Working towards MSC certification:

A practical guide for fisheries improving to sustainability

For use alongside the MSC Fisheries Standard version 3.0

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Acronyms

Term	Meaning
B_{lim}	Biomass limit reference point
B_{MSY}	Biomass consistent with MSY
B_{pa}	Biomass precautionary reference point
$B_{trigger}$	Biomass level that triggers management action
CAB	Conformity Assessment Body
CFP	EU Common Fisheries Policy
CITES	Convention of International Trade in Endangered Species
CoP	Code of Practice
CPUE	Catch per Unit Effort
CSA	Consequence Spatial Analysis
CV	Coefficient of Variation
ETP	Endangered, Threatened or Protected
EEZ	Exclusive Economic Zone
ERF	Evidence Requirements Framework
EU	European Union
F_{MSY}	Fishing mortality consistent with MSY
FAO	United Nations Food and Agricultural Organisation
FCP	MSC Fisheries Certification Process
FIP	Fishery Improvement Project
FMP	Fishery Management Plan
FNA	Fins Naturally Attached
GIS	Geographic Information System
HCR	Harvest Control Rule
ICES	International Council for Exploration of the Sea
IUCN	International Union for Conservation of Nature
IUU	Illegal, Unregulated, Unreported
ITM	In-Transition to MSC
LTL	Low Trophic Level
LRP	Limit Reference Point

Acronyms – *continued*

Term	Meaning
MCS	Monitoring, Control and Surveillance
MoU	Memorandum of Understanding
MPA	Marine Protected Area
MP	Management Procedure
MSC	Marine Stewardship Council
MSE	Management Strategy Evaluation
MSY	Maximum Sustainable Yield
MT	Metric Tonnes
NGO	Non-Governmental Organization
NM	Nautical miles
OOS	Out-of-scope species
PI	Performance Indicator
PRI	Point of Recruitment Impairment
PSA	Productivity Susceptibility Analysis
RBF	MSC Risk-Based Framework
RFMO	Regional Fishery Management Organisations
SB_{MSY}	Spawning stock biomass at MSY
SI	Scoring Issue
SG	Scoring Guidepost
SICA	Scale Intensity Consequence Analysis
SMP	Square Mesh Panels
SSB	Spawning Stock Biomass
TAC	Total Allowable Catch
TED	Turtle Excluder Device
TRP	Target Reference Point
UoA	Unit of Assessment
UoC	Unit of Certification
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System
WCPFC	Western and Central Pacific Fisheries Commission

Section 1

Introduction

Introduction to this guide

The Marine Stewardship Council (MSC) is an international non-profit organisation established to contribute to efforts to address the problem of unsustainable fishing and safeguard seafood supplies for the future. The MSC runs a certification and ecolabelling program for wild-capture fisheries that meets international best practice for sustainability standards. Fisheries that meet the MSC Fisheries Standard can make a claim that they are MSC certified and products from such fisheries are eligible to carry the MSC's blue ecolabel once they have obtained MSC Chain of Custody certification.

Overview

This guide is a resource for stakeholders working directly with fisheries moving towards achieving MSC certification. It contains practical examples and guidance to help fisheries understand how they can meet the MSC requirements.

With over 500 MSC certified sustainable fisheries, it is now possible to showcase many examples of best practice, and describe the actions being made by fisheries of all scales and intensities in many areas of the world to improve the sustainability of their practices. The guide builds on experience within the MSC program certifying best practice, on-going work with fisheries, and MSC policy work to ensure accessibility to the standard to a wide range of fisheries including those with more informal, traditional and data limited approaches.

The guide accompanies the capacity building training program developed to support improvement of fisheries to MSC certification. While the primary goal of the guide is to build the capacity of practitioners involved in Fishery Improvement Projects (FIPs), including the In-Transition to MSC program, it may also be used as a tool for building the capacity of other stakeholders associated with fisheries that are interested in MSC certification, including fishery managers, NGOs, development agencies and CAB auditors.

The MSC Fisheries Standard

The MSC Fisheries Standard was developed based on the United Nations Food and Agriculture Organization (FAO) Code of Conduct for Responsible Fisheries. It was developed in consultation with a range of stakeholders across the globe including government academics, researchers, fishing industry, NGOs, private sector and the fishing community.

The MSC Fisheries Standard is made up of three principles:

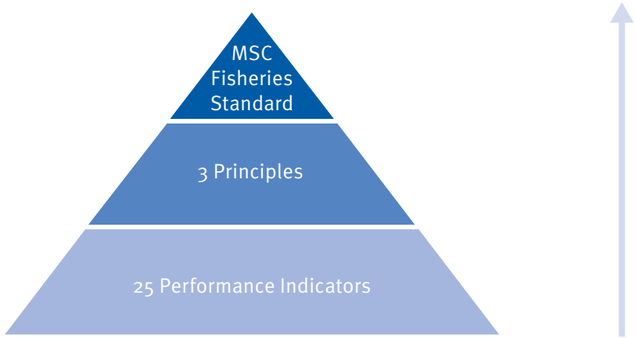
Principle 1 – Sustainable fish stocks

Principle 2 – Minimising environmental impacts

Principle 3 – Effective management

Each principle is further broken down into a set of Performance Indicators (PIs). Fisheries are assessed and scored against each of these PIs to determine how the fishery performs overall against the MSC Fisheries Standard.

To guide the Conformity Assessment Body (CAB) auditors (i.e., independent assessors), when scoring fisheries, each PI is further broken down into one or more scoring issues (SI). The performance required to reach a score of 60 (minimum acceptable level), 80 (global best practice) or 100 (state of the art) is defined in a set of scoring guideposts (SG). Auditors determine the performance of a fishery against the MSC Fisheries Standard based on whether they meet each of the SI scoring guideposts, with clear rationales, with supporting evidence, being provided at each point.



In order to be certified, fisheries must score at least 60 for each of the 25 PIs, as well as an average of 80 across all PIs under each of the 3 principles. Further detail on how a fishery is scored against the MSC Fisheries Certification Process (FCP).

Structure of the guide

This guide is designed as a tool to accompany the capacity building training program. It is divided into four sections:

Section 1
An introduction to the guide and an explanation of how the guide should be used.

Section 2
Key MSC Concepts

Section 3
A detailed overview of each of the 25 PIs of the MSC Fisheries Standard.

Section 4
A set of annexes to the main document.

Section 3 breakdown:

Section 3 is broken down into three chapters, one for each 'principle' of the Standard. Each principle is further divided into sub-chapters based on the PIs and scoring issues within it. Each scoring issue contains examples of good practice, What CAB auditors check, key questions and examples of scoring rationales. The guide shares real fisheries examples, key challenges and example solutions to meet specific requirements.

P1 | P2 | P3

Each PI subchapter includes:

- An overview of the PI
- Scoring issues
- Challenges and solutions
- Example actions to improve performance

Each scoring issue subsection includes:

- Good practice
- What CAB auditors check
- Key questions to determine if further action is needed
- Examples of scoring rationales

How to use this guide

Section 3 provides content on MSC's requirements at the PI and SI level with which to train practitioners involved in pre-MSC fisheries. However, users should note that this guide does not cover all the situations that may be encountered in a fishery when assessing any particular PI. The MSC Fisheries Standard itself is therefore the definitive reference, as it applies to different fishery types, and with more detailed content. Below the various subsections in Section 3 are introduced.

Good practice

The 'good practice' subsections of the guide provide examples of key attributes which, when present, may increase the likelihood of a fishery meeting the MSC Fisheries Standard. Users should note that these attributes are not exhaustive or prescriptive. There may be other ways in which a fishery may demonstrate consistency with a scoring issue requirement.

What CAB auditors check

This subsection is intended to give users an idea of the types of documents and information sources that can be used to demonstrate how a fishery meets the MSC requirements. This subsection must be viewed simply as a guide because the precise information that the assessment team uses in a full assessment may vary with individual fisheries.

Key questions to determine where further action is needed

This subsection lists typical questions that a FIP practitioner, an ITM manager or CAB auditor may ask when trying to determine if a fishery meets the requirements for a particular scoring issue and/or whether improvements may be required for a fishery to meet the MSC Fisheries Standard.

Examples of scoring rationales

This subsection provides typical examples of the supporting rationale that may be documented by the CAB auditors to demonstrate how a fishery meets the requirements of an SI. The examples have either been taken directly from previous assessments, modified from previous assessments or created as examples to show how evidence that a requirement is met might be presented. The latter approach was necessary to demonstrate examples of scoring rationales relating to new requirements created in the most recent version of the MSC Fisheries Standard (v3) as some SIs have not previously been scored against. The examples used here have been shortened or modified from their original and are not a definitive statement of the current state of the specific fishery cited. All references to the status of such fisheries should refer to the official reports published on www.msc.org.

Examples of scoring rationales – *continued*

Users may find it useful to compare the rationale provided in the examples with the level of performance in their own fisheries or use the examples to identify how they might make improvements in their fisheries. Users should however be aware that the dynamic nature of fisheries, and differences in their location, size and type, mean that while useful lessons can be learnt from the example rationale provided, the way that sustainability is demonstrated will differ from one fishery to another.

Users should also note that CAB auditors are required to back up the rationale provided in their assessments with appropriate source references and other information. These are a requirement for preparing the Public Certification Reports but have been left out of this guide for the sake of clarity and simplicity.

Challenges and solutions to meeting PIs

This section describes some of the challenges and solutions associated with achieving the requirements of each PI, including for fisheries of lower scale and intensity.

Example actions to improve performance for PIs

This section outlines possible actions to address gaps in the fishery's performance. The examples are based on some of the actions implemented by fisheries in order to meet the requirements of the MSC Fisheries Standard or to maintain their certification. These examples are useful in stimulating discussion on the development of an action plan for a FIP. They are however not intended as a generic set of actions to meet the MSC Fisheries Standard and must be referenced with caution given the unique and dynamic nature of fisheries around the world.

Disclaimer

The latest version of the MSC Fisheries Standard along with the latest version of the MSC Fisheries Certification Process (FCP) and Guidance provide the definitive source of the MSC Fisheries Standard. All formal assessments of fisheries against the MSC Fisheries Standard must refer to these scheme documents. It is important to note that this document 'Working towards MSC Certification: a practical guide for fisheries improving towards sustainability' is a supporting document only, and it is not the MSC Fisheries Standard nor an official MSC scheme document.

The text of the English MSC Fisheries Standard and other MSC scheme documents will prevail in all instances where doubt exists on requirements or interpretation. Visit the MSC website to access all scheme documents.

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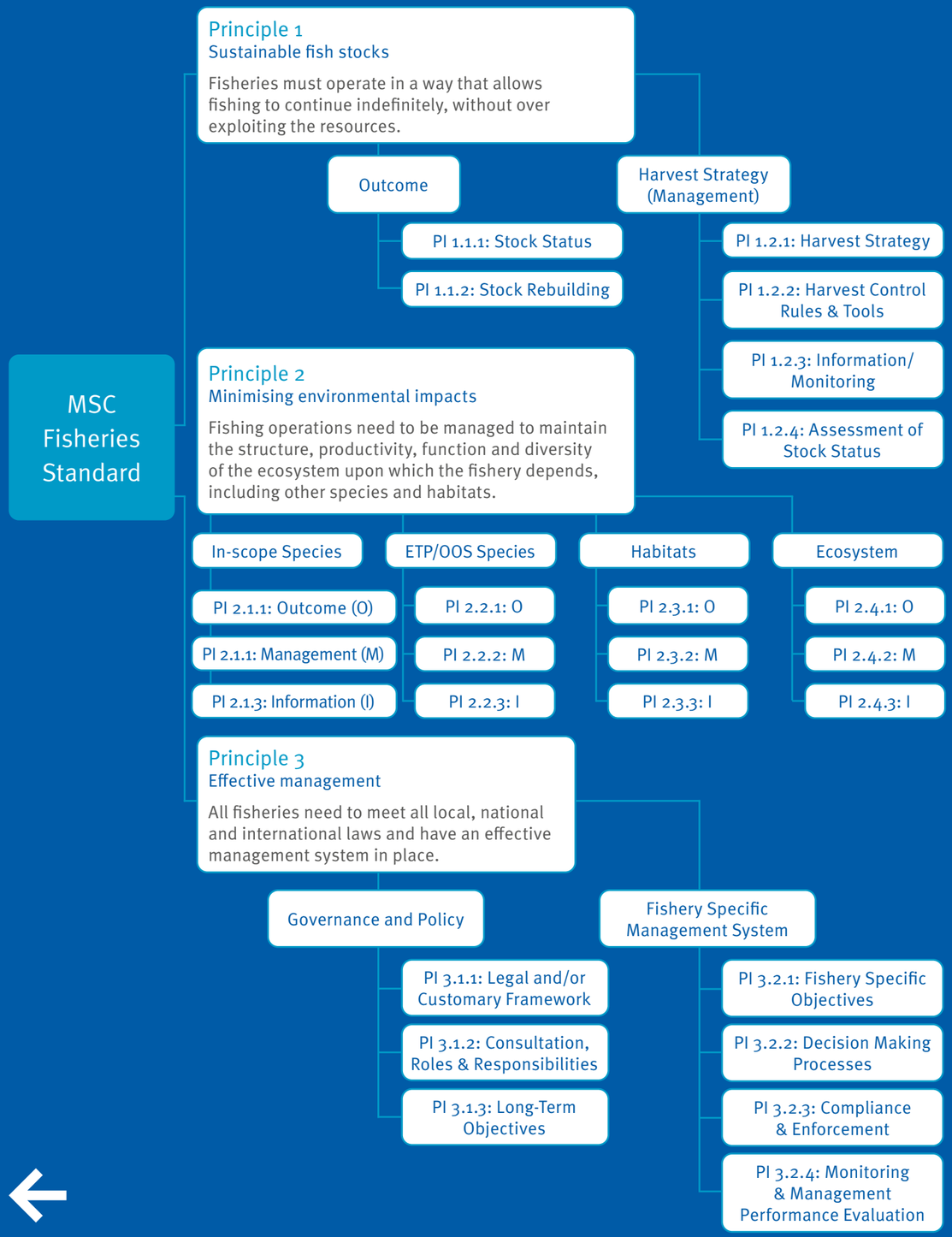
Feedback and review

The MSC welcomes feedback on the usability, content and structure of this guide. Please share your feedback by sending an email to: fisheries@msc.org

Section 2

Key MSC Concepts and The Default Assessment Tree

The Default Assessment Tree



What is assessed?

The scope of what is assessed varies slightly under each Principle. Principle 1 applies to the whole of the fish stock(s) exploited by the fishery being assessed, and this may include fleets fishing on that stock which are not covered by the assessment.

Principle 2 assesses the impacts of the fishery (as defined at the start of the assessment) on other species within the catch, habitat and ecosystem. While other fisheries and human uses may impact the same marine ecosystem and may ultimately cause impacts that prevent MSC certification of all related fisheries, the application of the MSC Fisheries Standard is focussed on the impacts of the fishery being assessed.

In some circumstances the actions of other MSC certified fisheries need to be considered, to avoid the problem of MSC fisheries generating cumulative impacts. This incentivises adoption of best practice by certified fisheries without requiring that they influence the wider fishing fleet.

Principle 3 applies to the management jurisdictions that applies to the fishery being assessed. There may be different levels of management jurisdiction which must be considered, such as regional, national or international, depending on the scale and operational characteristics of the assessed fishery and the biological characteristics of the P1 species (for example, highly migratory species are likely to require management at a greater (oceanic) spatial scale).

Unit of Assessment (UoA) and Unit of Certification (UoC)

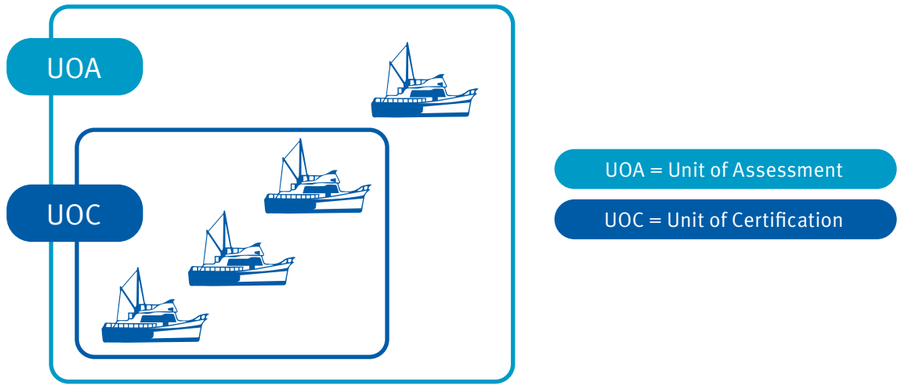
At the very beginning of the assessment process, the Unit of Assessment (UoA) needs to be decided upon. This defines the full scope of what is being assessed and includes:

- The target stock(s);
- The fishing gear type(s) and, if relevant, vessel type(s);
- The fishing fleets or groups of vessels or individual fishing operators pursuing that stock including entities initially intended to be covered by the certificate.

The Unit of Assessment could cover anything from a handful of local boats to a full national fleet.

Once it has been defined, only seafood from that particular unit will later be able to carry the MSC ecolabel in the marketplace (assuming an MSC assessment shows that the defined fishery has successfully met the required standard).

Defining the Unit of Assessment and Unit of Certification



Defining the Unit of Assessment and Unit of Certification – *continued*

The term Unit of Certification (UoC) refers to those elements of the UoA that are covered by an MSC certificate. As such, the UoC defines the unit that will be entitled to receive and make use of an MSC certificate under the same headings as described above for the UoA.

The reason there is a UoA and a UoC is because the MSC allows parts of fishing fleets to be certified, even if the rest of the fleet is not certified. There may be fishers (i.e. vessels) that are not part of the certification program but their impacts will have been assessed nonetheless. These fishers are called 'other eligible fishers', and they have the option to join the certificate at a later date through a 'certificate sharing' process.

The MSC Toolbox

The purpose of the MSC Fisheries Standard Toolbox is to house a suite of mandatory and optional MSC-endorsed assessment tools and their associated requirements. These tools and associated requirements, provided in the table below, are used by assessment teams to score, or inform the score, of Performance Indicators during the assessment of Units of Assessment (UoA) against the MSC Fisheries Standard.

Tool	Type
Risk-Based Framework (RBF)	Mandatory in certain cases (Refer to Annex 1 Risk-Based Framework)
Evidence Requirements Framework	Mandatory for various performance indicators
Benthic Impacts Tool	Optional (not included in this CBT Guide)
Early Application of Section SE	Optional (not included in this CBT Guide)

Where aspects of the MSC Toolbox are needed to score various sections of the Standard, these will be indicated throughout this CBT Guide. However, these only relate to the RBF and Evidence Requirements Framework, as the Benthic Impacts Tool and Early Application of Section SE are optional or no longer applicable.

A detailed description of the Risk-Based Framework (RBF), which sits within the MSC Toolbox, is provided in Annex 1 Risk-Based Framework.

The Evidence Requirements Framework is a tool in the MSC Fisheries Standard Toolbox that provides assessment teams with a comprehensive method to evaluate the quality of evidence used to determine a fishery's impacts and compliance with regulations.

For scoring issues where the Evidence Requirements Framework applies, assessors must evaluate the strengths and weaknesses of a fishery's monitoring system to determine the accuracy of the information that it provides. This includes consideration of how the information is collected, the extent of the fishery's activity that is monitored and how the information has been reported and provided to the assessment team.

This tool allows assessors to evaluate information in a systematic way, and to report their findings consistently and transparently as part of the certification process. The tool sets out a method to infer the accuracy of information used to score a fishery, based on an evaluation of the trueness, and where relevant, the precision, of information.

The Default Assessment Tree

*Grey cells indicate that there is no scoring guidepost for that scoring issue.

Performance Indicator	Scoring issue	SG 60	SG 80	SG 100
1.1.1 Stock status	(a) Stock status relative to recruitment impairment			
	(b) Stock status in relation to achievement of Maximum Sustainable Yield (MSY)			
1.1.2 Stock rebuilding	(a) Rebuilding timeframes			
	(b) Rebuilding evaluation			
1.2.1 Harvest strategy	(a) Harvest strategy design			
	(b) Harvest strategy evaluation			
	(c) Harvest strategy monitoring			
	(d) Harvest strategy review			
	e) Shark finning			
	(f) Review of alternative measures			
1.2.2 Harvest control rules and tools	(a) HCRs design and application			
	(b) HCRs robustness to uncertainty			
	(c) HCRs evaluation			
1.2.3 Information and monitoring	(a) Range of information			
	(b) Monitoring			
	(c) Comprehensiveness of information			
1.2.4 Assessment of stock status	a) Appropriateness of assessment to stock under consideration			
	(b) Assessment approach			
	(c) Uncertainty in the assessment			
	(d) Evaluation of assessment			
	(e) Peer review of assessment			
2.1.1 In-scope species outcome	(a) Main in-scope species stock status			
	(b) Minor in-scope species stock status			

Outline of the MSC Fisheries Standard – *continued*

Performance Indicator	Scoring issue	SG 60	SG 80	SG 100
2.1.2 In-scope species management strategy	(a) Management strategy in place			
	(b) Management strategy effectiveness			
	(c) Review of alternative measures			
	(d) Shark finning			
	(e) Ghost gear management strategy			
2.1.3 In-scope species information	(a) Information adequacy for assessment of impact on main in-scope species			
	(b) Information adequacy for assessment of impact on minor in-scope species			
	(c) Information adequacy for management strategy			
2.2.1 ETP/OOS species outcome	(a) Direct effects			
2.2.2 ETP/OOS species management strategy	(a) Management strategy in place			
	(b) Management strategy Effectiveness			
	(c) Review of alternative measures to minimise mortality of the ETP/OOS unit			
	(d) Shark finning			
	(e) Ghost gear management strategy			
2.2.3 ETP/OOS species information	(a) Information adequacy for assessment of impacts			
	(b) Information adequacy for management strategy			
2.3.1 Habitats outcome	(a) Less sensitive habitats			
	(b) More sensitive habitats			
2.3.2 Habitats management strategy	(a) Management strategy in place			
	(b) Management strategy effectiveness			
	(c) Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect more sensitive habitats			
	(d) Ghost gear management strategy			

Key MSC Concepts and The Default Assessment Tree

Outline of the MSC Fisheries Standard – *continued*

Performance Indicator	Scoring issue	SG 60	SG 80	SG 100
2.3.3 Habitats information	(a) Information quality			
	(b) Information adequacy for assessment of impacts			
	(c) Monitoring			
2.4.1 Ecosystem outcome	(a) Ecosystem status			
2.4.2 Ecosystem management strategy	(a) Management strategy in place			
	(b) Management strategy effectiveness			
2.4.3 Ecosystem information	(a) Information quality			
	(b) Investigation of UoA impacts			
	(c) Understanding of component functions			
	(d) Monitoring			
3.1.1 Legal and/ or customary framework	(a) Compatibility of laws or standards with effective management			
	(b) Resolution of disputes			
	(c) Respect for rights			
3.1.2 Consultation, roles and responsibilities	(a) Roles and responsibilities			
	(b) Consultation processes			
	(c) Participation			
3.1.3 Long term objectives	(a) Objectives			
3.2.1 Fishery-specific objectives	(a) Objectives			

Outline of the MSC Fisheries Standard – *continued*

Performance Indicator	Scoring issue	SG 60	SG 80	SG 100
3.2.2 Decision-making processes	(a) Decision-making processes			
	(b) Responsiveness of decision-making processes			
	(c) Use of precautionary approach			
	(d) Accountability and transparency of management system and decision-making process			
	(e) Approach to disputes			
3.2.3 Compliance and enforcement	(a) MCS system			
	(b) Sanctions			
	(c) Compliance (information)			
	(d) Compliance (outcome)			
3.2.4 Monitoring and management performance evaluation	(a) Evaluation coverage			
	(b) Internal and/or external review			

Section 3

Performance Indicators

Principle 1 - Sustainable fish stocks

A fishery must be conducted in a manner that does not lead to overfishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

Overview of Principle 1 Performance Indicators

1.1.1	Stock status	21
1.1.2	Stock rebuilding	33
1.2.1	Harvest strategy	43
1.2.2	Harvest control rules and tools	61
1.2.3	Information and monitoring	73
1.2.4	Assessment of stock status	85

Overview of Principle 1

Principle 1 states that "a fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery".

There are two components in Principle 1: an outcome component with two PIs and a management component with four PIs. The stock status PI (1.1.1) is the first PI in the outcome component and is scored to reflect:

- increased probability that exploited biomass maintains a high productivity and fluctuates around a target of Maximum Sustainable Yield (MSY), or a higher target if this is warranted from a consideration of the trophic inter-dependencies of the species; and
- decreased probability that exploited biomass will drop significantly towards the point where recruitment becomes impaired, either through recruitment overfishing or through genetic effects or imbalances in sex ratio.

The second PI in the outcome component covers stock rebuilding PI (1.1.2) and is only triggered in cases where stock status (PI 1.1.1) is not at or fluctuating around a level consistent with MSY. In these circumstances a timely and effective rebuilding plan must be in place.

In circumstances where the status of a stock is currently below the Point of Recruitment Impairment (PRI), this would not achieve the necessary pass level (SG60) in the stock status PI (PI 1.1.1). Such a stock would not meet the MSC Standard regardless of whether there are effective recovery plans or programs in place, until such time as the stock status rises above PRI.

The management component (harvest strategy) has four PIs. These PIs assess a fishery's (or the fishery management's) ability to manage the impact on target stocks to achieve the outcomes sought by Principle 1 – i.e. a high likelihood that the stock is at a level that maintains high productivity. The overall harvest strategy and the specific management components in PIs 1.2.1 – 1.2.4 should in combination be capable of achieving the desired management level expressed in the target and limit reference points.

If the target stock is managed by a Regional Fisheries Management Organisation (RFMO), the scoring requirements are assessed in a bespoke annex to the MSC Fisheries Standard, known as Section SE. Unlike other areas of the MSC requirements, Section SE drives fisheries to achieve the SG100 level of PI 1.2.1 scoring issue a and b. It also includes specified milestones to deliver a harvest strategy that includes a management procedure (MP) that has been developed through management strategy evaluation (MSE). In order to achieve the required outcomes, this level of performance has to be met for every target stock scored in Section SE.

The bespoke annex includes scoring of PI 1.2.1 scoring issue a and b and PI 1.2.2. The scoring requirements of these two PIs are the same as the default tree, except for an allowance to score 'available' harvest control rules (HCRs) at the SG60 level. 'Available' HCRs can only be scored if the target stock is healthy (i.e. Biomass (B) › Biomass consistent with MSY (BMSY)) and predicted to stay there. There are two allowances for 'available' HCRs. These are that the management body that oversees the target stock has put in place HCRs on another stock under its remit, or that there is an agreement or framework in place that requires the management body to adopt HCRs before the stock declines below BMSY.

If the target stock meets the criteria as a key low trophic level (LTL) species, they are assessed differently to other target species. Key LTL species typically have rapid growth, high fecundity, form schools, and occupy lower trophic positions in the ecological food chain. They are characterised by having a large proportion of the trophic connections in an ecosystem involving their populations, and large volumes of energy passing between lower and higher trophic levels. The designation of key LTL species, such as sardines and krill, is defined in the Fisheries Standard requirements. These species need to be assessed against their ecosystem importance, and higher management requirements apply to these species, to meet the ecosystem needs. Rather than assess the target stock health relative to the PRI and MSY, the key LTL requirements (PI 1.1.1A) ensure these species are managed in a precautionary manner against the ecosystem needs.

1.1.1 Stock status

Performance Indicator overview 22

Scoring issue (a) 23
Stock status relative to recruitment impairment

Scoring issue (b) 26
Stock status in relation to achievement of MSY

Challenges and solutions to meeting PI 1.1.1 29

Example process and actions to improve performance against PI 1.1.1 30

Performance Indicator overview

Performance Indicator (PI) 1.1.1 examines the impact of the fishery on the target stock/species and whether the species/stock status is at a sustainable level. This applies to the entire stock that is under assessment and the combined impact of all fisheries. In simple terms it looks to verify firstly that the stock status is likely to be above the Point of Recruitment Impairment (PRI) and secondly that the stock is fluctuating around a target level consistent with Maximum Sustainable Yield (MSY). This combination of scoring issues ensures that the stock meets the combined goals established in the UN Fish Stocks Agreement for high production from a fishery taken at a sustainable level (with a low risk of recruitment overfishing).

The scoring issues in PI 1.1.1 are phrased in terms of likelihood or probability. The phrasing is intended to allow for either qualitative or quantitative evaluation of the stock in a probabilistic way. Higher scores require not only a higher stock status but also a greater degree of certainty of that status.

The scoring of PI 1.1.1 implies that there is some empirical understanding of stock status (i.e. some form of stock assessment) in which stock status is determined relative to defined reference points. However, this does not call for an examination of either the quality of that assessment or the information used in the assessment, which are assessed later in Principle 1. Where a stock assessment is lacking, or reference points are lacking for that assessment, the MSC allows for an assessment to be made using the MSC Risk-Based Framework (RBF) to determine the score for this PI. This is described fully in Annex 1 of the Capacity Building Toolkit and requires that a scoring exercise is carried out, informed by both stakeholder input and some data in relation to both the species life history characteristics and the operational characteristics of the fishery. It involves determining a consequence score and examining the productivity of the species relative to its susceptibility to capture.

The scoring of PI 1.1.1 is intended to reflect the status of the target stock biomass or abundance. However, the MSC guidance also allows other proxies to be used in place of direct biomass indicators, such as indications of fishing effort or fishing mortality. Other proxies that can be used may include Catch per Unit Effort (CPUE). In these cases, CAB auditors are required to demonstrate how the proxies are consistent with the PRI and MSY levels. Examples of data-limited methods to demonstrate consistency with MSY are outlined in Annex 2 Data-limited methods.

Two scoring issues are considered under this PI:

(a) Stock status relative to recruitment impairment

(b) Stock status in relation to achievement of Maximum Sustainable Yield (MSY)

Scoring issue (a) – Stock status relative to recruitment impairment

The first scoring issue assesses the degree of confidence that the stock is above the point where recruitment would be impaired, termed the PRI.

Scoring issue	SG60	SG80	SG100
(a) Stock status relative to recruitment impairment	It is likely that the stock is above the point of recruitment impairment (PRI).	It is highly likely that the stock is above the PRI.	There is a high degree of certainty that the stock is above the PRI.

Good practice

Scoring issue (a) requires increasing an evaluation of the likelihood that the stock is above the PRI. Where probabilistic information is used in scoring this issue:

- "Likely" above the PRI, as required at SG60, means greater than or equal to the 70th percentile.
- "Highly likely" above the PRI, as required at SG80, means greater than or equal to the 80th percentile.
- "High degree of certainty" that the stock is above the PRI, as required at SG100, means greater than or equal to the 95th percentile.

If no evidence exists that the stock is likely above the PRI, then the fishery does not achieve the minimum 60 level and would fail its assessment.

Fisheries are easiest to score and potentially perform well against this scoring issue where they have some stock status indicators that can be used to show the position of the stock relative to a reference point that is regarded as equivalent to the PRI. MSC provides common default proxies for such levels in the guidance to the MSC Fisheries Standard, section GSA2.2.3.

MSC also provides guidance for fisheries which use proxy information as indicators of stock status and reference points. These may include Catch Per Unit Effort (CPUE) or mean fish sizes. In general, a higher score may be assigned here where the proxy information gives a higher level of confidence. For example, an 80 score may be appropriate where there are at least two proxies of biomass, both of which show no decline over several years equal to one generation time of the species. Where proxies are used there must be robust justification the proxies are appropriate for the context in which they are used.

Generally, stocks that are in a healthy state and which have shown no signs of decline over several years will perform well against this scoring issue, provided there is evidence to support this conclusion. Where limited data are available, and the RBF is used, high productivity stocks with low overlap with fishing effort and low intensity have a higher likelihood of performing well against PI 1.1.1.

What CAB auditors check

CAB auditors will primarily refer to the results of the most recent stock assessment carried out for the fishery. In order to place this in context they may also refer to previous stock assessments and any reviews or benchmark assessments carried out for the fishery. In doing so, CAB auditors will be giving consideration to the nature of the assessment methods used and the extent to which any reference points used may be taken as indicative of the PRI levels. Note that the more detailed aspects of the information used in assessing the stock and the robustness of the stock assessment are not directly scored under PI 1.1.1, but rather in PI 1.2.3 (Information and monitoring) and PI 1.2.4 (Assessment of stock status).

Scoring issue (a) – Stock status relative to recruitment impairment

What CAB auditors check – *continued*

CAB auditors will check if there is information available on the stock status relative to the PRI or MSY levels. If not, CAB auditors will examine the relevance of proxy indicators and see if they show a decline or have been stable over time. Where status can be determined against specific reference points that are regarded as consistent with either the PRI or MSY levels, the normal scoring process may be followed. Where a stock assessment, referring to reference points is not available, CAB auditors will score the fishery using the RBF, informed by stakeholder input, as described in Annex 1.

Key questions to determine where further action is needed:

Q Is there an up-to-¬date empirical stock assessment available for the stock being targeted by the fishery?

Q Does the stock assessment provide an indication of stock status relative to the PRI (in some cases this is used as the limit reference point, as scored in the Harvest Control Rules PI 1.2.2)?

Q Does the stock assessment indicate an empirical probability / likelihood that the stock is above this point?

Q Are proxy indicators available for the stock targeted by the fishery?

Q Do proxy indicators indicate the stock is in decline, stable or on an upward trend?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Albacore tuna longline fishery*: The latest stock assessment indicates that there is a 75% probability that the female spawning stock biomass (SSB) is above the reference level 20% Bo, at which the stock would be reduced to 20% of the unexploited level. This reference point level has not been estimated explicitly as the PRI for this stock, but it is consistent with the level given as a default proxy for the PRI in the MSC Fisheries Standard guidance (GSA2.2.3) and accepted by the team as a reasonable default for this type of stock. SG60 is met.

Scoring issue (a) – Stock status relative to recruitment impairment

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG60	*Sole gill net fishery*: The fishery is a fishery of lower scale and intensity (defined as per the legal framework of the country) and data-limited, and does not have an explicit stock assessment that provides an estimate of biomass in relation to the PRI level. However, the standardised CPUE level for the gill net fleet is used as a proxy for biomass. This has fluctuated around a level of 1.5t/vessel/day in the last 10 years, after recovering from a historical low level of 1.0t/vessel/day in 2012, following a reduction in the fleet size. Ten years is more than one generation time of the species. Since a recovery in CPUE was quickly achieved over that time, and because no reduction in recruitment had been observed while at the lower CPUE level, the standardised CPUE of 1.0t/vessel/day level is regarded as likely above any actual PRI. The current standardised CPUE of 1.5t/vessel/day is regarded as confirming that the stock is likely above the PRI. SG60 is met.
SG80	*Rock lobster fishery*: The latest stock assessment using a Biomass Dynamic Model indicated that current biomass (B) is 1.5 times larger than the biomass at MSY (BMSY), and it has fluctuated around that level over the last five years. In the last assessment of the fishery the level of recruitment was not evaluated. Based on the current values of biomass for the last five years, and taking into consideration the results of former assessments and the nature of the models, it is highly likely that the stock is above the PRI. SG80 is met.
SG100	*Tropical snapper fishery*: Formal reference points used for management purposes include a target of SB/SBMSY=1.0 and a limit reference point of 0.5 SBMSY. The limit reference point is consistent with the MSC default definition of PRI. The quantitative stock assessment estimates the stock in relation to SBMSY. The stock is estimated to have been above SBMSY for the past ten years and to have been above 0.5SBMSY (the limit reference point and PRI) with a probability in excess of 95% throughout this time. SG100 is met.

Scoring issue (b) – Stock status in relation to achievement of MSY

The second scoring issue assesses whether the stock is being maintained at high productivity levels, at or above the point of Maximum Sustainable Yield (MSY).

Scoring issue	SG60	SG80	SG100
(b) Stock status in relation to achievement of Maximum Sustainable Yield (MSY)		The stock is at or fluctuating around a level consistent with MSY	There is a **high degree of certainty** that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.

Good practice

Good practice requires that the stock is fluctuating around a level consistent with MSY. Stock status assessments or proxies must show the stock to be at highly productive levels, well above the PRI.

Generally, stocks that are in a healthy state and which have evidence indicating that there have been no signs of decline over several years will perform well against this scoring issue.

What CAB auditors check

CAB auditors will primarily refer to the results of the most recent stock assessment carried out for the fishery. CAB auditors will also refer to any long-term or strategic stock assessments, reviews or benchmark assessments carried out for the fishery, to determine the extent to which any reference points used in the fishery may be taken as indicative of the MSY levels. In doing so, CAB auditors will consider the quantity and quality of information available for stock assessment, the suitability of the assessment methods and reference points. Although these aspects are not directly scored under 1.1.1, they may inform the consideration of probability/certainty.

Where a stock assessment referring to reference points is not available, CAB auditors will carry out a RBF scoring exercise, informed by stakeholder input (this process is described in Annex 1 Risk-Based Framework).

Scoring issue (b) – Stock status in relation to achievement of MSY

Key questions to determine where further action is needed

Q Is there an up to date stock assessment available for the stock being targeted by the fishery?

Q Does the stock assessment provide an indication of stock status relative to MSY (in some cases this is taken to be the target reference point)?

Q Does the stock assessment indicate that the stock is at, or fluctuating around the MSY?

Q Does the stock assessment indicate an empirical probability/likelihood that the stock is above this point?

Q Does the recent history of stock abundance have a trend that is consistent with an expectation that future biomass will continue to fluctuate around MSY levels? (i.e. not steadily downwards over the time series, or currently below MSY)

Q Are there proxies that provide an indication of whether the stock has been in decline or stable?

Q If estimates of F are used to determine status, has F been 'low enough for long enough'?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	*Swordfish longline fishery*: A target reference point (TRP) has not been determined though an implicit TRP is BMSY. The latest stock assessment demonstrates that the most recent estimate of biomass is 1.1 B: BMSY, with previous estimates in subsequent assessments being 1.3 B:Bmsy and 0.9 B:Bmsy. In addition, estimates of fishing mortality rate (F) indicate that across all assessments, relative to MSY levels, i.e. FMSY, F has been less than FMSY. At present, therefore, the assessment result is accepted to reflect that the stock is at or fluctuating around its target reference point. SG80 requirements are met. *Anchovy mid-water trawl fishery*: The fishery is managed on the basis of a stock assessment that estimates the fishing mortality rate (F), relative to MSY levels, i.e. FMSY. The recent time series suggests that F has been 'low enough for long enough' to ensure that biomass is now likely to be at or fluctuating around MSY levels. Fishing mortality has been below the estimated FMSY for at least two generation times. SG80 is met.

Scoring issue (b) – Stock status in relation to achievement of MSY

Examples of scoring rationales – *continued*

Scoring issue (b)	Fishery Example
SG100	*Horse mackerel trawl fishery:* The fishery is managed on the basis of a stock assessment that estimates both absolute biomass (B) and the fishing mortality rate (F). The most recent assessment indicates there is a zero probability that B/BMSY is as low as 1.0 and has been the case for the past 10 years. The most recent value is around 1.6. The assessment also indicates that F has been 'low enough for long enough' (over two generation times) to ensure that biomass is now likely to be at or fluctuating around MSY levels. Taken in combination, these two indicators provide a high degree of certainty. SG100 is met.

Challenges and solutions to meeting PI 1.1.1

The biggest challenges to meeting the required level in this PI is where the stock is below the level at which it can be regarded as fluctuating around a biomass consistent with MSY (in which case at least a condition would be triggered), or worse, below the level where recruitment is impaired (in which case the fishery does not meet even the 60 level and would fail). In heavily exploited fisheries the stock may be below the PRI, in which case there is no alternative to allowing time for the stock to rebuild (typically also involving some form of management intervention) before seeking MSC certification. If, however the stock is between the PRI and MSY, it may be possible to achieve MSC certification, depending on scoring elsewhere in Principle 1, including in relation to rebuilding scored in PI 1.1.2.

The other major challenge is the availability of a recent independent and scientifically robust stock assessment, with appropriate reference points, to allow this PI to be scored. If this is absent, there is the potential to still score this PI using the RBF (described in Annex 1 Risk-Based Framework), although the scoring is more precautionary (as would be expected given the paucity of data). For this reason, MSC scores, and management certainty will normally be enhanced by the completion of an appropriate stock assessment ahead of a full MSC assessment.

In order to carry out an appropriate stock assessment there needs to be sufficient resources and capacity available to the fishery. This can be a constraint in fisheries of lower scale or intensity, or fisheries which have been subject to a lower management priority. However, there are a wide range of stock assessment approaches which may be appropriate, and which are less data-intensive and therefore less expensive (see Annex 2 Data-limited methods). MSC generally recognises that management must be consistent with the 'scale and intensity' of the fishery, but also expects that where data-limited approaches are used, higher levels of precaution will be applied to compensate for the lower information availability.

Example process and actions to improve performance against PI 1.1.1

Process Chronology				Management Actions	
1	2	3	4	Example action	Scoring issue
●				Determine the cause of poor performance in this PI. This could be caused by either: (i) actual stock status; (ii) lack of certainty about stock status; or (iii) lack of empirical assessment and the RBF has been used to score the fishery which has resulted in a score of less than 80.	(a), (b)
	●			If the low score relates to a depleted stock status, undertake a program of remedial measures (a rebuilding plan) designed to bring about the recovery of the stock in the shortest practicable timeframe. This is likely to involve a (possibly temporary) reduction in both landings and effort, but may also require additional steps, such as increased landing controls, technical measures (such as gear modification or changes to minimum landing sizes) or spatial or temporal closures.	(a), (b)
	●			If the low score relates to a lack of probabilistic certainty in relation to benchmarks, then it may simply be a case of including this probabilistic element into the next stock assessment, however this may also be an indication of the need for some stock rebuilding.	(a), (b)
	●			If the low score is a result of a high risk score when using the RBF (which may or may not be an indication of actual depletion), then a more empirical approach to determining stock status may be required. With in put from a stock assessment specialist, review all available empirical datasets, select an appropriate stock assessment methodology, and undertake on-going data collection tailored to the needs of the assessment.	(a), (b)
		●		Conduct a stock assessment (using appropriate technical experitise) which enables biological reference points to be estimated. Review stock status relative to these reference points.	(a), (b)
			●	Review stock status relative to reference points annually (or on a timeframe appropriate to the life history characteristics of the target species). Where the stock has been depleted, this should provide an indication of recovery if the rebuilding plan is successful.	(a), (b)

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1.1.2 Stock rebuilding

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Performance Indicator overview

This PI assesses the rebuilding and recovery of a stock that is depleted below the levels required to achieve an 80 score on PI 1.1.1. The PI is only scored where the score for 1.1.1 (stock status) is less than 80, indicating that the stock is either not regarded as 'fluctuating around' MSY or is less than highly likely (i.e. 80th percentile) to be above the PRI. This PI seeks to verify that where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe.

As with other scoring in Principle 1 the focus of this PI is on the rebuilding of the entire stock – not just the catches or management efforts of the fishery which is subject to the MSC assessment.

A stock that is depleted below the PRI (often used as the limit reference point) will score less than 60 for PI 1.1.1, so would not be eligible for MSC certification. In this instance although a recovery plan is likely required, no matter how convincing or effective this plan is, the fishery would not be eligible for MSC certification until such time that the stock had at least recovered to be considered 'likely' above the PRI, enabling PI 1.1.1 to achieve at least the 60 level.

It would normally be assumed that a well-constructed harvest strategy would include consideration of the scenario where a stock becomes depleted, for example by progressively reducing fishing mortality when the stock status falls below its target. However, when the stock is depleted below the MSY level, in order to ensure re-building is achieved in as short a timeframe as possible, additional management measures may be required, such as seeking to address issues of unobserved mortality, or introducing further restrictions or technical conservation measures to facilitate rapid rebuilding. Such a plan should seek to achieve its goal of rebuilding the stock to its target level consistent with MSY or a similar highly productive level within a specified time frame, or within a certain generation time (i.e., the average age of a reproductive individual in a fish stock).

This PI looks not only at the design of the plan but also the extent to which the plan is achieving its aims.

Two scoring issues are considered under this PI:

(a) Rebuilding timeframes

(b) Rebuilding evaluation

Scoring issue (a) – Rebuilding timeframes

This first scoring issue of PI 1.1.2 seeks to ensure that a rebuilding plan is in place with a specified timeframe for the recovery of the stock.

Scoring issue	SG60	SG80	SG100
(a) Rebuilding timeframes	A rebuilding timeframe is specified for the stock that is the **shorter of 20 years or 2 times its generation time**. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.		The shortest practicable rebuilding timeframe is specified that does not exceed **one generation time** for the stock.

Good practice

Expected performance for this scoring issue is for the recovery plan to specify a shorter timeframe – with the best being as short as practicably possible. This means there should be measures in place to ensure the level of catch is reduced so that the stock is likely to recover within one generation time (the average age of a reproductive individual in a fish stock).

What CAB auditors check

CAB auditors will refer to the results of the most recent stock assessment carried out for the fishery to provide the context for rebuilding – both the need for rebuilding and the recent progress of the rebuilding plan. They will then look at the rebuilding steps applied by management. This could include any measures within the harvest strategy for actions that will be taken when the stock levels fall below the target (or MSY) levels. It may also include a specific recovery or rebuilding plan, which details any additional steps to be taken to achieve the rapid recovery of the stock. CAB auditors will look to see that there is a specified timeframe for recovery, perhaps based on forward projections or an underlying management framework.

