and predicted oceanic, environmental and socio-economic conditions; and

(d) develop data collection and research programmes to assess the impact of fishing on non-target and associated or dependent species and their environment, and adopt plans which are necessary to ensure the conservation of such species and to protect habitats of special concern.

4. States shall take measures to ensure that, when reference points are approached, they will not be exceeded. In the event that they are exceeded, States shall, without delay, take the action determined under paragraph 3 (b) to restore the stocks.

5. Where the status of target stocks or non-target or associated or dependent species is of concern, States shall subject such stocks and species to enhanced monitoring in order to review their status and the efficacy of conservation and management measures. They shall revise those measures regularly in the light of new information.

6. For new or exploratory fisheries, States shall adopt as soon as possible cautious conservation and management measures, including, inter alia, catch limits and effort limits. Such measures shall remain in force until there are sufficient data to allow assessment of the impact of the fisheries on the long-term sustainability of the stocks, whereupon conservation and management measures based on that assessment shall be implemented. The latter measures shall, if appropriate, allow for the gradual development of the fisheries.

7. If a natural phenomenon has a significant adverse impact on the status of straddling fish stocks or highly migratory fish stocks, States shall adopt conservation and management measures on an emergency basis to ensure that fishing activity does not exacerbate such adverse impact. States shall also adopt such measures on an emergency basis where fishing activity presents a serious threat to the sustainability of such stocks. Measures taken on an emergency basis shall be temporary and shall be based on the best scientific evidence available.