It should be noted that fisheries are not necessarily required to have a 'formal recovery plan'. Instead, they are expected to have some sort of recovery strategy, which may or may not be binding in a statutory context.

Scoring issue (a) – Rebuilding timeframes

Key questions to determine where further action is needed

Q Is there a recovery plan (or equivalent), specifically outlining the approach to bringing about recovery of the stock to MSY level (or above)?

Q Is there a stated estimate of anticipated recovery time, based on an analytical assessment and stock projection?

Q Is the stated recovery time not longer 20 years or two generation times of the stock?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Herring pelagic trawl*: The multiannual plan has the objective of maintaining the stock size above 60000 tonnes (i.e. Bpa= 1.5*Blim) by exploiting the stock at FMSY. A Bpa = 60MT is used as Btrigger. If the stock is assessed to be below this level, the fishing mortality rate applied to the stock is reduced linearly with SSB. The MSY management framework was implemented in 2021 with the timeline of exploiting fish stocks at FMSY by 2026. The generation time for the species is approximately 4.5 years. Detailed projections of stock biomass have not been made, but achievement of an FMSY level within 5 years (by 2026) should allow the stock biomass to return to a BMSY level within not more than four more years, i.e., within two generation times of the stock. Monitoring is through the stock assessment. SG60 is met.
SG80	No scoring guidepost at the 80 level.
SG100	*Plaice trawl fishery*: There is strong evidence that rebuilding will be complete within the shortest practicable timeframe. The plaice fishery is implementing an explicit long term management plan with two defined stages in which the first stage aims to rebuild the stock above precautionary level (Bpa). The second stage aims to reduce the exploitation rate to a target level that will allow the stock to be harvested at MSY. The expected recovery timescale is currently within the required one generation timescale, assisted by the strong recruitment of recent year classes. SG100 is met.

Scoring issue (b) – Rebuilding evaluation

The second scoring issue looks at the evidence of rebuilding. This may be either actual evidence of rebuilding, or, if the stock is in the early stages of depletion and so it is not yet possible to demonstrate recovery, evidence of the likelihood of recovery based on simulation modelling, supported by appropriate monitoring. While the SG60 level only requires that some form of monitoring is in place (to accompany the rebuilding plan covered in scoring issue a), the SG80 level requires that some evidence is available to demonstrate rebuilding.

Scoring issue	SG60	SG80	SG100
(b) Rebuilding evaluation	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe.	There is **evidence** that the rebuilding strategies are rebuilding stocks, or it is **likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the **specified timeframe**.	There is **strong evidence** that the rebuilding strategies are rebuilding stocks, or it is **highly likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the **specified timeframe**.

Good practice

Good practice requires good evidence and confidence that the rebuilding strategies are either already working to rebuild stocks, i.e. that the stock biomass has been improving towards an MSY-consistent level, or that they are expected to work based on simulation modelling or other evidence.

What CAB auditors check

CAB auditors will refer to the results of the most recent stock assessment carried out for the fishery to provide the context for rebuilding. This may provide an indication of the response of the stock since the rebuilding plan or strategy was implemented. In addition, CAB auditors may look at:

- Any evaluations of the recovery plan or strategy which provides evidence of the likely efficacy of rebuilding, based on simulation modelling or other evidence such as low current exploitation rates, incoming recruitment patterns, and previous dynamics of the stock.
- Information on the management decision made in response to scientific advice on rebuilding.

Scoring issue (b) – Rebuilding evaluation

Key questions to determine where further action is needed

Q Can it be demonstrated that the stock is rebuilding as planned? Is the plan working?

Q Does the stock assessment already show a stock recovery since the recovery plan or strategy was implemented?

Q Has some form of evaluation been carried out either on previous recoveries of the fishery, or on the likely future recovery performance?

Q Has simulation modeling been carried out on the recovery strategy or plan which provides an indication of the likelihood of success (in rebuilding the stock to MSY-consistent levels) within the timeframe specified within the plan?

Q Does this simulation modeling provide confidence limits that may increase the evidence to a 'highly likely' level?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Sole trawl fishery*: Monitoring is in place using rigorous data collection (see PI1.2.3) and analytical stock assessments (see PI1.2.4). The stock is considered to be depleted since SSB is well below estimated biomass levels at MSY and shows no immediate signs of recovery. Although fishing mortality has declined in recent years, it has not yet reached a level consistent with MSY (FMSY=0.22). Under the EU long-term management plan, a rebuilding strategy is in place which aims at an annual 10% reduction in fishing mortality until F of 0.2 is reached, with a maximum change in total allowable catch (TAC) of 15%. This has been evaluated and concluded there was low risk of B<Blim within the next 10 years and that the management plan could be provisionally accepted as precautionary. However, given the SSB and fishing mortality levels outlined above, simulation modelling suggests that the North Sea sole stock is unlikely to rebuild under current levels of fishing exploitation by the specified timeframe (within the management plan). SG60 is met.
SG80	*Herring pelagic trawl fishery*: A ten-year multi-annual rebuilding plan was put in place two years ago. During this time, SSB has remained stable, though F has been reduced to levels less than FMSY, which was required under the management plan. Given the life-history of the species, increases in SSB as a result of reductions in F were not expected in the first two years of the rebuilding plan. Recent simulations based on the results from the initial two years indicate the plan is being implemented as planned and the stock is on track to rebuild to the TRP within the specified timeframe. SG80 is met.

Scoring issue (b) – Rebuilding evaluation

Examples of scoring rationales – *continued*

Scoring issue (b)	Fishery Example
SG100	*Plaice trawl fishery*: The management plan has shown evidence that rebuilding will be complete within the shortest practicable timeframe. The plaice fishery is implementing an explicit long term management plan with two defined stages, in which the first stage aims to rebuild the stock above precautionary level (Bpa). The second stage aims to reduce the exploitation rate to a target level that will allow the stock to be harvested at MSY. After a continuous increase in SSB in successive years, the first stage of the management plan has been completed successfully. The increase in the SSB experienced from 2015 has occurred under average recruitment conditions and is not caused by a higher productivity of the stock. Instead, increasing SSB levels are mainly due to the reduction of fishing mortality under the present management plan. The management plan has now entered the second stage which sets targets for the fishing mortality (F = 0.3 y-1) based on the principle of MSY. The target fishing mortality has been already achieved and temporal trends in SSB shows that the stock biomass is increasing toward target long term yields within the shortest practicable timeframe. SG100 is met.

Challenges and solutions to meeting PI 1.1.2

In order to put in place a rebuilding plan, it will typically first be demonstrated that the stock is in a depleted state (below levels that could be regarded as 'fluctuating around MSY'). Therefore, in data-rich fisheries, it is only once the results of some form of analytical stock assessment are available that there will even be an understanding of whether a rebuilding strategy is required. Ongoing monitoring and some form of on-going stock assessment will also be required to demonstrate that the recovery measures, once adopted, are working. In situations where there is low availability of data, the methods outlined in Annex 2 Data-limited methods will give an indication of how the stock is performing with respect to MSY.

The fact that a stock is depleted and requires rebuilding is a likely indication that past management has not adequately managed the impacts on the fishery. The rebuilding phase is therefore likely to require additional management measures and restrictions on the fleet. Getting agreement for these measures and then passing the necessary legislation to adopt and enforce these measures can be a challenge. This may be politically unpopular where there are perceived negative short term socio-economic impacts and may require additional management input, where the proposed management measures result in additional enforcement challenges. Such problems emphasise the benefits of incorporating such recovery strategies into the formal HCRs for the fishery and seeking agreement with fishers and stakeholders in advance of any stock declines.

Stock recovery can also be a slow process, particularly for fish with longer generation times. It therefore requires long term commitment on the part of the fishers and management to achieve rebuilding. This long-term commitment is more likely to be ongoing where there is a reasonable level of administrative stability.

Example process and actions to improve performance against PI 1.1.2

Process Chronology				Management Actions	
1	2	3	4	Example actions	Scoring issue
●				Where a stock is shown to be depleted (i.e. not meeting the SG80 level for PI 1.1.1), a review should be undertaken of the measures, regulations and plans that are in place to rebuild the stock.	(a)
●				Where a stock is shown to be depleted (i.e. not meeting the SG80 level for PI 1.1.1), an evaluation should be done of the effectiveness of the rebuilding measures in place (described above) and the degree to which these will ensure rebuilding within a specified timeframe (relative to species generation times).	(b)
	●			Where the reviews / evaluations described above (in step 1) indicate gaps, uncertainties or lack of confidence in the measures for rebuilding, development should begin on a revised / new rebuilding plan. This plan should stipulate how rebuilding will be achieved, including any special management measures / restrictions. It should stipulate the rebuilding timeframe relative to the species generation times. It should also stipulate how rebuilding will be monitored and enforced to ensure a high level of confidence that the strategies will work. The rebuilding plan should tie in with the wider management plan for the fishery.	(a), (b)
		●		The rebuilding plan should be formally implemented / enacted and all necessary management steps put in place.	(a), (b)
		●		On-going monitoring of key data should be maintained to ensure that rebuilding is effective. This may also require a more wide-ranging periodic evaluation of the effectiveness of the rebuilding plan (perhaps including external review).	(b)
			●	Amendments to the rebuilding plan should be made based upon the outcome of monitoring / evaluations where required to ensure rebuilding will be achieved within the specified timeframe.	(a)

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1.2.1 Harvest strategy

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Example process and actions to improve performance against PI 1.2.1 59

Performance Indicator overview

This PI seeks to verify that there is a robust and precautionary harvest strategy in place. A harvest strategy is the combination of monitoring, stock assessment, harvest control rules (HCRs) and management actions that are required to bring about the sustainable management of the fishery.

The harvest strategy sets out the management actions necessary to attain defined ecological objectives in a particular fishery, including achieving the management objectives expressed in the target and limit reference points. It should specify a process for conducting assessments and monitoring the appropriate attributes of the fishery as well as specific rules (i.e. HCRs) that control the level of fishing.

The scoring issues for PI 1.2.1 focus on the makeup of the harvest strategy and the expectation of success in maintaining the stock at MSY (i.e. a score of 80 for PI 1.1.1). In addition, there is a focus on the requisite monitoring, review and evaluation of the strategy to ensure that it remains appropriate to the changing dynamics of the fishery.

In general, harvest strategies should be pragmatic (or appropriate to the fishery given the economic and data limitations), cost effective, transparent, easy to understand to all stakeholders, and adaptive (able to change as more information becomes available).

Five scoring issues are considered under this PI:

(a) Harvest strategy design

(b) Harvest strategy evaluation

(c) Harvest strategy monitoring

(d) Harvest strategy review

(e) Shark finning

(f) Review of alternative measures

Scoring issue (a) – Harvest strategy design

The first scoring issue looks at the design of the harvest strategy and the degree of responsiveness to fluctuations in the stock.

Scoring issue	SG60	SG80	SG100
(a) Harvest strategy design	The harvest strategy is **expected** to achieve stock management objectives reflected in PI 1.1.1 / PI 1.1.1A SG80.	The harvest strategy is **responsive** to the state of the stock and the elements of the harvest strategy **work together** towards achieving stock management objectives reflected in PI 1.1.1 / PI 1.1.1A SG80.	The harvest strategy is **responsive** to the state of the stock and is **designed** to achieve stock management objectives reflected in PI 1.1.1 / PI 1.1.1A SG80.

Good practice

It is only at SG80 and SG100 that there is a requirement for the harvest strategy to be responsive to the state of the stock. The performance level described in SG100 also requires that the strategy has been designed. This implies a clear, fishery-specific strategy tailored to the needs of the fishery meaning that there is a management procedure (MP) that has been developed through management strategy evaluation (MSE). There should also be evidence that the harvest strategy is updated, as appropriate, to meet management objectives.

What CAB auditors check

CAB auditors begin by seeking to understand all the component parts of the harvest strategy, in order to determine how these components function together and the degree to which they have been developed to suit the needs of the particular fishery. This is likely to include consideration of:

- The stock assessment report for the fishery.
- The fishery management plan and the HCR.
- The fishery technical regulations (landings and effort restrictions, technical conservation measures, fleet licencing and capacity).
- The process of review and evaluation (although this is more subject of later scoring issues within this PI).
- The findings of any past reviews or evaluations of fishery or management performance, including Management Strategy Evaluation.

Scoring issue (a) – Harvest strategy design

Key questions to determine where further action is needed

- Q Does the stock assessment provide advice on overall management controls, and is management responsive to the advice given?
- Q Is there a management plan which sets out objectives for the fishery and an overall strategy detailing how this will be achieved through stock assessment, harvest rules (and reference points), fishery controls and technical measures, appropriate enforcement and monitoring of performance?
- Q Has it been demonstrated that the components of the management harvest strategy have been developed to work together to achieve the aims expressed by management objectives (including, but not limited to target reference points).
- Q Has there been a Management Strategy Evaluation?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Swordfish longline fishery*: There are several elements that make up the current harvest strategy, described in PI 1.2.2 - 1.2.4. These are expected to achieve stock management objectives reflected in PI 1.1.1. The state of the stock provides some evidence that the harvest strategy has been effective to date. However, there is a need for further development of the harvest strategy to ensure that it works together and is responsive to the state of the stock. For example, in the absence of output controls, input controls need to be effective in ensuring real catch reductions in line with HCR outputs. Nevertheless, the agreed monitoring, analysis, assessment and HCRs are expected to achieve management objectives with increased integration of management actions across the entire stock. SG60 is met.
SG80	*Lobster trap fishery:* The harvest strategy includes access controls, seasonal and area closures, effort controls, gear restrictions, and size limits supported by good monitoring and control at the local scale through the fishing cooperatives. All the elements of the harvest strategy have been examined and updated over time to meet the main management objective: maintain the reproductive stock and recruitment at levels close to maximum productivity. All the information available, including stock assessments, trends in relative abundance, and changes to catch levels suggest that the harvest strategy is responsive to the state of the stock and works to achieve stock management objectives as reflected in PI 1.1.1.SG80 is met.
SG100	Shrimp trawl fishery: The trawl fishery has a restricted number of licenses and restricted geographic range with no access to coastal waters inside of a 20 nm line, thus avoiding overlap and conflict with artisanal fishing activities and helping to reduce the catch of juveniles. Recently, the harvest strategy has been further developed and codified with additional management controls: (a) a revised upper annual limit for the number of trawl fishing licenses; (b) an agreed upper annual limit for the total days at sea by the trawl fleet; and (c) agreed target, trigger and limit catch rate thresholds that reflect the state of the stock relative to the agreed target and limit reference. The various controls have been codified as a management procedure (MP) which has been tested using management procedure evaluation (MSE) to ensure that stock management objectives should be achieved. These objectives are consistent with those at PI 1.1.1. As such, the harvest strategy has been designed (see SA2.4.1b) for the fishery. Decision making and implementation of controls demonstrates that the harvest strategy is responsive to the state of the stock. SG100 is met.

Scoring issue (b) – Harvest strategy evaluation

The intent of the second scoring issue for PI 1.2.1 is to ensure that the harvest strategy has received appropriate evaluation showing that it is working or likely to work.

Scoring issue	SG60	SG80	SG100
(b) Harvest strategy evaluation	The harvest strategy is **likely** to work based on prior experience or plausible argument.	The harvest strategy has been **tested** and is expected to meet the objectives reflected in PI 1.1.1/ PI 1.1.1A SG80 or there is evidence that the harvest strategy is achieving its objectives reflected in PI 1.1.1/ PI 1.1.1A SG80.	The performance of the harvest strategy has been **evaluated** and evidence exists to show that it is achieving its objectives reflected in PI 1.1.1/ PI 1.1.1A SG80, including being clearly able to maintain stocks at target levels.

Good practice

For both SG80 and SG100 there must be evidence that the harvest strategy is working. This implies that the strategy has been in place for sufficient time to show results or that previous experience shows that it is likely to work. However, if the harvest strategy has only been recently put in place, SG80 can still be met if evidence exists that it is expected to achieve the objectives. For example, this could happen based on projections in cases where evidence from a stock assessment has not occurred since a new harvest strategy was implemented. For SG100 there is a requirement for full evaluation of the harvest strategy, which tests it for robustness and uncertainty.

What CAB auditors check

CAB auditors will seek to understand how long the harvest strategy has been in place, to score a fishery's current performance in context. They are likely to refer to:

- Stock assessment reports – in particular since the implementation of the harvest strategy.
- A documented evaluation of the harvest strategy – such as a Management Strategy Evaluation.

Scoring issue (b) – Harvest strategy evaluation

Key questions to determine where further action is needed

Q Does the stock assessment (and profile of the stock status) indicate that the harvest strategy is working?

Q Has there been an evaluation carried out of the performance of the management system (harvest strategy)?

Q If there has not been a full evaluation, are structured logical arguments and analysis presented to support the choice of strategy?

Q If the harvest strategy (or significant components of the harvest strategy) is new, has it been demonstrated that it is expected to work?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Lobster trap fishery*: The harvest strategy is newly designed and implemented and there has not been a formal harvest strategy to date. There is therefore not yet any direct evidence, including from previous harvest strategies, that the newly implemented harvest strategy is achieving its objectives, nor has it been tested (see SA2.4.1c). Based on the results seen in fisheries of similar type, size and scale managed by the same management body and on generic analyses of fisheries of this type, it is regarded as likely that the strategy will work. SG60 is met.
SG80	*Albacore longline fishery*: The recent stock assessment provides an independent and indirect assessment of the effectiveness of management in controlling SSB and limiting the exploitation rate as required under the current harvest strategy. The robust state of the albacore stock provides evidence that the harvest strategy is achieving its objectives and those reflected in PI 1.1.1. SG80 is met.
SG100	*Tropical prawn fishery:* The harvest strategy has been evaluated (see SA2.4.1d) using Management Strategies Evaluation (MSE), including multiple sources of uncertainty and varying scenarios. The harvest strategy is regularly reviewed and updated as appropriate. Evidence exists through continual monitoring and stock assessment to show that it is achieving its objectives, and those reflected in PI 1.1.1, including being clearly able to maintain stocks at target levels. SG100 is met.

Scoring issue (c) – Harvest strategy monitoring

The intent of the third scoring issue for PI 1.2.1 is to ensure that all fisheries have in place appropriate monitoring which will provide information to determine whether the harvest strategy is working.

Scoring issue	SG60	SG80	SG100
(c) Harvest strategy monitoring	Monitoring is in place that is expected to determine whether the harvest strategy is working.		

Good practice

Fisheries should have monitoring in place to enable determination of whether the harvest strategy is working or not.

What CAB auditors check

CAB auditors will seek to understand the monitoring that occurs in the fishery. This is likely to be informed by stakeholder meetings with fishery managers and stock assessment scientists. It may also be informed by reference to the following documents:

- Stock assessment and advice.
- Fishery regulations.
- The management plan.
- Evidence of the outputs of monitoring being used in evaluation of the management strategy.
- Operating Procedures of the various fishery agencies.
- Logbooks.

Scoring issue (c) – Harvest strategy monitoring

Key questions to determine where further action is needed

Q Is monitoring undertaken, which would allow determination of whether the harvest strategy is working?

Q Are all relevant data for undertaking routine stock assessment monitored at the required level?

Q Does monitoring provide information on other aspects of the harvest strategy, such as fleet operational characteristics and performance?

Q Are the data obtained by monitoring made available as required – for example to fishery scientists and fishery managers?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	*Crab trap fishery*: The following monitoring is in place in the fishery: monitoring the distribution of catch and fishing effort by area and gear; tagging studies to assess growth, mortality and migration patterns; monitoring recruitment of post-larvae (as a good index of recruitment); monitoring environmental variables; surveys of spawning and nursery areas; evaluation of artificial refugia in comparison with other fishing methods; and stock assessment studies. While this research/ monitoring is conducted by different institutions at variable times and locations, monitoring information is produced regularly and is used to inform the harvest strategy. The information provided above indicates that the harvest strategy has adapted to the changes and needs of the fishery. SG60 is met.
SG80	No scoring guidepost at the 80 level.
SG100	No scoring guidepost at the 100 level.

Scoring issue (d) – Harvest strategy review

The intent of the fourth scoring issue for PI 1.2.1 is to determine whether the overall harvest strategy is subject to periodic review and improvement.

Scoring issue	SG60	SG80	SG100
(d) Harvest strategy review			The harvest strategy is periodically reviewed and improved as necessary.

Good practice

Credit for this scoring issue only occurs at the SG100 level. For this, the harvest strategy should be subject to periodic review, to allow improvements.

What CAB auditors check

CAB auditors will discuss with key stakeholders in the fishery, notably fishery managers and stock assessment scientists, the improvements that have occurred in the harvest strategy in recent years, what process highlighted the need for any such changes and, whether a review process of the overall strategy led to the changes. Where available they are also likely to review:

- Past harvest strategy evaluations to determine the degree to which past recommendations have been implemented by management.
- Any regulatory requirements of specifications in the management plan detailing the process for harvest strategy review.
- Minutes or reporting outputs of management review meetings.

Scoring issue (d) – Harvest strategy review

Key questions to determine where further action is needed

Q Is there a process of periodic review of the overall harvest strategy, that is intended to lead to on-going refinement and improvement in the design of the harvest strategy?

Q Are there examples of where elements of the harvest strategy have been changed because of monitoring indicating that change is required?

Q Does the process of stock assessment and advice also review monitoring of information and act as a review of the wider harvest strategy?

Q Are there meetings between fishers, scientists, and other stakeholders, as well as periodic analysis of fishery dependent information, to review and shape the adaptive management of the fishery?

Examples of scoring rationales

Scoring issue (d)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	No scoring guidepost at the 80 level.
SG100	*Skipjack tuna pole and line fishery*: The harvest strategy is under a constant process of review by the management RFMO, and it may be expected that the harvest strategy will be changed in response to identified issues. An example is the movement from an analytical assessment with known considerable uncertainties to the indicator approach used in recent years, following the recommendations of a review. This is considered to give more scientifically robust indications of stock status. SG100 is met.

Scoring issue (e) – Shark finning

Scoring Issue (e) only applies if the target species in the fishery (i.e. the species being scored in Principle 1) is a shark species. When this is the case, the fishery must show that shark finning is not occurring.

Scoring issue	SG60	SG80	SG100
(e) Shark finning	There is a **high degree of certainty** that shark finning is not taking place		

Good practice

Good practice requires a high degree of certainty and a strong empirical basis of confidence that shark finning is not occurring. This requires that there is a fins naturally attached (FNA) or non-retention policy in place, and that the policy is enforced, to provide a high degree of accuracy.

What CAB auditors check

CAB auditors will refer to the following key documents:

- Regulations governing the management of shark species.
- Robust and independent evidence of implementation and enforcement of fins naturally attached (FNA) or non-retention policy.
- Regulations governing the on-board processing of shark species.
- Records of inspections/observations providing validations of shark finning policies.

It should also be noted that when assessing this scoring issue, CAB auditors are required to apply the MSC 'Evidence Requirements Framework' (which is contained within the 'MSC Fisheries Standard Toolbox') to help determine the accuracy of information. This will require CAB auditors to confirm that reliable evidence is available to demonstrate the proper implementation and enforcement of the fins naturally attached (FNA) or non-retention policy. For this scoring issue, the assessment shall demonstrate that the trueness guidepost (TG) 3 is met.

Scoring issue (e) – Shark finning

Key questions to determine where further action is needed

- Q Is there a fins naturally attached (FNA) or non-retention policy in place?
- Q Do management measures within the fishery prohibit shark finning?
- Q Are policies enforced to provide a sufficient level of confidence?
- Q Is there reliable external validation of the vessels' activities to confirm that there is a high degree of certainty that shark finning is not taking place?

Examples of scoring rationales

Scoring issue (e)	Fishery Example
SG60	*Demersal longline shark fishery*: Regulations set by the management agency for the fishery state that any fins landed must be naturally attached to the remainder of the shark, constituting a fins naturally attached (FNA) policy. Interviews with fisheries boating and patrol officers indicate that the fishers comply with the regulation, and it is in place in the fishery. Fins are partially cut to allow them to be folded flat against the fish, and to allow for bleeding, but they remain naturally attached to the trunk of the shark when landed and species can be easily identified. Fishers are required to report all catches in logbooks, submitted prior to landing. Adherence to the FNA policy is evidenced via 20% onboard observer coverage. Dockside inspection to further verify compliance occurs sporadically but is estimated to occur for around 25% of trips. Compliance reports and observer records from the most recent three years demonstrate that shark finning has not been recorded with no violations. TG3 of the Evidence Requirements Framework is met as it is considered that most potential sources of bias have been mitigated, and where bias might exist, its effect on trueness is well understood and is not considered to be consequential. Therefore, there is a high degree of certainty that shark finning is not taking place. SG60 is met.
SG80	*No scoring guidepost at SG80 level.*
SG100	*No scoring guidepost at SG100 level.*

Scoring issue (f) – Review of alternative measures

This scoring issue applies when the fishery has unwanted catches of the target species (e.g., of a certain size or at certain times of the year, either for biological, economic or regulatory reasons). This also includes any catches of the P1 species as a result of ghost gear (i.e., lost or abandoned fishing equipment). This scoring issue requires that fisheries review whether the use of alternative measures could reduce the mortality arising from unwanted catches from the target stocks.

Scoring issue	SG60	SG80	SG100
(f) Review of alternative measures	There has been a review of **alternative measures** to minimise UoA-related mortality of **unwanted catch** of the target stock.	There is a **review** every 5 years of **alternative measures** to minimise UoA-related mortality of **unwanted catch** of the target stock and they are implemented as appropriate	There is a **review** that happens every 2 years of **alternative measures** to minimise UoA-related mortality of **unwanted catch** of the target stock, and they are implemented, as appropriate.

Good practice

Good practice requires regular review – at least every 5 years. At the SG80 and SG100 there is also a requirement to implement alternative measures where it is appropriate to do so.

What CAB auditors check

CAB auditors will refer to the following key documents:

- Any reviews that have been undertaken of the fishing gear under assessment in relation to catches of the target species.
- Any reviews of the practical and economic implications of introducing alternative gears in order to seek to minimise unwanted catch.
- Any reviews of additional management measures (such as spatial or temporal restrictions) designed to limit catches of unwanted catches of the target species.
- Evidence of implementation of any review recommendations (observer reports or evidence from inspections).
- Evidence of ghost gear or evidence of fishing gear inventory to identify when fishing gear is lost.

Scoring issue (f) – Review of alternative measures

Key questions to determine where further action is needed

Q If the fishery sometimes has an unwanted catch of the target stock, has a review been undertaken to determine how this may be minimised?

Q Is there a potential for ghost fishing (i.e. from lost or abandoned fishing equipment)? If so, how is this quantified and managed?

Q Is any review of possible alternative measures revisited and revised, perhaps as new technologies become available or more cost effective?

Q Are recommendations from reviews of alternative measures implemented as suggested and is there evidence of this?

Examples of scoring rationales

Scoring issue (f)	Fishery Example
SG60	*Tropical sole gillnet fishery*: The fishery is managed by means of quota and with minimum landing sizes. Unwanted catches are therefore those of the target species below the minimum landing size or on-going catch of the target species after the annual quota has been exhausted. Over the years, the mesh size in the fishery has gradually increased to reduce catches below minimum landing size, although there has been some resistance to further increases in mesh size due to the perceived loss of some valuable bycatch species. In the last few seasons, the quota has not been exceeded, therefore, there has been limited unwanted catch. However, management have given consideration to whether quota should be allocated individually to enable fishers to better manage their fishing entitlements and avoid the risk of the target species becoming an unwanted end of season catch. There has been some consideration (and practical trial) of different mesh sizes. The fact that management has previously reviewed how quota management might influence the amount of unwanted target species means that the intent of the scoring guidepost is met. SG60 is met.
SG80	*Atlantic octopus pot fishery*: Fishers use pots to catch octopus, and any individuals under the legal landing size are discarded. In recent years this has amounted to 10-15% of the total catch. Estimates on survival of any discarded octopus are based on an assessment of the condition that they are released in, and are expected to be at least 50%. A review of measures to reduce discarded species (the octopus plus a lobster species for which the fishers do not have quota) was undertaken in the previous five years and trap modification and crew training to increase post-release survival was assessed. The agency concluded that the measures to replace the pots with those containing escape hatches would be more effective at minimising catches of undersized octopus but that the costs of replacing all of the gear would make the fishery financially unviable. Crew training increased survivorship. A further review is scheduled next year. A review has been undertaken and measures have either been implemented or justification as to why they have not been (cost prohibitive) has been provided, and another review is scheduled within the next 5 years. SG80 is met.

Scoring issue (f) – Review of alternative measures

Examples of scoring rationales – *continued*

Scoring issue (f)	Fishery Example
SG100	*Tropical snapper pole and line fishery*: This fishery is managed by a local management authority. This authority sets minimum landing sizes for snapper, and any undersized snapper are returned to the water. In 2019, about 5% of the catch was generally undersized. No specific studies had been done to show the mortality rate. However, the authority implemented a biennial review of measures used to manage this species, including ensuring that undersized species are not caught or that they are given the best chance of survival if released. A consultant was hired to undertake the first review in 2019 and he found that prohibiting fishing in certain areas was likely to prevent capture of juveniles in the first place. These areas were closed from the start of the 2020 season to protect the juvenile stock. Another review of measures was undertaken in 2021 but no additional measures were identified that would be more effective than those currently in place and no additional areas were identified for potential closures. Since the measure was introduced the number of undersize snapper caught has decreased to be about 2% of the overall catch and the total catch rates have not decreased. The next review is scheduled to take place in 2023. SG100 is met.

Challenges and solutions to meeting PI 1.2.1

A good harvest strategy requires holistic management oversight at the level of the stock. This implies that there is good understanding of the stock boundaries and joined up management where a stock crosses management jurisdictions (either national or international). Once these foundations are in place, a good harvest strategy requires all of the component parts - monitoring, stock assessment, HCRs and management actions – to work together to bring about management objectives, typically reflected in the target and limit reference points, but also inclusive of wider management objectives related to ecosystem (P2) or fleet, governance and socio-economics (P3).

In many fisheries management systems, the component parts of a harvest strategy are present to some degree, however demonstrating that these are working together at an appropriate scale can be a challenge. Harvest strategies can be highly diverse in nature and data needs, so there is not always a one size fits all solution. Ensuring that the elements of the harvest strategy combine effectively is likely to involve good cooperation between agencies, agreements or combined management plans across jurisdictional boundaries. In addition, the effectiveness of a harvest strategy is greatly enhanced by a culture of monitoring and review to enable adaptive management, which is not only responsive to the state of the stock, but also able to address wider management issues as they arrive.

Sometimes there can be a lot of attention placed on getting the component parts of the harvest strategy in place (e.g. ensuring that there is a good stock assessment or an effective deterrent against illegal fishing) and less attention is paid to the strategic oversight which ensures the management system is (and continues to be) fit for purpose. Assuming that the component parts of the management system are in place, the development of strategic oversight need not be time consuming or costly, but it does require recognition of the need for such strategic oversight.

Example process and actions to improve performance against PI 1.2.1

Process Chronology				Management Actions	
1	2	3	4	Example action	Scoring issue
●				Set out the component parts of the existing harvest strategy for the target fishery, using the description for what a harvest strategy could and should contain (control rules and tools, information base, stock status monitoring, responsiveness of management to stock status). Outline how the monitoring, regulations, control rules, and stock assessment all fit together. Determine where there are gaps within the overall design of the strategy.	(a)
●				Detail how the performance of the harvest strategy is currently monitored, reviewed and where necessary amended in response to the state of the stock.	(b), (c), (d)
	●			Where the harvest strategy is missing, or gaps are evident from the reviews undertaken in step 1, then a harvest strategy should be developed. This is likely to be a process which requires the input from a wide range of stakeholders and expertise and should be closely linked to the drafting of a management plan for the fishery.	(a)
	●			Undertake simulation testing to demonstrate that the proposed harvest strategy is likely to work.	(b)
	●			Where there is a harvest strategy in place, but there is a lack of monitoring or evaluation to indicate the degree to which the harvest strategy is achieving its objectives, appropriate monitoring and a program for evaluation should be implemented.	(c), (d)
	●			Where the P1 species is a shark, the harvest strategy should include specific focus on shark finning including a non-retention or Fins Naturally Attached policy – and be able to robustly and independently show that these policies are enforced and effective.	(e)
	●			The harvest strategy should outline a process to consider and review, on a timely basis, alternative measures that will ensure unwanted catches of the target species will be minimised. This should be informed by empirical data on catch profiles.	(f)
		●		Ensure that all parts of the harvest strategy are enacted and implemented and, where necessary appropriately staffed and resourced.	(a)
			●	Undertake an evaluation of the performance of the harvest strategy as per the timetable set out in the fishery management plan.	(b)
			●	Implement changes to management where indicated as necessary in the harvest strategy evaluation.	(a), (b)

Notes

1.2.2 Harvest control rules and tools

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Performance Indicator overview

PI 1.2.2 assesses whether a fishery has well defined and effective harvest control rules (HCRs) in place. An HCR is a set of well-defined pre-agreed rules or actions used for determining a management action in response to changes in indicators of stock status with respect to reference points. HCRs are sometimes described as a set of 'if' and 'then' rules, defining the circumstances that will lead to what management responses (i.e. if the stock falls to x, then the management will respond by doing y).

HCRs should be designed to achieve a medium or long-term target reference point while also safely avoiding a limit reference point (LRP). The HCRs should also define how a stock will be rebuilt to the target reference point (TRP), at times when it falls below this level. Typically, the rule will be phrased in terms of changes in stock status triggering changes in exploitation rate (catches and/or fishing effort). HCRs should be based on plausible hypotheses about resource dynamics and be reasonable and practicable, in the context of the scale of the fishery, to ensure they are likely to achieve the management goals. In general, HCRs should be able to be implemented by the fishery, compliant with national regulations and/or international fishery agreements, based on relevant international experiences, supportive of ecosystem-based fisheries management, and compatible with the biology of target stocks.

HCRs are a critical component of precautionary management frameworks aiming at replacing ad hoc advice and decision-making with a more rigorous and consistent management structure. An HCR carries several advantages. By agreeing a set of rules by the fishery, the management system becomes both more transparent and more predictable, particularly where there has been effective stakeholder participation and consultation in the development of the rules. It is often easier and less controversial to agree on management actions, in the event of certain situations, before the need arises. If, and when, the stock level indicators highlight a need for a reduction in exploitation rate, there may be less socio-economic or political pressure to make short term management decisions which may be at odds with the long-term objectives for the stock. This should result in a timelier return to target levels.

The establishment of HCRs also enables the performance of a clear set of rules to be modelled, tested and evaluated. Typically, HCRs will be agreed for a certain time period, and will be subject to periodic testing and review. Rather than management over-riding or ignoring the HCR, it is good practice to periodically test and amend the rule, re-engaging in the participatory and consultative process to do so.

For key low trophic level (LTL) species, which are particularly important as food for other species in the ecosystem, the HCRs should maintain stocks at higher-than-normal levels.

Three scoring issues are considered under this PI:

(a) HCRs design and application

(b) HCRs robustness to uncertainty

(c) HCRs evaluation

Scoring issue (a) – HCRs design and application

The first scoring issue for PI 1.2.2 seeks to verify that appropriate harvest control rules (HCR) are in place, capable of both limiting exploitation rates as the PRI is approached and keeping the stock fluctuating around a level consistent with MSY.

Scoring issue	SG60	SG80	SG100
(a) HCRs design and application	**Generally understood** HCRs are **in place** or available that are **expected to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.**	**Well-defined** HCRs are **in place** that **ensure** that the exploitation rate is reduced as the PRI is approached, and are expected to keep the stock **fluctuating around** a target level consistent with (or above) MSY, or for key LTL species at levels consistent with ecosystem needs.	The HCRs are expected to keep the stock **fluctuating at or above** a target level consistent with MSY, or another more appropriate level **most** of the time, taking into account the ecological role of the stock.

Good practice

Good practice requires that there are 'generally understood' HCRs in place. 'Generally understood' HCRs are those that can be shown to have been applied in some way in the past but have not been explicitly defined or agreed. For SG80, the rules should be both 'well defined' and 'in place'. 'Well defined' HCRs exist in some written form that has been agreed by the management agency, ideally with stakeholders and state what actions will be taken at what specific TRP levels.

What CAB auditors check

CAB auditors will wish to speak to fishery managers to determine exactly what the HCR is that governs their decisions on the exploitation rate in the fishery. Equally important is the status of the rule, in terms of implementation. Details may be available in the following documents:

- Legislation, regulations or licencing arrangements relating to the HCRs.
- Management plans, defining how the HCRs will be applied.
- Reviews of evaluations that have contributed to the design and selection of the HCR.
- Where well defined HCRs may be missing, it may be important to consider the management authorities understanding of HCRs and application in other fisheries within their jurisdiction.

Note, if the target stock is managed by an RFMO, there is an allowance in Section SE to score 'available' HCRs at SG60. To do this, the target stock must be healthy (i.e. $B > B_{BMSY}$) and predicted to stay there. There are two allowances for 'available' HCRs. These are that the management body that oversees the target stock has put in place HCRs on another stock under its remit, or that there is an agreement or framework in place that requires the management body to adopt HCRs before the stock declines below B_{MSY}.

Scoring issue (a) – HCRs design and application

Key questions to determine where further action is needed

Q Is there a binding HCR that has been agreed and implemented for the fishery under assessment that is 'well-defined' and exists in some written form?

Q If there is not yet a binding HCR in place, are there 'generally understood' HCRs, that have been applied in some way in the past to maintain the stock at healthy levels (allowed at the SG60 level)?

Q Does the target stock referred to in the HCR give consideration to the ecological role of the target stock – in particular for key LTL species?

Q Are adequate monitoring and management tools in place to ensure that the exploitation rate could and would be reduced in the event of a decline in stock status, approaching the PRI?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Abalone hand-gathered fishery*: Fishing cooperatives have historically had control mechanisms to regulate the amount of effort exerted on the resource, particularly during times of crisis. The fishing cooperatives have a self-imposed co-management system in place, which may also compensate for the market-driven actions. They take the initiative to propose and implement management tools (such as changes in size limits, closed areas and closed seasons) that promote conservation of the resource in response to signs of stock decline (lower catches). Accurate and up to date records are kept of catch and effort, supported by annual stock assessment which enables an on-going review of stock status, which informs the need for management intervention. Taken as a whole, these measures represent generally understood (see SA2.5.2a) HCRs that reduce exploitation as the stock declines and that have been tested through time. SG60 is met. Skipjack tuna pole and line fishery (managed by RFMO and therefore Section SE applies): Skipjack stocks are currently above the levels at which effort reductions or other controls would be needed ($B>B_{MSY}$ for 2 generation times and is not expected to fall below BMSY in the next 5 years (see SE2.2.3a). Well defined HCRs are in place to manage bigeye and yellowfin tuna exploitation by the same RFMO (see SE2.2.4a). It is expected that similar HCRs would be applied to skipjack as and when needed, following management strategy evaluation (MSE), to achieve the stated target levels. SE2.2.3a and SE2.2.4a are met and HCR are regarded as "available". SG60 is met.

Scoring issue (a) – HCRs design and application

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG80	*Shrimp trawl fishery*: The HCR that is in place is well-defined and is consistent with the agreed harvest strategy that aims to maintain the shrimp stock at the MSY level. The agreed TRP has been set at B_{MSY} and the PRI is $0.5B_{MSY}$. If the stock status is lower than Bmsy, the HCRs require a probability of at least 50% of restoring the stock to the target level of B_{MSY} within 5 years. . SG80 is met.
SG100	*Snapper longline fishery:* Clear documented HCRs are agreed by management, following widespread consultation, and are enshrined in binding legislation. This is used to determine the TAC based on annual stock assessment advice. A modeling projection of the TAC levels in the HCR, based on the current stock assessment, indicates that if this catch is applied over 35 years, there will be a 10% chance or less of the spawning stock falling below 20% of the pre-exploitation level and the median spawning biomass will remain at or above 50% of its pre-exploitation level. Allowances are made for the ecological role of the stock as a minor forage species (at juvenile sizes) by keeping the stock at a higher level than would be required for a single species MSY level (estimated at 35% of pre-exploitation level). SG100 is met.

Scoring issue (b) – HCRs robustness to uncertainty

The second scoring issue focuses on the degree to which uncertainties are recognised and accounted for in the HCRs. Uncertainties could include assumptions in the stock assessment, uncertainty over the effects of environmental changes, uncertainty about life history attributes of the target species, data and reporting errors, uncertainties over stock boundaries, unaccounted fisheries mortality, such as from IUU etc.

Scoring issue	SG60	SG80	SG100
(b) HCRs robustness to uncertainty		The HCRs are **likely** to be robust to the main uncertainties.	The HCRs take account of a **wide** range of uncertainties including the ecological role of the stock, and there is **evidence** that the HCRs are robust to the main uncertainties.

Good practice

This scoring issue requires that the main uncertainties are considered in the HCR. SG100 requires that a wider range of uncertainties (including ecological uncertainties) are not only considered but that there is evidence that the HCRs are robust to these uncertainties (e.g. through simulation testing).

What CAB auditors check

The key stakeholders for this scoring issue are the fishery scientists involved in designing and testing the HCR. CAB auditors will be keen to discuss the uncertainties that have been considered in the design of the rule and the degree to which these have been tested. CAB auditors / CAB auditors / CAB auditors will refer to the following key documents:

- A document detailing the development and testing of the HCR.
- An evaluation of the HCR.

Scoring issue (b) – HCRs robustness to uncertainty

Key questions to determine where further action is needed

Q Did the development of the HCR specifically acknowledge that there were uncertainties that would affect the robustness of the rule and were the effects of possible errors accounted for in the design of the rule?

Q Was simulation testing carried out on the rule to test its robustness to these uncertainties; or is there evidence from similar fisheries that supports the use of the HCRs?

Q Is explicit consideration given to the uncertainty over the ecological role of the target stock (such as in relation to predator – prey interactions) in the design of the HCR?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	*Sole fishery*: The main uncertainties which affect the HCRs are some uncertainty in the overall catch levels through underreporting and misreporting. These uncertainties have reduced in recent years and they are taken into account in the stock assessment process which underpins the setting of the annual TAC. There is no evidence that a wide range of uncertainties has been explored in relation to the HCRs, in particular the technical measures. It is concluded that the HCRs are likely to be robust to the main uncertainties. SG80 is met.
SG100	*Prawn trawl fishery*: The assessment model, which informs the design of the current rule, provides information on the degree of uncertainty in estimating current levels of biomass and fishing mortality relative to the agreed management reference points. Those target and limit reference points currently incorporated into the HCR, have been established slightly above recommended levels, to account for the lack of specific measure of spawning biomass and also considering the low trophic level of the target species. The trigger point, set at the MSY level, will help to maintain the stock well above the limit reference point. The robustness of the HCR to uncertainties in key assumptions about stock and fishery conditions has been demonstrated with simulation modeling. SG100 is met.

Scoring issue (c) – HCRs evaluation

The final scoring issue of PI 1.2.2 examines the extent to which it has been demonstrated that the tools used to limit exploitation, as per the requirement of the HCR, are or would be effective. For example, were the HCR to trigger a reduction in effort, is there evidence that this would have the intended effect on limiting the overall exploitation rate?

Scoring issue	SG60	SG80	SG100
(c) HCRs evaluation	There is **some evidence** that tools used **or available** to implement HCRs are appropriate and effective in controlling exploitation.	**Available evidence indicates** that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	**Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the HCRs.

Good practice

Good practice requires firstly that the tools are already in place, for example that there is already a reactive system of effort or catch control, and secondly that it can be demonstrated that the tools are effective at controlling the exploitation rate as required by the HCR.

What CAB auditors check

CAB auditors will first consider whether the tools used by the HCR to limit exploitation (for example TAC or effort controls) are in place already. For this it will be necessary to consult fishery managers and refer to relevant regulation. Secondly CAB auditors will check whether the appropriateness and effectiveness of these tools for limiting the exploitation rate has been evaluated. Key documents are likely to be:

- A document detailing the development and testing of the HCRs.
- Regulatory evidence of quota, effort restriction, area or seasonal closures or any other measures applied in an adaptive manner as part of the HCR.
- An evaluation of the current levels of exploitation rates in the fishery, and their position relative to F_{MSY}.

Note, if the target stock is managed by an RFMO, there is an allowance in Section SE to score 'available' HCRs at SG60. To do this, the target stock must be healthy (i.e. $B>B_{MSY}$) and predicted to stay there. There are two allowances for 'available' HCRs. These are that HCRs are being "effectively" used in another stock that is managed by the same management body, or there is a description of the formal agreement or legal framework that the management body has defined, and the indicators and trigger levels that will require the development of HCRs.

Scoring issue (c) – HCRs evaluation

Key questions to determine where further action is needed

Q Are the tools which would limit exploitation rate, when required by the HCR, already in use?

Q Does experience in the fishery provide evidence that the tools are effective in limiting exploitation rate and resulting in the stock fluctuating around a target (approximately) consistent with MSY?

Q Where fishing mortality rate is estimated, is F currently less than FMSY (see GSA2.5.3)?

Q Has any simulation testing of the HCR occurred demonstrating that the selection of tools used by management to limit exploitation, as required, are expected to be effective?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	*Tropical crab pot fishery*: The main tools to limit exploitation are input controls related to gear restrictions in terms of pots per/vessel, limited entry into the fishery from licensing, legal size limits and prohibition on the retention of berried females. The stock is managed primarily against a proxy for fishing mortality, being kg/pot lift. Historically, effort has been low given the remote nature of the fishing grounds and limited entry through licensing. There is some evidence to demonstrate however, that the input controls have constrained exploitation. SG60 is met. Skipjack tuna pole and line fishery (managed by RFMO and therefore Section SE applies): Skipjack stocks are currently above the levels at which effort reductions or other controls would be needed ($B>B_{MSY}$ for 2 generation times and is not expected to fall below B_{MSY} in the next 5 years (see SE2.2.3a). 'Well defined' HCRs are in place to manage bigeye and yellowfin tuna exploitation by the same RFMO. Evidence shows that the HCRs used for bigeye and yellowfin are effective in controlling exploitation as all indicators have been within their desired ranges in recent years, well above their respective PRI (see SE2.2.6a). It is expected that similar HCRs would be applied to skipjack as and when needed, following management strategy evaluation (MSE), to achieve the stated target levels. SG60 is met.
SG80	*Shrimp trawl fishery*: Taken in combination, the limited entry system and a restriction on days at sea are appropriate and effective in ensuring implementation of the HCR. The satellite VMS has been operational for some time and is an appropriate and effective tool in monitoring vessel activity, including total days-at-sea, time spent fishing at each location identified and compliance with the closed area regulation. The VMS data, together with shrimp trawl fishery activity data summaries provided by the processing plants, are housed in databases maintained by the national fisheries authority and are the main data required by the present assessment model to determine shrimp exploitation levels, as required under the HCR. Consistent with GSA2.5.3, recent (past 5 years) stock assessments estimate $F<F_{MSY}$ and $B>B_{MSY}$. SG80 is met.
SG100	*Groundfish trawl fishery*: The main management tool to achieve the required exploitation level is a TAC, allocated to the license holders through Individual Transferable Quotas (ITQs). Catches from the fishery are reported by fishers in electronic logbooks after each trawl shot and the landed catch is weighed and recorded at the end of each trip and reported to the management agency which act to ensure both the ITQ and the TAC are not exceeded. The TAC has never been exceeded. Compliance monitoring and the compulsory use of VMS also help ensure other management measures, including gear restrictions and spatial closures, are complied with. The stock remains well above BMSY and has been maintained below FMSY since the introduction of the HCRs. SG100 is met.

Challenges and solutions to meeting PI 1.2.2

An HCR implies the need for quantitative stock assessment and reference points, so these need to be put in place initially. Ideally an HCR would also include empirical modelling to assess the effectiveness under different scenarios. This approach will be challenging for certain developing economies that lack the information, tools or technical capacity to develop either the assessments or the resulting rules. However, HCRs can in some cases also be based on simple rules, supported by plausible argument and monitored by means of appropriate indicators, although such rules may require a higher level of precaution. Thus, HCRs are not necessarily a constraint for fisheries of lower scale or intensity or fisheries which have been historically subject to lower levels of scientific and management oversight. However, it is likely that testing and monitoring will require economic and specialist technical resources.

An effective HCR also requires a good degree of participatory development, involving consultation or engagement between managers and fishers. This is vital if the rule is to prove effective and practical in the long run. Where such participatory approaches are not common within the administrations, this can be a challenge. An effective HCR also requires some means of limiting the exploitation where the stock assessment indicates that this is required. A relatively open access fishery which only has technical measures but does not have either quota or effort control may find it more difficult to limit the exploitation rate effectively when required to do so. Furthermore, where the HCR (responding to stock status) requires a reduction in exploitation rate, and where this proves unpopular or damages the economic viability of the fleet, it is likely that the controls may prove insufficiently robust, without increased investment in monitoring, control and enforcement.

Example process and actions to improve performance against PI 1.2.2

Process Chronology				Management Actions	
1	2	3	4	Example action	Scoring issue
●				Undertake an initial review of the rules which are used to determine the level of exploitation in the fishery, examining how clearly defined they are, the objectives they seek to meet, and the degree to which uncertainties are considered.	(a), (b)
●				Undertake an initial review of the tools which are used to set the exploitation rate in the fishery, as determined by the HCRs.	(c)
	●			With input from appropriate technical expertise, develop or refine HCRs which clearly state the key trigger reference points for the stock and defines how the exploitation rate will be adjusted relative to these.	(a)
	●			Add or amend the tools in use to control the exploitation rate (such as quota, effort restriction, technical measures or spatial or seasonal controls), as defined by the HCR. It should be demonstrated that where the application of the HCR requires a reduction in exploitation rate (for example as the PRI is approached), the selected tools will effectively achieve this.	(c)
		●		The HCR and the tools used to apply the HCR should be implemented. This may require the drafting of amendments to legislation, or the inclusion within a Fishery Management Plan. It may also require personnel or budgetary changes to ensure that all practical steps required to apply the HCR are in place.	(a), (c)
			●	Continue to set the exploitation rate in the fishery according to the HCR. Where these are deemed out of date or inappropriate, they should be subject to full consultative review prior to amendment.	(a), (c)
			●	Undertake periodic evaluation of the HCR performance and seek to address any remaining uncertainties.	(b)

Notes

1.2.3 Information and monitoring

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Performance Indicator overview

PI 1.2.3 requires that relevant information is collected to support the harvest strategy. Sound and precautionary fisheries management requires the timely use of reliable information to enable analysis and ultimately management feedback response. The information and monitoring required for the management of stocks should include everything that is needed to inform the harvest strategy, HCRs and control tools. For Principle 1, the information that is essential is focused on the requirements for management of the target stock and more specifically, the information required to:

- Undertake a stock assessment;
- Inform the design of the harvest strategy and effective HCRs;
- Operate the HCRs.

A well-designed fisheries monitoring programme provides essential operational understanding to inform management decisions and demonstrate to stakeholders that the objectives (in particular the long-term sustainability of the resource) are being met and that the management measures are effective. Over time, monitoring also enables the detection of trends and provides a baseline from which to inform discussions of future fisheries performance.

The information needs of a given fishery will vary according to its scale and operational characteristics, but it is crucial that the information (and the monitoring that provides this) is tailored to the needs of the management system. This PI considers not just the breadth and depth of information available but also the suitability of that information to support management decision-making processes, as well as its veracity. Typically, the following information categories will be required to inform management of the target stock, and will therefore be the focus of this PI:

- Stock structure (geographical range of stock, age, size, sex, genetic structure).
- Stock productivity (maturity, growth, natural mortality, stock recruit relationship, fecundity).
- Fleet composition (effort by gear type or method of capture, fleet characteristics).
- Stock abundance (absolute or relative abundance indices, surrogate indicators).
- Fishery removals (level, size, age, sex, genetic structure of all forms of catch including landing, IUU, discards, recreational, etc.).
- The scale of any unobserved mortality.
- Other data (other information that may influence fish populations such as temperature or weather).

Three scoring issues are considered under this PI:

(a) Range of information

(b) Monitoring

(c) Comprehensiveness of information

Scoring issue (a) – Range of information

The first scoring issue of PI 1.2.3 assesses the range of information that is available, and the relevancy of that information, to support management decision-making in relation to the target stock.

Scoring issue	SG60	SG80	SG100
(a) Range of information	**Some** relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	**Sufficient** relevant **information** related to stock structure, stock productivity, fleet composition and other data are available to support the harvest strategy.	A **comprehensive range of information** (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly relevant to the current harvest strategy, is available.

Good practice

Good practice requires a comprehensive range of relevant information. The explicit requirement for information on 'stock abundance, fishery removals and other information such as environmental information or information not directly relevant to the harvest strategy' is only required at the SG100 level. The additional information could, for example, enable managers to consider a wider range of hypotheses or scenarios, enabling the management to be more robust to future changes in the fishery.

What CAB auditors check

The information requirements for this scoring issue should fit the management system, therefore CAB auditors will consider the information in the context of the harvest strategy, control rules and tools which control the exploitation level. CAB auditors also consider the veracity of the information, so this is likely to be informed by a range of stakeholder input. Key sources for the consideration of this are likely to be.

- The stock assessment – and any background documents, such as benchmark assessments.
- The management plan – particularly where it details monitoring and data collection requirements.
- Any legislation which details approach to data collection or monitoring requirements.
- Evaluations of the HCR or harvest strategy.
- The published outputs of any other monitoring – i.e. fleet composition.
- Research plan.
- Scientific papers.

Scoring issue (a) – Range of information

Key questions to determine where further action is needed

- Q Does the fishery have information on stock structure, stock productivity and fleet composition?
- Q Is the information that is available adequate to support the harvest strategy?
- Q Is monitoring designed to provide the information required for stock management decision-making?
- Q Have any information gaps (which may have been highlighted in past evaluations or stock assessments) been addressed?
- Q Are there other monitoring programs which, though not directly relevant to the target stock, are referred to by fishery managers to inform their understanding of stock management (i.e. environmental monitoring?)

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Sole gillnet fishery:* Some relevant information on the stock structure (geographical range, size composition) is available. Additionally, a few studies on size at maturation, growth and fecundity have been conducted [to inform the stock assessment]. While, the fleet composition and effort data for the target fishery is well-known, information on other fleets that target the stock is minimal. There is thus some relevant information to support the harvest strategy. SG60 is met.
SG80	*Yellowfin tuna pole and line fishery*: There is good information on stock structure (age, size and sex), stock productivity, growth, and fleet composition. This is sufficient to monitor the fishery and assess stock status as required to support the harvest strategy. In addition, tagging data, catch data and size frequency data are available on a continuing basis for inclusion in stock assessments. Information is sufficient to support the harvest strategy. SG80 is met.

Scoring issue (a) – Range of information

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG100	*Crab trap fishery*: Detailed information is available from fisheries independent trawl and trap surveys and the at-sea observer program on the distribution and geographical range of the stock, and the age, size and sex structure of the stock. Genetic studies show that there is a single crab stock and movement of crabs within the wider stock is minimal. Good information is available on stock productivity in the form of growth and natural mortality rates, including size at terminal moult, and reproductive capacity in the form of maturity and fecundity. Fleet composition is described comprehensively through the licensing system, and daily fishing activity is recorded for the largest vessels through the VMS program. Stock abundance is estimated through indices of exploitable and pre-recruit biomass from multi-species trawl surveys and post-season trap surveys, and fishery removals are very closely monitored through a dockside monitoring. Increasingly critical to the management of the crab fishery is the recognition that crab biomass is influenced by environmental and biological factors even in the absence of fishing. The most recent stock assessments show that CPUE is inversely correlated with bottom water temperature, and that the warm oceanographic regime in recent years suggests future declines in recruitment. A comprehensive range of climate indices is also collected for the region and presented at various management and scientific meetings to inform analysis of future crab stock trajectories. The availability and strategic collection of a wide range of comprehensive data is ongoing and goes beyond supporting the harvest strategy. SG100 is met.

Scoring issue (b) – Monitoring

The focus of the second scoring issue of PI 1.2.3 is on the monitoring program. This again considers the relevancy to the harvest strategy, the frequency of monitoring as well as the accuracy and robustness of the monitoring results.

Scoring issue	SG60	SG80	SG100
(b) Monitoring	Stock abundance and UoA removals are monitored and **at least 1 indicator** is available and monitored with sufficient frequency to support the harvest strategy.	Stock abundance and UoA removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest strategy**, and 1 or more indicators are available and monitored with sufficient frequency to support the harvest strategy.	All information required by the harvest strategy is monitored with high frequency and a h**igh degree of certainty,** and there is a good understanding of the inherent **uncertainties** in the information (data) and the robustness of assessment and management in dealing with this uncertainty.

Good practice

Good practice requires management to have a wide range of monitoring, with a high degree of frequency, and a high level of accuracy (including full recognition of inherent uncertainties).

What CAB auditors check

CAB auditors will need to seek to build a picture of what information is routinely monitored and by who. To inform this, CAB auditors may wish to discuss monitoring processes with stock scientists and fishery managers and other relevant stakeholders – such as on-board observers, or those engaged in environmental monitoring programs. Key sources for the consideration of this are likely to be:

- The stock assessment – and any background documents which detail the available datasets.
- The management plan – particularly where it details monitoring and data collection requirements.
- Any legislation which details approach to data collection or monitoring requirements.
- Evaluations of the HCR or harvest strategy.
- Research plan.

Scoring issue (b) – Monitoring

Key questions to determine where further action is needed

- Q Are stock abundance and fishery removals monitored?
- Q Are all monitoring programs that may be required to enable managers to make informed management decisions in place?
- Q Do all relevant monitoring programs happen on time and without interference or complication?
- Q Is consideration given to the possible sources of error or uncertainty in the monitoring programs?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Scallop trawl fishery*: The harvest strategy is based on empirically derived rules, including move on rules based on catch rates by area in near real time. Authorities require skippers to maintain log books, detailing date, fishing location and catch. While the management agency does not actively 'monitor' the CPUE series in the main fishing area, it is monitored by fishermen who apply an agreed (as part of the harvest strategy) informal 'move on' rule (based on kg/hour) when a local scallop bed shows signs of depletion. The data are also used to conduct stock assessments to estimate stock abundance. VMS data are sent to inspection services every two hours and are available to monitor/verify areas fished, including closed areas. Overall, stock abundance and removals are monitored and one indicator (CPUE) is available to inform the harvest strategy. SG60 is met.
SG80	*Prawn trawl fishery*: Catch rate is being used as the measure/index of stock abundance and is recorded as tonnes per day-at-sea, consistent with the measure agreed to monitor and enforce the HCR. Vessel captains and the prawn processing plants maintain regular records for each fishing trip and the processing plant data forms are currently made available to inform the assessment process. The established satellite VMS also facilitates independent monitoring of actual fishing effort, recorded as days-at-sea and can contribute information on fishing locations, changes in which are important to interpret the catch rate index. SG80 is met.
SG100	*Mid-water pelagic trawl fishery*: All information required by the HCR is monitored with high frequency and a high degree of certainty and there is a good understanding of inherent uncertainties in the information and the robustness of assessment. For example, annual fisheries-independent research plankton tow surveys occur on an annual basis in the winter and inform the TAC decision making process prior to the fishery opening in the Summer. Main stock indicators, including those determined from both the research surveys and commercial landings are essential for assessing status relative to precautionary reference points. These indicators rely on data from the fishery and the annual research survey. Data from the summer fishery are collected systematically and are considered representative of the commercial catch and effort. The survey, in place for many years, follows strict sampling protocols to produce statistically valid results. The simulation model was used in the selection of decision rules and provided a test of the robustness of assessment and management to uncertainty. Such uncertainty include changes in environmental conditions that may influence recruitment. The model describes and assesses a wide range of uncertainties underlying its performance. SG100 is met.

Scoring issue (c) – Comprehensiveness of information

The final scoring issue of PI 1.2.3 requires that there is good information on all other fishery removals from the stock. This is likely to include captures of the target stock by other fleets (including recreational fisheries), discards of the target stock and any IUU related fishing mortality.

Scoring issue	SG60	SG80	SG100
(c) Comprehen-siveness of information		There is good information on all other fishery removals from the stock.	

Good practice

If there is good information on all other removals, SG80 is met. The fishery should either be the only one fishing on the stock or information is available on any other fishery or fisheries (including recreational fisheries) that may be targeting the stock.

What CAB auditors check

Following stakeholder consultation, CAB auditors will understand the possible sources of other fishing related mortality. CAB auditors will then review documents to ascertain the extent to which information of these other possible sources of fishing mortality are recorded. These may include:

- Stock assessment and advice – does this highlight any additional sources of fishing related mortality?
- Evaluations of the performance of the monitoring control and surveillance system, which may provide estimates of IUU catches.
- Breakdown of total catches of the P1 stock by all nations and all gears.
- Studies on bycatch (of the target species, either in the targeted fishery, or other overlapping fisheries).

Scoring issue (c) – Comprehensiveness of information

Key questions to determine where further action is needed

Q Are there other fisheries catching the target stock, whether directed or incidental?

Q Are sufficient data available to understand the key characteristics of the stock – life history characteristics, stock productivity, stock structure, boundaries?

Q Are data (either from routine or periodic monitoring) available to quantify catches of the target stock by other fleets (either landed or discarded), discards in the targeted fishery (either due to high grading, size limits or quota restrictions), illegal fishing, or spoiled catch?

Q Does the stock assessment consider, or seek to quantify these possible other sources of mortality?

Q Is there any unobserved mortality?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	*Lobster pot fishery*: Management regulations prohibit any take of lobsters outside the fishing season. During the two-month fishing season, access to the commercial fishery is only permitted for license holders. Recreational fishers are permitted to take lobsters during the two month fishing season, though bag and size limits apply. Recreational catches are monitored by Fishery Compliance Officers both on the water and at the two local boat ramps. Based on surveys of recreational fishers that are conducted at the boat ramps, estimated recreational catches are included in the stock assessment as part of sensitivity analysis. During the closed season, IUU is not thought to be a problem given the constricted range of the stock, the localised access and high compliance rates. SG80 is met.
SG100	No scoring guidepost at the 100 level.

Challenges and solutions to meeting PI 1.2.3

Despite the importance of monitoring, fishery managers and stakeholders have sometimes struggled to implement effective monitoring programs in fisheries which may have been a lower management priority in the past or where access to economic and human resources maybe limited. Monitoring programs that have been in place for many years may not be adapted to the requirements of a newer, more adaptive fishery management strategy. Monitoring may historically have focused on priority areas, particularly if resources are limited, such as target fishery removal or fleet statistics. These may also be the most straightforward to monitor and therefore have the longest time series and clearest departmental oversight. However, some of the more challenging areas to monitor are also important to have proper oversight of stock dynamics. Stock productivity, fishery removals, environmental parameters, measures of gear efficiency, bycatch rates and post capture mortality are all likely to be increasingly used to inform the management process. For example, it is likely that some fishery monitoring may have already been in place before the need to undertake an empirical stock assessment was identified. With this requirement for an increased level of analysis, comes an increased data demand, so the monitoring plans, responsibilities, capacity and budgets must be adjusted accordingly.

As a result, even when some monitoring is in place, it is part of the function of management to ensure that monitoring is reviewed, adapted, and if necessary expanded, to remain relevant to the needs of management.

To be efficient and achievable, monitoring programs need to consider costs of data collection, processing and analysis and determine both financial and departmental responsibility. The strategy for monitoring must also be tailored, for example, in some situations sampling at sea may be more relevant than at port monitoring, which in turn will necessitate a certain level of equipment, training and infrastructure.

It is important also that data collection is, where possible, standardised in consistent electronic formats, which should make data entry, analysis and reporting more efficient and mean data is readily available for future use. For this, standardised computer use is important within departments. Where fishers themselves are to undertake monitoring, for example by providing information on catch rates, or fishing areas, submission of data in electronic form may be challenging where there are low levels of computer literacy or problems with rural connectivity.

Example process and actions to improve performance against PI 1.2.3

Process Chronology				Management Actions	
1	2	3	4	Example action	Scoring issue
●				Review all of the information and data monitoring that is currently available to inform the fishery management process. This should include consideration of the adequacy of this data and any uncertainties. Information may be available from a range of sources including research organisations, universities, fishers, NGOs, management agencies, processors, etc. It may also be useful to indicate where responsibility lies for monitoring, the frequency of monitoring and the process by which this informs fishery management decisions.	(a), (b), (c)
	●			Undertake a review of the types of information that will be required for the evolving harvest strategy (as described in 1.2.1), harvest control rule (as described in 1.2.2) and for future stock assessment (as described in 1.2.4). Identify where there are gaps in the existing data (described in step 1), with regard to the needs of future management.	(a), (b), (c)
		●		Plan for the monitoring of any new indicators or the refinement of any existing monitoring programs. This should clearly identify where responsibility for monitoring lies and ensure that all resource and capacity issues relating to future monitoring are addressed. Information may be generated through management agencies, NGO's, fishers, research institutes, etc.	(a), (b), (c)
		●		Ensure that new monitoring regime is enshrined in the fishery management plan and/or relevant legislation or regulation. Or if this is not possible, ensure that the new monitoring regime in implemented in a way to ensure that it is robust and reliable.	(a), (b), (c)
	●			Begin the new monitoring program and continue with the collection of any previously collected time series of data which may be of value to fishery management.	(a), (b), (c)
		●		Once established and operational, the monitoring program should be subject to periodic evaluation and / or review, to ensure that it is delivering the requisite insight for management.	(a), (b), (c)

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1.2.4 Assessment of stock status

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Performance Indicator overview

The final Principle 1 PI requires that there is an adequate assessment of the stock status. There are many different approaches to stock assessment and a key consideration for this PI is the appropriateness of the assessment method to the scale of the fishery. There are also requirements for reference points, whether the stock assessment identifies major sources of uncertainty and whether the assessment method has been evaluated and internally or externally peer reviewed.

The complexity of assessment methods used for a given stock generally reflects the availability of data and the value or importance of the fishery. Most large scale, industrial fisheries generate enough revenue to justify wide ranging data collection and sophisticated stock assessments.

For lower value fisheries, or fisheries which have historically been a lower priority for management, conducting surveys and collecting fishery-independent data is often difficult or the costs cannot be justified. However, effective management still requires a reliable understanding of stock status and trends to inform adaptive stock management. To be classified as an assessment, an analysis must at least produce some measure of stock or fishery status relative to a reference point or benchmark such as a fishing target or an overfishing limit. When possible, assessments should consider biological characteristics of the species (e.g. natural mortality, growth rates) as well as account for main uncertainties.

There are a wide range of stock assessment methods, requiring different levels of input data or computing power. Not all are necessarily model based, or reliant on fishery-independent survey data. However, it is important that whatever method is used, it seeks to identify stock status relative to either analytical (model-based) or empirical (e.g. catch rates, CPUE, etc.) reference points.

When information is scarce and data-limited stock assessments are used, it can be informative to consider a variety of different assessment methods. Variations in outcomes between different approaches can help to refine the process of assessment, help to identify uncertainty and enable more informed decisions. Annex 2 Data-limited methods, provides an overview of several assessment methods that can be used in data limited situations.

Peer review is another important element of the stock assessment process, to ensure the results are subject to external scrutiny. Peer review is typically conducted by independent fisheries scientists from inside and outside management agencies, carried out at reasonable intervals. The focus of peer review is likely to include (i) the survey sampling methods used in the collection of fishery-dependent and fishery-independent data; (ii) the stock assessment methods themselves, and (iii) uncertainty estimates and risk management strategies.

When the MSC Risk-Based Framework is used to assess stock status for PI 1.1.1, this PI is not scored. In this case a default score of 80 is given for this PI.

Five scoring issues are considered under this PI:

(a) Appropriateness of assessment to stock under consideration

(b) Assessment approach

(c) Uncertainty in the assessment

(d) Evaluation of assessment

(e) Peer review of assessment

Scoring issue (a) – Appropriateness of assessment to stock

The first scoring issue seeks to ensure that the assessment is appropriate to enable the harvest control rule (HCR) to be applied and that it is relevant to the biological characteristics of the target stock.

Scoring issue	SG60	SG80	SG100
(a) Appropri-ateness of assessment to stock under consideration		The assessment is appropriate for the stock and for the harvest strategy.	The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA.

Good practice

Good practice requires that the assessment is appropriate and considers the biological characteristics of the fishery.

What CAB auditors check

The key source of information is likely to be stakeholder meetings with stock assessment scientists, covered with review of the following documents:

- The stock assessment report.
- Background documents, such as benchmark assessment, which may provide a review of the choice of the stock assessment.
- Science working group papers.
- Any internal or external peer reviews of the stock assessment.
- Published literature demonstrating appropriateness of the assessment.

Scoring issue (a) – Appropriateness of assessment to stock

Key questions to determine where further action is needed

- Q Is there a stock assessment carried out for the fishery?
- Q Given the scale, intensity and operational practices of the fishery, is the assessment appropriate to provide managers with reliable understanding of the effectiveness of the harvest strategy?
- Q Are the assessment and the underlying assumptions, appropriate for the target stock?
- Q Is the assessment a one-off, or will it continue to be carried out at appropriate intervals?
- Q Have other assessment approaches or models been applied?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	*Albacore tuna longline fishery*: The assessment methodology has been developed using the software MULTIFAN-CL (MFCL), which is software that implements a size-based, age-and spatially-structured population model. This is a robust and internationally acknowledged approach. This assessment methodology was specifically developed to take advantage of the tuna fishery data available from the region. Difference in growth rates between male and female albacore are apparent but are not modeled directly in the assessment. The assessment uses an assumed level of steepness to model the stock-recruitment relationship and estimated MSY-based reference points are sensitive to this parameter. The assessment method estimates stock status in relation to a number of indicators and management advice is presented in terms of MSY-based reference points and HCRs as required by the harvest strategy. SG80 is met.
SG100	*Tropical shrimp trawl fishery*: The assessment of the status of shrimp relies on information from both fisheries dependent and independent sources to estimate stock health indicators relative to precautionary reference points which were developed in accordance with the management agencies decision-making framework. The main stock indicators include both male and female abundance. Because shrimp are protandrous (i.e., change sex), it is important to protect both the male (recruitment to the female component) and the female stock components (spawning stock). The assessment also considers the role of predators as a source of natural mortality. The assessment thus takes into account the major features relevant to the biology of the species and the nature of the UoA. SG100 is met.

Scoring issue (b) – Assessment approach

The second scoring issue seeks to ensure the assessment provided for the fishery describes stock status relative to reference points, as used in the HCR.

Scoring issue	SG60	SG80	SG100
(b) Assessment approach	The assessment estimates stock status relative to generic reference points appropriate to the species category.	The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated.	

Good practice

To meet requirements the assessment must not only be relative to reference points, but the reference point used must be possible to estimate from the assessment and be appropriate to the stock.

What CAB auditors check

The key source of information is likely to be stakeholder meetings with stock assessment scientists, combined with review of the following documents:

- The stock assessment report.
- Background documents, such as a benchmark assessment which may provide a review of the choice of the stock assessment.
- Any internal or external peer reviews of the stock assessment.

Scoring issue (b) – Assessment approach

Key questions to determine where further action is needed

Q Does the assessment describe stock status relative to reference points?

Q Are the reference points used estimated from the assessment?

Q Are the reference points appropriate for the species?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Sardine mid-water trawl fishery*: Spawning stock biomass and recruitment are assessed systematically using a stochastic age structured model with density-dependent recruitment. This is appropriate for the species category, taking into consideration its biology and the possible SSB-R relationship. SG60 is met.
SG80	*Temperate prawn trawl fishery*: A logistic surplus yield model was used to assess the stock status, made possible by the availability of catch and effort data over a recent 10-year period and a time series of total catch for this same period. This type of model does not allow examination of size-specific or seasonal dynamics, but is suitable for assessment of species that have difficulty in attaining accurate age estimates, such as the target species. There is an assumption that the surplus yield model used is an appropriate model for representing the population dynamics of the stock. The surplus yield model provides information on stock health (current biomass/biomass at MSY level) and the status of fishing performance (current fishing mortality/fishing mortality at MSY level) that includes estimation of corresponding levels of catch rate (tonnes per day-at-sea) and fishing effort (days-at-sea). The assessment model directly informs the agreed harvest strategy and HCR that uses catch rate and fishing effort to measure the achievement of fishery performance relative to agreed management reference points. The assessment therefore estimates stock status relative to reference points that are appropriate to the stock and can be estimated. SG80 is met.
SG100	No scoring guidepost at the 100 level.

Scoring issue (c) – Uncertainty in the assessment

The third scoring issue addresses the issue of uncertainty in assessments requiring that any uncertainties are identified and given proper consideration.

Scoring issue	SG60	SG80	SG100
(c) Uncertainty in the assessment	The assessment **identifies major sources** of uncertainty.	The assessment **takes uncertainty into account**.	The assessment evaluates stock status relative to reference points in a **probabilistic** way.

Good practice

Good practice requires that the assessment method must take uncertainty into account. To achieve higher scores, stock status must also be evaluated relative to reference points in a probabilistic way.

What CAB auditors check

The key source of information is likely to be stakeholder meetings with stock assessment scientists, combined with review of the following documents:

- The stock assessment.
- Background documents, such as a benchmark assessment which may provide a review of the choice of the stock assessment.
- Any internal or external peer reviews of the stock assessment.

Scoring issue (c) – Uncertainty in the assessment

Key questions to determine where further action is needed

- Q Are the possible sources of uncertainty clearly identified in the stock assessment?
- Q Does the assessment take account of the uncertainties in drawing conclusions?
- Q Is stock status assessed in a probabilistic way, fully recognizing the possible inherent errors or uncertainty?
- Q Is the assessment seeking to address sources of uncertainty for future assessment?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	*Snapper demersal line fishery:* The main source of uncertainty for this species is recruitment variability. The assessment clearly acknowledges this uncertainty. SG60 is met.
SG80	*Anchovy mid-water trawl fishery*: The main uncertainty for this species is the recruitment variability, which is taken into account in the future projection, when uncertainty around last year's numbers-at-age is also taken into account. SG80 is met.
SG100	*Tropical shrimp trawl fishery*: The model is applied using a Bayesian framework that provides outputs in the form of probability densities that illustrate clearly the levels of uncertainty associated with each of the estimates generated (current biomass relative to the MSY level and current fishing mortality relative to the MSY level). The probability ranges are illustrated graphically and the 90% confidence intervals for estimates are provided in tabular format. Establishment of the present harvest strategy and HCR has taken into account the probabilities provided by the assessment, as well as the 10% risk of overshooting the agreed target reference point requested by the industry. SG100 is met.

Scoring issue (d) – Evaluation of assessment

The fourth scoring issue of PI1.2.4 rewards those fisheries where the stock assessment has been shown to be robust by rigorous testing.

Scoring issue	SG60	SG80	SG100
(d) Evaluation of assessment			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.

Good practice

A maximum score can only be achieved where the assessment has undergone thorough and rigorous assessment of alternative hypotheses.

What CAB auditors check

The key source of information is likely to be stakeholder meetings with stock assessment scientists, combined with review of the following documents:

- The stock assessment.
- Background documents, such as a benchmark assessment which may provide a review of the choice of the stock assessment.
- Any internal or external peer reviews of the stock assessment.

Scoring issue (d) – Evaluation of assessment

Key questions to determine where further action is needed

Q Does the assessment explore alternative hypotheses?

Q Is rigorous testing carried out of the alternative hypotheses?

Q Has the testing of hypotheses demonstrated that the assessment is robust?

Examples of scoring rationales

Scoring issue (d)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	No scoring guidepost at the 80 level.
SG100	*Skipjack tuna pole and line fishery*: The assessment has been tested using a systematic exploration of the interactions among different sets of assumptions. The final stock status estimate is robust, representing a synthesis from a grid of 180 models. This confirms that alternative hypothesis and assessment approaches have been rigorously explored. SG100 is met.

Scoring issue (e) – Peer review of assessment

The intent of the final scoring issue for PI 1.2.4 is to ensure that the stock assessment is subject to an appropriate level of peer review to ensure rigour.

Scoring issue	SG60	SG80	SG100
(e) Peer review of assessment		The assessment of stock status is subject to peer review.	The assessment has been **internally and externally** peer reviewed.

Good practice

Good practice requires that there is both internal and external review. This will usually involve stock assessment reports being presented for review to external independent entities such as regional scientific bodies or other independent external reviewers. The review should be carried out by peers with appropriate technical expertise and will normally result in recommendations to consider in future assessment processes.

What CAB auditors check

The key source of information is likely to be stakeholder meetings with stock assessment scientists, combined with review of the following documents:

- Any internal or external peer reviews of the stock assessment.
- Any policy or regulatory documents detailing the process of peer review.
- The fishery management plan, should this detail the process of stock assessment peer review.

Scoring issue (e) – Peer review of assessment

Key questions to determine where further action is needed

- Q Does the stock assessment get submitted to a peer review process before being used for management purposes?
- Q Does the peer review process seek to get outside, independent expert review, as well as any internal review mechanisms?
- Q Does the peer review process result in changes to the stock assessment, or amendments to future assessment methodologies?
- Q Where external reviewers are engaged, are they fully independent of the fishery?

Examples of scoring rationales

Scoring issue (e)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	*Temperate prawn trawl fishery*: The most recent assessment was completed in 2021 and internally reviewed during the management agencies' implementation meeting. The implementation meeting is usually held annually and provides a level of peer review, among internal staff and a small number of visiting assessment experts serving as meeting consultants and counterpart fisheries. SG80 is met.
SG100	*Yellowfin longline fishery*: All stock assessments that are produced by the RFMO that oversees the stock are peer reviewed – both internally and externally. This includes internal review by other members of staff in the stock assessment team and the Chief Scientist. The stock assessment was then presented at the most recent scientific committee meeting, where external scientists from member countries and other interested parties reviewed the draft, commenting on the assessment. Updates were undertaken based off these reviews, prior to the stock assessment being accepted as the best available science. SG100 is met.

Challenges and solutions to meeting PI 1.2.4

Developing appropriate stock assessments has been a challenge in many fisheries which have not, until now, been subject to stock assessment. In some cases, outside funding, or technical expertise have enabled occasional quantitative stock assessments, informed by research surveys to be undertaken. However, if these have been one off or irregular exercises, they are less useful in providing managers with timely feedback information on the effectiveness of the harvest strategy.

For simpler, more affordable empirical stock assessment methodologies, which may be fishery dependent and less reliant on expensive survey work, there is a requirement for access to relevant data sets to support the development of appropriate indicators of stock status. The available data is most useful where it is in electronic format to enable rapid analysis. There may also be limitations in the technical capacity to develop or run such methodologies, but also in the scientific and technical knowledge to peer-review the stock assessment at the national level. In addition, external peer-review can also be expensive (although this may be possible within the RFMO structure).

There are growing efforts globally to develop data-limited methods that are more cost effective and more appropriate to the type of data available to many fisheries operating in developing economies. Some of the more established methods are described in Annex 2 Data-limited methods.

Example process and actions to improve performance against PI 1.2.4

Process Chronology				Management Actions	
1	2	3	4	Example action	Scoring issue
●				Review the existing method of estimating stock status for the fishery, assessing its robustness, timeliness and appropriateness. This may be combined with a review of the information that is currently available.	(a)
●				Conclude whether the existing stock assessment method is appropriate for the target stock and where it is not, whether additional information should be collected to ensure that the assessment of the stock can be updated appropriately.	(a)
	●			Identify most appropriate method for stock assessment given the characteristics of the species, the stock and the fishery. This should allow for the assessment of stock status (whether it is analytical stock assessment or proxy indicators) to be reported on, relative to limit and target reference points.	(a), (b)
	●			Detail how the assessment properly evaluates major sources of uncertainty and takes them into account and provide justification of robustness of the assessment method as well as detail why alternative hypothesis and assessment approaches were not chosen/ undertaken.	(c), (d)
	●			Identify additional data needs and develop and implement research and data collection programs.	
	●			Contact qualified scientists to perform a peer-review of the stock assessment, particularly in terms of the appropriateness of the assumptions, the validity of the data used and the considerations on main uncertainties.	(e)
	●			Conduct a stock assessment to obtain a measure of the status of the stock, robust reference points. Make sure the approach considers main uncertainties in the biology of the species, and the data available.	(a), (b), (c), (d), (e)
	●			Ensure that the results of the stock assessment are fed into the management decision-making process in a timely fashion.	
		●		Periodically undertake baseline assessments, which draw upon the conclusions of both external and internal peer review, which evaluate the performance of past assessments, and consider alternative approaches.	(a), (b), (c), (d), (e)

Notes

Notes

Principle 2 - Minimising environmental impacts

Fishing operations should be managed to maintain the structure, productivity, function and diversity of the ecosystem on which the fishery depends, including other species and habitats.

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Overview of Principle 2

Principle 2 states that 'fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends'.

There are four components in Principle 2, which are considered to cover the range of potential ecosystem elements that may be impacted by a fishery. These are:

- In-scope species
- Endangered Threatened and Protected and out-of-scope species (ETP/OOS)
- Habitats
- Ecosystems

Each Principle 2 component has three PIs: outcome, management strategy and information. The outcome PIs assess the current status of each component and whether the fishery is posing a risk of serious or irreversible harm to the component or hindering its recovery. The management strategy PIs assess the arrangements in place to manage the impact that the UoA has on the Principle 2 components to ensure that it does not pose a risk of serious or irreversible harm to them (or, in the case of ETP/OOS, that UoA-related mortality is minimised). The information PIs assess the adequacy of information to determine the level of impact and to support the management strategy.

Designation of P2 species

All species that appear in the catch (whether targeted or unwanted) must be considered within the MSC assessment. Any species which is a candidate for MSC certification (i.e., a candidate for making use of the MSC logo), and therefore the subject of the MSC assessment, must be scored in Principle 1. Any habitat forming sessile invertebrate species will be scored in principle 2 in component 2.3 (Habitats). All other species which feature in the catch of the UoA must be categorised into either:

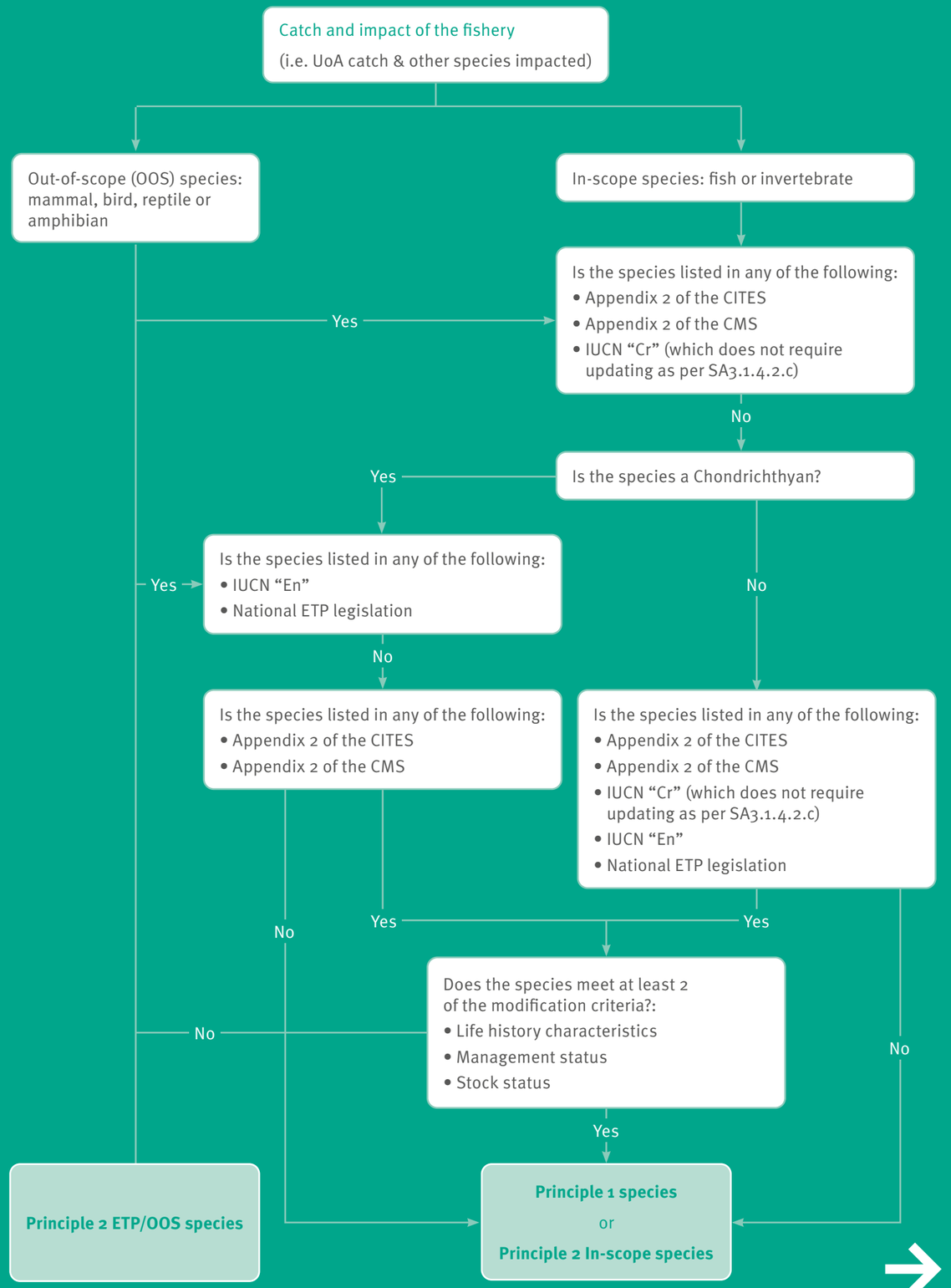
- 2.1 In-scope species
- 2.2 ETP/OOS species

The categorisation between Principle 1 species, 2.1 species and 2.2 species is straightforward for some species, but modification criteria apply for others, which make the process more complex. For the definitive explanation of the exact categorisation and for the complete list of qualifying criteria, the most recent version of the MSC Fisheries Standard should be referred to. Note that all species need to be assessed against the decision tree to determine whether a species is eligible to be certified. If a species is designated as ETP/OOS, it cannot be certified within Principle 1.All species scored in Principle 2 will be scored under 2.1 (in-scope) unless:

1. It is a bird, mammal, reptile or amphibian (i.e. an out-of-scope species) or;
2. It is a fish or invertebrate which is listed on any of the following:
   - Appendix 1 of the Convention on International Trade in Endangered Species (CITES).
   - Appendix 1 of the Convention on the Conservation of Migratory Species of Wild Animals (CMS).
   - The International Union for Conservation of Nature (IUCN) Red List of Threatened Species and classified globally as "Critically Endangered (Cr)"
   - For Chondrichthyans, "Endangered (EN)" or National ETP legislation.
3. Or it is a fish or invertebrate which is listed on any of the following:
   - Appendix 2 of the CITES.
   - Appendix 2 of the CMS.
   - For non-Chondrichthyans, IUCN Red List of Threatened Species and classified globally as 'EN' or national ETP legislation
   - For non-Chondrichthyans, IUCN Red List of Threatened Species and classifed as globally as "Critically Endangered" but the listing is "needing update"
   - AND where any of these species categories (i.e. those bullet points under '3') does not meet two of the following three criteria:
     - (i) Life history characteristics: the species is inherently resilient to exploitation as demonstrated by high productivity attributes.
     - (ii) Management status: the stock is subject to measures or management tools, reflected in either Limit Reference Point (LRPs) or Target Reference Point (TRPs), or equivalent
     - (iii) Stock status: the stock is at a level that maintains high productivity.

If the species qualifies on the basis of any of the criteria above then it is scored under the ETP/OOS performance indicators and is ineligible for certification as the target stock under Principle 1.

The decision tree, presented here provides an overview of this process and seeks to clarify the intent of the separation between 'in-scope' and 'ETP/OOS'. It can be used as a guide on the designation of P2 species.



Scoring species as ‘elements’

All species within a particular component, whether in-scope, ETP/OOS or habitat forming species, should be scored separately. These are referred to as different ‘elements’ of the score, noting that ETP/OOS are referred to as ‘units’. Whilst ‘units’ and ‘elements’ are treated the same way in scoring terms, the MSC’s expectation is that ‘units’ should, where possible, be at population or sub-population level, whilst with other scoring elements this may not be the case in all situations. Where there are multiple elements, the overall score for a scoring issue is determined by the lowest performing element. In other words, the score is not determined from an aggregate of all elements. For example, if one scoring element fails to meet SG60, the entire unit of assessment would fail. Or, if one scoring element scores below SG80, the unit of assessment will receive a condition.

2.1.1
In-scope species outcome

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Minor in-scope species stock status

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Performance Indicator overview

Performance Indicators (PIs) 2.1.1 to 2.1.3 assess the species caught in the fishery which are categorised as 'in-scope'.

The objective of this PI is to ensure that these types of species caught by the fishery are either not depleted, or that there is an assurance that the fishery under assessment is not hindering the ability of those stocks to recover. The benchmark applied for PI 2.1.1 is lower than what is applied under Principle 1. The certainty thresholds are as follows:

Likely ≥ 70th percentile

Highly likely ≥ 80th percentile

High degree of certainty ≥ 90th percentile

Species assessed within the 'in-scope' performance indicators are those that are caught, regardless of whether they are subsequently landed. Where species are caught and discarded (if permitted by the management system), perhaps because of restrictions on landing, size restrictions or lack of market opportunities, their status should still receive full consideration. In addition, the impacts of any unobserved mortality, for example as a result of ghost fishing by lost or discarded fishing gear should be considered. Further, they would also need to be categorised as either 'main' or 'minor' species.

The focus of scoring is on the 'main' in-scope species. 'Main' in-scope species are those that contribute 5% or more each to the total catch of the fishery, or that CAB auditors conclude to be less resilient, perhaps on the basis of low productivity or where there is existing knowledge of depletion or vulnerability to anthropogenic or natural changes. In order to achieve high scores, CAB auditors must also consider species that account for a small proportion of the catch, known as 'minor' species. 'Minor' in-scope species are those that contribute less than 5% each to the total catch of the fishery.

Although this PI focuses on outcome, rather than information, scores are inevitably influenced by the level and the quality of available information.

Two scoring issues are considered under this PI:

(a) Main in-scope species stock status

(b) Minor in-scope species stock status

Scoring issue (a) – Main in-scope species stock status

The first scoring issue examines the status of those stocks which are classified as both in-scope and main. It considers if there is evidence that the stocks are above a Point of Recruitment Impairment (PRI), or, where the species is below this level, that the UoA does not hinder recovery or rebuilding.

Scoring issue	SG60	SG80	SG100
(a) Main in-scope species stock status	**Main** in-scope species are **likely** to be above the PRI. OR If the species is below the PRI, it is **likely** that the UoA does not hinder recovery and rebuilding.	**Main** in-scope species are **highly likely** to be above the PRI. OR If the species is below the PRI, there is evidence of recovery, or it is **highly likely** that the UoA does not hinder recovery and rebuilding.	There is a **high degree of certainty** that **main** in-scope species are fluctuating around a level consistent with MSY.

Good practice

To perform well on this scoring issue, stocks are required to be above the PRI with a high likelihood, and around the MSY point to meet SG100. Fisheries with little or no interaction with other species perform well on this scoring issue, therefore the use of highly selective gear designed to reduce bycatch can contribute to improved performance.

What CAB auditors check

CAB auditors require clear empirical evidence to support scoring of this scoring issue and will refer to the following data – ideally in published form:

- Empirical catch composition data, perhaps with seasonal and spatial patterns.
- All available stock assessments for species which comprise more than 5% of the catch.
- Stock assessments for any species which may be vulnerable or depleted, classified as "less resilient", and which comprise 2-5% of the catch.
- In some cases, it may also be necessary to derive data for total catches on the stock, including from other fisheries, to determine the fishery's contribution to overall mortality.
- Where stock assessments showing stock status relative to reference points are unavailable, then the assessment team will carry out a risk-based framework scoring exercise with input from fishery stakeholders (Annex 1 Risk-Based Framework)

Scoring issue (a) – Main in-scope species stock status

Key questions to determine if further action is needed

Q Is there a quantitative breakdown of catches in the fishery under assessment? If yes, is this independent and reflective of conditions across the fishery?

Q For those stocks that are considered main, have stock assessments been carried out, and do these stock assessments refer to stock status relative to reference points?

Q Are proxies or other indicators of stock status available?

Q Are the main in-scope species likely to be above the PRI?

Q If the fishery catches a stock which may be depleted to the PRI, can it be demonstrated that the fishery under assessment is not the cause for this depletion, or hindering recovery?

Q Where the assessment of main in-scope species is based on reference points, does the empirical assessment which supports this, allow the confidence limits to be demonstrated? Is confidence high?

Q Where in-scope species are not subject to stock assessment or not subject to management relative to stock status reference points, has a RBF scoring exercise been undertaken?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Groundfish demersal trawl fishery:* The main in-scope species is wolffish, with annual catches of 5.4% by weight of total the catches. The latest stock assessment shows that Spawning Stock Biomass (SSB) is currently slightly above its PRI, but there is uncertainty surrounding this estimate caused by on-going problems with misreporting of bycatch. It is concluded that the species is 'likely' to be above the PRI. SG60 is met. *Hake demersal trawl fishery:* There is only one in-scope species in this fishery, the sleeper shark. This species is classified as 'less resilient' according to clause SA3.5.2.1.b and the UoA catch of the species is 2.1% of the total UoA catch (averaged over the last 5 years) so it is considered 'main'. The stock is currently below B_{lim} and there have been no signs of recovery. The species is not landed for commercial purposes by the fishery, but some interactions do occur and there is a very low survival rate. It is estimated that about 100 sharks per year are incidentally caught by the UoA, compared to the 3000 reported annual catches of this species in all fisheries, although both numbers are likely underestimated due to issues with misreporting. Although the sleeper shark is below PRI, it is 'likely' that at reported catch levels (~3% of total catches) the UoA does not hinder recovery or rebuilding. SG60 is met.

Scoring issue (a) – Main in-scope species stock status

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG80	*Sablefish demersal trawl fishery:* The main in-scope species are hake, whiting and yellowtail flounder. Two of these species (hake and whiting) were found to be well above their respective PRI (1.4 B/B_{MSY} for hake and 1.1 B/B_{MSY} for whiting). Consequently, it is highly likely that these stocks are above the PRI, satisfying SG80 for these two scoring elements. The yellowtail flounder stock is below the PRI, but fishing mortality (F) is well below F_{MSY} (0.3 F/F_{MSY}). Although the stock has not yet shown any signs of recovery, the current fishing mortality rate is expected to rebuild the stock to surpass the PRI in 3 years with a very high confidence level (CL 95%). The current low fishing mortality (satisfying clause SA3.5.5c) demonstrates it is highly likely that the UoA does not hinder recovery and rebuilding. SG80 is met.
SG100	*Cod longline fishery:* The main in-scope species are saithe and haddock. The catches are 5.6% and 6.9% of total catch respectively. The biomass of both species is above the PRI with a high degree of certainty (95% CI). There is robust stock monitoring and assessment in place which indicates that haddock biomass has been increasing and has been fluctuating around B_{MSY} for the last 5 years. For saithe, the stock has declined slightly since 2005, but is still twice the level of B_{pa}, which the management authority has deemed to be well above a level consistent with MSY. SG100 is met for both species. *Yellowfin tuna pole and line fishery:* Although the yellowfin tuna fishery is a selective fishery with no bycatch that meets the main in-scope thresholds, the fishery does use green herring as bait and these are categorized as in-scope main species, on account of the volume used. The green herring populations consist of multiple distinct stocks, often separated by distinct near shore spawning areas. A complete green herring stock assessment combining all these distinct stocks is not available. A precautionary management plan for green herring is in place, where commercial harvest on herring stocks is not permitted in an area unless stock forecasts of annual population levels exceed a minimum threshold biomass. These effort controls tied to the biomass surveys have led to significant increases in stock biomass for all distinct herring stocks and stocks are now at the highest observed levels compared to the ten-year average. Since the herring stocks used for bait are at very healthy levels, there is a high degree of certainty (90% probability) that the stock is fluctuating around MSY. SG100 is met.

Scoring issue (b) – Minor in-scope species stock status

The second scoring issue of PI 2.1.1 assesses the status of minor primary species, which are more rarely caught by the target fishery. This scoring issue considers evidence that stocks are above PRI or where minor species are below PRI there is management in place by the fishery to ensure recovery is not hindered.

Scoring issue	SG60	SG80	SG100
(b) Minor primary species stock status			**Minor** in-scope species are **highly likely** to be above the PRI. OR If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of **minor** in-scope species.

Good practice

To perform well on this scoring issue, stocks are required to be above the PRI or, in case where stocks are below PRI, the fishery should seek to ensure that they do not hinder the recovery of any minor in-scope species. Generally, fisheries with low interaction with other non-target species perform well on this scoring issue.

What CAB auditors check

CAB auditors require clear empirical evidence to support scoring for this PI and will refer to the following data – ideally in published form:

- Empirical catch composition data, perhaps with seasonal and spatial patterns.
- All available stock assessments for stocks identified as minor in-scope species.
- Where stock assessments showing stock status relative to reference points are unavailable, then the assessment team may elect to carry out a risk-based framework scoring exercise with input from fishery stakeholders (Annex 1 Risk-Based Framework).
- Evidence that the fishery is not hindering the recovery of any minor species below the PRI, such as evidence indicating a lack of gear interaction, or evidence pointing to an unrelated cause (or fishery) limiting recovery.

Scoring issue (b) – Minor in-scope species stock status

Key questions to determine if further action is needed

- **Q** Are there minor in-scope species in the fishery?
- **Q** Are stock assessments available for these minor in-scope species? Are proxies or other indicators available?
- **Q** Where stock assessments are not available, has a RBF scoring exercise been undertaken?
- **Q** Are the minor in-scope species highly likely to be above the PRI? Or do stock assessments indicate that the species is depleted below the PRI?
- **Q** Where stocks are below PRI has the cause of the stock depletion been identified?
- **Q** Is there evidence to demonstrate that the fishery under assessment is not hindering the recovery of stocks below PRI?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	No scoring guidepost at the 80 level.
SG100	*SG100* *Plaice trawl fishery:* The regularly landed species composition, as an average over the last 5 years, contains 10 in-scope species. Of these, only cod and redfish are landed in significant quantities to count as 'main' species. The remaining species are therefore classified as minor. Except for sculpin, which accounts for about 1% of the catches, the others are caught in very small quantities (usually ~ 0.1% of the total catch). Stock assessments indicate that all the minor species are considered to be fluctuating around MSY with 90% confidence intervals. SG100 is met for all minor species. *Groundfish demersal trawl fishery:* There are two in-scope minor species in this fishery, calico rockfish and copper rockfish. Based on trawl survey abundance data, which is collected annually, both species have shown a decline in the long-term average over the last 5 years and cannot be considered highly likely above the point of recruitment impairment (PRI). Although these stocks are not showing any signs of recovery at the moment, the incidental mortality caused by the fishery, estimated at fewer than 10 individuals per year, represents a very small contribution to the total estimated fishing mortality, which is mostly from a directed fishery that catches in the order of 30,000t. For these two scoring elements, the SG100 level is therefore satisfied as the fishery cannot be considered to be hindering the recovery of these species. SG100 is met.

Challenges and solutions to meeting PI 2.1.1

This PI relies on the availability of an empirical catch profile of the fishery under assessment, representative of spatial and temporal patterns. Ideally this would be independently provided, to give an unbiased and accurate description of the fishery. In many fisheries this information is not reliably available and is therefore an important step in preparing for full assessment. In many fisheries of lower scale and intensity, or fisheries which have historically been a lower management priority, there may already be some indication of the species mix from the landing statistics, but this may not necessarily match actual catches unless all catches are retained (i.e. zero discarding). Furthermore, there may be weaker verification procedures and inconsistent data recording protocols for fisheries which have been subject to less management in the past. This may be the result of a lack of capacity on the ground for accurate monitoring, or the result of a lack of funding, or simply the result of a lack of a perceived need to collect the data to an appropriate level of accuracy.

For those species/stocks which are caught by the fishery, which do have management relative to reference points, supported by stock assessment, there is a requirement for the stock assessment to offer some confidence in the status of the stock being assessed. Those stocks which do not have a stock assessment and which are subject to fewer management controls will need to be scored using the MSC RBF (Annex 1 Risk-Based Framework).

Finally, where there is evidence of a stock depletion, there is a requirement to demonstrate that the fishery under assessment is not the cause of this depletion, or that it is not hindering the potential of the depleted stock to recover. Unless the proportions of the catch from the assessed fishery are insignificant compared to another targeted fishery, this may be difficult to demonstrate. This may require a certain amount of scientific research, examining the catch rates of the gear under assessment or other studies such as post capture survival. Where wider scientific study is required, this may be constrained by available resources and expertise.

Example process and actions to improve performance against PI 2.1.1

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example Actions	Scoring Issue
●				Undertake a catch profiling trial for the fishery. This should be independent, scientifically robust, and spatially and seasonally representative.	(a), (b)
●				Determine catch proportions of each species (including P1 target species). Allocate as “main” those non P1 species, which are in-scope (and not ETP/OOS) that are greater than 5% of the catch. For these determine whether management tools and measures are in place, expected to achieve stock management objectives reflected in either limit or target reference points. If so, score these by reference to the most recent stock assessment. If not, score these by application of the MSC RBF.	(a), (b)
	●			Refer to available stock assessments (or the results of the RBF exercise) to determine whether main and minor in-scope species are above the PRI and the degree of confidence in this.	(a), (b)
	●			Where stock assessments are available for main in-scope species, but these assessments do not provide the level of robustness to be able to draw conclusions with high degree of confidence, refine the assessment methodology to address uncertainties.	(a)
		●		Put in place appropriate management measures to ensure that the fishery do not hinder the recovery of any species below the PRI (whether main or minor). This could include reduced exploitation levels (through licensing, quota or effort restrictions), gear modifications, seasonal or area closures.	(a), (b)
		●		Where depleted stocks are caught but not retained (i.e. discarded), undertake post capture mortality trials to demonstrate whether the fishery is contributing to overall mortality levels.	(a), (b)
		●		Ascertain the level of fishing mortality on any stock below the PRI attributable to the fishery under assessment, in comparison with that from other fleets.	(a), (b)
			●	Introduce a system of on-going periodic recording of catch profiling, plus any other data gathering as required.	(a), (b)

Notes

2.1.2 In-scope species management strategy

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Performance Indicator overview

The second PI relates to the management of in-scope species. The definition of in-scope species is set out at the start of the P2 section. This PI seeks to ensure that there is management in place for in-scope species to ensure that the fishery does not pose a risk of serious or irreversible harm to their stocks/populations. It also encourages the development and implementation of technologies and operational methods to minimise mortality of unwanted catch of in-scope species and the avoidance of ghost fishing.

The PI assesses the level of management that is applied to in-scope species. Management typically comprises some combination of management measures. The more that these management measures have been strategically combined and the greater the understanding of how these measures work together, the more robust and effective the management is likely to be. At higher levels of management there will be increased evidence of monitoring and analysis to provide insight into management efficiency. Management may include measures that apply directly to the UoA but also measures that apply to the wider fleet.

This PI is designed to cater for both in-scope species that are targeted by the fishery and which have an obvious commercial value, but also any in-scope species that may be unwanted by the fishery, either due to lack of market or inability to land (perhaps due to licence or quota restrictions). As such it is not necessarily looking to minimise catches of in-scope species (unless they are unwanted), but rather ensure that the impact on those species is appropriately managed.

Five scoring issues are considered under this PI:

(a) Management strategy in place

(b) Management strategy effectiveness

(c) Review of alternative measures

(d) Shark finning

(e) Ghost gear management strategy

Scoring issue (a) – Management strategy in place

The first scoring issue assesses the level of management that is in place for the fishery to either maintain the in-scope species stock above the PRI, or to ensure that the fishery does not hinder the recovery of the in-scope species.

Scoring issue	SG60	SG80	SG100
(a) Management strategy in place	There are **measures** in place for the UoA, **if necessary**, that are expected to maintain or to not hinder rebuilding of the **main** in-scope species at/to the in-scope species outcome SG60 level.	There is a **partial strategy** in place for the UoA, **if necessary**, that is expected to maintain or to not hinder rebuilding of the **main** in-scope species at/to the in-scope species outcome SG80 level. OR Where in-scope species outcome fails to meet the SG80, a demonstrably effective strategy is in place between all MSC UoAs that categorise this species as **main** in-scope to ensure that they collectively do not hinder recovery and rebuilding.	There is a **strategy** in place for the UoA for managing **main** and **minor** in-scope species to achieve the in-scope species outcome SG80 level of performance.

Good practice

A strategy is described as a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how they work to achieve an outcome and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification of fishing practices in the light of the identification of unacceptable impacts.

To perform well under this requirement fisheries should have a strategic combination of actions or tools (i.e. measures) that are designed to manage impact on in-scope species.

At both SG60 and SG80 the focus is just on main species. At SG100 there is also a requirement for a strategy to be in place which also covers minor species. Both SG60 and SG80 also contain the caveat 'if necessary', meaning that these SG levels do not need to be scored when there is no impact of the fishery on 'main' in-scope species. However, at SG100 there is an expectation that a strategy is in place regardless of necessity.

Scoring issue (a) – Management strategy in place

What CAB auditors check

CAB auditors will look at the management that is in place at the level of the fishery for each of the in-scope species, but also at the wider management that is in place for the in-scope species/stocks. Documentation and information required will include:

- Management plans for each of the in-scope species.
- Stock assessment for each of the in-scope species.
- A summary of management measures and regulations governing the fishery catches (may be for in-scope species or for other species), e.g. TAC, minimum landing sizes, seasonal and spatial restrictions.
- Any gear design characteristics or modifications which may be impacting on each of the in-scope species.
- Evidence of any UoA operational practices that may influence the impact on in-scope species. Where there is a UoA commitment to take certain management measures, then CAB auditors will also look for evidence of implementation of and compliance with those measures.

Key questions to determine if further action is needed

Q Is there an understanding of which species are in-scope species and which are main and minor?

Q Can it be demonstrated that management measures or a partial strategy are not necessary – i.e. that the fishery has negligible impact on in-scope species?

Q Are there management measures in place that ensure that each of the in-scope species is either maintained above its PRI or ensures the fishery does not hinder its recovery (these measures could either be specific to the species or designed for another species but also work for this species)?

Q Are these management measures, whether designed for in-scope species or not, brought together into either a partial strategy or a strategy for each of the in-scope species?

Q Is there evidence to show that any management applied at the fleet level is actually implemented and effective (i.e. commitment to certain operational practices)?

Scoring issue (a) – Management strategy in place

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Lobster trap fishery:* The two main in-scope species are rock crab and hermit crab. As there is no market, both species are discarded alive and are expected to have high survivability, although this has not been specifically tested in this fishery. In addition, to mitigate effects of potential ghost fishing through gear loss, the traps have biodegradable panels so that target and bycatch species can escape if a trap is not recovered. Both measures are expected to ensure that these species are maintained above their point of recruitment impairment. SG60 is met for both species.
SG80	*Plaice trawl fishery:* The two main in-scope species are haddock and cod. Several measures are in place which contribute to maintain the haddock stock at its current healthy levels. These include effort restrictions to ensure that the haddock capture is minimised. In addition, the fishery has reduced discards of unwanted catches through a conservation credits scheme. The haddock stock status and landings are monitored, and the measures are expected to be amended should they cease to be effective. SG80 is met for haddock. Cod scores below 80 on PI 2.1.1 as it is below its PRI. There are two other MSC certified fisheries that have this cod stock as a main in-scope species. All MSC fisheries are signatories to a cod rebuilding plan that includes effort restrictions to minimise capture of this species and an area closure for cod spawning grounds. The fishery is monitored by VMS and catches are regularly independently sampled through a scientific observer program. Stock status is closely monitored, and the information available collectively demonstrates that the rebuilding plan has been effective at reducing the fishing mortality on this stock $1.3F_{MSY}$ to $0.8F_{MSY}$ over five years. The strategy is demonstrably effective. SG80 is met for cod.
SG100	*Yellow perch gillnet fishery:* Walleye is the only main in-scope species identified in this fishery. Since the 1980s, walleye has been co-managed by the three states that surround the lake under a Fishery Management Plan comprising an annual TAC, Individual Transferable Quotas, gear and mesh size restrictions and closed areas for walleye spawning. The most recent walleye stock assessment indicates that the stock is currently fluctuating around B_{MSY}. The Fishery Management Plan includes a monitoring program and regular meetings of an advisory committee tasked with changing the management measures should they cease to be effective. A strategy is in place for walleye to achieve the in-scope species outcome SG80 level of performance. SG100 is met.

Scoring issue (b) – Management strategy effectiveness

The second scoring issue assesses the expectation of whether the management described in scoring issue (a) is effective in achieving its objectives and the degree of empirical or evidential basis to support the claim of effectiveness.

Scoring issue	SG60	SG80	SG100
(b) Management strategy effectiveness	The measures, **if necessary**, are considered **likely** to work for the **main** in-scope species, based on plausible argument.	There is some **evidence** that the measures/ partial strategy, **if necessary**, is achieving the objectives for **main** in-scope species set out in scoring issue (a), based on some information directly about the UoA and/or species involved.	**There is evidence** that the partial strategy/ strategy is achieving the objectives set out in scoring issue (a), based on information directly about the UoA and/or species involved.

Good practice

Good practice requires that there is clear evidence that the management, whether a partial strategy or strategy, is effective. This requires that the management is already showing the intended results, rather than a theoretical expectation of future management success. This evidence should be directly applicable to the management that is being scored.

What CAB auditors check

CAB auditors will look for the following evidence in support of this scoring issue:

- Details of any management evaluations undertaken for each of the in-scope species caught in the fishery.
- Details of any testing that may have taken place of any measures designed to manage the fishery's impact on in-scope species – such as gear testing.
- Evaluations of other parts of the management system that contribute to managing the impact on in-scope species.
- Any stock status evidence (i.e. from stock assessments) which may provide objective basis for confidence that management measures/strategies are working.
- Any evaluation or testing of impacts on the species by similar fisheries (i.e. using same or similar gear and in a similar area).
- Any monitoring that may provide evidence of the effectiveness of management.

Scoring issue (b) – Management strategy effectiveness

Key questions to determine if further action is needed

Q Is there a plausible argument to support confidence that the management approach described in scoring issue (a) will work for each scoring element (i.e. species)?

Q Can this argument be supported more objectively – by pointing to empirical evidence, or better still by pointing to testing either in the fishery or in a similar fishery?

Q Does monitoring of both the impacts of the fishery and the status of each of the in-scope species provide objective basis for confidence that the management described in scoring issue (a) is working?

Q Have any more empirical testing, or management evaluations been carried out on any of the management described in scoring issue (a)?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Herring midwater trawl fishery:* The main in-scope species are boarfish and mackerel. On- board sorting of the catch is not possible due to vessel design and regulation. Processors pay higher prices for clean catches of the target species. So, there is an economic incentive to ensure that catches of other species are minimised. The measures to avoid mixed catches (through shoal identification) are considered likely to work based on the economic incentive, but there is no evidence that the that these measures are achieving their objectives. SG60 is met for boarfish and mackerel.
SG80	*Tropical shrimp trawl fishery:* The main in-scope species is a croaker species. Captures of this species are minimised through use of a bycatch reduction device (BRD) and effort limitation for the target species, which also limits the impact on other species. The fishery is monitored by VMS and is also subject to inspections by control officers both at sea and at port. Inspections have shown that compliance with these measures is good. Based on the use of the BRD in similar fisheries with bycatch of croaker, post escape survival from the bycatch reduction device is expected to be good, although this has not been tested specifically in this fishery. There is therefore some evidence that the measures are achieving their objectives in this fishery. SG80 is met.
SG100	*Yellowfin tuna purse seine fishery:* The main in-scope species is skipjack tuna, and the minor in-scope species is black marlin. A partial strategy is in place in this fishery to manage the impact of the fishery on skipjack which includes general effort control and spatial closures. There is ongoing monitoring, and observers are deployed on board at least 20% of the trips. The observers record the implementation of measures and volumes of catches (which are reported to be low for both skipjack and black marlin). The management agency reviews the observer data as well as the other fishery information and has used management strategy evaluation to determine that the combined measures are working to limit the catches of both species, and are therefore meeting their objectives. SG100 is met for both species.

Scoring issue (c) – Review of alternative measures

The third scoring issue of PI 2.1.2 relates to efforts made to minimise the mortality of unwanted in-scope species to the extent practicable. It is only scored for those in-scope species that are identified as being 'unwanted'. This contrasts with the earlier scoring issues for this PI which recognise that other in-scope species may be important elements of the catch, along with the target species assessed under Principle 1, so their management at a UoA level may not simply be about avoiding the capture of in-scope species. However, for this scoring issue, the focus is on ensuring that the UoA continues to consider mortality of unwanted catches and reviews any other possible approaches to either minimise this catch or to utilise it so that it is no longer considered 'unwanted'.

Scoring issue	SG60	SG80	SG100
(c) Review of alternative measures	There is a **review** of **alternative measures** to minimise UoA-related mortality of **unwanted catch** of **main** in-scope species.	There is a **review** at least once every 5 years of **alternative measures** to minimise UoA-related mortality of **unwanted catch** of **main** in-scope species and they are **implemented, as appropriate.**	There is a **review** that happens every 2 years of **alternative measures** to minimise UoA-related mortality of **unwanted catch** of all in-scope species, and they are **implemented, as appropriate.**

Good practice

To perform well under this scoring issue, fisheries should be reviewing and considering implementation of other measures that could further reduce the mortality of unwanted species. Measures reviewed may include alternative gear design, catch reduction devices, spatial and temporal measures, better handling and discarding practices to improve survivability, limits on unwanted catches, etc. Both SG80 and SG100 require that measures to minimise the fishery's mortality of unwanted in-scope species have been implemented, as appropriate.

What CAB auditors check

CAB auditors will first need to clarify from the catch composition, which elements of the catch are unwanted – usually either due to lack of market or due to inability to land a particular species, i.e. licence or quota restrictions. The assessment of this scoring issue is likely to be informed by meeting with the regulatory authority, but also from discussions with fishermen. Important supporting evidence in assessing this scoring issue is likely to come from:

- Empirical catch profile, including discards and any indication of their likely survivability, to detail which in-scope species are unwanted.
- Details of gear specification and any modifications currently used to minimise mortality of each of the unwanted species.
- Details of supporting evidence, assessing the efficacy of current gear modifications or other measures for each of the unwanted species, e.g. spatial or seasonal restrictions, handling practices etc.
- Evidence of actual reviews. This could come from document outputs from review projects, or minutes of meetings where alternative measures were reviewed, or even evidence of operational or technical changes that result from such a review.
- Evidence of either implementation of alternative measures, if they are likely to be more effective at minimising mortality than current measures and are practical, or evidence of why the alternative measures were not implemented, i.e. not likely to further minimise mortality of unwanted species, not practical or cost effective, likely to negatively impact another species and/or habitat.

Scoring issue (c) – Review of alternative measures

Key questions to determine if further action is needed

- **Q** Are there in-scope species which are unwanted in the catch and have high mortality, for reasons such as discarding (with low survivability) due to lack of quota, lack of appropriate license entitlement or lack of market?
- **Q** If there are unwanted in-scope species in the catch, have measures been taken to reduce mortality of catches of these species, such as gear modifications, seasonal or area closures, improved handling practices or other technical measures?
- **Q** Is there evidence to demonstrate how well the measures taken to reduce unwanted in-scope species mortality are working?
- **Q** Has any review been carried out of potential alternative measures to reduce mortality of unwanted species?
- **Q** Have the results and recommendations of any review or testing been implemented within the management system? If so, is there evidence of implementation?
- **Q** If measures have not been implemented, what were the reasons (i.e. not practical, not cost effective, would negatively impact other species and/or habitats) and is there supporting evidence for this?
- **Q** Are reviews carried out regularly, i.e. is the next review scheduled?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	*Flounder longline fishery:* Cod is a main in-scope species in the catch despite a zero TAC. They are therefore classed as unwanted species, and this scoring issue must be scored. The fishery applies a move-on rule if >10% of a haul is cod. As part of a national bycatch reduction program, a review was undertaken of other potential measures to minimise mortalities of cod including closed areas, closed seasons and better handling practices. However, the report concluded that better handling practices would not improve survivability of the cod and that closing areas or seasons to avoid cod bycatch would severely limit the economic viability for the flounder fishery. Therefore, none of the measures were implemented. SG60 is met.
SG80	*Lobster trap fishery:* Velvet crab is a main in-scope species. They are classified as unwanted because they are required to be landed but there is no market for the product, so they are discarded after landing. In 2019 the fishery implemented a closed area to avoid capture of crabs. A review in 2022 indicated that if the fishery started 1 month later that it would further minimize bycatch of crab and would not have significant cost or practicality implications as fishers would still have ample opportunity to fulfil their lobster quota. As a result of the 2022 review, the fishery voluntarily started their season 1 month late in 2023 and have shown a reduction in the amount of crab bycatch for the season. Another review is scheduled to be undertaken by the national bycatch reduction program for 2027. SG80 is met.
SG100	*White shrimp trawl fishery:* Jellyfish are the only main in-scope species. To reduce impact on turtles, a review of measures in 2016 showed that using a Turtle Excluder Devices (TED) could minimise captures of both turtles (assessed under ETP/OOS) and jellyfish. This measure was introduced in 2019, prior to assessment of this fishery. It became clear that following introduction of the TED that the number of jellyfish landed decreased by 70% and the next review is scheduled on a biennial basis (every 2 years). SG100 is met.

Scoring issue (d) – Shark finning

The intent of the fourth scoring issue in PI 2.1.2 is to ensure that any in-scope shark species are not subject to shark finning in the UoA. This SI only applies if there are shark species in the catch which are not either the P1 species or ETP/OOS component.

Scoring issue	SG60	SG80	SG100
(d) Shark finning	There is a **high degree of certainty** that shark finning is not taking place.		

Good practice

Good practice requires that evidence is provided that shark finning is not taking place. In order to ensure this, there needs to be a fins naturally attached (FNA) or non-retention policy for sharks. There also needs to be evidence of both implementation and enforcement of these policies.

What CAB auditors check

The intent of this scoring issue is to provide a high level of confidence that shark finning is not taking place. This high level of confidence is achieved by having both appropriate policies in place and clear evidence of their implementation and enforcement. This is informed by the following information:

- Observer reports along with a summary of the frequency of observer trips.
- Details of regulations/policies in place governing the management of sharks.
- Details of any monitoring and enforcement of relevant shark policies.
- Documentation of the destination of all retained shark.
- Evaluations of the vessel's activities to confirm that it is likely that shark finning is not taking place.

i It should also be noted that when assessing this scoring issue, CAB auditors are required to apply the MSC 'Evidence Requirements Framework' (which is contained within the 'MSC Fisheries Standard Toolbox') to help determine the accuracy of information. This will require CAB auditors to confirm that reliable evidence is available to demonstrate the proper implementation and enforcement of the fins naturally attached (FNA) or non-retention policy. For this scoring issue, the assessment shall demonstrate that the trueness guidepost (TG) 3 is met.

Scoring issue (d) – Shark finning

Key questions to determine if further action is needed

Q Is there a fins naturally attached (FNA) or non-retention policy in place?

Q Do management measures within the fishery prohibit shark finning?

Q Are policies enforced to provide a sufficient level of confidence?

Q Is there reliable external validation of the vessels' activities to confirm that there is a high degree of certainty that shark finning is not taking place?

Examples of scoring rationales

Scoring issue (d)	Fishery Example
SG60	*Ling trawl fishery:* Shark species are required by a National Shark Protection Act (NSPA) to either be released or, if retained, landed with Fins Naturally Attached (FNA). Fisheries managers conducted training with crew and skippers on the NSPA, including safe-release techniques. Over the past five years, the fishery had 30% of its trips monitored by independent observers whose remit included recording of catches and discards. Observers were assigned to vessels based on stratified random sampling within vessel size classes. Fishers are required to report catches and discards in e-logbooks, submitted prior to landing. The fishery is subject to at-sea inspections from the enforcement agency, which includes verifying compliance with all national legislation. Four inspections were completed in the most recent year, based on risk. The enforcement agency inspects 100% of landings from this fishery including to verify compliance with NSPA and check logbook information. Compliance reports from the five most recent years, which include reviewing potential sources of bias, have showed no violations of the NSPA requirements. TG3 of the Evidence Requirements Framework is met as it is considered that most potential sources of bias have been mitigated, and where bias might exist, its effect on trueness is well understood and is not considered to be consequential. Therefore, there is a high degree of certainty that shark finning is not taking place. SG60 is met.
SG80	No scoring guidepost at the 80 level.
SG100	No scoring guidepost at the 100 level.

Scoring issue (e) – Ghost gear management strategy

The final scoring issue of PI 2.1.2 seeks to ensure that any ghost gear does not impact upon any in-scope species. Ghost gear is defined as lost, discarded or abandoned fishing gear. Impacts might include mortality arising from the entrapment, entanglement, or other physical interactions with ghost gear. The ghost gear management strategy SI will be scored for in-scope species, only if there are no ETP/OOS species and therefore the ghost gear management strategy is not scored under ETP/OOS species.

Scoring issue	SG60	SG80	SG100
(e) Ghost gear management strategy	There are measures in place for the UoA, **if necessary**, that are expected to minimise ghost gear and its impact on all in-scope species.	There is a partial strategy in place for the UoA, **if necessary**, that is expected to minimise ghost gear and its impact on all in-scope species.	There is a strategy in place for the UoA, **if necessary**, that is expected to minimise ghost gear and its impact on all in-scope species.

Good practice

In situations where this SI is scored (because the ghost gear management strategy is not scored under ETP/OOS management PI), if it can be demonstrated that there is no (or negligible) risk of ghost gear fishing or ghost gear impacts, then it can be concluded that the 'if necessary' clause does not apply and SG100 is met. By contrast, if there is a risk of ghost gear fishing or ghost gear impacts, then a strategy is required (at the SG100 level), which is expected to minimise impacts from ghost fishing to the extent that any impact would be negligible.

What CAB auditors check

In order to address this SI, the CAB auditors must first determine whether or not to score the SI. This will depend upon the presence or absence of ETP/OOS species. If it is scored, then the CAB auditors will seek evidence to determine if the risk of impact from ghost fishing can reliably be concluded to be either negligible or zero. This may be based on:

- Evidence of from gear studies.
- Evidence from reviews of ghost gear fishing across gear types.
- Stakeholder consultations focused on obtaining an understanding of the operational on-board practices.
- Interviews with skippers, crews and on-board observers.

Where there is a risk of ghost gear fishing impacts, the CAB auditors will wish to review the management measures that are in place to mitigate the impacts and the extent to which measures have been strategically combined to enable a more informed and therefore potentially adaptive approach to management on impacts. Potential measures might include:

- Marking and identification of fishing gear.
- Spatial and/or temporal measures to reduce gear conflict.
- Fishing input controls to limit gear use (e.g. limits on soak time for passive gear types).
- Gear design to reduce whole or partial loss of the fishing gear (including technology to track gear position).

Scoring issue (e) – Ghost gear management strategy

What CAB auditors check – *continued*

- Vessel design to reduce discarding of gear and other aquatic litter.
- Use of end-of-life fishing gear disposal facilities.
- Fisher education and awareness on preventing gear loss.

Once the CAB auditors understand the extent of management measures and the degree of strategic linkage, they will seek evidence as to the efficacy of those measures. For each measure, they will assess if there is objective and independent evidence of implementation and, if there is any indicator metric to indicate whether the objectives of management (i.e. to minimise to negligible any ghost gear impacts), if it is achieved.

Key questions to determine if further action is needed

Q Will the ghost gear management strategy be required for in-scope species (this will depend upon whether or not there are ETP/OOS species)?

Q What is the potential for ghost gear fishing from the gear used by the fishery?

Q Is there any objective evidence available to support any claims that the impact of ghost fishing is negligible?

Q What measures are in place to ensure that there is mimimal lost, abandoned or discarded fishing gear?

Q Has any review been carried out of potential effectiveness of the measures?

Q Have the results and recommendations of any review or testing been implemented within the management system? If so, is there evidence of implementation?

Scoring issue (e) – Ghost gear management strategy

Examples of scoring rationales

Scoring issue (e)	Fishery Example
SG60	*Skate gillnet:* The gear has potential to interact with in-scope species if lost and, as there are no ETP/OOS species that interact with the fishery, this scoring issue is assessed. The fishery is required by law to mark gillnet buoys with the owner's fishing permit number with numbers at least 1 inch in height and contrasting with the buoy colour. Buoy lines are marked with three 12-inch, colored marks (spaced at top, middle and bottom), with colors assigned to the owner of the fishing permit by the management agency. In addition, there are some areas that are closed to gillnet activity to reduce impacts on non-target species. The two preventive measures are in place but there is no evidence that the impacts of gear loss are assessed in the fishery, and therefore no awareness of the need to change them should they cease to be effective. SG60 is met.
SG80	*Tropical tuna purse seine:* The fishery deploys drifting Fish Aggregating Devices (FADs) which may impact in-scope species. As there are no ETP/OOS species interactions, this scoring issue is assessed under in-scope. Fishers have a Code of Good Practice, compliance with which is verified by third-party observers. The Code includes the following ghost gear measures: marking of FADs, use of only non-entangling FADs and monitoring numbers of FADs deployed and retrieved. The Code of Conduct is reviewed regularly, and interviews with those involved in this review and minutes from previous review meetings demonstrate that there is an awareness of the need to change measures should they cease to be effective. SG80 is met.
SG100	*Crab trap:* Fishery managers previously identified ghost fishing as a potential problem for in-scope species. As there are no ETP/OOS species assessed for the UoA, this scoring issue is assessed under in-scope. In 2019, a Ghost Fishing Strategy was implemented in the fishery to address this problem. The Strategy includes gear marking, gear disposal programs, limits on soak time, inclusion of biodegradable panels on traps, and lost gear retrieval programs. The fishery is required to comply with the Strategy through license requirements. Compliance with the Strategy is reported by enforcement inspectors to be good. The gear retrieval program has retrieved and disposed of over 10,000 traps in the last 2 years. Fisher representatives participate in annual meetings to review implementation of the strategy and make improvements where needed to ensure that it achieves its objective of minimising ghost fishing. Since prevention, mitigation and remediation measures are in place, it complies with the intent of 'strategy' following GSA3.6.3-4. SG100 is met.

Challenges and solutions to meeting PI 2.1.2

There might be a number of challenges for meeting PI 2.1.2 in fisheries which are not yet MSC certified, perhaps because they are fisheries of lower scale and intensity, or because they are a lower management priority. It is possible, and in some cases probable, that other species in the catch (which are not in either of the habitats or the ETP/OOS component) may be subject to less management than the species which is the subject of the P1 assessment. Some species in this in-scope component may have clear management oversight, perhaps even to the level of harvest control rules linked to stock status reference points, but for others there will almost certainly be less management. In some cases, where the species is not commercially marketed, or thought to be depleted, there may be little or no management, aside from the generic fleet-wide management, i.e. restrictive licencing and technical conservation measures. However, even in these circumstances, management measures can be applied at the UoA level to enable candidate UoAs to demonstrate that an adequate and appropriate level of management is in place.

There may also be challenges in implementing any necessary management steps to ensure the fishery does not impact in-scope species to the PRI, or to avoid hindering the potential of the depleted stock to recover. This may require a certain amount of scientific research, examining the catch rates of the gear under assessment or other studies, such as post-capture survival or potential for alternative management measures such as area or seasonal closures. Where wider scientific study is required, this may be constrained by available resources and expertise. Further review and assessment work may also be required in relation to unwanted species. Consideration should also be given to associated monitoring and, where necessary, enforcement to ensure that any management is properly implemented and that there is evidence of this implementation.

Example process and actions to improve performance against PI 2.1.2

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Undertake a profile of the catch, to determine which species are caught (as opposed to just landed). This should be independent, scientifically robust, and spatially and seasonally representative.	(a), (b)
●				For each species identified as in-scope, review their stock status relative to reference points to identify those that are below the PRI. Where an appropriate stock assessment is not available, a risk-based framework scoring exercise should be undertaken.	(a), (b)
●				For each species identified as in-scope, identify the management measures that are in place, both at the stock level and at the level of the UoA and consider the effectiveness (and degree of confidence) of this in achieving the stock objectives.	(a), (b)
●				Determine the level of catches of in-scope species relative to the catches from other fleets/target fisheries. This may provide indication of relative impact of UoA.	(a)
	●			Where there is the potential for ghost-fishing, (and it is not scored under ETP/OOS), consider the need to measures to minimise any impact and the need for evidence to demonstrate that management is working of that the impacts are zero or negligible.	(e)
	●			Where an in-scope species is a shark, the client should also ensure that there is either a Fins Naturally Attached (FNA) or a non-retention policy in place and that any such policy is fully implemented and reliably enforced.	(d)
	●			Review alternative approaches and, if necessary, undertake trials of different management measures to reduce catches of unwanted in-scope species – such as gear trials, area or seasonal closures etc.	(c)
	●			Where there is a HCR and supporting reference points in place, but this is not achieving aims, consider need for this to be re-evaluated or additional measures applied at a stock level (i.e. recovery plan).	(a), (b)
		●		Implement any management measures either at the level of the stock or the level of the fishery (i.e. fleet) to ensure that the impact of the fishery is appropriately managed. This should include consideration of the necessary regulatory, administrative and enforcement resources.	(c)
			●	Undertake periodic review of the efficacy of management measures designed to manage the impact of the fishery on in-scope species. In the case of unwanted in-scope species, this should also include a review of alternative measures.	(b), (c), 3.2.4

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2.1.3 In-scope species information

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Performance Indicator overview

The third of the PIs assessing in-scope species focuses on the availability and quality of information or data to inform outcome and management. It seeks to ensure that information on the nature and extent of in-scope species is adequate to determine the risk posed by the fishery and to determine the effectiveness of the strategy to manage in-scope species.

Information is a crucial component of an effective fisheries management system. Any effort to understand stock status, the scale of fishery impacts, or the effectiveness of management measures is compromised by a failure to collect adequate information in a robust, independent and timely fashion.

Determining adequacy of information will depend to some extent on the necessity of that information. For example, if the fishery operates at a very low level of intensity, if the species is well above its PRI or the management approach is very precautionary, information with a lower precision may be adequate for both the estimation of current status and the performance of the management strategy.

Conversely, where a fishery is being more heavily targeted, and the species is close to or below its PRI and only limited management is in place (with little evidence of precaution), then a more comprehensive range of information would be required to assure managers (and CAB auditors) of stock status or impact.

As with the other P2 species PIs, this PI needs to be addressed on a scoring element basis, with a score determined for each in-scope species being assessed.

Three scoring issues are considered under this PI:

(a) Information adequacy for assessment of impact on main in-scope species

(b) Information adequacy for assessment of impact on minor in-scope species

(c) Information adequacy for management strategy.

Scoring issue (a) – Information adequacy – main species

The first scoring issue for PI 2.1.3 assesses the amount and quality of information to assess the impact of the fishery on the main in-scope species, with respect to status. This would include information on catches (not just landings) of in-scope species caught by the fishery, but may also include further detail such as post capture mortality, where released. Given that the impact must be determined relative to stock status, this also means the information required to determine stock status may also be subject to scrutiny here – although the emphasis of the language is on the fishery. The scoring issue also has an option to score information if the RBF is used to score PI 2.1.1.

Scoring issue	SG60	SG80	SG100
(a) Information adequacy for assessment of impact on main primary species	Information is adequate to **broadly understand** the impact of the UoA on the stock status of **main** in-scope species.	Information is adequate to **estimate** the impact of the UoA on the stock status of **main** in-scope species with a high **degree of accuracy**.	Information is adequate to **estimate** the impact of the UoA on the stock status of **main** in-scope species with a **very high degree of accuracy.**

Good practice

Good practice requires that the information is both quantitative and affords a high degree of certainty for each main in-scope species. This implies that there is a degree of independence and that results are scientifically robust (with confidence intervals). The methods for collecting data should be robust, true and unbiased.

What CAB auditors check

CAB auditors may wish to speak to stock assessment scientists involved in the assessment of the main in-scope species to get an indication of the veracity of landings information, as well as any compliance/control bodies that might have observers or review logbooks and fishers themselves.

CAB auditors may also refer to the following documentary evidence for justification:

- Catch profiles.
- Stock assessments/advice for main in-scope species.
- Reviews or evaluations of stock assessments, which may give more comment on adequacy of information.
- Catch profile for the fleet under assessment, for recent seasons/years. This could be fishery-dependent or fishery-independent information.
- Regulatory requirements for catch monitoring and reporting.
- Other published studies looking at impact of fishery or other relevant fisheries on each in-scope species.

Scoring issue (a) – Information adequacy – main species

What CAB auditors check – *continued*

- Photographic evidence, vessel logbooks, catch landing sheets, observer reports, compliance records, including any information on unobserved mortalities and unwanted catches.
- Catch profile for the fleet under assessment, for recent seasons/years. This could be fishery-dependent or fishery-independent information.
- Regulatory requirements for catch monitoring and reporting.
- Other published studies looking at impact of fishery or other relevant fisheries on each in-scope species.

i It should also be noted that when assessing this scoring issue, CAB auditors are required to apply the MSC 'Evidence Requirements Framework' (which is contained within the 'MSC Fisheries Standard Toolbox') to help determine the accuracy of the available information. For this scoring issue, the assessment shall consider which trueness guidepost (TG) and precision guidepost (PG) are met.

Key questions to determine if further action is needed

Q Is the available information, robust, reliable, accurate and unbiased?

Q Is there a scientifically robust and independent catch profile of the fishery?

Q Are catches (as opposed to landings) routinely reported? How are these figures verified?

Q Is a coefficient of variation (CV) or precision of an estimate given?

Q Is all the information required for the stock assessment of in-scope species available?

Q Is there information on the indirect impact of the fishery on in-scope species – such as post-capture mortality (in event of escape or release)?

Q Is there information on the extent of unobserved mortalities or unwanted catches?

Q Do the methods used to collect data have a high or low level of verifiability?

Q If the in-scope species are close to or below their PRI, are data collection methods with higher levels of verifiability and lower levels of bias used?

Scoring issue (a) – Information adequacy – main species

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Sole gillnet fishery:* The main in-scope species are plaice and sea bass. There are relevant stock assessments using reference points for both species. Catches (including discards) are reported to the management agency through standardized logbooks. Logbook data shows that plaice constitutes around 5% of total catch and sea bass varies from 3-8% of total catch. Independent verification of catches is undertaken by the control agency in periodic at-sea inspections (2-3 per year). Landings are monitored using a risk-based protocol (~30% of landings in most recent year). Logbooks are also verified through this process. Interviews undertaken with the control agency, stock assessment scientists and randomly selected fishers indicated that fishers do not discard either of these species because there is a good market for them. This information was verified by sales notes. They confirmed that the two species represent 5-10% of the catch depending on season. The stock assessments are precautionary and allow for these captures. Following the application of the Evidence Requirements Framework, it's concluded that TG1 and PG1 are met for both scoring elements as the effect of potential bias on trueness can be anticipated and is not considered to be consequential, and a catch monitoring system is in place that facilitates estimation of catches, reports data to management authorities and includes independent verification of catches. As such, SG60 is met for both plaice and seabass.
SG80	*Flounder trawl fishery:* The main in-scope species are plaice and witch. Information is collected to monitor stock status through annual demersal research trawl surveys (carried out by a national fisheries research agency) and through monitoring CPUE data from both logbooks and observers and size data from observer samples. Plaice has a restricted TAC, so almost all catches are discarded and are expected to have high mortalities. Witch has an adequate TAC and are mostly retained and sold. Fishers are required to record catch for each haul by weight in logbooks. There are three years' worth of logbook data that indicate that catches (before discards) of plaice and witch average 5% and 8% by weight, respectively. The control agency places observers on randomly selected trawl vessels throughout the season, and their main duty is to take samples of catch and discards. In the previous two years the observer coverage in the fishery was approximately 5% and representative of fishing activity. Enforcement agency analysis of differences between logbook and observer catch estimates indicates the two are not statistically distinct. Landings inspections are also undertaken for all vessels and verify that only witch is regularly landed. TG2 of the Evidence Requirements Framework is met for both scoring elements as there is limited potential for bias to exist but its effect on trueness is broadly understood and not considered to be consequential. PG2 of the Evidence Requirements Framework is met for both scoring elements as the catch monitoring system accounts for the main sources of error that may affect the precision of catch estimates. As TG2 and PG2 are met, SG80 is met for both scoring elements.
SG100	*Swordfish longline fishery:* Bluefin tuna and white marlin are the main in-scope species. There is 100% observer coverage on the vessels in this fishery in addition to electronic logbook reporting. Observers are required to observe all hauls (possible due to timing of hauls) to report on weights of species caught and discarded as well as any hook loss. The observer data and the fishery data assess the impact of the fishery with a high degree of certainty, with 95% confidence intervals. In addition, these data contribute to the biannual stock assessments for these species. Most potential sources of bias have been mitigated and the catch monitoring system in place enables a census of catches using independent observation, therefore TG3 and PG3 of the Evidence Requirements Framework are met for both scoring elements. SG100 is met for both scoring elements.

Scoring issue (b) – Information adequacy – minor species

The second scoring issue focuses on the information of the impact on minor in-scope species – i.e. those that fit the description of in-scope and are not classified as main either as a result of catch proportion or particular vulnerability.

Scoring issue	SG60	SG80	SG100
(b) Information adequacy for assessment of impact on minor in-scope species			Information is adequate to **estimate** the impact of the UoA on the stock status of **minor** in-scope species with a **high degree of accuracy.**

Good practice

Good practice requires the availability of some quantitative information to enable the accurate assessment of the impact of the fishery on minor species.

What CAB auditors check

CAB auditors may wish to speak to stock assessment scientists involved in the assessment of in-scope species as well as any compliance/control bodies that might have observers or review logbooks and fishers themselves. They may also refer to the following documentary evidence for justification:

- Stock assessments/advice for minor in-scope species.
- Reviews or evaluations of stock assessments, which may give more comment on adequacy of information.
- Catch profile for the fleet under assessment for recent seasons/years. This could be fishery-dependent or fishery-independent information.
- Regulatory requirements for catch monitoring and reporting.
- Other published studies looking at impact of the fishery or other relevant fisheries on in-scope species.
- Photographic evidence, vessel logbooks, catch landing sheets, observer reports, compliance records, including any information on unobserved mortalities and unwanted catches.

i It should also be noted that when assessing this scoring issue, CAB auditors are required to apply the MSC 'Evidence Requirements Framework' (which is contained within the 'MSC Fisheries Standard Toolbox') to help determine the accuracy of the available information. For this scoring issue, the assessment shall consider which trueness guidepost (TG) and precision guidepost (PG) are met.

Scoring issue (b) – Information adequacy – minor species

Key questions to determine if further action is needed

- Q Is the available information, robust, reliable, accurate and unbiased?
- Q Is the same level of information available for minor in-scope species, as for main in-scope species (scored in scoring issue (a))?
- Q Is catch profiling information available which adequately captures the amount of mortality on minor species attributable to the fishery?
- Q Is all the information for the stock assessment of minor in-scope species available?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	No scoring guidepost at the 80 level.
SG100	*Toothfish longline fishery:* Minor in-scope species are unicorn icefish, grey rock cod and sandpaper skate. Effort in the fishery is monitored by one independent observer on each vessel. Observers are required to observe at least 60% of hauls and record catches and discards, including whether the species are alive or dead when discarded. Fishers are also required to maintain logbooks. The management agency reviews both logbooks and observer records on an annual basis and has determined that these have been consistent over the past 10 years. Furthermore, there is a comprehensive and statistically robust fisheries independent trawl survey conducted each year that contributes to the understanding of the status of minor in-scope species. Together, the information is relevant to the fishery and of sufficient quality to assess whether bycatch rates are changing, and the status relative to the various bycatch TACs. Following the application of Evidence Requirements Framework, it's concluded that TG2 is met for all minor species scoring elements as there is limited potential for bias to exist in the information and where it might exist its effect on trueness is broadly understood and not considered to be consequential. SG100 is met for all minor species scoring elements.

Scoring issue (c) – Information adequacy for management strategy

The focus of the third scoring issue of PI 2.1.3 is on the adequacy of information to support the management of in-scope species. This has a slightly wider scope than the previous two scoring issues, which were more focused on information relating to mortality caused by the fishery. The intent of this scoring issue is therefore to include information on aspects such as change in operational practices, information in relation to fishing patterns or information required to monitor any of the management measures or strategies referred to in PI 2.1.2.

Scoring issue	SG60	SG80	SG100
(c) Information adequacy for management strategy	Information is adequate to support **measures** to manage **main** in-scope species.	Information is adequate to support a **partial strategy** to manage **main** in-scope species.	**Information is adequate to support a strategy** to manage **all** in-scope species and evaluate with a **high degree of certainty** whether the strategy is achieving its objective.

Good practice

To perform well in relation to this scoring issue fisheries should have adequate information to support management of in-scope species including information that allows detection of any changes in level of risk to in-scope species.

What CAB auditors check

CAB auditors will consider the information required to undertake the management measures detailed in PI 2.1.2. Supporting evidence for this is likely to come from:

- Analysis of catch profiles over time, indicating responses to management measures.
- Information required for wider management measures – such as effort or spatial mapping.
- Monitoring or evaluation reports detailing changes in operational practices over time.
- Observer reports which capture information relevant to the management of in-scope species, or the impact of the fishery on those species.
- Regulatory requirements for monitoring and reporting.
- Any compliance issue in relation to statutory reporting requirements.
- Other published studies looking at impact of the fishery on in-scope species over time.
- Details of any voluntary, fleet level recording of interactions with in-scope species.

Scoring issue (c) – Information adequacy for management strategy

Key questions to determine if further action is needed

- **Q** Is the available information, robust, reliable, accurate and unbiased?
- **Q** Is the appropriate information collected (or monitoring programs in place) to determine whether the management measures referred to in PI 2.1.2 are achieving their objectives?
- **Q** Where the wider management of in-scope species requires certain information – such as effort, fishing pattern or quota uptake – do the reporting and monitoring systems effectively provide this information?
- **Q** Are there additional sources of information (such as voluntary reporting or observer reports) which provide further information in relation to management measures?
- **Q** Do the stock assessments or advice for in-scope species indicate that all the required information is in place and verifiable?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	*Estuarine mullet gillnet fishery:* Golden perch is the main in-scope species. Interviews with fishers and the management agency indicated that catches of golden perch have been consistent over time, and it is managed using proxy stock reference points. The management agency regularly reviews sales notes for golden perch and would be able to detect an increase in the catch of golden perch. The main measure to control catches of golden perch is the mesh size, which limits the catches to mature individuals. If the mesh size were to change, the increase or decrease of captures would eventually be picked up by the management agency. The mesh size of gillnets used are monitored by the local enforcement agency on a stratified sampling basis and they have indicated a high degree of compliance with this measure. There is also an economic incentive for fishers to use this mesh size to maximize catches of mullet. There is information adequate to support measures to manage golden perch. SG60 is met.

Scoring issue (c) – Information adequacy for management strategy

Examples of scoring rationales – *continued*

Scoring issue (c)	Fishery Example
SG80	*Hoki demersal trawl fishery:* The main in-scope species is hake. Hake is a quota managed species and is subject to stock assessments and monitoring of landings. Size restrictions on landings (discards of undersized species form a very small percentage of catch due to trawl mesh size) and seasonal area closures are measures that form part of the partial strategy for these species. Biological and life history traits for these species are well known and support the management of these species. Catches are recorded systematically through electronic monitoring (EM), with at least 30% of the haul footage reviewed, and through electronic logbooks. Fish length is also recorded using the EM tool. This information is provided to the management body, who are able to monitor any changes in risk to or non-compliance of measures used for this species so information is adequate to support a partial strategy to manage this species. SG80 is met.
SG100	*Lake perch gillnet fishery:* The in-scope species are roach, bream and pikeperch. Fishers are required to provide data on catches and discards of all in-scope species on a continuous basis. In addition, a test-gillnet fishery is undertaken on an annual basis two times a year (coincident with the fishery) by the local university, which records all captures of species. These data are analysed by the university along with the fishery-dependent data to provide regular updates to CPUE trend data for all species. The time series analysis goes back 15 years, and the analysis is peer reviewed. This gives a reliable estimate of stock status. The university uses these data to create a simulation model of stock status for the coming year, which they can test against potential risks. Together these data provide enough information to enable the management to determine if there is any change to the risk in species with a high degree of certainty. In addition, landings inspections and vessel inspections are regularly undertaken to ensure that the management measures are complied with. SG100 is met for roach, bream and pikeperch.

Challenges and solutions to meeting PI 2.1.3

This PI requires that several sources of fisheries data are available and adequate. Across the 3 scoring issues of the PI the scope of the information requirements are quite wide. This can range from information on catch and fishing related mortality, to information to support the assessment of stock status of the in-scope species, to information to monitor the performance of management measures (both related to the management of in-scope species and the management of the fishery impacts on in-scope species). Across each of these areas of information there is an increasing requirement (at least to achieve higher scores) for the information to be scientifically robust, independent and comprehensive.

This all implies a certain level of monitoring and reporting infrastructure, a good level of scientific capacity and the availability of systems, such as databases to support the collation and analysis of the relevant information, to ensure that information is not only collected – but used.

Example process and actions to improve performance against PI 2.1.3

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Once the in-scope species have been identified and further divided into main and minor, undertake a review of the level of existing information, or routine monitoring currently in place, to determine the adequacy of this information in determining both the status of those in-scope species and the fishery impact of those species (and consequence to in-scope species status).	(a), (b), (c)
●				Review existing stock assessment reports for in-scope species which may also provide an indication of the quality of the information that is available and routinely collected for management purposes.	(a), (b), (c)
	●			Ensure there is a quantitative robust catch profile for the fishery, which will provide evidence of total catches of all species (including any that may not be landed). If necessary initiate improved monitoring and catch recording systems so that the catches of in-scope species by the fishery are reliably recorded in the future.	(a), (b), (c)
	●			Where gaps are identified in the information and monitoring reviewed in the stages described above, propose data gathering exercises and routine monitoring procedures to ensure that these information gaps are addressed.	(a), (b), (c)
		●		Commission any independent research or observer work where necessary to address any of the information gaps identified above.	(a), (b), (c)
		●		Implement any additional data gathering or routine monitoring processes required to successfully manage in-scope species (and the fishery impact on in-scope species). If required, this should highlight the needs for staff training or capacity building, identify appropriate resourcing of monitoring programs and include any regulatory and enforcement backing.	(a), (b), (c)
		●		Undertake consultation/outreach on any new proposed data gathering exercises to ensure there is good stakeholder understanding of the need for data, the process by which data will be collected and the ways in which data will be protected and used.	(a), (b), (c)
			●	Undertake periodic evaluations of the effectiveness of the data collection in relation to in-scope species, to ensure that programs continue to be tailored to the needs of management.	(a), (b), (c)

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2.2.1 ETP/OOS species outcome

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Performance Indicator overview

This component assesses the impact of the UoA on:

Any Endangered, Threatened or Protected (ETP) species, from a class which is eligible for MSC certification (i.e. they are within the scope of the MSC programme).

Any amphibians, reptiles, birds and mammals. These are known as out-of-scope (OOS) species and are never eligible for MSC certification.

The component is known by the acronym ETP/OOS. Full details of the species selection criteria, which explains exactly which species should be treated as ETP/OOS is explained within this guide at the beginning of the Principle 2 section.

Many fisheries occur in areas where ETP species also occur, and many fisheries will encounter and potentially impact upon OOS species. Possible impacts may be poorly understood, but may include entanglement, direct capture and mortality, impacts on behavioural or migratory patterns, indirect impacts due to competition for resources, loss of habitat and pollution. The objective of this PI is to ensure that the direct impacts of the fishery on ETP/OOS species are known to not hinder recovery of the ETP/OOS unit to favourable conservation status. Favourable conservation status is considered to be at least 50% carrying capacity. Therefore where an ETP/OOS species is below that level it must be demonstrated that the fisheries impact is not hindering recovery to 50% of the carrying capacity within 3 generations or within 100 years, whichever is shorter.

In many cases there are strategies (comprising many measures) that can be taken to mitigate possible negative impacts. Although this management is the subject of scoring in the next PI, it is the outcome of that management, or the impact or outcome to the ETP/OOS species that is the subject of this PI.

The certainty thresholds for PI 2.2.1 are as follows:

Unlikely ≥ 70th percentile

Highly likely ≥ 80th percentile

High degree of certainty ≥ 95th percentile

Where the impact of the fishery on ETP/OOS species cannot be determined analytically, the ETP/OOS species outcome status PI may be scored using the MSC's Risk-Based Framework (RBF). See Annex 1 Risk-Based Framework.

There is a single scoring issue for this PI:

(a) Direct effects

Scoring issue (a) – Effects of the UoA on outcome status

The scoring issue focuses on the impact of the fishery on the status of ETP/OOS species and specifically the likelihood that the direct effects of the UoA are hindering the recovery of ETP/OOS species.

Scoring issue	SG60	SG80	SG100
(a) The direct effects of the UoA do not hinder recovery of the ETP/OOS unit to favourable conservation status	The direct effects of the UoA are **unlikely** to hinder recovery of the ETP/OOS unit to favourable conservation status.	The direct effects of the UoA are **highly unlikely** to hinder recovery of the ETP/OOS unit to favourable conservation status.	There is a **high degree of certainty** that the direct effects of the UoA do not hinder recovery of the ETP/OOS unit to favourable conservation status.

Good practice

Good practice seeks to ensure that the UoA has a minimal impact on ETP/OOS species, such that it can be concluded that the UoA will not hinder the recovery of the species to a favourable conservation status, defined as being at least 50% of the carrying capacity.

What CAB auditors check

The initial task is to determine which species are classified as ETP/OOS according to the MSC. This will require an understanding of which out-of-scope species may occur in the catch. Also will require a review of which other species in the catch are protected by the relevant endangered species national and international legislation, or have a status on the IUCN redlist that would also qualify the species for inclusion within the ETP/OOS component. This will require reference to the following sources:

- Robust and reliable catch profile.
- ETP/OOS national and international legislation (including CMS and CITES species annexes).
- ETP/OOS distribution maps.
- National species profiles.
- IUCN status for all in-scope (i.e. fish and invertebrate) species.
- Records of interaction with a fishery in logbooks, scientific reports, observer data etc.
- Independent observer reports.
- Independent expert reports (e.g. environmental NGOs).
- Records of any testing or inspecting of any ETP/OOS mitigating management measures (e.g. gear modifications).

If the operational aspects of the fishery mean that an ETP/OOS species is intentionally harassed or intentionally killed, then the assessment team will need to refer to a quantitative estimate of the population size of that species from within the last 5 years and this will need to support scoring at the SG100 level.

Scoring issue (a) – Effects of the UoA on outcome status

Key questions to determine if further action is needed

- **Q** Is there reliable information of which out-of-scope (i.e. amphibians, reptiles, birds and mammals) species feature in the catch?
- **Q** Is there a clear understanding of what species present in the area of the fishery are considered ETP?
- **Q** Is the distribution and abundance of the ETP/OOS species in the area of the fishery known?
- **Q** Has the impact of the fishery on all relevant ETP/OOS species been independently quantified?
- **Q** Are there reliable estimates of any unobserved mortality on ETP/OOS species? Unobserved mortalities can include animals that are injured and/or stressed, and die as result of interactiong with fishing gears. Also can include ghost fishing.

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Swordfish longline:* The only ETP/OOS unit identified is blue shark, which is classified as ETP/OOS through its listing on CITES and CMS Appendix II (modification criteria in SA3.1.4.3 not met). The ETP/OOS unit is the southern Atlantic stock of blue shark, defined as a stock by the RFMO for management purposes, but based on genetic information. The most recent stock assessment indicates that the southern blue shark could be overfished (B2021/BMSY=0.78-1.29) and that overfishing could be occurring (F2021/FMSY=0.54-1.19). The BMSY reference point used is consistent with an objective of recovering the stock to at least 50% carrying capacity. The fishery catches 3050t of southern blue shark on average (2.62% of UoA catches), based on logbook and observer data (2% of trips) over past five years. Southern blue shark is targeted in two other fisheries, with a combined total of 25,873t estimated to be caught. The UoA therefore represents an estimated 11.7% of the total mortalities on this stock. The UoA follows a code of conduct to release all sharks caught, but the post-release survival is unknown. An independent researcher was contracted to evaluate the UoA impact on this stock using population viability analysis and determined that at the current catch levels the fishery was unlikely to hinder recovery of the species within 100 years or 3 generations. SG60 is met.

Scoring issue (a) – Effects of the UoA on outcome status

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG80	*Hake gillnet:* The only ETP/OOS unit identified is the harbour porpoise. The fishery interacts with the Celtic Sea population, which has an estimated 35,232 individuals. A removals limit is set by the Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas of 1.7% of the population, which is consistent with the interim objective of recovering or maintaining the population at 80% of carrying capacity. For this population, the removals limit to ensure that the population objective is achieved within 100 years or 3 generations, whichever is shorter, would be ~599 individuals. The fishery maintains logbooks and has independent sampling from a research institution to monitor catches in the fishery. From these sources, the research institute estimates 14 individuals per annum are caught in the fishery (with a 1-sided upper 90% CI of 129 individuals). Based on this information it is highly unlikely (greater or equal to 80% probability) that the fishery is hindering recovery of this species to favorable conservation status. SG80 is met.
SG100	*Hoki trawl:* The ETP/OOS units identified are Salvin's albatross and Westland petrel. The ETP/OOS unit is at the species level for both seabirds. Salvin's albatross breed on Bounty Islands and Westland petrel breed on a small stretch of NZ mainland. There are no sub-populations identified by the management authority for management purposes or based on biological distinctiveness. Mortalities are estimated as 15 (95% CI: 7-27) and 3 (95% CI: 0-9), respectively, based on independent observations of >30% of trips. Fisheries managers apply a risk assessment methodology to calculate the likelihood that a fishery will hinder populations to at least 70% of their carrying capacity within 100 years or 3 generations, whichever is shorter. They do this by first determining the number of mortalities that could be sustained for each species based on Bayesian population models. The population sustainability thresholds were calculated as 3600 (95%CI: 2710-4940) for Salvin's albatross. The fishery mortality estimates are well below this level with a high degree of certainty. SG100 is met for Salvin's albatross. The Westland petrel population size is estimated at 6200 breeding pairs. The fishery removals are less than 10 individuals per year on average (over past 5 years) with a high degree of certainty. The information PI (2.2.3) meets at least SG80 for scoring issue a given the precision and trueness of information provided. This species meets the negligible criteria under SA3.8.2.5. SG100 is met for the Westland petrel.

Challenges and solutions to meeting PI 2.2.1

In some situations, a lower priority may be placed on the protection of out-of-scope or endangered, threatened and protected species. This is not necessarily because of purposeful neglect but because policy makers, fishers and communities may not place the same value on these species in a non-consumptive context. Protection and management of ETP/OOS species may be seen as a lesser priority compared with ensuring livelihoods for rural coastal communities. Therefore, there may be greater government focus on developing the fishing fleet, increasing training and safety or building fisheries infrastructure and market channels. Challenges to meeting this PI in a context of fisheries of lower scale and intensity, and fisheries which have historically been subject to a lower level of management, include:

- Limited expertise and capacity to undertake the research needed to identify ETP species.
- Limited funding to undertake the research needed on ETP/OOS species interactions.
- Lack of awareness and value of ETP/OOS species to the general ecosystem.
- Lack of understanding at a fleet level as to which species are considered ETP.

Example process and actions to improve performance against PI 2.2.1

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Determine which ETP/OOS species within the catch or with the potential to be impacted by the UoA are included within the component.	(a)
●				Review the status of identified ETP/OOS species, including recent trends. Information on distribution and temporal patterns are also likely to be helpful to determine the potential for impact.	(a)
	●			Determine the level of direct impact of the fishery on the identified ETP/OOS species. Determine whether the information basis is sufficient to draw confident and robust conclusions. Include consideration of unobserved mortality.	(a)
	●			Commission or undertake any additional monitoring or research required to quantify the direct impact more accurately.	(a), 2.2.3
		●		Based on the outcomes of the review and research undertaken above, consider the need for the development and implementation of more measures as part of a management strategy. These could include a range of possible solutions such as spatial or temporal restrictions, gear modifications, improved monitoring and reporting, capacity building and training etc.	(a), 2.2.2
		●		Undertake consultation on any proposed additional management measures or monitoring proposals, to ensure that any potential obstacles to efficient and practical implementation are addressed.	2.2.2, 3.1.2
		●		Implement any additional measures, monitoring, etc. Ensure that all necessary regulatory and personnel issues are addressed to enable implementation.	2.2.2
			●	Continue to monitor the performance of the fishery, such that the outcome status can be determined with a high degree of confidence.	2.2.3

Notes

2.2.2 ETP/OOS species management strategy

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Performance Indicator overview

The second PI in relation to ETP/OOS species focuses on the management that is in place to manage the impact on those species that are vulnerable to being impacted by the UoA in the assessment area. Management strategies should follow best practice and be precautionary, whilst aiming to minimise interaction and impacts, to ensure that the fishery does not hinder recovery of any ETP/OOS species. In addition, these strategies and their component measures should be evaluated and reviewed to provide evidence that management is achieving its objectives and enable on-going refinement and enhancement of management.

The management strategy or strategies referred to here could comprise measures applied at different jurisdictions, or different tiers of management. For example, there may be measures in place nationally, such as protected areas for certain species, measures in place at an overall fleet level, such as regulations covering gear design, and even measures in place at the client fishery level, such as crew training, on-board voluntary codes of conduct and voluntary reporting. A strategy should state its objectives, identify potential risk, apply measures, and ultimately demonstrate that the component measures work together to meet the stated objectives. There is also a need for management to address specific impacts, such as shark finning or the impacts of ghost gear (i.e. lost or discarded fishing gear), where applicable.

There are also strong linkages between the information described in the next PI (ETP/OOS species information, 2.2.3) and management. A management strategy should identify the information and monitoring requirements for management decision-making and should stipulate how this information will be collated and used.

Finally, an effective management strategy should have at its core, strong regulatory basis (although there will always be place for additional voluntary measures). This in turn may require some redrafting of legislation, and some budgetary and administrative planning to ensure that the management requirements are fully met.

Five scoring issues are considered under this PI:

(a) Management strategy in place

(b) Management strategy effectiveness

(c) Review of alternative measures to minimise mortality of the ETP/OOS unit

(d) Shark Finning

(e) Ghost gear management strategy

Scoring issue (a) – Management strategy in place

This scoring issue scores the level of strategic management that is in place, and the degree to which that management has been designed to cohesively and strategically work together toward ensuring that the UoA does not hinder recovery of the ETP/OOS unit to favourable conservation status.

Scoring issue	SG60	SG80	SG100
(a) Management strategy in place	There are **measures** in place, **if necessary**, that are expected to **minimise** the UoA-related mortality of the ETP/OOS unit and achieve the ETP/OOS outcome SG80 level of performance.	There is a **strategy** in place, **if necessary**, that is expected to **minimise** the UoA-related mortality of the ETP/OOS unit and achieve the ETP/OOS outcome SG80 level of performance.	There is a **comprehensive strategy** in place that is expected to **minimise** the UoA-related mortality of the ETP/OOS unit and achieve the ETP outcome SG80 level of performance.

Good practice

The requirement for management is greater for ETP/OOS species than elsewhere in Principle 2. At the SG100 level, there is a requirement for the strategy to be comprehensive. Good practice fisheries will have a robust management strategy that covers all possible impacts, is well-supported by appropriate data and monitoring, evaluates its performance to highlight changing risks and consider ways to improve. Good practice will seek to implement mitigation measures to prevent interactions between fisheries and ETP/OOS species. The type of management measures within the strategy will depend on the nature of the impacts. For example, in some cases certain fishing areas or seasons may be closed, some fisheries may require gear modifications to prevent interaction with species, and in some cases it may be appropriate to adopt measures to maximise the live release of ETP/OOS species.

What CAB auditors check

CAB auditors will speak to a range of stakeholders, such as the fisheries and nature protection administrations, the fishers themselves, environmental NGOs to understand the measures and/or strategies in place. This could be supported by the following documentary evidence:

- A description of the ETP/OOS strategy, either for all ETP/OOS species or for a specific species – perhaps in a standalone document, or included in the fisheries management plan, or a national sector-wide policy document.
- Any regulatory backing of measures within the strategy or the strategy itself (i.e. licence conditions or regulations on technical measures).
- Evidence of ETP/OOS data (scored in 2.2.3) being used by management to inform decision-making processes.
- Research or evaluations of the efficacy of any of the measures which comprise the strategy.

Scoring issue (a) – Management strategy in place

Key questions to determine if further action is needed

Q Are there measures in place to minimise the fishery's impact on any/all ETP/OOS populations?

Q Are these measures brought together in a strategic and cohesive manner, in a way which demonstrates that the measures are appropriate and tailored to the identified risks?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Crab trap fishery:* The only ETP/OOS species identified is minke whale. The fishery has recorded 2.5 minke whales/fishing season entangled in its gear. There is only one vessel in the UoA. Measures to minimize entanglements (and therefore potential mortalities) were implemented in 2015: requirements that setting should not occur during intense whale activity in the vicinity and that weights between traps be used to reduce buoyancy of the lines. These measures are expected to minimize mortalities, as they show to be effective in reducing the number of entanglements of minke whales in another trap fishery within the same region. SG60 is met.
SG80	*Shrimp trawl:* The only ETP/OOS species identified is Pacific eulachon. The species is subject to a national recovery plan, which identifies threats to the stock, establishes priority actions for addressing the threats and research priorities. The national and state fishery managers require use of bycatch reduction devices on shrimp trawls with 19mm bar spacing and use of LED lights in the fishery. These measures were required after extensive testing in the fishery which showed that they were effective at reducing eulachon catches. The combination of recovery plan and mitigation measures comprise a strategy, which also contains mechanisms to modify fishing practices if unacceptable impacts are identified. However, the strategy has not been fully tested with respect to impacts of management responses on the populations, so it is not comprehensive. SG80 is met.

Scoring issue (a) – Management strategy in place

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG100	*Toothfish longline:* The only ETP/OOS species are seabirds. Management actions at the national and RFMO level provide a comprehensive strategy for managing the fishery impacts on seabirds. The RFMO conservation measure 25-02 includes requirements for line weighting to improve sink rates, requiring minimum deck lighting at night, and deployment of a streamer line during setting. These combined measures are identified as "best practice" for this gear type by the Agreement on Conservation of Albatross and Petrels. A national strategy to minimize seabird interactions is also in place, which in addition to the RFMO measures, includes temporal and spatial closures during high-risk seasons. This management strategy is adaptive, containing actions to be taken if ETP/OOS mortalities arise. Incentives to improve practices are provided in that the national license scheme favors access to the fishery for vessels with low ETP/OOS interactions. ETP/OOS mortalities are monitored and recorded by independent observers, of which 2 are deployed on every trip. The data from this is fed into both the national and RFMO working groups, where the strategies are tested and updated as needed. SG100 is met.

Scoring issue (b) – Management strategy effectiveness

The second scoring issue seeks to verify that the management described in SI (a) is demonstrated to be effective and if it provides evidence of a reduction in ETP/OOS mortalities since the adoption of the management.

Scoring issue	SG60	SG80	SG100
(b) Management strategy effectiveness		Evidence indicates that the **measures, strategy, or comprehensive strategy** have reduced or **minimised** the mortality of the ETP/OOS unit.	

Good practice

Good practice requires not only that the management is effective, but also that evidence exists to demonstrate that the management is effective. This could be in a form of trend that impact is reducing over time. This therefore requires both that the management has been fully implemented and that it has been in place for sufficient time for results to be evident. In order to achieve this the monitoring or analysis will need to the tailored to specific requirements of the management, to enable an evaluation of performance and to highlight changing risks and potential improvements.

What CAB auditors check

CAB auditors will speak to a range of stakeholders, such as the fisheries and nature protection administrations, the fishers themselves, environmental NGOs to understand the strategies that are in place and the degree to which there is evidence of effectiveness. This could be supported by the following documentary evidence:

- A description of the ETP/OOS strategy for all/any ETP/OOS species – perhaps in a standalone document, or included in the fisheries management plan, or a national sector-wide policy document.
- The outputs of any monitoring which may indicate whether the management is working.
- Evaluations of any measures used to minimise the impact of the UoA on ETP/OOS species.

Scoring issue (b) – Management strategy effectiveness

Key questions to determine if further action is needed

Q Is there evidence to support the selection of the ETP/OOS management measures and provide confidence that they will work?

Q Is there research or analytical assessments, from this fishery or from analogous fisheries that can be used to provide objective basis for confidence that the measures in place will work?

Q Is there evidence available to show that adopted management has reduced or minimised the mortality of ETP/OOS species?

Q Has the strategy for managing the fishery impact on ETP/OOS populations ever been analysed or evaluated?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	*Halibut longline fishery:* The ETP/OOS species identified are black-footed and Laysan albatrosses. The seabird management strategy implemented in the fishery includes the mandatory use of seabird avoidance measures, including use of streamer lines, night setting and line weighting. An analysis of the effectiveness of these measures after mitigation adoption shows that bycatch of black-footed albatrosses reduced by 75% and Laysan albatrosses by 92%. As the population of both species has remained stable or increasing over the past 10 years, the decrease is not likely to be due to a decline in the population rather than the effectiveness of the measures. This demonstrates that the management strategy has reduced the mortality of the ETP/OOS units. SG80 is met.
SG100	No scoring guidepost at the 100 level.

Scoring issue (c) – Review of alternative measures to minimise mortality of the ETP/OOS unit

The third scoring issue does not need be scored if the mortalities of ETP/OOS species by the UoA are concluded to be zero or negligible. However, where there is some mortality attributable to the UoA then this SI seeks to ensure that there is a proper process by which any alternative measures to minimise that level of mortality are considered within a review and, where appropriate, implemented.

Scoring issue	SG60	SG80	SG100
(c) Review of alternative measures to minimise mortality of the ETP/OOS unit		There is a **review** at least once every 5 years of the **alternative measures** to **minimise** UoA-related mortality of the ETP/OOS unit and they are implemented as appropriate for the ETP/OOS unit.	There is a **review** that happens every 2 years of **alternative measures** to **minimise** UoA-related mortality of the ETP/OOS unit, and they are implemented, as appropriate for the ETP/OOS unit.

Good practice

Good practice requires that there is a review of possible alternative measures, which could be adopted to minimise the mortality of ETP/OOS species by the UoA and that the review occurs routinely and frequently (every 2 years at SG100). Where appropriate (i.e. where deemed to reduce the mortality of ETP/OOS without impacting upon commercial catches, crew safety or other species or habitats), alternative measures should be implemented.

What CAB auditors check

CAB auditors will look for the following evidence:

- Details of gear specification and any modifications currently used to minimise mortality of any/all ETP/OOS species.
- Details of supporting evidence, assessing the efficacy of current gear modifications or other measures (e.g. spatial or seasonal restrictions, handling practices etc.) for any/all ETP/OOS species.
- Evidence that alternative measures have been considered or reviewed for any/all ETP/OOS species, such as a consultant or management agency report or minutes from a meeting where alternative measures were considered.
- Evidence of either implementation of alternative measures (if they are likely to be more effective at minimising mortality than current measures and are practical etc.) or evidence of why the alternative measures were not implemented (i.e. not likely to further minimise mortality of ETP/OOS species, not practical or cost effective, likely to negatively impact another species and/or habitat).
- Evidence of management commissioning or undertaking specific reviews of the ETP/OOS strategy and the potential to improve management by the implementation of alternative measures.
- Evidence of the management authority keeping abreast of developments in ETP/OOS mitigation measure in other fisheries (globally), which may provide potential within the fishery.

Scoring issue (c) – Review of alternative measures to minimise mortality of the ETP/OOS unit

Key questions to determine if further action is needed

Q Were the measures which comprise the management strategy selected following review of alternative possible measures?

Q Have examples of ETP/OOS mitigation measures from other fisheries and/or recommended by national or international bodies been reviewed and considered for the fishery?

Q Does the management strategy for ETP/OOS species recognise the need for regular review, with particular emphasis on alternative measures? Is it stated how frequently such reviews should take place?

Q Does management/fleet respond to the conclusions of such reviews and implement any alternative measures that are likely to be more effective than current measures? If not, why not?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	No scoring guidepost at the SG60 level.
SG80	*Tropical shrimp trawl fishery:* The only ETP/OOS species identified is leatherback turtle. Following a review of measures to minimize interactions in 2021, fisheries managers developed a strategy to achieve this. Alternative measures considered in the review were a code of conduct for safe handling and release and use of Turtle Excluder Devices (TEDs). Trials of the use of these practices in the fishery showed that, combined, they were 97% effective in reducing mortalities of leatherback turtles. Given the success at reducing mortalities and that there were no adverse impacts on target species catch, these two measures were mandated for use in the fishery in 2019. Another review is scheduled (as shown in the minutes of the meeting of the Fishermen's Association) to consider any other alternative measures and their effectiveness compared to the existing code of conduct and TED in 2025 (four years from last review). SG80 is met.
SG100	*Hake gillnet fishery:* The ETP/OOS species identified are porbeagle shark, common skate and spurdog. A strategy for managing unwanted catches in the fishery has been reviewed every 2 years for the past 10 years by a Bycatch Working Group (BWG) as evidenced by the minutes of the BWG meeting minutes. The review includes consideration of the effectiveness of current measures (mainly quota restrictions) and reviews alternative measures to determine if any are likely to be more effective at minimizing mortalities whilst also being safe and practical to implement. In the most recent review, a number of spatial closures were reviewed for areas where these species are likely to aggregate based on habitat characteristics but were not determined to be applicable as the fishery does not operate in the identified 'hotspots'. In addition, training on safe handling and release practices were reviewed and implemented. The management agency conducted training workshops for fishers in the off-season and have provided posters for vessels and quaysides that illustrate safe handling practices. SG100 is met for all ETP/OOS units.

Scoring issue (d) – Shark finning

Scoring Issue (d) only applies in event of there being shark species in the catch which are concluded to be in the ETP/OOS species component. Where this is the case, the fishery must show that shark finning is not occurring.

Scoring issue	SG60	SG80	SG100
(d) Shark finning	There is a **high degree of certainty** that shark finning is not taking place.		

Good practice

Good practice requires a high degree of certainty and a strong empirical basis for confidence that shark finning is not occurring. This requires that there is a 'fins naturally attached' (FNA) or non-retention policy is in place for all sharks, and that the policy is enforced, to provide a high degree of accuracy.

What CAB auditors check

CAB auditors will refer to the following key documents:

- Regulations governing the management of shark species.
- Robust and independent evidence of implementation and enforcement of fins naturally attached (FNA) or non-retention policy.
- Regulations governing the on-board processing of shark species.
- Records of inspections/observations providing validations of shark finning policies.

i It should also be noted that when assessing this scoring issue, CAB auditors are required to apply the MSC 'Evidence Requirements Framework' (which is contained within the 'MSC Fisheries Standard Toolbox') to help determine the accuracy of information. This will require CAB auditors to confirm that reliable evidence is available to demonstrate the proper implementation and enforcement of the fins naturally attached (FNA) or non-retention policy. For this scoring issue, the assessment shall demonstrate that the trueness guidepost (TG) 3 is met.

Scoring issue (d) – Shark finning

Key questions to determine if further action is needed

Q Is there a 'fins naturally attached' (FNA) or non-retention policy in place?

Q Do management measures within the fishery prohibit shark finning?

Q Are policies enforced to provide a sufficient level of confidence?

Q Is there reliable external validation of the vessels' activities to confirm that there is a high degree of certainty that shark finning is not taking place?

Examples of scoring rationales

Scoring issue (d)	Fishery Example
SG60	*Tropical tuna purse seine:* The ETP/OOS shark species identified are silky sharks and oceanic whitetip sharks. The flag state Fisheries Act mandates that all sharks caught during purse seine operations be released as soon as possible after the shark is brought alongside the vessel in a manner that causes as little harm as possible. There is evidence of crew training in both safe-handling practices and the non-retention policy of sharks for the fishery. The flag-state observer program is part of the RFMO Regional Observer Program for which there are standards that cover minimum data collection fields (including on catch and release of all shark species), observer training, a code of conduct, sea safety, placement/deployment, debriefing and performance reviews. 100% of purse seine trips have observer coverage. Catches from this fishery can only be landed at two nominated ports, with 100% of landings monitored by inspectors from the fishery agency. A review of observer data and inspection reports for this fishery over the past 5 years shows no instances of sharks being retained or evidence of shark finning occurring. Since most potential sources of bias have been mitigated and where bias might exist, its effect on trueness is well understood and not considered to be consequential, TG3 of the Evidence Requirements Framework is met for both scoring elements. As such, there is a high degree of certainty that shark finning is not taking place. SG60 is met.
SG80	No scoring guidepost at the 80 level.
SG100	No scoring guidepost at the 100 level.

Scoring issue (e) – Ghost gear management strategy

The final scoring issue of PI 2.2.2 relates to efforts made to ensure that any ghost gear (i.e. lost or abandoned fishing gear) does not impact upon ETP/OOS species. Impacts might include mortality arising from the entrapment, entanglement, or other physical interactions with ghost gear.

Scoring issue	SG60	SG80	SG100
(e) Ghost gear management strategy	There are **measures** in place for the UoA, **if necessary**, that are expected to **minimise** ghost gear and its impact on all in-scope species.	There is a **partial strategy** in place for the UoA, **if necessary**, that is expected to **minimise** ghost gear and its impact on all in-scope species.	There is a **strategy** in place for the UoA, **if necessary**, that is expected to **minimise** ghost gear and its impact on all in-scope species.

Good practice

This SI shall only be scored if there are ETP/OOS species. If there are ETP/OOS species, but it is determined that the risk of ghost gear or its impact is negligible, then it may be concluded that a ghost gear management strategy is not necessary and SG100 can be met. In all other situations where there are ETP/OOS species and there is a risk of ghost gear fishing or ghost gear impacts, then appropriate management is required, which is expected to minimise impacts from ghost fishing to the extent that any impact would be negligible. The management (whether measures, partial strategy or strategy) should be designed to prevent gear loss and impact occurring on ETP/OOS. Higher scores will be obtained if these measures are combined with steps to minimise any impact of gear loss or lost gear is retrieved.

What CAB auditors check

Where there are ETP/OOS species in the fishery, then the CAB auditors will seek evidence to determine whether the risk of impact from ghost fishing on those species can reliably be concluded to be either negligible or zero. This may be based on:

- Evidence of from gear studies
- Evidence from reviews of ghost gear fishing across gear types.
- Stakeholder consultations focused on obtaining an understanding of the operational on-board practices.
- Interviews with skippers / crews / on-board observers.

Where there is a risk of ghost gear fishing impacts, the CAB auditors will wish to review the management measures that are in place to mitigate the impacts and the extent to which measures have been strategically combined to enable a more informed and therefore potentially adaptive approach to management on impacts.

Potential measures might include:

- Marking and identification of fishing gear.
- Spatial and/or temporal measures to reduce gear conflict.
- Fishing input controls to limit gear use (e.g. limits on soak time for passive gear types).
- Gear design to reduce whole or partial loss of the fishing gear (including technology to track gear position).
- Vessel design to reduce discarding of gear and other aquatic litter.
- Use of end-of-life fishing gear disposal facilities.
- Fisher education and awareness on preventing gear loss.

Scoring issue (e) – Ghost gear management strategy

What CAB auditors check – *continued*

Once the CAB auditors have an understanding of the extent of management measures and the degree of strategic linkage, they will seek evidence as to the efficacy of those measures. For each measure, is there objective and independent evidence of implementation and is there any indicator or metric to show whether the objectives of management (i.e. to minimise to negligible any ghost gear impacts) is being achieved?

Key questions to determine if further action is needed

Q What is the potential for ghost gear fishing impacts on ETP/OOS species from the gear used by the fishery?

Q Is there any objective evidence available to support any claims that the impact of ghost fishing is negligible?

Q What measures are in place to ensure that there is minimal lost, abandoned, or discarded fishing gear?

Q Are measures in place to recover lost fishing gear?

Q Has any review been carried out of potential effectiveness of the measures?

Q Have the results and recommendations of any review or testing been implemented within the management system? If so, is there evidence of implementation?

Examples of scoring rationales

Scoring issue (e)	Fishery Example
SG60	*Rock lobster coastal trap:* The ETP/OOS species identified are blue shark and ray species. This scoring issue is scored because risk of ghost gear loss or impact is not demonstrably absent or negligible. Gear is required to be marked with individual license numbers. Gear loss is not monitored but interviews with fishers and managers confirmed that it is almost always a single pot that is lost rather than an entire line. Coastal pots are mainly constructed of wooden (biodegradable) materials. Strong coastal currents mean that any lost pots would likely break up quickly, reducing the period where entanglement or capture of ETP/OOS species could happen. There are measures that are in place (gear marking and some use of biodegradable materials) that are expected to minimize ghost gear and its impact on the ETP/OOS species, but these do not constitute a partial strategy as there is no evidence of awareness of the need to change measures should these cease to be effective. SG60 is met.

Examples of scoring rationales – *continued*

Scoring issue (e)	Fishery Example
SG80	*Halibut gillnet:* The ETP/OOS species identified are northern wolffish, spotted wolffish and hooded seal. The potential for ghost fishing is monitored through the requirement for gillnets to be tagged by a unique identification number using a tag obtained from the management agency. Lost gillnets must be recorded in logbooks and reported to the management agency, with penalties for not doing so. Training is provided by the management agency to fishers every 2-3 years on measures to prevent gear loss. It is expected that every reasonable effort is made to retrieve lost nets, although this is not mandated. However, there are a limited number of tags provided each year by the management agency, incentivizing gear recovery. The combined measures constitute a partial strategy as interviews with management agency personnel indicate that there is ongoing monitoring of lost gear in the fishery and an awareness of the need to change measures should these cease to be effective. SG80 is met.
SG100	*Salmon gillnet fishery:* The ETP/OOS species identified are nationally-designated endangered salmon populations and pigeon guillemots. A fishery code of conduct includes a ghost gear management strategy with measures including gear marking, spatial measures to avoid conflicts with active gears, reporting of lost gear and lost gear recovery initiatives. In addition, the fishers are working on a project with a local NGO to send nets that are no longer useable to be recycled. Funds from this initiative are used to support local community projects. The fishery association, which is responsible for reviewing and updating the code of conduct, meets once a year. Gear loss numbers and any issues with recovery, as well as review of new methods to prevent and mitigate gear loss, are discussed, as evidenced from the minutes of the most recent meeting. This provides a mechanism to review and update the code of conduct if the current measures cease to be effective. Overall, this constitutes a strategy to minimize gear loss and its impact on ETP/OOS species. SG100 is met.

Challenges and solutions to meeting PI 2.2.2

The major constraint on the development and implementation of effective ETP/OOS management strategies relates to the need for recognition that such strategies are required. It is probable that there will be different local cultural perspectives on the importance of ETP species and the need for their protection in different regions or stakeholder groupings. In particular there may be a lack of understanding of importance of ETP management, or a lack of interest in prioritising strategies to minimise impacts. There is therefore initially a requirement that the need for an ETP/OOS management strategy is recognised before this can be developed or implemented.

ETP/OOS management technical measures, such as gear modifications can be unpopular where they hinder operational practicalities or even affect catch rates. ETP/OOS management such as spatial or seasonal restrictions may also be opposed where these overlap with important fishing grounds. Effective management is also reliant on good information (as discussed in 2.2.3). Obtaining the information required for management can be costly and complex and be a drain on limited resources.

Ensuring that management measures are binding (i.e. through regulation or licence conditions), implemented and complied with, can require considerable administrative work and may require changes in departmental structures or budget allocations. Ensuring that fishers comply with management measures (including any voluntary or code of conduct measures) may require considerable outreach and training.

Example process and actions to improve performance against PI 2.2.2

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				In the context of the ETP/OOS species discussed in 2.2.1 (and their biological and legal status) consider which management measures are in place for the fishery and whether these constitute a strategy or comprehensive strategy. To what extent does the management in place meet best practice?	(a), (b)
●				Identify the potential risks posed by the fishery to ETP/OOS species and review the efficacy of the measures/strategies in place to mitigate against these risks. Include in this a critical analysis of the adequacy of the evidence that informs this review. This should include specific risk areas such as shark finning and ghost gear.	(a), (b), (d), (e)
	●			Where necessary develop new measures, bringing these together into an overarching strategy which demonstrates how the identified risks have been addressed, how the measures work together to meet the objectives, and how the performance of management will be monitored and evaluated.	(a), (b), (d), (e)
		●		Undertake full consultation on new management strategies including relevant outreach and training where required.	3.1.2
		●		Implement new measures and strategies so that, where possible, these are binding and develop monitoring protocols to incentivize compliance.	(a), (b), 3.2.3
			●	Evaluate the performance of the management strategy in order to provide evidence of the efficacy of management since its adoption. This should include review of alternative measures and where recommendations result, these should be implemented in a timely manner.	(b), (c)

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2.2.3 ETP/OOS species information

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Performance Indicator overview

PI 2.2.3 assesses the adequacy of information, both to determine the risk posed to ETP/OOS species by the UoA and to evaluate the effectiveness of the strategy to manage impacts on ETP/OOS species. There is a wide spectrum of information that may be required such as status and distribution of ETP/OOS species (migratory patterns etc.), vulnerability of ETP/OOS species to impact from fishing, fishing effort distribution and gear characteristics (including information of efficacy of any measures applied). Taken in combination, the available information should be sufficient to support the management of fishery impacts on ETP/OOS species, including:

- Information to determine the outcome status of ETP/OOS species.
- Information to develop and assess the effectiveness of the management strategy.

For each of these, there is likely to be a range of information, from the more qualitative (i.e. plausible argument), to the more quantitative (i.e. direct monitoring, empirical modelling or scientifically robust studies). The range and quality of the information available, and how appropriate this is to the scale and intensity of the fishery and its potential for impact will be scored by the CAB auditors.

It is also important to consider the availability of on-going monitoring and data collection to identify changes within the fishery that could potentially lead to an increase in the risk of impact from fishing activity over time. The MSC ideal is that fisheries should be moving in the desired direction or operating at a low-risk level.

Information may come from a variety of sources, including from local knowledge or research from fishers or community members. By contrast it may also come from regulatory monitoring programs, observer reports, inspections or in some case even electronic monitoring tools such as VMS or electronic monitoring. Specialised scientific studies are also likely to be a vital source of information and may be useful to management decision-making even where not directly based on the fishery.

As with the other P2 species PIs, this PI needs to be addressed on a scoring element basis, with a score determined for each ETP/OOS species assessed.

Two scoring issues are considered within this PI:

(a) Information adequacy for assessment of impacts

(b) Information adequacy for management strategy.

Scoring issue (a) – Information adequacy for assessment of impacts

The first scoring issue focuses on information about the impact of the UoA on the ETP/OOS species in the area of the fishery, ideally including the consequential impacts on their population status.

Scoring issue	SG60	SG80	SG100
(a) Information adequacy for assessment of impacts	Information is adequate to **broadly understand** the impact of the UoA on the ETP/OOS unit.	Information is adequate to **estimate** the impact of the UoA on the ETP/OOS unit, and to **estimate** whether the UoA may be a threat to its recovery, with a **high degree of accuracy.**	Information is adequate to **estimate** the impact of the UoA on the ETP/OOS unit, and to **estimate** whether the UoA may be a threat to its recovery, with a **very high degree of accuracy.**

Good practice

Good practice requires quantitative information, of sufficient quality and coverage to provide a high degree of certainty of both the impact of the fishery on ETP species, and the consequence to those populations. In order to fully understand the consequence to impacted populations, information in relation to their status will also be required.

What CAB auditors check

CAB auditors may be keen to speak to nature protection departments or agencies and environmental NGOs to ascertain the level of available information, along with any research scientists working in the field and representatives of any government work in the area. More specifically the following types of documentary evidence are likely to support scoring:

- ETP/OOS species distribution maps.
- ETP/OOS species status reports or assessment of populations.
- Fleet effort maps (to determine overlap with areas of high ETP/OOS concentrations).
- Fishing gear studies (or research papers) on ETP/OOS interaction.
- Any recording of information on interactions with ETP/OOS species, e.g. logbooks (whether regulatory or voluntary), observer coverage, video surveillance or specific project records.
- Evidence to support the efficacy of any management measures.
- Key parameters for any species assessed using the RBF – species range, life history traits, and post-capture mortality for any/all ETP/OOS species.

i It should also be noted that when assessing this scoring issue, CAB auditors are required to apply the MSC 'Evidence Requirements Framework' (which is contained within the 'MSC Fisheries Standard Toolbox') to help determine the accuracy of the available information. For this scoring issue, the assessment shall consider which trueness guidepost (TG) and precision guidepost (PG) are met.

Scoring issue (a) – Information adequacy for assessment of impacts

Key questions to determine if further action is needed

- **Q** Is there information available on the ETP/OOS species present in the fishing area, including population status and trends, spatial and migratory patterns?
- **Q** Are the key productivity attributes of the ETP/OOS species known, along with their vulnerability to the fishing gear?
- **Q** Is there reliable quantitative information available on the level of impact on ETP/OOS species, particularly catch rates (per unit effort)?
- **Q** Is the information on both the impact of the fishery and the status of the ETP stock adequate to allow the consequences to ETP/OOS status to be determined in an analytical way?
- **Q** If qualitative information is used to support management, is this considered robust or reliable?
- **Q** Are there several sources of data which can be cross-referenced?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Tropical tuna longline:* The ETP/OOS species identified are loggerhead and leatherback turtles. There is some information on catch numbers, including approximate volume, fate, and condition upon release through observer coverage (coverage is 7.6% of total effort and randomly allocated) of the ETP/OOS species in the past 5 years. This is supported by robust debriefing and quality control processes. Fishers are required to complete electronic logbooks for each trip, including recording ETP/OOS interactions and fate. Data from observers and logbooks are provided to the national management agency and RFMO. A catch monitoring system is in place that is able to collect and provide catch information, therefore PG1 of the Evidence Requirements Framework is met. There is potential for bias to exist in the information given the low rates of interactions that are typical of these species groups and relatively low levels of independent observations, but its effect on trueness can be anticipated and is not considered to be consequential, therefore TG1 of the Evidence Requirements Framework is met. There is some information on the demographics of local populations of both turtle species. As TG1 and PG1 are met, information is adequate to broadly understand the impact of the fishery on the scoring elements. SG60 is met for both species of marine turtle.

Scoring issue (a) – Information adequacy for assessment of impacts

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG80	*Mixed species demersal trawl fishery:* The ETP/OOS species identified are northern fur seals, Steller sea lions and short-tailed albatross. Information is available on population size and demographic characteristics from long-term monitoring studies for all three species. Information is recorded on ETP/OOS species interactions through the observer program. Observer coverage is on 30% of trips, allocated to ensure representative coverage across the fleet and seasons, and observer protocols mandate that the observer monitor and record catches (including fate and condition) of all hauls. In addition, they must spend at least 15 minutes during daylight hauling observing seabirds for potential warp cable strikes. Seabird vessel attendance, warp strikes and fate or condition of bird, if known, are recorded. Fishers are required to report ETP/OOS interactions and fate, if known, in logbooks. The fisheries management agency reviews logbooks and observer records regularly, and found they align well. The catch monitoring system is expected to account for the main sources of random error that may affect precision of estimates of ETP/OOS mortalities, therefore meeting PG2 of the Evidence Requirements Framework. There is limited potential for bias to exist in the information, but where it does its effect on trueness is broadly understood and not likely to be consequential, meeting TG2 of the Evidence Requirements Framework. As TG2 and PG2 are met for all three species, SG80 is met.
SG100	*Toothfish longline fishery:* ETP/OOS species are white-chinned petrels, southern elephant seal, Antarctic fur seal and porbeagle shark. 100% of effort in the fishery is monitored by observers, with two observers on each vessel. Fishers and observers maintain shot by shot logbooks and the management agency has found that these are consistent. The impact of the fishery is considered through an annual quantitative risk assessment process, based on the information collected on the fishery impacts and on demographic information for each ETP/OOS unit. These data are collected through independent research. The information is of sufficient quality to estimate the impact of the UoA on the ETP/OOS species with a very high degree of accuracy. Independent information provides a census of the number of ETP/OOS individuals caught in the fishery. Most potential sources of bias have been mitigated. Following the application of Evidence Requirements Framework, TG3 and PG3 are met for all ETP/OOS species, and therefore SG100 is met.

Scoring issue (b) – Information adequacy for management strategy

The information requirements in the second scoring issue of PI2.2.3 are more closely linked to the needs of the management strategy referred to in 2.2.2, to enable the efficacy of the strategy to be determined.

Scoring issue	SG60	SG80	SG100
(b) Information adequacy for management strategy	Information is adequate to support **measures** to manage the impacts on ETP/OOS units.	**Information is adequate to support a strategy** to manage impacts on the ETP/OOS unit, and to measure trends to evaluate the effectiveness of the **measures** to minimise mortality.	Information is adequate to support a **comprehensive strategy** to manage impacts on the ETP/OOS unit, and to evaluate the effectiveness of the **measures** to minimise mortality with a **high degree of certainty.**

Good practice

Good practice requires that information related to the performance of the management strategy allows a high degree of certainty, including information that allows detection of any changes in level of risk to ETP/OOS species. This information should be tailored to the management strategy and should be inclusive of injuries and trends.

What CAB auditors check

CAB auditors will refer to the management strategy PI (2.2.2) to determine what the information needs might be to demonstrate the efficacy of the strategy and its component measures. For each component measure there is likely to be a monitoring requirement along with some evaluation of the efficacy of measures. Documentary evidence to support this may include:

- Published research on any ETP/OOS interactions with fishing gears and research on the efficacy of any gear modifications tailored to mitigate against ETP/OOS impacts.
- Information on spatial and temporal distribution of ETP/OOS species, where this is relevant to the management strategies that are in place.
- Quantitative assessments (observer reports, academic studies, logbooks) of ETP/OOS impact before and after the application of the management strategy, demonstrating trends in ETP/OOS impacts.
- Ecosystem modelling of impacts (including impacts on ETP/OOS species) which enable the likely benefits of a range of management measures to be evaluated.

Scoring issue (b) – Information adequacy for management strategy

Key questions to determine if further action is needed

Q Is the information collected tailored to the needs of the management strategy and does it provide a quantitative indication of whether the measures that comprise the management strategy are working?

Q Does the information in relation to impact allow a quantitative assessment over time, which enables changes in relative impact to be determined as management measures (and strategies) are added or refined?

Q Where measures within the management strategy are implemented, is there evidence (either from past research or from evaluations or modelling) that these are demonstrably effective?

Q Where new management measures are proposed or introduced, is this linked to a consideration of the information required to monitor its performance and the cost and administrative practicalities of obtaining this information?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Anchovy mid-water trawl fishery:* Fishers are required to record captures of ETP/OOS species (northern giant petrel, South American sea lion) in logbooks. In addition, cameras for electronic monitoring (EM) are placed on 3 of the fleet's 8 vessels in a place that allows all species caught to be observed. The vessel size, areas and seasons of operation, and gear deployment of those vessels with EM are considered representative of the fleet. The fisheries management agency samples ~10% of hauls from the EM and records information on species, number, condition, and likely fate. Information is adequate to support measures to manage the impact of the fishery on all ETP/OOS species as changes in the composition of ETP/OOS species bycatch can be detected. SG60 is met.
SG80	*Skate gillnet fishery:* ETP/OOS species include great shearwater, grey seal, common dolphin and loggerhead turtle. There are two observer programs that operate under the fisheries management system in this fishery that collectively collect a broad range of data on catches by species, disposition (retained vs discarded) and gear characteristics including mitigation deployment. The main difference is that biological samples are taken as part of the national observer program, so a larger portion of their time is spent on this, and the at-sea monitoring program focuses more on catch data collection. The total observer coverage is about 50% of trips in the fishery, based on stratified random sampling within vessel size classes, with the at-sea monitoring being at least 30% of the coverage. Estimates of annual mortalities for all ETP/OOS species are calculated based on this information, allowing changes to be detected. This level of independent information is adequate to support a strategy to manage impacts on the ETP/OOS units and to measure trends to evaluate the effectiveness of measures to minimize mortalities. SG80 is met.

Scoring issue (b) – Information adequacy for management strategy

Examples of scoring rationales – *continued*

Scoring issue (b)	Fishery Example
SG100	*Hand-raked cockle fishery:* ETP/OOS species in the area include a wide range of bird species that feed on the mudflats, but the gear used (hand-raking and sieving) is very unlikely to cause direct mortalities for these species. Cockles are caught and sorted using a 20mm square mesh riddle and only those retained in the riddle are landed, using a management-agency approved landing bag. Catches are reported daily upon landing by the fishers. In addition, the enforcement agency weighs the cockle stacks when carrying out compliance checks to see if they are within the quota and check license number, size and harvesting methods used. Compliance checks are randomly undertaken with coverage across seasons and fishers. No mortalities of ETP/OOS species have ever been recorded by fishers or by the enforcement agency. Given the nature of the gear and very low likelihood of direct mortalities in this fishery, information is adequate to support a comprehensive strategy to manage ETP/OOS interactions. SG 100 is met.

Challenges and solutions to meeting PI 2.2.3

There are several potential challenges to the collection of ETP/OOS species information. But equally there are a lot of existing sources of information that may be directly applicable from international studies or from analogous fisheries elsewhere which can provide a useful source of information. Collecting locally specific ETP/OOS species information can be complex and costly, and may sometimes be seen as a lower priority than other fisheries management initiatives. Placing observers on board vessels can be costly, requires appropriate training and can be further constrained by safety considerations. Undertaking specific research on the efficacy of management measures, for example gear modifications, may also be seen as costly and would require a level of scientific rigour. Studies on ETP/OOS species distribution, migratory patterns and status trends may be more likely to be conducted at an international level, but countries are likely to have the opportunity to contribute to these. Monitoring of ETP/OOS impacts of the fishery should be seen as a priority. This not only identifies the scale of any existing impact, but also provides a baseline by which any future management initiatives may be judged. Even where constrained by resources, some mechanism for obtaining this information should be possible and once in place will go some way toward meeting the requisite MSC level.

Example process and actions to improve performance against PI 2.2.3

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Undertake a review of the existing information. This should critically review the amount and quality of information that is available in relation to ETP/OOS species (distribution, vulnerability, migratory patterns) and the impact of the fishery on ETP/OOS species. Additionally, the review should consider whether the information is adequate to show changes in impact over time with adoption of management measures. This should also include studies from elsewhere which may be analogous.	(a), (b)
●				Undertake a review of the likely information needs for the management strategy described in 2.2.2. The strategy is likely to comprise of many measures. Is the existing monitoring and information adequate to evaluate the performance of these (existing or proposed new) measures? Identify any information gaps.	(a), (b)
	●			Consider a range of cost-effective and practical ways of addressing information gaps identified in the reviews above. Make proposals for further information collection and routine monitoring.	(a), (b)
	●			Commission any research that may be required to address any gaps identified in the review above – in particular in relation to the efficacy of existing or proposed management measures (e.g. spatial closures or gear modifications).	(b)
	●			Consider potential to engage vessel crews in the collection of ETP/OOS management information. This could include training on ETP/OOS species identifications and the recording of interactions, via logs and on-board manuals. Engage more widely in regional efforts to collect information and manage impacts on ETP/OOS species.	(a), (b)
	●			Where information gaps are identified in relation to the need to quantify fishery impact, consider the potential value in a robust and independent on-board observer program as an effective way of demonstrating the level of impact.	(a), (b)
		●		Implement monitoring programs or expand or enhance existing monitoring programs to ensure that impact (and the trend of impacts) of the fishery on ETP/OOS populations are recorded. This should include practical considerations of cost and logistics to ensure the work is adequately resourced and, where possible independent and reliable.	(a), (b)
			●	Undertake consultation with stakeholders on the proposed monitoring and data collections programs to be implemented to ensure these are appropriately tailored.	3.1.2
			●	Carry out periodic evaluation of the information and the monitoring that is available to inform management of the efficacy of the ETP/OOS management strategy. Where gaps or potential improvements are identified these should be implemented.	(a), (b)

Notes

2.3.1 Habitats outcome status

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Example process and actions to improve performance against PI 2.3.1 191

Performance Indicator overview

The MSC certification process seeks to ensure that the fisheries under assessment do not cause undue impacts on habitats (PI 2.3.1), that appropriate management is in place to ensure this (PI 2.3.2), and that appropriate information is available to verify this (PI 2.3.3). In simplified terms, more heavily impacting gears and habitats which are slower to recover are likely to require more management to demonstrate that any potential for impact is mitigated. Given the scale and intensity of more heavily impacting gears, stronger evidence is also likely to be required to support conclusions.

This first habitat PI assesses the impact of the fishery on the habitats that are encountered. The MSC vocabulary describes a habitat as 'the chemical and bio-physical environment, including biogenic structure, where fishing takes place'. In theory this therefore includes the water itself (i.e. the pelagic or mesopelagic environment). However, in practice, in most past assessments CAB auditors have focused on the impacts on seabed habitats. In doing so, consideration is given to the following characteristics that should be included in the seabed habitat definition:

- Substratum – sediment type (e.g. hard substrate or mobile sediments).
- Geomorphology – seafloor topography (e.g. flat rocky terrace or shelf edge).
- Biota – characteristic floral and/or faunal group(s) (e.g. kelp-dominated seagrass bed and mixed epifauna, respectively).

Defining the Habitats

There are likely to be several habitats included in any fishery assessment. These must all be defined at the beginning of the assessment process. Once defined, each habitat must be grouped into:

- 'Less sensitive' habitats:
  - Any habitat that would be able to recover to at least 80% of its 'unimpacted structure and function' within 20 years, if fishing were to cease entirely
  - Scored in SI(a).
- 'More sensitive' habitats:
  - Any habitat which would take longer than 20 years to recover to at least 80% of its 'unimpacted structure and function', if fishing were to cease entirely
  - Scored in SI(b).
  - In general any habitat which has been designated as a Vulnerable Marine Ecosystem (VME) would also likely be scored as a 'more sensitive' habitat.

Given that the unimpacted state will often not be known, the MSC defines when this point should be. This will depend upon whether or not a recovery plan has defined a point, whether or not modelling exists showing the unimpacted state, and whether or not the habitat has been protected. In the absence of any of these, the year 2006 can be used as the 'unimpacted state' as this was the year of the United Nations General Assembly Resolution 61/105 on Sustainable fisheries.

Performance Indicator overview – *continued*

Determining the nature of impact

The key consideration of the impact is upon the structure and functionality of the habitat and whether or not the impact can be described as causing 'serious or irreversible harm'. For 'less sensitive' habitats, this is defined by the MSC as reductions in habitat structure and function, such that the habitat would be unable to recover to at least 80% of its hypothetical climax state within 20 years, if fishing were to cease entirely. This is the stable state to which a habitat would eventually recover to towards the end of an ecological succession, in existing environmental and anthropogenic conditions.

For 'more sensitive' habitats (including VMEs), the expectation is greater, and the assessment will therefore seek to verify that the fishery is unlikely to reduce (or is unlikely to have reduced) 'more sensitive habitats' structure and function to below 80% of the unimpacted level (as previously defined).

Determining the scale of impact

As well as the composition of the habitat and the nature of the change (both described above), the final element to consider is the scale of the impact. The MSC guides CAB auditors to primarily consider the full area managed by the local, regional, national or international governance body(s) responsible for management in the area(s) where the fishery operates (the 'managed area' for short). However, consideration can also be given to the habitat where its range extends beyond this.

When determining the level of impact, CAB auditors are required to give an indication of the level of confidence in the conclusion, using the following scale:

- SG60 'unlikely': no more than a 40% probability.
- SG80 'highly unlikely': no more than a 30% probability.
- SG100 'evidence': no more than a 20% probability.

Where there is inadequate information on the habitats encountered and where there is not information on the impact of the fishery on habitats encountered, PI 2.3.1 is scored using the MSC's Risk-Based Framework. The risk-based approach for scoring habitats is known as the Consequence Spatial Analysis (CSA). It involves determining a risk score on the basis of proxies for gear type, overlap of gear with habitat, substratum characteristics, biota characteristics and natural disturbance. This is further described in Annex 1 Risk-Based Framework.

In addition, the MSC provides a Benthic Impacts Tool in the MSC Toolbox, which can be used to score habitat impacts in more data rich situations.

Two scoring issues are considered under this PI:

(a) Less sensitive habitats

(b) More sensitive habitats

Scoring issue (a) – Less sensitive habitats

The first scoring issue assesses the likelihood of the UoA causing serious or irreversible harm to less sensitive habitat(s). Note that there can be more than one less sensitive habitat.

Scoring issue	SG60	SG80	SG100
(a) Less sensitive habitats	The UoA is **unlikely** to reduce structure and function of **less** sensitive habitats to a point where there would be **serious or irreversible harm.**	The UoA is **highly unlikely** to reduce structure and function of **less** sensitive habitats to a point where there would be **serious or irreversible harm.**	There is **evidence** that the UoA is **highly unlikely** to reduce structure and function of **less** sensitive habitats to a point where there would be **serious or irreversible harm.**

Good practice

Good practice requires either a very low interaction between the fishing gear and seabed habitats, or, where the gear does interact with the habitat, that the level of interaction does not lead to significant changes in the habitat structure and function (or that any such impacts would be rapidly reversible). In addition, the fishery is able to provide evidence that the interaction between the gear and the less sensitive habitat does not lead to serious or irreversible harm.

What CAB auditors check

CAB auditors are likely to inform their scoring conclusions during stakeholder meetings with fishermen, but this may be augmented by meetings with gear manufacturers, marine environmental scientists, and government officers responsible for marine habitats or representatives of local environmental NGOs. However, justifications will also be supported by evidence taken from (where available):

- Evidence of fishing patterns (i.e. VMS plots).
- Seabed habitat maps.
- Seabed habitat images.
- Assessments of gear impact on less sensitive habitats – ideally peer reviewed.
- Assessments of rate of recovery from fishing for relevant gears and habitats – ideally peer reviewed.
- Assessment of efficacy of any gear modifications.
- Ecosystem modelling (if available) which captures the habitat functionality.
- Any time series that may provide an indication of changes in less sensitive habitat status over time.

Scoring issue (a) – Less sensitive habitats

Key questions to determine if further action is needed

- **Q** Is there a good understanding of the less sensitive habitats in the managed area?
- **Q** Can the substratum, geomorphology and biota of the less sensitive habitats be described?
- **Q** Is the preferred habitat of the target (P1) species known and well described?
- **Q** Is there any evidence (such as from the documents listed above) that can support the conclusion that the fishery is not causing any serious or irreversible harm?
- **Q** Are there areas protected from fishing or where fishing does not occur where the habitat being assessed is in a favourable status?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Scallop dredge fishery:* The only less sensitive habitat identified is 'fine sediments – flat – no flora and fauna'. The habitat is considered less sensitive as comparable habitats have been estimated to recover to at least 80% of their unimpacted state within 20 years. Some research on the interaction of this habitat type with scallop dredging has been done and shows that scallop dredging causes long-term reductions in habitat structure in shelf areas. Mobile demersal fishing gear reduces seafloor habitat complexity by homogenising the sediment, smoothening sediment waves, rolling boulders, and killing structure-building fauna. Minimal research has been done to determine the recovery time of this habitat following impact from this specific gear type; however, research from similar gear types on similar habitats can be used to extrapolate that the fishery is unlikely (<40% probability) to hinder recovery to at least 80% of its hypothetical climax state within 20 years. In addition, although this fishery causes significant alteration of habitat cover/ mosaic that causes major change in the structure or diversity of the species assemblages, parts of some scallop grounds are permanently closed to scallop fishing. Therefore, it is unlikely that this fishery causes serious or irreversible harm to the less sensitive habitat. SG60 is met.

Scoring issue (a) – Less sensitive habitats

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG80	*Shrimp demersal trawl fishery:* The only less sensitive habitat identified is 'fine sediments – flat – infauna'. The habitat is considered less sensitive based on benthic impact studies showing that recovery to at least 80% of the unimpacted state occurs within 5-10 years. The fishery takes place in a restricted band of coastal water within the country's EEZ, with no fishing permitted within 10nm of the coast. Due to the relatively shallow waters and low towing speeds, there is less need for large heavy trawl doors and ground gear. Trawls are kept open using lightweight otter boards made of wood, reinforced by a skid made of steel. The seabed environment where the fishery occurs is characterised by relatively stable, dynamic mud with low structural complexity due to natural sedimentation processes. The MSC Benthic Impacts Tool was applied by a consultant to predict the relative benthic status and recovery trajectory for the fishery impacts on this habitat. Standard depletion rates and default recovery rates provided by the tool were used. Based on the recovery trajectory, there is <30% probability that the fishery will reduce structure and function of this habitat to a point where there would be serious or irreversible harm. SG80 is met.
SG100	*Herring pelagic trawl fishery:* Pelagic trawl gear is not designed to withstand impacts with solid objects and is not intended to be fished on or close to the seafloor. This gear is fished in pelagic habitats only and while the pelagic gear has heavy trawl doors designed to make the gear sink, the warp length and tow speed mean that this does not contact the seabed except in unforeseen events. Such events are required to be reported in logbooks and by independent observers, but none were reported in the fishery within the past five years. Herring is a pelagic species that apart from demersal spawning events spend their entire lifecycle above the seabed. Because they are a shoaling pelagic species, herring are most efficiently caught using pelagic trawls, which are used to fish the upper layers of the water column. There is evidence that the fishery is highly unlikely to cause serious or irreversible harm to any benthic habitat since none are encountered. SG100 is met.

Scoring issue (b) – More sensitive habitats

The second scoring issue of PI 2.3.1 assesses the likelihood of the UoA causing serious or irreversible harm to more sensitive habitats and only applies when more sensitive habitats are encountered. Where multiple habitats are defined as being more sensitive, these should be scored separately.

Scoring issue	SG60	SG80	SG100
(b) More sensitive habitats	The UoA is **unlikely** to reduce structure and function of **more** sensitive habitats to a point where there would be **serious or irreversible harm.**	The UoA is **highly unlikely** to reduce structure and function of **more** sensitive habitats to a point where there would be **serious or irreversible harm.**	There is **evidence** that the UoA is **highly unlikely** to reduce structure and function of **more** sensitive habitats to a point where there would be **serious or irreversible harm.**

Good practice

To perform well against this scoring issue, the interaction of the gear with more sensitive habitats should not lead to significant changes in the structure and function of those habitats. In addition, the fishery is able to provide evidence that the interaction of the gear with more sensitive habitats does not lead to serious or irreversible harm. The MSC defines serious or irreversible harm to more sensitive habitats as any reduction in habitat structure and function below 80% of the unimpacted level.

What CAB auditors check

CAB auditors are likely to inform their scoring conclusions with stakeholder meetings with fishermen, but this may be augmented by meetings with gear manufacturers, marine environmental scientists, and government officers responsible for marine habitats or representatives of local environmental NGOs. However, justifications will also be supported by evidence taken from (where available):

- Evidence of fishing patterns (i.e. VMS plots).
- Seabed habitat maps.
- Seabed habitat images.
- Maps of the distribution of any more sensitive habitats, including any habitats defined as VME that occur in the fishery's managed area.
- Assessments of gear impact on more sensitive or VME habitats – ideally peer reviewed.
- Assessments of rate of recovery from fishing for relevant gears and habitats – ideally peer reviewed.
- Assessment of efficacy of any gear modifications.
- Ecosystem modelling (if available) which captures the habitat functionality.
- Any time series which may provide an indication of changes in more sensitive and/or VME habitat status over time.
- Any historical data which provide an indication of the unimpacted level.

Scoring issue (b) – More sensitive habitats

Key questions to determine if further action is needed

- **Q** Is there understanding about the presence of all possible habitats that could be classified as more sensitive, including any habitat designated as a VME in the managed area?
- **Q** Is there any mapping that captures the location and distribution of more sensitive habitats (including VMEs)?
- **Q** Have there been dedicated studies looking at the status of more sensitive habitats in the managed area?
- **Q** Can it be demonstrated that the gear would not cause serious or irreversible harm to the more sensitive habitats (including VMEs), if encountered?
- **Q** Are the impacts of fishing on more sensitive habitats managed, including by means of protection?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Cod demersal trawl fishery:* The only more sensitive habitat identified is 'biogenic reefs – low relief – large erect'. This habitat is considered to be more sensitive as studies have demonstrated that this habitat typically requires more than 40 years to recover to at least 80% of its unimpacted state. Locations of reefs within the managed area have been mapped. In the southwest portion of the managed area, these reefs are protected through a series of closed areas, but there are no such closed areas in the northeast. However, national regulations state that intentional and negligent destruction of known biogenic reefs is prohibited and precaution is required when fishing in the vicinity of known biogenic reefs. VMS data on the spatial distribution of fishing effort coupled with the known historical distribution of the habitat show that the fishery only impacts 15% of the biogenic reef within the managed area. Anecdotal evidence from vessel captains suggests that substantial hauls of biogenic organisms are rare. Further, the risk of gear loss represents a fundamental constraint on severe impacts on these reefs. Although trawling poses a risk to this habitat, the area of overlap is low and fishing vessels will avoid areas where loss of gear is likely, so it unlikely (‹40% probability) that the fishery would reduce habitat structure and function to the point where there would be serious or irreversible harm. SG60 is met.

Scoring issue (b) – More sensitive habitats

Examples of scoring rationales – *continued*

Scoring issue (b)	Fishery Example
SG80	*Shrimp otter trawl fishery*: The only more sensitive habitat identified is 'solid reef - flat – large erect', specifically corals as studies on this habitat type show that recovery to at least 80% of unimpacted levels take longer than 20 years. Otter trawl gear is known to impact habitat structure and function. Coral, which would be particularly vulnerable to trawl impact, are mainly located outside the fishing area and managed area. Only about 5% of the coral within the managed area were ever impacted by the fishery, and this impact last occurred 30 years ago. Skippers aim to reduce fuel costs so gear contact with the seafloor is minimised by using shorter hauling ropes. The fishery is also testing the use of semi-pelagic doors to reduce the impact further. Additionally, since bycatch of coral would affect the shrimp catch negatively, known coral areas are actively avoided. VMS data confirm this. Further, fishing in new areas is regulated by national regulations, so it is unlikely that the fishery will encounter new, unknown corals. The limited spatial intensity of the fishery, the change to the lighter gears, and the fishery's avoidance of known coral areas makes it highly unlikely for this fishery to reduce habitat structure and function to a point where there would be serious or irreversible harm. SG80 is met.
SG100	*Hake demersal longline fishery:* The only more sensitive habitat identified is coral (Lophelia sp). Longlines are a bottom-set gear held in place by weights and using floating lines, so there is limited potential for lines to impact on the bottom habitat. Any impact results only from the direct impact of anchors or the movement of anchors due to currents or drag from the gear until the anchor flukes have fully set or at the time of hauling. However, it can be concluded that bottom longline fisheries may be employed without significant habitat damage. There is extensive habitat mapping of the managed area, so all coral areas are known, and there is international legislation to protect VMEs by closing all coral areas to bottom fishing. VMS data provide an effective tool to verify that this fishery never fishes these closed areas, which have been in place for the last 40 years. Therefore, the fishery has had a negligible impact on the historical distribution of coral. There is evidence that it is highly unlikely that this fishery causes serious or irreversible harm to coral. SG100 is met.

Challenges and solutions to meeting PI 2.3.1

There are a number of challenges to meeting this PI, in particular in jurisdictions where marine habitat research and dedicated habitat management has not been prioritised. These may include:

- Need for specialist expertise to undertake the research needed to identify habitat impacts and to map habitat types, including more sensitive habitats.
- Studies on habitat require specialised skills and technology as well as time to undertake the work and can therefore require a considerable financial commitment. This may be a challenge within existing budgetary constraints.
- In certain fisheries it is extremely difficult and costly to measure impacts on habitat (e.g. measuring the impact of trawl gear in deep water or on VMEs requires highly sophisticated equipment such as remotely operated vehicles and other specialised research vessels).

If information is available, it is generally difficult to assess the actual impacts of the fishery on all relevant habitat types. Invariably, well-established fisheries have historically impacted habitat and have in effect 'altered' the system to an extent. The challenge is to understand the ongoing effects and to consider if habitat rebuilding is needed or if the status quo should be maintained.

Where there is limited availability of information the habitats encountered and the impact of the fishery on the habitat, the Consequence Spatial Analysis (CSA) can be used (Annex 1 Risk-Based Framework).

Example process and actions to improve performance against PI 2.3.1

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Review the current level of knowledge of key parameters related to habitat impact – such as fleet fishing patterns, habitat mapping, gear impact studies and rate of recovery studies.	(a), (b)
●				Define habitats according to substratum, geomorphology and biota. This should include any habitats within the managed area that are designated as VME.	(a), (b)
●				For each habitat determine the theoretical rate of recovery in order to categorise each habitat into either 'less sensitive' or 'more sensitive'. Any previously designated VMEs are included in the assessment as 'more sensitive'.	(a), (b)
	●			Update information base as required, either by undertaking research locally or drawing on relevant studies from comparable fisheries.	(a), (b)
	●			At the very least obtain an up-to-date map of fishing effort, and a map representing the current state of knowledge of local habitat distributions, highlighting the locations of each habitat type (including more sensitive habitats, which may include designated VMEs), should be available to managers/CAB auditors.	(a), (b)
		●		Consider potential for mitigation through gear improvements and use of alternative fishing gear, spatial controls (e.g. zoning and protected areas), etc. Also identify whether any other fisheries in the area (including MSC certified UoAs) already have measures in place to align with.	(a), (b)
		●		Take legislative, regulatory or capacity building steps required to implement mitigation measures – or detail procedures to ensure voluntary compliance.	(a), (b)
		●		Initiate any necessary further appropriate research on habitat and gear interactions.	(a), (b)
			●	Design on-going monitoring requirements to ensure changes in habitat over time are captured and to ensure that any mitigation measures implemented are achieving their objectives. This may include independent at-sea monitoring of habitat impacts.	(a), (b)

Notes

2.3.2 Habitats management strategy

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Performance Indicator overview

The second habitat PI requires that there is management in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to habitat types. The scoring issues focus on ensuring that a management strategy is in place, which is considered likely to work, and that there is some evidence that the strategy is meeting its objective(s). There is also a requirement that the UoA complies with any additional relevant management measures which may be in place in other overlapping MSC certified fisheries.

The management that is in place should be appropriate to the scale and intensity of the fishery, so higher scale, more potentially impacting fisheries or fisheries overlapping more sensitive habitats (including designated VMEs) may be expected to require a higher degree of management. Typically, management should include (if necessary):

- Information based decisions, which draw upon, for example:
  - Understanding of the scale of the activity.
  - Understanding of the habitat types in the management area, their status and their key characteristics (e.g. vulnerability to impact or rate of recovery).
  - Understanding of the scale of impact.
- A strategic combination of management measures designed to limit or mitigate for any adverse impacts. These may include:
  - Technical measures (such as restrictions on fishing gear, spatial or temporal restrictions).
  - Spatial protection measures (such as Marine Protected Areas, MPAs).
  - Research and monitoring program tailored to the needs of management.
  - Limited fleet access or effort, or further expansion.
  - A regulatory basis, detailing clear departmental responsibility and supported by appropriate resources to enable effective management.
  - Measures to ensure/incentivise compliance.
  - Periodic review/evaluation including review of alternative measures.

Four scoring issues are considered under this PI:

(a) Management strategy in place

(b) Management strategy effectiveness

(c) Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect more sensitive habitats

(d) Ghost gear management strategy

Scoring issue (a) – Management strategy in place

The first scoring issue looks at the extent of the management in place to address the fishery's impact on habitats to ensure that there are no serious or irreversible impacts to those habitats.

Scoring issue	SG60	SG80	SG100
(a) Management strategy in place	There are **measures** in place, **if necessary**, that are expected to achieve the habitat outcome SG 80 level.	There is a **partial strategy** in place, **if necessary**, that is expected to achieve the habitat outcome SG 80 level or above.	There is a **strategy** in place for managing the impact of all MSC UoAs/ non-MSC fisheries on habitats.

Good practice

Good practice requires there to be a cohesive, strategically designed set of measures for addressing the particular habitat interaction. Even fisheries that do not regularly contact benthic habitats should have a management strategy in place to mitigate the impact, since gear loss or unexpected seafloor change could occur. At SG100, the fishery is expected to have a comprehensive management plan to ensure that that all fishing activities do not cause serious or irreversible harm to habitats (including more sensitive habitats, which may include designated VMEs). This comprehensive management plan should include other MSC fisheries and non-MSC fisheries and is focused on ensuring that there is combined management that ensures that impact on habitats is mitigated.

What CAB auditors check

All consideration of habitat management will be placed in the context of the habitat outcome status (2.3.1) and the supporting evidence – i.e. studies relating to habitat types, gear interactions and area of fleet operation. In addition, CAB auditors will look for evidence of management which is appropriate to the scale of the impact of the gear on the habitats in the fishery area. Ideally, CAB auditors would speak with a representative of a government department or administrative body with oversight of marine habitats, with clear responsibility for managing the impact of fisheries – in particular on more sensitive habitats (which may be subject to designation and additional protection measures). Supporting evidence may include:

- Evidence of spatial management measures applied within the management jurisdiction, such as areas closed to particular gears, no take zones or measures applied to identify and protect more sensitive habitats.
- Evidence of technical management measures applied to the fishery, such as restrictions on gear design or overall effort.
- Evidence of additional voluntary measures undertaken by the fishery to minimise habitat impacts.
- Evidence of clear management oversight of habitat impacts from the fishery, within the management jurisdiction, such as studies demonstrating an impact and a clear management response.
- Evidence of any statutory requirements for impact studies.

Scoring issue (a) – Management strategy in place

Key questions to determine if further action is needed

Q Does the management authority identify habitats, consider the potential for impact on these habitats from fishing and take appropriate management action?

Q Is there clear administrative responsibility for managing the impacts of fishing on habitats?

Q Has the fishery or management authority specifically considered what the impacts of the fishery may be on habitats and designed a cohesive set of measures to ensure the fishery does not cause serious or irreversible harm to habitats? And is this documented?

Q Has management done all it reasonably can to ensure that the impact of the fishery on habitats does not cause serious or irreversible harm?

Q Does management make use of the information described in PI 2.3.3 to continue to verify that management is achieving its objectives?

Q Are there any other MSC fisheries or non- MSC fisheries which impact on habitats? Is the impact of any other fisheries covered in the management strategies? Are these other fisheries subject to the same rules and regulations to minimise impact on more sensitive habitats?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Saithe trawl fishery:* There are several measures in place to avoid trawling in more sensitive habitat areas. Areas with carbonate mounds have been closed to all bottom trawling and the tracking of fishing vessels by VMS (position given every two hours) make it highly unlikely that these rules are being breached. In addition, the vessels of the fishery have signed up to a management program to promote responsible fishing. This includes agreements to protect spawning areas for target species by not trawling in inshore areas. SG60 is met.

Scoring issue (a) – Management strategy in place

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG80	*Rock lobster trap fishery:* There is a good understanding of habitat types in the area and in broad terms the restriction of fishing gear to traps set on hard substrata is a relevant management measure which will restrict habitat damage, particularly as it avoids interaction with more sensitive habitat types. The short fishing seasons at each island further limit the number of traps being set. The team considered that these measures together comprised a 'partial strategy' to avoid habitat damage, with a reasonable basis for confidence that it would work, given that past and recent habitat surveys do not indicate any signs of damage. However, it cannot be said that there is a formal strategy, nor have impacts of fishing gear on habitats been directly tested. SG80 is met.
SG100	*Inshore multi-species groundfish dredge, gillnet, trap and line fishery:* The management is based around a bioregional marine planning framework, which uses an ecosystem-based fisheries management approach involving ecological risk assessments. Management takes a precautionary approach to risks identified for habitats and includes closed areas for a variety of gears to protect aggregations of more sensitive habitats and a system of marine protected areas, offering more permanent protection from any bottom-contacting gears. Habitat mapping is in place and strategic research addresses any remaining information gaps on the impacts of fishing on habitats, as well as the relative health of relevant habitats. Results are routinely used to inform fishery management decisions. There is another MSC fishery also operating in this area and this fishery is also subject to the bioregional marine planning framework, so this impact is included in the strategy to manage impacts on habitats. SG100 is met.

Scoring issue (b) – Management strategy effectiveness

The second scoring issue relating to the management of habitat impacts assesses the degree of supporting evidence to demonstrate that the management described in 2.3.1 will meet its objectives.

Scoring issue	SG60	SG80	SG100
(b) Management strategy effectiveness	The **measures, if necessary,** are considered **likely** to work, based on **plausible argument.**	There is some **evidence** that the measures/ partial strategy, **if necessary,** is achieving the objectives set out in SI (a), based on **information directly about the UoA and/or habitats** involved.	There is evidence that the **partial strategy/ strategy** is achieving the objectives set out in SI (a), based on **information directly about the UoA and/or habitats** involved.

Good practice

Good practice requires that there is some empirical supporting evidence, sufficient to provide a high degree of confidence that the management will work. This may include systematic monitoring or research providing reliable information on all major points of interaction between the fishery and the habitat(s) appropriate to the scale and intensity of the fishery.

What CAB auditors check

In addition to those sources detailed above for SI (a), CAB auditors may look for further evidence contained in:

- Any reviews or evaluations of the implemented management measure/partial strategy/strategy, either at the level of the fishery or the overall jurisdictional level, that indicate the likelihood of success of the management in place.
- Any information that covers the habitat(s) impacted by the fishery that has been used by management to help determine the effects of habitat management measure/partial strategy/strategy.
- Any evaluations of the management jurisdictions adherence to international commitments on the protection of VMEs.
- Any published reviews indicating the effects of any gear modifications or operational measures on the impacted habitats.

Scoring issue (b) – Management strategy effectiveness

Key questions to determine if further action is needed

Q Is there a plausible argument to offer confidence that the management measures/ partial strategy/strategy described in scoring issue (a) will work to safeguard the habitats from serious or irreversible harm?

Q Is there evidence available to support this 'plausible argument'?

Q Do the management feedback mechanisms in place provide confidence that the management measures/partial strategy/strategy are achieving their objectives?

Q Is there information available on the fishery's habitat impacts to enable the effects of different management measures to be tested?

Q Is there a requirement to review or evaluate management measures in place to safeguard habitats – in particular more sensitive habitats?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Scallop dredge fishery: T*he fishery has implemented management measures (spatial, gear, and effort restrictions) to protect the commonly encountered habitats and has established a series of closed areas to protect identified more sensitive habitats. These measures are considered likely to work, based on plausible argument, although this argument is partially based on research papers which have reviewed the success of similar spatial and effort restrictions in other comparable fisheries. SG60 is met.
SG80	*Shrimp twin-rig demersal trawl fishery:* The fishery's partial strategy includes spatial restrictions and a cap on fishing effort. When considering the known nature of the fishery and the habitats encountered, combined with evidence from annual drop camera deployment, there is some evidence the partial strategy is working to protect the habitat from serious or irreversible harm. SG80 is met.
SG100	*Mussel dredge fishery:* There is a good understanding of mussel bed dynamics as well as distribution of the habitats and their likely vulnerability to fishing activities. The impact of the gear has also been tested in these mussel beds with dedicated research. The local inshore management authority and statutory nature conservancy agency has approved the gear's continued use on the mussel beds, following a comprehensive assessment of impacts. This included modelling of habitat impacts under a range of possible management scenarios (including varying sizes of area closures) which were under consideration. This concluded that the existing management is ensuring that habitat impacts are negligible, primarily due to the dynamic nature of naturally occurring mussel beds within the estuary. Monitoring of habitat status is also on-going. There is therefore sufficient information and testing that the strategy is working to achieve its objectives. SG100 is met.

Scoring issue (c) – Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect more sensitive habitats

The third scoring issue relating to the management of habitat impacts is intended to ensure that there is compliance with management measures for the protection of more sensitive habitats, including those which may have been put in place by other fisheries (including any previously certified MSC UoAs). This SI therefore only applies if the fishery impacts (or potentially impacts) a more sensitive habitat (including designated VME), which has been afforded protection, through management (including management applied by another fishery). There is a requirement that the UoA complies with any such applicable management, such as:

1. Area closures that are scientifically based and clearly aimed at the precautionary protection of more sensitive habitats – as opposed to closures designed for other purposes (e.g. to establish a fishery's market advantage);
2. Area closures (arising from move-on rules) or other management measures implemented by other MSC fisheries; and
3. Move-on areas implemented by non-MSC fisheries if the area coordinates are publicly available.

Scoring issue	SG60	SG80	SG100
(c) Compliance with management requirements and other MSC UoAs'/ non-MSC fisheries' measures to protect more sensitive habitats	Information is adequate to **broadly understand** compliance in the UoA with management requirements to protect **more** sensitive habitats.	Information is adequate to **determine**, with a **high degree of accuracy**, compliance in the UoA with both its management requirements and protection measures afforded to **more** sensitive habitats by other MSC UoAs/non-MSC fisheries, **where relevant.**	Information is adequate to **determine**, with a **very high degree of accuracy**, compliance in the UoA with both its management requirements and with protection measures afforded to **more** sensitive habitats by other MSC UoAs/non-MSC fisheries, **where relevant.**

Good practice

Good practice requires a stronger evidence base of compliance with both the fishery's own management requirements to protect more sensitive habitats, as well as those implemented by other relevant MSC and non-MSC fisheries.

What CAB auditors check

CAB auditors will initially be required to review the management requirements for the fishery. At the SG80 and SG100 levels, CAB auditors will also assess whether or not the fishery complies with relevant protection measures implemented by other MSC fisheries, which may require contact with other CAB auditors, and non-MSC fisheries. This will be supported by:

- Evidence that the fishery complies with any management measures applied within the 'managed area', such as areas closed to particular gears, no-take zones or measures applied to identify and protect more sensitive habitats.

Scoring issue (c) – Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect more sensitive habitats

What CAB auditors check – *continued*

- MSC assessment reports of other relevant MSC fisheries detailing any habitat management strategies.
- Any publicly available coordinates for closed areas or move-on areas that have been established by non-MSC fisheries.
- Where management measures in other MSC or non-MSC fisheries are not complied with, evidence detailing why the protective measure is not required for the fishery (i.e. is not 'relevant').

i It should also be noted that when assessing this scoring issue, CAB auditors are required to apply the MSC 'Evidence Requirements Framework' (which is contained within the 'MSC Fisheries Standard Toolbox') to help determine the accuracy of the available information. For this scoring issue, the assessment shall consider which trueness guidepost (TG) is met.

Key questions to determine if further action is needed

Q Does the management strategy for this fishery recognise and seek to comply with any specific habitat protection measures in place to address the impacts of MSC and non-MSC fisheries?

Q Has the design of the management strategy been tailored to ensure it is compatible with similar strategies in other fisheries?

Q Is the management sufficient to ensure the cumulative impact of all MSC and non-MSC fisheries does not cause serious or irreversible harm to any habitats that have been classified as more sensitive or any habitat which has been designated as VME by any of the relevant management authorities?

Q Is the robust and independent evidence available to demonstrate compliance?

Scoring issue (c) – Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect more sensitive habitats

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	*Clam hand collection fishery:* The fishery client has voluntarily established some closed areas to protect known more sensitive habitats within the 'managed area'. Training is provided at the start of each season to remind fishers of the closed areas. Given the nature of the fishing method, interactions with more sensitive habitats are very rare. Enforcement officers from the management agency regularly patrol the managed area throughout the fishing season, with at least 1-2 patrols per month. Interviews with an enforcement officer confirmed that they have never seen fishers in the closed areas, however there is no quantitative evidence to support this. Stakeholders interviewed (including NGOs and fisheries managers) also indicated that there is no anecdotal evidence or concerns that fishing is occurring in the closed areas. There is potential for bias to exist in the information but given the nature of the fishery and independent qualitative information from enforcement agency and other stakeholders, its effect on trueness can be anticipated and is not considered to be consequential. Following the application of Evidence Requirements Framework, it's concluded that TG1 is met. As such information is adequate to broadly understand compliance with management measures to protect more sensitive habitats. SG60 is met.
SG80	*Mussel dredge fishery:* The fishery client established one voluntary closed area based on previous encounters with more sensitive habitats. The management entity has closed two additional areas to all bottom-contacting gear. Vessels are all equipped with maps that identify the fishery and management-based closed areas. Enforcement is primarily based on patrols by air and sea by officers from the fisheries enforcement agency and coast guard. Patrols are organised on a risk basis (with more conducted during certain seasons and in high-risk areas), rather than on a statistical representativity basis. In the last five years no non-compliances have been detected in the fishery. The fishery has scientific observers on board for ~30% of trips annually. Their role is to record catches (including of any habitat-forming species) and geo-locations of where fishing took place. Records are submitted to the management agency primarily for scientific purposes, but are also used for enforcement purposes to confirm locations fished recorded in fisher logbooks. The observer coverage is representative of the fishery. Observer data over the past 5 years confirms that the fishery avoids the relevant closed areas. Sanctions for fishing in a closed area are severe, so fishers are generally thought to comply. There is limited potential for bias to exist in the information and its effect on trueness is generally understood, but there is no additional independent data (e.g., VMS data) to further mitigate sources of bias. TG2 of the Evidence Requirements Framework is met. Therefore, information is adequate to determine compliance with habitat management measures with a high degree of accuracy. SG80 is met.
SG100	*Plaice set net fishery:* The fishery has established three of its own closed areas where it encountered more sensitive habitats in the past. This fishery operates in the same area as one non-MSC set net fishery and one other MSC fishery, a demersal trawl fishery. After encountering more sensitive habitats, the non-MSC fishery closed two additional areas and made these coordinates publicly available. Upon receiving this information, the fishery also closed these areas. The overarching management entity has established five no-trawl zones, which are avoided by the other MSC fishery. Since the UoA in question does not use demersal trawl, it is not required to avoid these no-trawl zones. The fishery has VMS data which is reviewed regularly by the enforcement agency for enforcement purposes in management-designated closed areas, and at the client request, also considers whether there any non-compliances that have been detected in the voluntary closed areas. Logbooks are also required to be completed with information on set net locations. The logbook and VMS data for the past three seasons correspond well and confirm that the fishery avoids all the relevant closed areas (i.e., its own closed areas plus those of the non-MSC set net fishery and the management entity). Following the application of the Evidence Requirements Framework, TG3 is met. Most potential sources of bias have been mitigated, so the information is adequate to determine with a 'very high degree of accuracy'. SG100 is met.

Scoring issue (d) – Ghost gear management strategy

The final scoring issue of PI 2.3.2 relates to efforts made to ensure that any ghost gear (i.e. lost or abandoned fishing gear) does not impact upon habitats. Impacts might include physical damage from ghost gear on habitats.

Scoring issue	SG60	SG80	SG100
(d) Ghost gear management strategy	There are **measures** in place, **if necessary**, for the UoA that are expected to **minimise** ghost gear and its impact on all habitats.	There is a **partial strategy** in place for the UoA, **if necessary**, that is expected to **minimise** ghost gear and its impact on all habitats.	There is a **strategy** in place for the UoA, **if necessary**, that is expected to **minimise** ghost gear and its impact on all habitats.

Good practice

In situations where it can be demonstrated that there is no (or negligible) risk of ghost gear impacts on habitats, then it can be concluded that management is not "necessary", which means that SG100 is met. By contrast, if there is a risk of ghost gear impacts on habitats, then a strategy is required (at the SG100 level), which is expected to minimise impacts from ghost fishing to the extent that any impact would be negligible. It should be noted also that any lost, discarded or abandoned Fish Aggregating Devices (FADs) will be considered to be ghost gear and therefore management will need to address and minimise the impacts.

What CAB auditors check

The CAB auditors will seek evidence to determine whether the risk of impact from lost, abandoned or discarded gear on habitats can reliably be concluded to be either negligible or zero. This may be based on:

- Evidence of from gear studies.
- Evidence from reviews of ghost gear impacts across gear types.
- Stakeholder consultations focused on obtaining an understanding of the operational on-board practices.
- Interviews with skippers / crews / on-board observers.
- Marking and identification of fishing gear.
- Spatial and/or temporal measures to reduce gear conflict.
- Fishing input controls to limit gear use (e.g. limits on soak time for passive gear types).
- Gear design to reduce whole or partial loss of the fishing gear (including technology to track gear position).
- Vessel design to reduce discarding of gear and other aquatic litter.
- Use of end-of-life fishing gear disposal facilities.
- Fisher education and awareness on preventing gear loss.

Where there is a risk of ghost gear impacts, the CAB auditors will wish to review the management measures that are in place to mitigate the impacts and the extent to which measures have been strategically combined to enable a more informed and therefore potentially adaptive approach to management on impacts. Potential measures might include:

Once the CAB auditors have an understanding of the extent of management measures and the degree of strategic linkage, they will seek evidence as to the efficacy of those measures. For each measure, is there objective and independent evidence of implementation and is there any indicator metric to show whether the objectives of management (i.e. to minimise to negligible any ghost gear impacts) is being achieved?

Scoring issue (d) – Ghost gear management strategy

Key questions to determine if further action is needed

- **Q** What is the potential for ghost gear fishing impacts on habitats from the gear used by the fishery?
- **Q** Is there any objective evidence available to support any claims that the impact of lost, abandoned or discarded gear on habitats is negligible?
- **Q** What measures are in place to ensure that there is minimal lost, abandoned or discarded fishing gear?
- **Q** Has any review been carried out of potential effectiveness of the measures?
- **Q** Have the results and recommendations of any review or testing been implemented within the management system? If so, is there evidence of implementation?

Examples of scoring rationales

Scoring issue (d)	Fishery Example
SG60	*Tuna purse seine using drifting FADs (dFADs):* No purse seine nets have been reported lost, and the high value of these nets mean that even if lost the fishery would make every effort to recover nets. The main risk of ghost gear impacts is from the dFADs, particularly on coral reefs within the managed areas. There is a record of number of dFADs released annually but no information on the number lost or retrieved, with dFADs marked but not tracked. The dFADs used in this fishery all have a non-entangling design, but this design is more relevant for ensuring that the gear does not continue fishing species rather than mitigating habitat impacts. SG60 is met.
SG80	*Octopus trap:* Traps are set on sandy bottoms near reefs or seagrass beds. Fishers are required to mark their traps and report any lost traps in their logsheets. A total of 300 traps were lost over a five-year period, the majority (>200) of which were lost during a winter of unusually high storm activity and big swells. The traps have a unique design and can be expensive to replace, so fishers actively seek to retrieve lost gear. Of the 300 traps reported as lost, more than half were recovered. To prevent future trap loss, a predictive warning system has been developed to alert fishers to get their traps out of the water when swell conditions are in place. Since its implementation, annual reported trap loss is much lower (~2-5 per year). Together, these measures constitute a partial strategy that is expected to minimize ghost gear impacts on habitats. SG80 is met.
SG100	Hand-dived abalone: Abalone is hand collected from shallow coastal waters. Abalone divers work on small vessels (<10m) using a 'hookah' (surface supplied air breathing apparatus) and apply an abalone 'iron' to prise abalone off rocks. There have been no reports of loss of the 'hookah' or 'irons' used in the fishery, and in any case the risk that these items pose to habitats is negligible. As such, a strategy to minimize ghost gear impacts is not necessary. SG100 is met.

Challenges and solutions to meeting PI 2.3.2

Ideally, implementation of precautionary management should never be delayed due to lack of information. Instead, good management theory suggests that reduced levels of information should just lead to increased levels of precaution. However, in practice it may also be recognised that management is typically only introduced (and included in budget considerations) once there is an awareness of the need for management. The development of management therefore often only occurs following an awareness of the distribution of habitats, and in particular more sensitive habitats (including any which are designated as VME), within the management jurisdiction and an awareness of the potential for fishing gear to impact those, potentially to the point of serious or irreversible harm.

It is therefore likely that management will be less advanced where there is poorer understanding of both the seabed habitats and the potential of fishing gear to impact those habitats. Efforts to develop management will often start by saying 'we need more evidence', which may be costly, complex and time consuming to collate and may be beyond the capacity, or beyond the short term priorities of the administration. Taking genuinely precautionary measures in the absence of such an information base would reflect a commendable adherence to the precautionary principle, but may locally prove politically challenging.

Once management measures or strategies have been agreed upon, there may be a delay in getting these implemented and through the relevant regulatory amendments. There is also likely to be a cost of monitoring to verify the effectiveness of the management measures and to ensure good compliance. More voluntary measures at a fleet level may face similar challenges such as the difficulty in getting agreement, the cost of modifications, and the challenge of independently demonstrating that the agreement is achieving its aims.

Example process and actions to improve performance against PI 2.3.2

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Review the habitat management measures in place, including any in place in other MSC fisheries and relevant non-MSC fisheries.	(a), (c)
●				Review the current level of knowledge of key parameters related to habitat impact – such as fleet fishing patterns, habitat mapping, gear impact studies, rate of recovery studies (as undertaken for PI 2.3.1).	(a)
	●			Summarise the potential for interaction and impact between the fishery and the habitats within the managed area, highlighting those that are considered 'more sensitive' (including VME) habitats and highlighting where there is a potential for serious or irreversible harm.	(b)
	●			Evaluate a range of possible habitat management measures that may mitigate against the risk of serious or irreversible harm to the identified habitats. These are likely to include spatial measures, technical measures and/or changes to operational practice.	(a), (b)
	●			Undertake any further or on-going data collection/research as required by management. This could include engaging the fleet in the collection of fishery-dependent data.	
		●		Consider the administrative, legislative, financial, data and research requirements necessary to incorporate management measures into a cohesive strategy. Ensure that these are in place.	(a), (b)
			●	Undertake periodic evaluation of the performance of the designed management strategy to ensure that the objectives are being met or, where not met, that management is adjusted accordingly.	(b)
			●	Ensure control and enforcement measures are tailored to the needs of the habitat strategy in order to ensure good compliance with measures contained within the strategy.	(b)
			●	Ensure measures to address the risk of ghost fishing are contained within the strategy.	(d)

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2.3.3 Habitats information

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Performance Indicator overview

PI 2.3.3 assesses the adequacy of information available to understand the nature of the habitats and to determine both the risk posed to the habitat(s) by the fishery and to evaluate the effectiveness of the strategy to manage impacts on the habitat(s). There is a wide spectrum of information that may be required such as habitat distribution, fishing effort distribution, gear characteristics, habitat productivity and vulnerability, impact of fishing gears and recovery rates. For each of these, there is likely to be a range of information, from the qualitative (i.e. plausible argument), to the more quantitative (i.e. empirically modelling or scientifically robust studies). The range and quality of the available information and its appropriateness to the scale and intensity of the fishery and potential for impact will be scored by the CAB auditors.

It is also important to consider the availability of on-going monitoring and data collection to identify changes within the fishery that could potentially lead to an increase in the risk of impact from fishing activity over time. The MSC ideal is that fisheries should be moving in the desired direction or operating at a low-risk level.

Information may come from a variety of sources, including from local knowledge or research from fishers or community members. It may be place-based (i.e. local to a particular geographical area) and may have social, economic or ecological dimensions. By contrast, it may also come from regulatory monitoring programs, observer reports, inspections or electronic monitoring tools such as VMS or CCTV. Specialised scientific studies are also likely to be a vital source of information and may be useful to management decision-making even where not directly based on the fishery.

Three scoring issues are considered under this PI:

(a) Information quality

(b) Information adequacy for assessment of impacts

(c) Monitoring

Scoring issue (a) – Information quality

The focus of the first scoring issue of PI 2.3.3 is on the quality of information relating specifically to habitat distribution (i.e. habitat mapping) and the occurrence of vulnerable habitats.

Scoring issue	SG60	SG80	SG100
(a) Information quality	The types and distribution of habitats are **broadly understood**.	The nature, distribution, and **vulnerability** of habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA.	The distribution of habitats is known over their range, with particular attention given to the occurrence of **vulnerable habitats**.

Good practice

Good practice requires that the distribution of all habitats (including both less and more sensitive) is known over their entire range and not limited to the specific area in which the fishery operates.

What CAB auditors check

The scoring of this PI may firstly be informed by stakeholder meetings or potentially more structured stakeholder interviews to capture the extent of local knowledge. However, it is also likely to be augmented by evidence such as:

- Habitat maps – either in digital format (i.e. GIS) or in published papers.
- Seabed charts.
- The outputs of any regional or international projects to map vulnerable habitat types.

Scoring issue (a) – Information quality

Key questions to determine if further action is needed

Q Is there a good understanding of the spatial distribution of the seabed habitats, both in the area of the fishery and beyond? And is there an awareness of the locations of more sensitive or vulnerable habitats?

Q Have there been seabed mapping studies (either in the past or on-going), which have provided outputs that can be used by managers to determine the distribution of habitats?

Q Does the available mapping cover the whole habitat range (including beyond the boundaries of the fishery)?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Shrimp demersal trawl fishery:* Published research in 1996 suggested that the distribution of the shrimp species is on the coastal shelf and closely associated with particular seabed habitats. Two other research papers (one in 1962 and the other in 2001) discuss the general distribution of seabed habitats on the coastal shelf. Available data, however, only allow for a basic understanding of the types and distribution of main habitats in the area where the fishery operates. However, fishermen themselves have a good understanding of seabed characteristics and how this varies over their fishing range. No recent investigations or studies have examined the nature, distribution and extent of seabed habitats in the fishing zone nor have there been any research on the vulnerability of some the habitat species identified. SG60 is met.
SG80	*Scallop otter trawl fishery:* Extensive sampling by trawl and dredge during annual biomass surveys has provided a good basic understanding of the habitat in the fishery's area. The results of this work are presented in a habitat map which details sediment type and fauna. Preliminary investigation of the physical environment of the seafloor has indicated relationships between sediment composition and structure and scallop beds. Although the benthic habitat of the entire shelf has not been systematically sampled, the evidence from this fishery and other fisheries in the area point to there being only two main habitats (i.e. fine sand and mud, both with low relief). As a result of some relevant scientific study in comparable fisheries, it is known that these habitats are not vulnerable to fishing at the scale and intensity of this fishery. SG80 is met.
SG100	*Crab pot fishery:* The distribution of all habitats is known over their range, with particular attention to the occurrence of more sensitive habitats. Detailed habitat mapping for the entire sea has taken place and there is also very good data on where crab pots are deployed. This information is used regularly in management and fishing decisions to ensure that vulnerable habitats are not harmed. SG100 is met.

Scoring issue (b) – Information adequacy for assessment of impacts

The second scoring issue relating to PI 2.3.3 seeks to ensure that information is adequate to understand the impact of the fishery's gear on the habitats found within the fishery's area. In order for any impact to be appropriately estimated, the spatial and temporal distribution of the fishing activity and its overlap with different habitats must also be understood.

Scoring issue	SG60	SG80	SG100
(b) Information adequacy for assessment of impacts	Information is adequate to **broadly understand** the impacts of gear use on habitats.	Information is adequate to **estimate** the impacts of the UoA on habitats with a **high degree of accuracy.**	Information is adequate to **estimate** the impacts of the UoA on habitats with a very **high degree of accuracy.**

Good practice

Good practice requires that there are directly applicable studies relating to the particular gear and the particular habitats, demonstrating the scale of impact. This can be combined with a high level of understanding of the spatial and temporal overlap between fleet operations and habitat distribution.

What CAB auditors check

CAB auditors would look to be informed by:

- Studies looking at the impact of fishing gears on the habitats in the fishery's area. Ideally this would include information on both initial impact and recovery time.
- A map providing a spatial overlap of the fishery's spatial distribution with habitats.
- For fisheries where there are more sensitive habitats (including but not limited to designated VMEs), maps and footprint data, position of closed areas to protect more sensitive habitats and catch and catch rates of those species to support precautionary trigger levels.

i It should also be noted that when assessing this scoring issue, CAB auditors are required to apply the MSC 'Evidence Requirements Framework' (which is contained within the 'MSC Fisheries Standard Toolbox') to help determine the accuracy of the available information. For this scoring issue, the assessment shall consider which trueness guidepost (TG) and precision guidepost (PG) are met.

Scoring issue (b) – Information adequacy for assessment of impacts

Key questions to determine if further action is needed

Q Have any studies been done looking at the impacts of the fishery's gear on the habitats that are present in the fishery's area?

Q Are there gear impact studies from comparable fisheries that may enable the impact of the fishery's gear to be assessed in this case?

Q Is it possible to produce an accurate overlap map of the fishery's spatial distribution and the habitat distribution?

Q Have studies been done on the frequency of fishing gear interaction with habitats?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Clam dredge fishery:* There is significant research available to understand the impacts of dredge fisheries on the main habitat types. The fishery does not interact with any more sensitive habitats, as these are generally protected by closed areas or in areas where clam dredges do not operate to avoid damaging the gear. This information is supported by information from stakeholder consultation, broad-scale habitat maps, logbook data from the entire fishery and VMS tracks from several of the vessels in the fishery. The VMS does not cover the entire fishery and the habitat maps are at a broad scale. There is potential for bias to exist within logbook data and information from stakeholder consultation. Since the VMS is on vessels that operate similarly to the others, the largest aggregates of more sensitive habitats have been identified, and all vessels complete logbooks and no major differences are shown in operation between vessels, the effect of this bias on trueness is not considered to be consequential and TG1 of the Evidence Requirements Framework is met. Information is therefore adequate to broadly understand the impacts of gear use on habitats. SG60 is met.

Examples of scoring rationales – *continued*

Scoring issue (b)	Fishery Example
SG80	*Sole set net fishery:* A broad range of scientific studies over the past 10 years have evaluated the different impacts of the fishery on the main habitats (less sensitive habitats: sand and mud with low relief; more sensitive habitat: biogenic reefs with corals) within its area, including the consideration of different levels of activity on the main habitats, habitat extent and variability, seabed relief, sediment sorting and bottom damage or alteration. Many studies have also examined the impacts of the fishery using biological indicators such as species diversity, abundance, rates of recovery and other criteria. VMS data are required on all vessels and provide adequate information on the spatial and temporal extent and location of the fishery. The fishery is required to report any time corals are caught in nets, including location and weight, in logbooks. About 10% of trips also have independent observer coverage, with observer tasks including recording of corals (by species, weight and location). Both logbooks and observer reports are provided to the management agency. The VMS, logbook and observer coverage and results of habitat studies indicate that there is limited potential for bias to exist in the information, but where it does the effect on trueness is not considered to be consequential. As such, TG2 of the Evidence Requirements Framework is met. For the more sensitive habitat, a catch monitoring system is in place that meets the requirements of PG1 of the Evidence Requirements Framework. Information is therefore adequate to estimate the impacts of the UoA on habitats with a high degree of accuracy. SG80 is met for all habitat scoring elements.
SG100	*Herring pelagic trawl fishery:* The main interaction is with the pelagic habitat (water column). There is potential for gear loss that could cause interactions with demersal habitats, so these are also considered here. The fishery location is accurately known through VMS. The seabed habitat has also been extensively mapped to a high level of detail, enabling the overlap of fishing activity and habitats to be accurately presented. There is 100% observer coverage on all trips and observers are required to report on gear loss incidents. Fishers also complete logbooks on all trips and are required to report on gear loss. Data from observer reports and logbooks for the past 10 years show that there have been no reports of gear loss. TG3 of the Evidence Requirements Framework is therefore met for both scoring elements (pelagic and demersal habitats) as most potential sources of bias have been mitigated and information is therefore adequate to estimate the impacts of the UoA on habitats with a very high degree of accuracy. SG100 is met for both scoring elements.

Scoring issue (c) – Monitoring

The final scoring issue of PI 2.3.3 relates to changes in risk and habitat distribution over time. An understanding of temporal changes in habitat health and distribution is essential, compared with a single snapshot mapping exercise, as it enables management to determine that management measures are working and provides verification that activities are not contributing to increasing risk to the habitats.

Scoring issue	SG60	SG80	SG100
(c) Monitoring		Adequate information continues to be collected to detect any increase in risk to habitats.	Changes in habitat distributions over time are measured.

Good practice

Good practice requires that habitat mapping is repeated at timely intervals so that the relative changes may be recorded and responded to. This will enable any increase in risk to be quickly identified.

What CAB auditors check

CAB auditors would look to be informed by:

- All previous habitat studies on record in the fishery's area.
- Proposals or government policy or funding commitments indicating the likelihood and timing of any future habitat mapping exercises.
- Any additional studies or approaches to data collection that allow habitat information to be routinely augmented.

Scoring issue (c) – Monitoring

Key questions to determine if further action is needed

Q Has more than one habitat mapping exercise been carried out in the fishery's area?

Q Is there clear governmental / organizational responsibility for the on-going collection of habitat information?

Q Is it possible to produce an accurate overlap map of the fishery's spatial distribution and the habitat distribution?

Q Where habitat management measures (such as gear restrictions or area closures) are implemented, is there monitoring in place to demonstrate that these are achieving the objective of improving habitat outcome status?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	*Shrimp demersal trawl fishery:* Fishing effort and distribution is monitored through the on-board VMS on all vessels within the fishery. Management of the shrimp species by effort control provides a clear means by which any increased risk to habitats can be identified. These data are collected on an on-going basis as part of the management plan as implemented through the license program. The Code of Practice for the vessels requires the collection of data in relation to encounters with more sensitive habitats during fishing operations. The management plan also considers the data when determining the strategy's effectiveness in ensuring that serious or irreversible harm does not occur. There have been a small number of habitat mapping exercises over the last 30 years, although there is no further mapping exercises currently scheduled. These historic habitat studies would provide a baseline for any future mapping exercises. Adequate information is collected to detect any increase in risk to habitats. SG80 is met.
SG100	*Lobster pot fishery:* The local fisheries research institute has a detailed research plan, which includes a program for surveying all habitats within the fishery's area on a three-year basis. Therefore, changes in the distribution of all habitats within the fishery's area are measured over time, building upon the existing evidence of habitat distribution. In addition, routine fishing effort and fishing location information forms part of the statutory monitoring program. This level of information collection and monitoring is sufficient and would enable any changes in fleet effort or spatial extent to be identified by management. SG100 is met.

Challenges and solutions to meeting PI 2.3.3

There are several challenges to meeting this PI, in particular in jurisdictions where marine habitat research and monitoring has not been prioritised. There is a requirement for information to provide: (i) an understanding of habitat distribution, (ii) evidence of the fishery's spatial distribution, (iii) understanding of the impact of the gear on the relevant habitats and (iv) some understanding of how these patterns change over time (and in particular that of habitat distribution).

This implies that a certain amount of research has already been undertaken in the past and will continue to be done in the future. Habitat mapping exercises can be expensive and time consuming, and gear impact studies require a high level of research expertise. In the case of a widely distributed fishery, the area requiring some form of mapping may be extensive and possibly beyond a single jurisdiction. This also implies a certain degree of vessel monitoring is already on-going. This is easiest where some form of electronic vessel tracking (such as VMS) is in place – which can be an expensive tool to introduce across a fleet and which may require additional staff resources to monitor properly.

However, in all these challenges, it should be considered that the MSC requires information and measures which are 'appropriate to the scale and intensity of the fishery'. In this context, the constraints may not be insurmountable. For example, it is reasonable to draw on relevant and applicable research already undertaken in different fisheries, such as gear impact studies. Fisheries knowledge can also be captured to build up an evidence base – indicating fleet spatial patterns, habitat distribution or gear/habitat interaction. Further, less expensive research, such as drop-down camera work or grab sampling, can be usefully done where well planned and well executed. Additionally, the MSC Consequence Spatial Analysis (CSA) is to be used in assessments where there is little understanding of habitats encountered, their distribution and the impact of the fishery on the habitats – see Annex 1 Risk-Based Framework to learn more about the CSA.

Example process and actions to improve performance against PI 2.3.3

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Undertake a review of the existing habitat information, monitoring programmes and relevant supporting information such as gear impact studies and fleet effort and spatial patterns. Evaluate the adequacy of this information for effective habitat management purposes. Identify any gaps in the information currently available.	(a), (b), (c)
	●			Propose a programme of monitoring or commission research to address any gaps identified in step 1 (above). This should include focus on: i) habitat distribution and changes over time, with particular emphasis on the distribution of vulnerable habitats; ii) habitat / gear interactions to quantify the scale of impact; and iii) patterns of fishing effort so that overlap with habitats may be determined.	(a), (b), (c)
	●			Practicalities of information and monitoring requirements should be addressed so that responsibility for monitoring is clarified, any capacity building steps may be addressed and the legal basis for monitoring can be firmly established.	(a), (b), (c)
	●			Where appropriate, explore the potential to engage the fleet in monitoring or research programmes or collecting information during routine fishing operations.	(a), (b), (c)
		●		Implement all required monitoring programmes or research. Ensure that results and findings are disseminated in a timely and transparent manner.	(a), (b), (c)
		●		Ensure that the information is collated, analysed and passed to the relevant management authority to enable habitats management strategy to be reviewed and amended as required. This should enable fleet effort to be overlaid upon habitat distribution informed by gear impact studies so that the overall impact of the UoA may be quantified and the potential for recovery may be understood.	(a), (b)
		●		Management to respond to the information presented in a timely and transparent manner.	2.3.2
			●	Continue to collect habitat information to detect any changes in risk over time.	(c)
			●	Undertake periodic review of the information used to support habitat management.	(a), (b), (c)

Notes

2.4.1 Ecosystem outcome status

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Performance Indicator overview

PI 2.4.1 assesses the status of the ecosystem as a whole, and in particular the fishery's impact on the ecosystem. This requires that the fishery does not cause serious or irreversible harm to the key elements of the ecosystem or the underlying ecosystem structure and function to a point which would hinder the ecosystem resilience or ability to recover from impact. In doing so this seeks to ensure that regardless of natural background changes in ecosystem dynamics, its capacity to sustain itself whilst producing food and economic opportunities is maintained indefinitely for the benefit of present and future generations. Examples of key elements of the ecosystem are:

- "Key" prey, predators, and competitor species.
- Predator-prey interaction.
- Food web interactions.
- Community composition.
- Carrying capacity.
- Species biodiversity.
- Genetic diversity.
- Migratory behaviour.

This assessment of ecosystem status or outcome is not intended to be a repeat of the earlier assessments of the impact of the fishery on habitats and other species caught in the fishery (whether targeted, unwanted or ETP/OOS). Instead, this considers the wider ecosystem structure and function, including consideration of the indirect effects of removal of the species caught by the UoA, which is not considered elsewhere in P1 or P2. This also addresses any indirect effects of the UoA on ETP/OOS units to those factors listed above. Types of indirect effects may include:

- Changes to trophic structure or function.
- Removal of biomass as a food source for the ETP/OOS unit (including localised depletions) or its prey (trophic interactions).
- Addition of biomass due to discards or offal discharge.
- Changes to essential habitat for the species.

This requires consideration of the impacts of the fishery on both the ecosystem's inherent health and balance (e.g. structure, trophic relationships and biodiversity) but also the impact on the services provided by the ecosystem (e.g. to the benefit of the target fishery itself, or to other fisheries and human uses). The MSC guidance provides some helpful indications of the types of ecosystem impacts which would be the subject of consideration under this PI.

These include:

- Wider ecosystem impacts of removal of 'keystone' predators or important prey species which disrupts overall balance of the ecosystem.
- Major changes in the overall species biodiversity of the ecological community (e.g. loss of species, or major changes in species evenness and dominance).
- Changes in the genetic diversity of species caused by, for example, selective fishing.
- Other indirect impacts, such as introduction of invasive species or pollution.

Where there is no information available to support an analysis of the impact of the fishery on the ecosystem, the outcome PI in relation to ecosystem may be scored using the MSC's Risk-Based Framework (see Annex 1 Risk-Based Framework).

Only one scoring issue is considered under this PI:

(a) Ecosystem status

Scoring issue (a) – Ecosystem status

There is only a single scoring issue for PI 2.4.1. This seeks to determine whether there is an impact from the fishery (either direct or indirect) that is likely to cause serious or irreversible harm to ecosystem structure and function.

Scoring issue	SG60	SG80	SG100
(a) Ecosystem status	The UoA is **unlikely** to disrupt the **key** elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The UoA is **highly unlikely** to disrupt the **key** elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is **evidence** that the UoA is **highly unlikely** to disrupt the **key** elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.

Good practice

Good practice requires that the operation of the fishery does not reduce those key features that are crucial to maintaining the integrity and structure of the ecosystem and does not adversely impact ecosystem productivity. This includes not causing serious changes to biological diversity.

What CAB auditors check

There is recognition that this PI may sometimes lack supporting evidence. This may be particularly the case in less advanced fishery management systems. CAB auditors may therefore rely on general observations, qualitative assessment and expert judgement (or seek to identify surrogates) to provide an indication of impacts on ecosystem structure. It may also be possible to draw inferences from directly measured impacts on populations, species and functional groups. It is therefore likely that stakeholder consultation will play an important role in informing this PI. However, in addition CAB auditors are likely to consider the following documentary evidence (where available):

- Status (ideally stock assessments) of key predators of the target species and key prey of the target species.
- Evidence of consideration of the ecological role of the target species in setting exploitation rates.
- Any ecosystem modelling undertaken in the area of the fishery or analogous areas which can provide evidence in relation to:
  - Predator-prey interactions.
  - Food web interactions.
  - Community composition.
  - Carrying capacity.
  - Species biodiversity.
  - Genetic diversity.
  - Migratory behaviour.

Scoring issue (a) – Ecosystem status

Key questions to determine if further action is needed

Q Is the fishery of lower scale and intensity, using selective and low impact gear, targeting a well-controlled and precautionary quantity of a resource which shares an ecosystem niche with many other species? If so, the level of impact may be small – although this must still be demonstrated.

Q Is there an understanding of the trophic relationships in the ecosystem in which the fishery operates?

Q Is there good understanding of the other key elements of the ecosystem?

Q Is the ecosystem role of the target species and any species or habitats impacted by the fishery under assessment understood?

Q Is there any evidence available to indicate the changes in ecosystem balance (changes in relative balance of key species, habitats)?

Q Is there an understanding of the indirect effects of the fishery on the ecosystem which have not been considered elsewhere in P2, such as impacts of waste products from the fishery?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Scallop dredge fishery:* The key ecosystem element considered is community composition. There are benefits to certain scavenging species but detrimental effects on other organisms, particularly invertebrates, but also ETP/OOS species such as common skate. The dredge fishery reduces seafloor habitat complexity (as addressed under the habitats PI). The ecosystem consequence of the on-going use of dredges is to maintain the benthos in an altered ecological state. Where large, closed areas have led to a cessation of dredging, there has been marked increases in benthic megafaunal production with species such as skates, haddock and flounders shown to be generally larger inside than outside the closed areas (although no differences were detected in the size of 11 other species). This is seen as evidence of ecosystem recovery in areas that have been closed to demersal gears. The scallop fishery is therefore known to have widespread impacts on ecological and biological components of the ecosystem, with recovery rates for some key features of ecological importance known to be very slow. The study also shows that the indirect impact on the ETP/OOS common skate is not likely to hinder recovery of this species and there is evidence for ecosystem recovery in a permanently closed area. SG60 is met.

Scoring issue (a) – Ecosystem status

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG80	*Rock lobster trap fishery:* The key ecosystem elements considered are predator-prey and food web interactions. Rock lobsters are scavengers and a large proportion of their diet consists of kelp and algal material. Its main predators are octopus and some fish and shark species, including the ETP/OOS hammerhead shark. Octopus are predators, and in this environment may feed largely on lobster, as well as on bivalves and other crustacean and mollusc species. Octopus species in general are fast growing and have a rapid turnover, making the populations resilient to fishing pressure. Given its high abundance and large size, the rock lobster clearly plays an important role in the trophic organization of the benthic environment. However, the relatively high CPUE, and some evidence of density-dependence suggests that populations are not very depleted relative to natural levels. Taking the above factors in consideration, it is highly unlikely that the fishing mortality of lobsters or the indirect impacts of the fishery would disrupt the food webs or predator-prey interactions of benthic ecosystems, including the ETP/OOS species. SG80 is met.
SG100	*Saithe demersal trawl fishery:* The key ecosystem element is food web interactions. The fishery research institute has a wide-ranging research program dating back over half a century, much of which is aimed ultimately at developing an ecosystem model. As yet, these studies have not identified any critical role that saithe may play in the overall stability of the marine ecosystem. However, the stock management advice resulting from the stock assessment shows explicit ecosystem consideration in determining the reference points used as part of the HCR. Saithe prey upon a variety of fish and invertebrate species and, in turn, are prey to larger species such as seals, toothed whales and possibly even some baleen whales. Thus, they have their part to play but there is no evidence from research undertaken thus far that they are a keystone link within the system, nor are they considered a low trophic species. Studies also show that ETP/OOS species that utilize saithe as a prey resource are not solely dependent on this species, so the fishery is not likely to indirectly hinder recovery of these species. Evidence indicates it is highly unlikely that the fishery disrupts key elements underlying ecosystem structure or function. SG100 is met.

Challenges and solutions to meeting PI 2.4.1

A potential hindrance to meeting this PI in fisheries of lower scale and intensity or less data rich fisheries is likely to be the lack of ecosystem evidence available to support scoring. The ability to address this constraint may in turn be influenced by a lack of resources or expertise required to undertake ecosystem modelling exercises. In order to have a good understanding of ecosystem balance and dynamics there is an implicit requirement to have a record of changes in status of key species and habitats and any other relevant parameters/indicators within the ecosystem over a number of years. This would suggest that some rudimentary stock assessment has been undertaken on other key species within the ecosystem. Where comprehensive data is unavailable, the RBF can be used.

Example process and actions to improve performance against PI 2.4.1

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Review the current level of knowledge of key species within the ecosystem and trophic relationships.	(a)
●				Identify the key ecosystem elements.	(a)
●				Consider the direct and indirect impacts of the fishery (including cumulatively and those that can impact ETP/OOS units) on the ecosystem structure and function.	(a)
●				Where supporting evidence is lacking but the perceived impacts are low, it may be prudent undertake a stakeholder consultation exercise (as would be undertaken as part of a SICA scoring exercise) to ensure widespread stakeholder agreement on the low level of perceived impact.	(a)
	●			Where a need is identified, develop a proposal for a simple ecosystem modeling exercise.	(a)
	●			Where a need is identified, develop a proposal for further studies on the direct and indirect impact of the fishery on the ecosystem.	(a)
	●			Implement a data collection program for any parameters that may be used as proxies to inform managers about ecosystem health.	(a)
		●		Give consideration to the ecosystem role of the target species and the wider ecosystem impacts (both direct and indirect) in the setting of fishing opportunities.	(a)
		●		Ensure that the Fishery Management Plan gives due consideration to the direct and indirect impacts of the fishery on ecosystem aspects.	(a)
			●	Design on-going monitoring requirements to ensure changes in ecosystem balance over time are captured and to ensure that any mitigation measures implemented are achieving their objectives.	(a)
			●	Undertake more refined ecosystem modeling and seek to move management toward an ‘Ecosystem Based Approach to Fisheries Management’.	(a)

Notes

2.4.2 Ecosystem management strategy

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Performance Indicator overview

PI 2.4.2 requires that there is management in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function. Scoring issues focus on the degree to which measures are combined into an effective overall strategy, the level of implementation and the likelihood of success.

In some cases, the management measures in place to manage the impact of the fishery on other components (such as target catch controls, spatial management or gear selectivity) may also be included for consideration under this PI – where it can be demonstrated that these contribute to safeguarding long term ecosystem balance. However, it is likely that for many fisheries there may need to be further evidence of explicit consideration of ecosystem functionality in management decision-making. In particular, in order to be considered as a strategy (as opposed to simply measures) it is likely that there should be evidence of a dedicated management feedback response, which demonstrates that appropriate ecosystem information (scored under the next PI) is being used by management to shape decisions and tailor management measures accordingly. Where management is aware of gaps in understanding, it should be demonstrated that research is tailored to address management needs.

It may be that management of ecosystem impacts may be the responsibility of a different department than the one responsible for commercial fisheries. If so, it should be demonstrated that the management efforts are cohesive and compatible. Voluntary management measures may also contribute to this PI, such as industry Codes of Conduct, education or training programs or voluntary reporting. In order for these to receive credit it must be demonstrated that they are functioning as intended.

Two scoring issues are considered under this PI:

(a) Management strategy in place.

(b) Management strategy effectiveness.

Scoring issue (a) – Management strategy in place

The first scoring issue examines the extent of the management that is in place to address ecosystem impacts and the degree to which measures are strategically combined to specifically address ecosystem impacts.

Scoring issue	SG60	SG80	SG100
(a) Management strategy in place	There are **measures** in place, **if necessary**, which considers the potential impacts of the UoA on the **key** elements underlying ecosystem structure and function.	There is a **partial strategy** in place, **if necessary**, that is expected to achieve the Ecosystem outcome SG80 level.	There is a **strategy** in place for managing the impact of the UoA on the **key** elements underlying ecosystem structure and function.

Good practice

Good practice requires that a UoA, regardless of how benign their impact, has a strategy (i.e. a focussed, cohesive and strategic arrangement) to address all of the fisheries impacts on the ecosystem.

What CAB auditors check

CAB auditors will consider this scoring in the context of scores and justification provided in relation to removal of target stocks (Principle 1) and the impact on other species and habitats (Principle 2) to determine the degree to which further ecosystem-specific management is necessary. CAB auditors will also look for evidence of specific ecosystem management such as:

- Evidence of management referring to ecosystem indicators in setting fishery rules.
- Evidence of management considering indirect ecosystem consequences of the fishery and shaping controls to mitigate these (including indirect impacts on ETP/OOS).
- Evidence of explicit ecosystem objectives, included in the management plan (discussed further in Principle 3).
- Evidence of explicit ecosystem consideration in stock assessment and advice.
- Evidence of management tailoring future research needs to address gaps in ecosystem understanding.
- Industry codes of conduct, relating to minimising environmental / ecosystem impact.
- Additional measures taken by industry or management to safeguard the ecosystem.
- Ecosystem status reports, indicating state of knowledge on ecosystem health, threats and proposed management.
- Ecosystem model – which is referred to by management in taking fishery decisions.

Scoring issue (a) – Management strategy in place

Key questions to determine if further action is needed

Q Have key risks to the ecosystem and key ecosystem elements been identified by management which is applicable to the UoA?

Q Is there any ecosystem-specific management in place?

Q Do the measures in place to address impacts of the fishery on target species (P1) and habitats and other species (Principle 2) give consideration to indirect impacts and address the overall need for ecosystem management?

Q Is the ecosystem where the fishery occurs subject to specific data collection, analysis and review and does this in turn influence management decision-making?

Q Is there a requirement within the management framework, or management plan, to give consideration to ecosystem effects in setting fishery-specific rules?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Sardine purse seine fishery:* There are measures in place, or available to managers, that take into account potential impacts of the sardine fishery on key elements of the ecosystem (e.g. the size composition of the catch is monitored, fishing areas can be closed if certain set limits are reached, other areas are closed to fishing). This shows that the fisheries management could adapt to changes if needed. However, the fishery does not achieve a higher score because these measures are not combined into a partial strategy to restrain impacts of the fishery on the ecosystem. SG60 is met.
SG80	*Shrimp demersal trawl fishery:* The partial strategy comprises many measures which combine to limit impact on key ecosystem elements, although they were not necessarily designed as such. These include the shrimp fishery management plan limiting effort, the on-board Code of Practice, VMS monitoring of fishing effort, mandatory reporting to the fishery department of shrimp catches (target species) and other catches, inspection, control and enforcement, the mandatory use of turtle excluder devices; as well as the strategy to reduce bycatch of fish through use of bycatch reduction devices. There is a general awareness of the need to change measures should these cease to be effective. The fisheries management agency reviews information from the fishery and wider ecosystem on a regular basis and can adapt to environmental changes, representing a partial strategy. SG80 is met.

Scoring issue (a) – Management strategy in place

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG100	*Cockle hand rake fishery:* The fishery is principally managed with regard to key ecosystem elements, namely the food web impacts and indirect impacts on birds. Ecosystem impact assessments are used as the primary basis for setting limits for cockle removal, to ensure adequate ecological food reserves for wintering birds. The fishery is managed through a fishery management plan and annual conditions set by national permit and provincial license, as well as a long-term agreement in certain areas. The catch limit is set differently in different areas, but the emphasis is on limiting ecological impact. Catch varies from just 2.5% of harvestable cockle stock (with an average of 1.1% taken across a 5-year period) to a management approach which only opens the fishery when a minimum level of food resource (5,000 tons of cockle meat) is available for birds. Annual counts of birds ensure that catch limits remain appropriate. There is a mechanism to review bird numbers and fishery measures should a change in risk be detected. SG100 is met.

Scoring issue (b) – Management strategy effectiveness

The second scoring issue of the ecosystem management PI examines the likelihood that management will work and the degree to which this can be demonstrated objectively by evidence.

Scoring issue	SG60	SG80	SG100
(b) Management strategy effectiveness	The **measures, if necessary,** are considered **likely** to work, based on plausible argument.	There is **some evidence** that the **measures/ partial strategy, if necessary,** is achieving the objectives set out in scoring issue (a) based on some information directly about the UoA and/or the ecosystem involved.	There is **evidence** that the **partial strategy/ strategy** is achieving the objectives set out in scoring issue (a) based on information directly about the UoA and/or ecosystem involved.

Good practice

Good practice requires that a fishery demonstrate that something more than general theory and plausible argument are being used to justify ecosystem management measures. There would need to be at least objective (i.e. empirical) reasons but ideally the measures would have been subject to full testing. The available evidence should indicate that the management measures are working.

What CAB auditors check

CAB auditors will look for the following types of information.

- Evidence of management measures being implemented to address ecosystem impacts.
- Evidence of testing of proposed management measures – such as ecosystem modelling.
- Evidence of dedicated impact assessments for management policy.
- Evidence from ecosystem indicators demonstrating that ecosystem management is achieving its objectives.

Scoring issue (b) – Management strategy effectiveness

Key questions to determine if further action is needed

- **Q** Is there any management in place to address ecosystem impacts of the UoA?
- **Q** Are measures to mitigate any indirect effects of the UoA on ETP/OOS species included within the ecosystem management?
- **Q** Does management subject proposed decisions to ecosystem modeling, or some form of ecological impact assessment to ensure that there are no unintended impacts on the ecosystem?
- **Q** Are ecosystem management measures/strategies objectively tested in any other way?
- **Q** Are there any systems for review of ecosystem health, perhaps at a regional level, which identifies which management measures are in place, how these are working, and what future requirements may be?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Mulloway and mullet gillnet and handline fishery:* The management uses reference points that are derived from catch history, and while this is suitable for the purposes of maintaining fishery production, they are not constructed to be directly applicable indicators of lake ecosystem structure and function. However, there have been studies that show that these measures have been broadly effective at maintaining lake ecosystems in general. Although research has not been undertaken specifically on this issue, ecosystem experts highlighted potential concerns that the balance of predator-prey dynamics could be affected by changes in target species abundance. The measures are therefore considered likely to work based on plausible argument, but there is not enough evidence of the impact of the fishery in this specific ecosystem to determine if the measures are achieving their objective. SG60 is met.
SG80	*Shrimp demersal trawl fishery:* Effort reductions through reductions in license numbers have added to the security of the shrimp resource and on-going CPUE controls. At least one study has been completed showing that these measures are likely to provide some safeguard in the context of the role of shrimp in the food web and its function as a prey species for many other aquatic species, based on modelling abundance and food web interactions. This provides some evidence that the partial strategy is achieving its objectives. SG80 is met.
SG100	*Mackerel pelagic trawl:* Ecosystem considerations play an important part of the management strategy for the mackerel stock as considered and provided by the work of independent stock assessment scientists. The management strategy is informed by this scientific advice and addresses the main potential ecosystem impacts of the fishery. The scientific advice makes use of available knowledge on topics such as food chain functioning and functional component relationships within the pelagic ecosystem. The management strategy is supported by a regulatory regime that underpins the scientific rationale. It is likely that existing regulations are effective at ensuring that the operation of the fishery does not pose serious or irreversible harm on the pelagic and wider oceanic ecosystem. There is rigorous scientific input into the management strategy and continual evolution of the fishery management plan to address ecosystem impact as well as its effectiveness in meeting objectives. SG100 is met.

Challenges and solutions to meeting PI 2.4.2

Formal consideration of ecosystem management and formal adoption of ecosystem-based approaches to fisheries management is a comparatively new concept. Even in well-developed fishery management systems with excellent scientific resources and capacity, genuine ecosystem-based approaches to management remain in their infancy. Empirically robust ecosystem models can be complex and therefore require considerable expertise and can be expensive. Evidence of ecosystem change or evidence of a fishery impacting on the ecosystem require good datasets with reasonable time series. A lack of reliable baseline data may compromise efforts to determine the degree of ecosystem change.

Nonetheless, it is possible for management to demonstrate a commitment to ecosystem objectives, by giving explicit consideration to potential ecosystem consequences of management actions. It may also be possible to tailor data collection and research to help inform management consideration of ecosystem impacts in the future. This PI does not automatically require complex science, expensive data collection or sophisticated modelling, but it does require that management gives sensible and explicit consideration of ecosystem functionality in the operations of the fishery.

Example process and actions to improve performance against PI 2.4.2

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Review the current measures that are in place which may contribute to safeguarding ecosystem balance and trophic relationships. Consider whether these are sufficient and whether these may be combined into a formal strategy.	(a), (b)
●				Review the current fishery management regulations and fishery management decision-making processes to identify where there is scope to increase explicit consideration of the ecosystem?	(a), (b)
●				Review impacts of the fishery on the ecosystem to determine whether there are any indirect or cumulative impacts of the fishery on the ecosystem which are not addressed by the management system.	(a), (b)
	●			Where necessary, develop data collection, monitoring, scientific study and modeling to address any gaps identified in step 1.	(a)
	●			Develop ecosystem objectives, which are well defined and measurable, and include these in the Fishery Management Plan. These should be fully consulted on with industry and other stakeholders.	(a)
	●			Implement ecosystem management proposals and ensure control is in place to ensure compliance with newly adopted measures / strategies.	(a), (b)
		●		Over time move toward a greater (and more empirically supported) adoption of the Ecosystem Approach to Fisheries Management. Where possible incorporate trophic models into the assessment of stock status and demonstrate that the levels of fishery exploitation are not simply target-oriented management approaches.	(a)
		●		Consider whether there are additional measures that could be undertaken by the fleet to safeguard the ecosystem.	(a), (b)
			●	Design on-going monitoring requirements to ensure changes in ecosystem balance over time are captured and to ensure that any mitigation measures implemented are achieving their objectives.	(b)
			●	Undertake periodic review and evaluation of the performance of ecosystem management measures / strategies to ensure they remain adaptive and provide objective basis for confidence.	(b)

Notes

2.4.3 Ecosystem information

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Performance Indicator overview

The final PI of Principle 2 focuses on ecosystem information. This requires that there is adequate understanding of:

- The elements of the ecosystem and their function.
- The impacts of the fishery on the ecosystem.
- The ecosystem role of the other P1 and P2 components (i.e. target species, in-scope species, ETP/OOS species, and habitats).
- The impacts (both direct and indirect) of the fishery on those components and the consequential impact on the ecosystem.

Monitoring the effects of environmental change on the natural productivity of species and habitats should be considered good practice and should include recognition of the increasing importance of climate change.

Above all, information which is collected about the ecosystem should provide the management system with all the information that it requires to ensure that the impacts of the fishery and proposed changes to fisheries policy or regulation can be fully understood.

Four scoring issues are considered under this PI:

(a) Information quality.

(b) Investigation of UoA impacts.

(c) Understanding of component functions.

(d) Monitoring.

Scoring issue (a) – Information quality

The first scoring issue examines the state of knowledge of the ecosystem and in particular the key elements of the ecosystem (without reference to the fishery).

Scoring issue	SG60	SG80	SG100
(a) Information quality	**Information is adequate** to **identify** the **key** elements of the ecosystem.	**Information is adequate** to **broadly understand** the **key** elements of the ecosystem.	

Good practice

Good practice requires that the ecosystem information is sufficient to enable the key elements of the ecosystem to be both identified and broadly understood.

What CAB auditors check

CAB auditors will look to see evidence of information describing the ecosystem in which the fishery operates, such as:

- Any published ecosystem descriptions.
- Any ecosystem summaries, which combine descriptions of species, trophic levels, and habitats.
- Any reviews of changes in the ecosystem over time, which may provide an indication of the key elements of the ecosystem.
- Any species lists or guides (both flora and fauna) for the area where the fishery operates.

Scoring issue (a) – Information quality

Key questions to determine if further action is needed

- **Q** Is there good understanding of all the species in the area of the fishery?
- **Q** Is there a good understanding of the fauna and habitat forming species in the area of the fishery?
- **Q** Is there spatial understanding of the ecosystem functionality of different areas (spawning, nursery or feeding areas)?
- **Q** Is there understanding of which species are the key predators, which are the key prey and any keystone species?
- **Q** Is there an understanding of the trophic relationships that exist between the key species in the ecosystem?
- **Q** Is there an understanding of ecosystem variations and the possible impacts of climate change on the ecosystem?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Groundfish trawl fishery:* The ecological role of the target species has been the subject of a targeted study, and this indicates that the key element of the ecosystem is the impact of prey removal on food web interactions. Food web interactions have not been studied in this area, but studies in nearby continental shelf areas are adequate to provide a general picture of trophic relationships in the fishery area. With respect to general ecosystem issues, sizes of groundfish are monitored annually and there have been no indications of significant long-term shifts to smaller sizes. Information allows the identification of key elements of the ecosystem. SG60 is met.
SG80	*Sardine purse seine fishery:* It is considered that there is adequate information to broadly understand the key elements of the ecosystem. This includes information on stock structure and abundance, impacts of stock removals on food web interactions for the pelagic ecosystem and extensive information in relation to the ecosystem (e.g. oceanography, physio-chemistry, habitats, community structures and relationships). SG80 is met.
SG100	No scoring guidepost at the 100 level.

Scoring issue (b) – Investigation of UoA impacts

The second scoring issue on ecosystem information assesses the state of knowledge of the impacts of the fishery under assessment on the key elements described in the previous SI (a).

Scoring issue	SG60	SG80	SG100
(b) Investigation of UoA impacts	Main impacts of the UoA on the **key** ecosystem elements **can be inferred** from existing information.	Main impacts of the UoA on the **key** elements of the ecosystem **have been investigated in detail.**	Main interactions between the UoA and the **key** ecosystem elements **have been investigated in detail.**

Good practice

Good practice requires that both the main impacts and the main interactions of the UoA on the key ecosystem elements have been investigated.

What CAB auditors check

The focus of this scoring issue is on the degree of investigation of fishery impacts. Therefore, CAB auditors are likely to speak with members of the scientific or academic community to learn about past research in the area of fishery impacts on the ecosystem. Ideally this would be supported by the following documentary evidence:

- Published research on fishery impacts in the area of the fishery.
- Applicable studies from other fisheries in similar ecosystems.
- Unpublished academic or government research investigating impacts of the fishery on the ecosystem.
- Modelling outputs which enable the impacts of the fishery on other key elements of the ecosystem to be inferred.

Scoring issue (b) – Investigation of UoA impacts

Key questions to determine if further action is needed

Q Has government research or local academic research investigated the impacts of the fishery on the key elements of the ecosystem?

Q Are there any other sources of information that enable the impacts of the fishery on key elements of the ecosystem to be inferred?

Q Does ecosystem modeling work enable the impacts of the fishery on key ecosystem elements to be inferred?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Lobster trap fishery:* Traps are among the least impacting gear on both the habitat and other species. Modelling of the rocky coastal ecosystem suggests that even for exploited lobster populations, predation and competition are stronger stressors than current fishing effort. The main impacts of the UoA on key ecosystems can be inferred. SG60 is met.
SG80	*Mussel dredge fishery:* The main impacts of hand dredging on key ecosystem elements are understood. The key element is removal of food source for birds (oystercatcher and common eider). The impact on birds with regard to ecological food requirements have been investigated in detail through ecosystem models. SG80 is met.
SG100	*Crab trap and pot fishery:* Key features of the ecosystem are well known. Crab prey on a wide variety of benthic species, primarily shrimp, starfish, sea urchins, worms, molluscs, etc. Smaller and especially soft-shell crabs are preyed upon by a variety of groundfish species as well as seals. Large, hard-shell male crabs targeted by the fishery are not known to be an important prey item for any species. The area has been the focus of intense ecological research. There has been no indication that the crab fishery causes any disruption of key elements of the ecosystem. As part of a broader focus in support of ecosystem-based management, initiatives to identify ecologically and biologically significant as well as sensitive benthic areas and to identify and evaluate areas of interest for possible MPA designation have provided detailed knowledge and understanding of the various components of the ecosystem and their functions. SG100 is met.

Scoring issue (c) – Understanding of component functions

The third scoring issue of PI 2.4.3 relates to changes in risk and habitat distribution over time. An understanding of temporal changes in habitat health and distribution is essential, compared with a single snapshot mapping exercise, as it enables management to determine that management measures are working and provides verification that activities are not contributing to increasing risk to the habitats.

Scoring issue	SG60	SG80	SG100
(c) Understanding of component (i.e. P1 target species, in-scope and ETP/ OOS species, and habitats) functions		The main functions of the components in the ecosystem are **known**.	The impacts of the UoA on the components are identified and the main functions of these components in the ecosystem are **understood**.

Good practice

Good practice requires that not only are the ecosystem functions of the other P1 and P2 components understood, but that the impact of the fishery on these are identified.

What CAB auditors check

- Any published ecosystem descriptions.
- Any ecosystem summaries, which combine descriptions of species, trophic levels and habitats.
- Evidence of components (i.e. target species, in-scope and ETP/OOS species and habitats) function in ecosystem descriptions.
- Evidence of components (i.e. target species, in-scope and ETP/OOS species and habitats) function in ecosystem models.
- Impacts of the fishery on components (this is likely to have already been described earlier in P1 and P2).

Scoring issue (c) – Understanding of component functions

Key questions to determine if further action is needed

Q Are the species described in P1 and earlier in P2 (both flora and fauna) all included in an ecosystem description?

Q Is the contribution of the suite of species affected by the fishery to ecosystem structure and function fully understood?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	*Cod demersal trawl fishery:* The main functions of ecosystem components are known, though not in detail for some species. Diet studies have been integral to the development of this knowledge. SG80 is met.
SG100	*Hake demersal trawl fishery:* The area in which the fishery operates has been the focus of intense ecological research. Several initiatives have been undertaken as part of a broader focus in support of ecosystem-based management. These include initiatives to identify ecologically and biologically significant as well as sensitive benthic areas and to identify and evaluate areas of interest for possible MPA designation, and to provide detailed knowledge and understanding of the various components of the ecosystem and their functions. SG100 is met.

Scoring issue (d) – Monitoring

The final scoring issue in relation to ecosystem information examines the degree of on-going monitoring that requires that data 'continue to be collected'. This focuses on ensuring that future changes to the ecosystem attributable to the fishery would be reflected in future data collection exercises.

Scoring issue	SG60	SG80	SG100
(d) Monitoring		Adequate data continue to be collected to detect any increase in risk level.	**Information is adequate** to support the development of strategies to manage ecosystem impacts.

Good practice

Good practice requires continued collection of information adequate to give management good feedback response.

What CAB auditors check

CAB auditors would seek to get an understanding of the on-going data collection programs that are in place, both for the fishery and the ecosystem to ensure that future impacts of the fishery on the ecosystem would not go unobserved. This could be supported by the following:

- A list of routine ecosystem sampling requirements.
- Ecosystem specific work included in research plans.

Key questions to determine if further action is needed

Q Is the information collected adequate to inform management about whether ecosystem management efforts are working or not?

Q Would future changes in the ecosystem, in particular those changes caused by the fishery, be identified in routine data collection programs?

Q Do the ecosystem elements of the fishery management plan specify the data that should be collected in relation to the ecosystem?

Q Where ecosystem objectives expressed in the management plan are 'well defined and measurable', is data being collected to enable the progress against these objectives to be measured?

Scoring issue (d) – Monitoring

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	No scoring guidepost at the 60 level.
SG80	*Hoki trawl fishery:* Monitoring of hoki catch (including target catch, and all other species) by fisheries observers, as well as vessel-based reporting of the main species caught continue as part of the fishery management regime. Monitoring of ETP and OOS species captured is also part of ongoing management. Fishing practices are also documented to varying degrees of detail (e.g. tow location, date, and gear type). Annual research trawl surveys (unrelated to fishing vessel activities) continue. Together, these data are expected to be sufficient to detect increased risks of fishing to ecosystem components. The ongoing research priorities relevant to the hoki fishery are reported to the management agency. SG80 is met.
SG100	*Mussel dredge fishery:* Data is routinely collected on an ongoing basis to allow for the detection of any change or increase in risk level to the main ecosystem components. These data include landings data, effort data, spatial data in relation to habitats and species distributions and annual bird counts. These data have been and continue to be crucial in the development of strategies to manage the fishery. These data are used to determine whether and to what extent the fishery is open. These data also enable the impact of the management regime of a wide range of ecosystem components, such as seal haul out/breeding areas, bird feeding/breeding/overwintering areas and eelgrass and mussel reef habitat to be considered. In addition, a recent study was commissioned by the management agency to model impacts of climate change on mussel productivity to inform development of future strategies to manage ecosystem impacts. SG100 is met.

Challenges and solutions to meeting PI 2.4.3

Not all fishery management systems will have prioritised the collection of ecosystem information, particularly in jurisdictions where there has been less investment in marine science. In some cases, it is therefore likely that there may be a lack of data to understand and manage ecosystem impacts. In these situations, there may also be challenges understanding what information should be collected. Perhaps a simple summary would be that information should provide an understanding of the ecosystem and that adequate information should also be collected for any possible impacts of the fishery (whether direct or indirect) to be understood. Primarily, CAB auditors will look to ensure that there is adequate ecosystem information available to managers to inform their decisions and that this is appropriate to the scale and intensity of the fishery.

If there is a challenge in obtaining information about the direct impacts of the fishery on target stock, habitats, in-scope species, and ETP/OOS species (as discussed in earlier PIs) then it is likely that going a step further to infer the ecosystem consequences of these impacts is likely to present a still greater challenge. Similarly, if there is a challenge in presenting an ecosystem description which captures key elements and components, then it is likely to be a further challenge to capture the roles and functional relationships that are present and the potential fishery impact upon those roles.

In both cases this goes a step further than simple collection of information of a direct impact. It requires that information is used to help shape understanding of the ecosystem, its key elements, and the roles of the components within the ecosystem. At its most literal, this would imply a fairly complex and sophisticated level of ecosystem data collection, analysis and modelling (i.e. expensive and requiring considerable scientific capacity), but CAB auditors are likely to take a more practically minded interpretation and seek to verify that where it is reasonably possible to collect and use ecosystem information, then this is done.

Example process and actions to improve performance against PI 2.4.3

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Review the current information that is available or that is collected in relation to ecosystem balance and trophic relationships. Consider whether this is adequate to understand the fisheries impact on the ecosystem?	(a), (b), (c)
●				For each key element or key component of the ecosystem, review the degree to which its role in the ecosystem is understood.	(c)
	●			Consider the types of information that would need to be collected in order to get a complete understanding of ecosystem changes over time? Seek practical and cost-effective means of undertaking this data collection.	(a), (b), (c), (d)
		●		Plan for any future research or information collection as required, so that gaps in understanding can be addressed.	(a), (b), (c), (d)
		●		Ensure all data gathering, monitoring or research is implemented as required, properly resourced and where necessary given regulatory backing.	(a), (b), (c),
		●		Consider the potential for unintended or indirect ecosystem impacts of the fishery and ensure that on-going research and data collection are adequate to identify these changes.	(d)

Notes

Notes

Principle 3 - Effective management

The fishery is subject to an effective management system that respects local, national, and international laws and standards, and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

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Overview of Principle 3

Principle 3 states that 'the fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable'.

The intent of Principle 3 is to ensure that there is an institutional and operational framework appropriate to the size and scale of the fishery for implementing Principles 1 and 2, and that this framework is capable of delivering sustainable fisheries in accordance with the outcomes articulated in these Principles.

There are two components in Principle 3. The 'governance and policy' component has three PIs (PI 3.1.1 – PI 3.1.3) which capture the broad, high-level context of the fishery management system within which the UoA is found. The 'fishery specific management system' component has four PIs (PI 3.2.1 – PI 3.2.4) which focus on the management system directly applied to the fishery. For some fisheries this management system will include both national and international components.

3.1.1 Legal and/or customary framework

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Performance Indicator overview

This first PI of Principle 3 provides the legal foundation for all subsequent P3 questions. It requires that a management system exists within an appropriate and effective legal and/or customary framework which ensures that it:

- Is capable of delivering sustainable fisheries in accordance with MSC principles 1 and 2
- Includes cooperation where stocks are shared (i.e., transboundary)
- Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood, and
- Incorporates appropriate dispute resolution frameworks.

The legal framework plays a key role in delivering sustainable fisheries by ensuring that rules or the general terms and conditions under which the fishery is managed are appropriate and adequate to ensure the on-going health of the fisheries resources and ecosystem. At its most basic, the legal framework should clearly define who can fish, where, when, for what species and under what conditions. However, the legal framework needs to also provide for a diverse range of other governance issues, such as where responsibility for management lies and the power of management, the monitoring of compliance, how other ecosystem commitments are adhered to and how stakeholders may engage with or appeal management decision-making.

Because of the international nature of many fisheries in terms of stock dynamics, fleet composition and markets, fisheries management has been the subject of international agreements for many years. For stocks which are shared between jurisdictions, straddling, highly migratory or those on the high seas, there is a clear requirement for international cooperation in management. Consequently, several international and regional instruments have been developed to lay down principles and rules for sustainable fisheries management which must be implemented at the national level. These may cover the collection and sharing of scientific data, the assessment of stock status, the development of advice and the establishment and delivery of management actions and monitoring and control. When considering the legal framework, it is therefore important to consider all relevant jurisdictions.

The only fisheries which do not require this international element are those where the stock dynamics, fleet and market are not subject to international cooperation because the fishery is entirely within the internal waters, archipelagic waters or territorial sea of a sovereign state. An example would be a fishery that targeted a sedentary species found within a small coastal region, such as on the continental shelf. For these fisheries the focus of consideration will be on national legislative structures. For these fisheries, although the international dimension may be less, there remains the same need for appropriate and adequate legal frameworks and often cooperation between locally devolved agencies and national agencies will become more important.

The important role that informal and traditional management systems sometimes play are also recognised by the MSC Standard where more formally documented management systems may be absent. In these situations where management rules have not been codified, well-established traditional or informal systems may still achieve the same aims of precautionary and adaptive management. Accepted norms may be evident and effective, which draw on commonly held values or widely understood rules across the fishing communities. Further guidance is provided within the MSC Standard in these circumstances.

Three scoring issues are considered under this PI:

(a) Compatibility of laws or standards with effective management

(b) Resolution of disputes

(c) Respect for rights

Scoring issue (a) – Compatibility of laws or standards with effective management

The first scoring issue seeks to ensure that all the necessary legal frameworks required for effective management are in place.

Scoring issue	SG60	SG80	SG100
(a) Compatibility of laws or standards with effective management	There is an **effective national legal system** and a **framework for cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles I and 2.	There is an **effective national legal system** and **organised and effective cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles I and 2.	There is an **effective national legal system** and **binding procedures governing cooperation** with other parties, which delivers management outcomes consistent with MSC Principles I and 2.

Good practice

Fisheries that perform well under this PI have an effective national legal system. Where stocks are shared there is international cooperation or national cooperation between regional and national entities that is shown to be organised and effective and unequivocally binding. Such cooperation would generally involve collection and sharing of data, assessment of status of stocks and development of scientific advice.

What CAB auditors check

The range of documents CAB auditors will consult to find evidence of compliance with scoring issue (a) include:

- Fishery and relevant environmental legislation (Acts, Regulations) at all relevant jurisdictions – regional, national, international.
- Relevant international instruments and evidence of domestic implementation.
- Regional Fishery Management Organisations (RFMO) conservation and management measures.
- Fisheries policy documentation.
- Documents on fishery management arrangements, such as legal and policy research papers.
- Accepted norms, values and agreed rules held across the fishery.

Scoring issue (a) – Compatibility of laws or standards with effective management

Key questions to determine where further action is needed

- **Q** Does the stock which is being managed require cooperation across jurisdictions to deliver effective sustainable fisheries management?
- **Q** Does the legal framework include all tiers of jurisdiction required to deliver management outcomes?
- **Q** Is the national management authority party to effective international cooperation as required?
- **Q** Does the framework for cooperation include all relevant aspects of science, data collection, management rules and control and enforcement?
- **Q** Is there appropriate engagement at the level of RFMO?
- **Q** Are the rules that govern the fishery applicable to all vessels and to all areas where the species are targeted?
- **Q** Do national legislation and implemented rules of operation comply with international agreements?
- **Q** Are all relevant international instruments ratified and implemented and can this be demonstrated?
- **Q** Are there traditional or informal practices and rules that are consistent with ensuring cooperation?
- **Q** Is the fishery conducted under a controversial unilateral exemption to an international agreement?

Scoring issue (a) – Compatibility of laws or standards with effective management

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Tropical sole gillnet fishery:* The fishery occurs mainly within the jurisdiction of a single country. Most management occurs at the national level within the clear framework of an appropriate national legal system. All decisions over licensing, stock management and regulations occur at this level. However, the stock boundaries extend into a neighbouring country's EEZ, at least at certain times of the year, where some artisanal catches occur. Although in the past there have been some efforts to cooperate with the neighbouring country and the artisanal fleet representatives on the management and to obtain accurate landings information, this process has not been regular or formalised. However, scientists from both countries cooperate in the regional scientific organisation. SG60 is met.
SG80	*Demersal cod fishery:* There is an effective legal system in place, both nationally and within the European Union's Common Fisheries Policy. The system provides for cooperation between national entities involved in the management of the fishery, as well as between the national and EU level, and can hence be characterised as organised and effective, comprising not only scientific but also management cooperation at the international (EU) level. SG80 is met.
SG100	*Rock lobster trap and pot fishery:* The fishery operates in an archipelago with its own constitution which is consistent with local law. The fishery falls entirely under this jurisdiction and lobster stocks around each of the islands in the archipelago are managed separately. The concession holder is obligated through contract to comply with both the constitution of the Island as well as fulfil a range of conditions related to fishing the lobster stock sustainably (P1) and within the long-term ecosystem objective laid out for the island (P2). The concession holder has strengthened the Island fishery management system by contracting experts to undertake quantitative stock assessments and develop OMPs related to scientific recommendations for the management of the fishery. Hence, there is a national legal system in place with binding procedures governing cooperation with other parties and it is consistent with MSC Principles 1 and 2. SG100 is met.

Scoring issue (b) – Resolution of disputes

The intent of the second scoring issue is to ensure that there are appropriate and effective dispute resolution mechanisms, within the legal framework and that these exist at all relevant levels – fleet, regional, national and international.

Scoring issue	SG60	SG80	SG100
(b) Resolution of disputes	The management system incorporates or is subject by law to a **mechanism** for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes, which is **considered to be effective** in dealing with most issues and that is appropriate to the context of the UoA.	The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes, that is appropriate to the context of the UoA and has been **tested and proven to be effective.**

Good practice

High performing fisheries have dispute resolution mechanisms at all jurisdictions that are relevant to the scale of the fishery (e.g., fleet level, national and international) and the dispute resolution mechanism is transparent and proven appropriate and effective. The dispute resolution system should be enshrined within all relevant tiers of the fisheries management system.

What CAB auditors check

Stakeholder meetings will often be a key source in informing the scoring of this scoring issue to determine the extent that stakeholders are aware of any dispute resolution process. Hypothetical questions may also inform the considerations (e.g., what would happen if...). CAB auditors may also wish to consult the documentation at all jurisdictions relevant to the fishery, to determine whether mechanisms for resolving disputes are explicitly outlined. The following documents may contain reference to dispute resolution processes:

- Fisheries legislation.
- Bilateral or multilateral fisheries agreements.
- RFMO rules and policy documents.
- Documents on fishery management arrangements, such as legal and policy research papers.
- Evidence of any legal challenges against the government in relation to fisheries and how these were resolved.

Scoring issue (b) – Resolution of disputes

Key questions to determine where further action is needed

- **Q** Are dispute resolution mechanisms in place at all relevant jurisdictions?
- **Q** Are informal or traditional mechanisms for dispute resolutions in place?
- **Q** Are dispute resolution mechanisms appropriate to address all disputes that may be likely to occur?
- **Q** Are all parties signed up to the dispute resolution mechanisms, such that the outcome of any process would be binding (i.e. considered effective)?
- **Q** Are there examples of disputes being resolved through this process?
- **Q** Is the process transparent? For example, is it possible to review past findings in previous disputes?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Temperate prawn trawl fishery:* The fishery operates within a single EEZ. At the national level, there are mechanisms for dispute resolution in place, as fishers can take their case to court if they do not accept the rationale behind an infringement accusation by enforcement authorities, or the fees levied against them. Verdicts at the lower court levels can be appealed to higher levels. At the international level, the Permanent Committee is of particular importance in resolving differences that arise between the parties at the level of the EU Commission itself. The Permanent Committee also has several working groups where delegate work to find compromise when agreement cannot be reached in the EU Commission or the Permanent Committee. SG60 is met.

Scoring issue (b) – Resolution of disputes

Examples of scoring rationales – *continued*

SG80	*Tropical seabob shrimp fishery:* The fishery operates within a single EEZ. The country has a full judiciary and legal process which provides a transparent mechanism for resolving legal disputes. Most fishery disputes are resolved proactively before the full legal proceedings are required, via one of the following forums: • A Fisheries Advisory Committee - a committee with 5 representatives from commercial fishing sectors (including seabob, and artisanal representatives) and representatives of the other main government departments with marine concerns, such as, the coast guard and maritime authority. • A Seabob Working Group – formally constituted and comprising representatives of the four seabob fishing companies, technical and statistical staff of the fisheries department, representatives of the artisanal sector and an eNGO. By achieving broad agreement on management proposals and initiatives at this level before passing recommendations to the fishery advisory council or minister, there is increased likelihood of disputes being avoided, and the system is effective. SG80 is met.
SG100	*Albacore, yellowfin and bigeye longline fishery:* The RFMO has a dispute resolution procedure within its convention. While encouraging (and prescribing peaceful) resolution of disputes among its members, it provides for an appropriate review panel to be convened should it be necessary. Disputes between fishing entities can be submitted to final and binding arbitration through a Permanent Court of Arbitration (The Hague) at the request of either party. International disputes can be resolved through the International Court of Justice (ICJ) or the International Tribunal for the Law of the Sea (ITLOS) if they cannot be resolved in other ways. Additionally, the national management system incorporates a mechanism for the resolution of legal disputes that is effective in dealing with most issues. There have been several successful court cases. National disputes are handled through the provisions of the relevant national legislation. The Ministry's consultation process is an attempt to avoid unresolved disputes by ensuring all interested parties have an opportunity to participate and have an input into decisions. The mechanisms for dispute resolution at the national and regional levels, including reviews of the RFMO Commission decisions, have been tested and proven effective. SG100 is met.

Scoring issue (c) – Respect for rights

The intent of the third scoring issue is to ensure that the established rights of any indigenous or aboriginal groups or individuals dependent on fishing for either food or livelihood are fully recognised within the management system.

Scoring issue	SG60	SG80	SG100
(c) Respect for rights	The management system has a mechanism to **generally respect** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **observe** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **formally commit** to the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.

Good practice

Fisheries that perform well under this scoring issue have a system or means within management to ensure that the legal rights that have been established by custom or law for those dependent on fishing are observed.

Higher levels of performance require that these rights are not just demonstrated in practice but that they are explicitly codified in the binding rules of the fishery.

What CAB auditors check

Field observations and stakeholder meetings will often be a key source in informing the scoring of this scoring issue to determine the extent of established rights. In particular, CAB auditors may wish to speak with representatives of any groups dependent on fishing for food or livelihood.

CAB auditors may also review relevant legislation and decisions of legislatures (through statutes or national treaties relating to aboriginal or indigenous people) or courts to determine if rights have been conferred on any particular group or individual and that there is a mechanism to implement such rights.

Scoring issue (c) – Respect for rights

Key questions to determine where further action is needed

- **Q** Are the rights of any groups of aboriginal or indigenous people dependent on fishing for food or livelihood recognised in the fishery management system?
- **Q** Are the established rights of any such groups or individuals formally recognised in treaties or other relevant legislation?
- **Q** Have past court cases established relevant rights and if so, are these recognised in management?
- **Q** Does the management system have an appropriate mechanism to acknowledge these rights?
- **Q** Are there norms and practices across the fishery that are supportive of established rights?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	*Cod, haddock and saithe trawl fishery:* The fishery operates in the Barents Sea. In Russia, the rights of fishery-dependent communities are explicitly stated in the Federal Fisheries Act. In the Northern basin, a fixed quota of cod and haddock is given to the indigenous Sami, based on their traditional fishing rights in the region. Hence, the management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2. SG60 is met.
SG80	*Rock lobster trap and pot fishery:* The fishery operates in a remote, oceanic archipelago consisting of four islands. Through the 'Fishery Committee,' island staff, who work in the island factories, have direct input into the management of the fishery, via the Council. Although the main fishing vessel may occasionally catch unused TAC this is generally avoided to maximise the direct benefits of the fishery to the community from the smaller artisanal vessels. The management system hence has a mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2. SG80 is met.
SG100	*Small pelagic mid-water trawl fishery*: The fishery operates within a single EEZ. The national government has a commitment to negotiate indigenous land use and fishery agreements under well-established legislation. Within this legislation is an explicit agreement that provides for the fisheries minister and indigenous groups to develop and/or maintain management arrangements for traditional fishing. The fisheries agency has a customary fishing policy that applies to those of indigenous descent, fishing in a traditional manner, for non-commercial needs. This requires fisheries policy and management to provide specific and appropriate consideration of management practices in customary fisheries. The management system has a mechanism to generally respect, observe and formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2. SG100 is met.

Challenges and solutions to meeting PI 3.1.1

A number of challenges may be faced by fisheries which have been subject to a lower level of fisheries management intervention (such as fisheries of lower scale and intensity) in implementing an effective legal framework for sustainable fisheries, including the requisite elements of dispute resolution and respect for rights. Although in some jurisdictions many of the issues will have already been addressed for the most commercially important, or heavily targeted stocks, for other species which have been the focus of less management, governance and responsibility can sometimes be less clearly defined. For example, whilst cooperation may be in place and effective for some fisheries, there may be other stocks, which are fished in and by the same jurisdictions, which are considered a lower priority, and which are yet formally included in any relevant international processes.

Further challenges may exist for some fishing states in meeting MSC Fisheries Standard and requirements, which may require changes at high / legislative levels such as:

- Lack of updated legislation that takes into account modern international fisheries law and evolving requirements under regional fisheries management agreements.
- The slow and costly procedure for developing legislation in many countries, which does not allow for timely management intervention.
- Non-participation in regional fisheries management organisations.
- Non-ratification of relevant international instruments.
- Lack of domestic legislation implementing relevant international instruments.
- Limited awareness of international and regional fisheries obligations.
- Limited capacity at the national level to draft relevant fisheries legislation.
- Lack of transparency within established management systems.

In some countries unstable government, or major changes in government institutions or policy direction at the time of governmental change, may lead to a lack of continuity in fisheries policy, and increased potential for political decision-making. For example, there may be political resistance to restrict catch and effort, because of social, economic and political costs.

It is also important that the management framework is at an appropriate jurisdictional scale to the biology of the resource that is being targeted. For example, highly migratory or transboundary fish stocks require multi-lateral management agreements. In order for this to happen there must be some scientific understanding of the stock population dynamics and some forum for international cooperation in the field of fisheries management and science.

Example process and actions to improve performance against PI 3.1.1

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Develop criteria of management requirements using international standards (i.e. FAO Code of Conduct for Responsible Fisheries).	(a)
	●			Review national legislation and management plans against criteria developed.	(a)
	●			Where stock boundaries cross international limits, or for highly migratory species engage and participate in regional fisheries management organisations, cooperate on science and encourage multi-lateral fisheries management agreements.	(a)
		●		Undertake legislative modification.	(a)
		●		Ensure there are binding procedures in place (and adopted) governing the management of shared resources and the resolution of disputes between parties.	(a), (b)
	●			Review dispute resolution mechanisms at each relevant tier of the fishery management process.	(b)
	●			Consult with industry on their understanding of dispute resolution processes.	(b)
	●			Develop or refine transparent appeals process/complaints procedure.	(b)
		●		Ensure appropriate dispute resolution is included in legislative updates.	(b)
			●	Review efficacy of past dispute resolutions and transparency of process.	(b)
	●			Review legislation, treaties and past court cases to determine rights recognition for those dependent on fishing for food or livelihood. Undertake structured interviews with affected parties.	(c)
		●		Ensure appropriate rights recognition is included in legislative updates, or draft dedicated treaties.	(c)

Notes

Notes

3.1.2 Consultation, roles and responsibilities

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Performance Indicator overview

Fisheries management has been shown to be more successful where the management system identifies and actively engages with all parties with an interest in the fishery or 'stakeholders'. Stakeholders may include people and organisations not directly related to fishery activities, but that interact with or have an interest in a fishery.

By effectively consulting with stakeholders at key stages in the management process, managers provide and obtain relevant information, and this helps to ensure that subsequent decisions are appropriate and that the process of decision-making is both transparent and well understood. If carried out effectively this should ensure that stakeholders are supportive (or at least understanding) of the management process, which may lead to an increased sense of stewardship and potentially increased compliance with fisheries laws and regulations. Effective consultation also assists management and stakeholders to adapt to changes in the fishery and is therefore recognised as a key aspect of sustainable fisheries management.

Additionally, successful fisheries management requires that the organisations and agencies involved in the fisheries management process, and ideally also the individuals within those bodies, are well known and that their roles and responsibilities are clearly understood by all stakeholders.

These roles and responsibilities may be identified within existing fisheries management legislation or more likely in the fishery management plan, which should identify the function of the management authority, its objectives and the interested parties, while clarifying their respective roles, rights and responsibilities.

Three scoring issues are considered under this PI:

(a) Roles and responsibilities

(b) Consultation processes

(c) Participation

Scoring issue (a) – Roles and responsibilities

This scoring issue looks at the function and the roles and responsibilities of stakeholders within the management system.

Scoring issue	SG60	SG80	SG100
(a) Roles and responsibilities	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **generally understood.**	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for key areas** of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for all areas** of responsibility and interaction.

Good practice

Fisheries that score well under this scoring issue have identified the key areas of responsibilities within the fishery management system, as well as the individuals or organisations with responsibilities in those areas. Key areas of responsibility include data collection, science, licensing, decision-making, monitoring and surveillance (at all relevant locations) administration and training.

What CAB auditors check

CAB auditors will consult a range of documents and seek meetings with key stakeholders in the fishery to get an understanding of the key roles and responsibilities within the fishery and the extent to which this is understood by stakeholders. The following documents are likely to help inform the CAB auditors:

- Fisheries legislation, policy documents, sector studies, annual reports and reports by scientists describing the fishery.
- Management plans for specific fisheries often have well defined stakeholder roles and responsibilities.
- Rules of procedure.
- Minutes of meetings of advisory groups.
- Organisational chart and staff job descriptions.
- Organisation websites (for example of relevant government departments, statutory bodies, academic / research institutes, industry organisations).

Scoring issue (a) – Roles and responsibilities

Key questions to determine where further action is needed

- **Q** Are key areas of responsibility within the fishery identified? Where and how are they defined?
- **Q** Are the established rights of any such groups or individuals formally recognised in treaties or other relevant legislation?
- **Q** Do stakeholders in the fishery know how the management system works and the relative roles of each of the key organisations and individuals?
- **Q** If stakeholders have a question, a concern or a relevant contribution for consideration, is it understood where these should be addressed and to whom?
- **Q** If roles and responsibilities within the fishery change, either as a result of personnel changes or reorganisation within management bodies, are these changes communicated to ensure clarity of understanding?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Cod trawl fishery:* The UoA operates in Iceland. Different user groups are well integrated in the management process, and according to interviews with stakeholders during the site visit the functions, roles and responsibilities of the various actors involved in the management process are generally understood. SG60 is met.
SG80	*Tropical shrimp trawl fishery:* The shrimp fisheries management plan (FMP) provides a schematic that shows the different organisations involved in the management system/process and the flow of information / input / consultation that takes place between the respective bodies and groups within the management process. The national and shrimp FMPs also provide further descriptions of the functions, role and responsibilities of key organisations. Interviews with stakeholders confirm that these roles and responsibilities are well understood. Hence, functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction. SG80 is met.
SG100	*Albacore, yellowfin and bigeye tuna longline fishery:* The fishery operates within the WCPFC convention area and the UoA is a member country of the Pacific Islands Forum Fisheries Agency (FFA). At the international level, the WCPFC Convention provides information on the functions, roles and responsibilities of member states and relevant committees. At the national level, the Ministry of Fisheries is responsible for the implementation of the offshore fisheries conservation and management legislation. There are job descriptions for all staff that explicitly define roles and responsibilities. Interviews with individuals in the fishery show that they understand the roles and responsibilities of the management system. At national and international levels, the functions, roles and responsibilities of organisations involved in the management processes are explicitly defined and well understood for all areas of responsibility. SG100 is met.

Scoring issue (b) – Consultation processes

The second scoring issue focuses on the process by which managers seek stakeholder input and communicate how this is used.

Scoring issue	SG60	SG80	SG100
(b) Consultation processes	The management system includes consultation processes that **obtain relevant information** from the main affected parties, including **local knowledge**, to inform the management system.	The management system includes consultation processes that **regularly seek and accept** relevant information, including **local knowledge.** The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that **regularly seek and accept** relevant information, including **local knowledge.** The management system demonstrates consideration of the information and **explains how it is used or not used.**

Good practice

All fisheries should be able to have clear consultation processes. However, fisheries should also be able to demonstrate that these processes are regular, that key organisations are consulted, and that the information obtained is accepted and considered by management.

What CAB auditors check

CAB auditors will consult a range of documents and seek meetings with key stakeholders in the fishery to get an understanding of the extent and effectiveness of consultation mechanisms within the fishery. The following documents are likely to help inform the CAB auditors:

- Evidence of past (recent) consultations, relevant to the fishery.
- Fisheries legislation and policy documents which may state requirements for consultation with stakeholders or the need to have stakeholders involved in the management advisory process.
- Stakeholder consultation may be specified in a co-management process or in respect of consulting with traditional fishers.
- Records of consultation or committee meetings.
- Annual reports and specific stakeholder meeting reports.
- Mechanisms in place to facilitate stakeholder engagement such as newsletters, broadcasts, invitation letters, posters, etc.

Scoring issue (b) – Consultation processes

Key questions to determine where further action is needed

- **Q** Does the management system include consultation processes? And are there recent relevant examples of these?
- **Q** Does the consultation process collect relevant information?
- **Q** Does the management system consult with stakeholders at all key points and in support of major decisions and policy changes?
- **Q** Is the management system effective at engaging with all relevant stakeholders during consultations?
- **Q** Does the management system consider the information provided by consultation?
- **Q** Are stakeholders provided with feedback indicating how the consultation processes have been considered and the extent to which information obtained has been used?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Saithe trawl fishery:* The fishery operates on the Doggerbank. At the EU-Norway negotiations, industry groups and scientists are represented on both delegations. At the EU level, the Common Fisheries Policy (CFP) requires stakeholder participation through Advisory Councils. At the national level, there are a number of consultation mechanisms for authorities to seek relevant information from stakeholders. In the the flag state in the fishery the National Federation of Fishermen's Organisations, the UK Association of Fish Producer Organisations and other stakeholders are actively involved in consultations with national authorities. In Germany, as one of the coastal states in the fishery, all large fishing companies and associations are invited to annual meetings with the Federal Office for Agriculture and Food, where regulations and quota distribution are discussed. In Norway, another coastal state, the Norwegian Fishermen's Association is consulted on a regular basis, and Regulatory Meetings organised twice a year are open to all, including NGOs and the media. In Denmark, another coastal state and port state, the most important formal arena for stakeholder consultations is the so-called 'paragraph 6 committee', which is prescribed by paragraph 6 in the Fisheries Act. The committee, formally named the Committee on Commercial Fisheries, is an advisory body for the Government in all areas of fisheries legislation and management. It meets 7-8 times per year, and all stakeholders are free to attend. All stakeholders interviewed at the site visit report short lines of communication and easy access to national fisheries management authorities. Hence, the management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system. SG60 is met.

Scoring issue (b) – Consultation processes

Examples of scoring rationales – *continued*

Scoring issue (b)	Fishery Example
SG80	*Hand-gathered tropical clam fishery:* Evidence has been presented to show that the formal management system has sought and accepted information about the management of the stock and also the structure of the management regime. In response to this the State Government has established a Village Clam Fisheries Council (VCFC) to create a mechanism for integrating local knowledge into the management system; the VCFC also provides an opportunity for environmental NGO input as well as the local village council. The VCFC has, in turn, held stakeholder consultation meetings. This activity demonstrates that the management system is actively seeking and accepting relevant information. The creation of the VCFC and changes to the HCRs for the clam fishery demonstrate that the management system considers and responds to the information obtained. SG80 is met.
SG100	*Crayfish trap fishery*: The UoA operates in Sweden, which has a long tradition of including NGOs in fisheries management, with continuous consultation and close cooperation between governmental agencies and user-groups. Representatives of SwAM, SLU and the county boards have regular discussions with individual fishermen and their organisations. Representatives of the fisheries management authorities also attend the annual meetings of the Association on a regular basis, where they inform, listen and discuss management-related matters. Other stakeholders are included in the Water Protection Association of the respective UoA lakes, among them municipalities, counties, industries and NGOs. At the national level, SwAM's Council for Public Access to Information consists of politicians and representatives of civil society, business and other state bodies of governance. The website of the Association of Swedish Lake Fishers has a section where all relevant public hearings and the Association's responses to them are listed. All stakeholders interviewed at the site visit confirmed that each management agency demonstrate consideration of their input and explain how it is used or not used, which is also reflected in minutes from meetings. SG100 is met.

Scoring issue (c) – Participation

The third scoring issue focuses on the process by which stakeholders are engaged in consultations, and the efforts made by management to support this.

Scoring issue	SG60	SG80	SG100
(c) Participation		The consultation process **provides opportunity** for all interested and affected parties to be involved.	The consultation process provides **opportunity and encouragement** for all interested and affected parties to be involved, and **facilitates** their effective engagement.

Good practice

In fisheries that score well against this scoring issue, consultations are made widely available to all parties. Opportunities are presented in an appropriate format for stakeholders and are widely publicised in appropriate locations, ensuring that it is easily possible for all those who may have an interest to participate. Such opportunities may include representation of different stakeholder groups in advisory bodies or other similar entities.

What CAB auditors check

CAB auditors will review past consultations and speak to stakeholders to determine the extent to which participation in past consultations was actively and effectively facilitated. There may be less in the documentary record, although the following documents/data may support scoring:

- Documented evidence of past participation in consultation exercises.
- Sectoral representation in consultation committees as shown by committee membership and minutes.
- Fishery legislation or other policy documents which detail a minimum level of consultation and the process by which this will be achieved.

Scoring issue (c) – Participation

Key questions to determine where further action is needed

Q Are there good levels of participation in consultative exercises and does the management system consider how best to maximise stakeholder participation in these processes?

Q Are consultative processes designed to make it easy for stakeholders to respond?

Q Are sector representatives consulted within the management process and do these representatives in turn consult with their members?

Q Have stakeholders been well aware of past consultation processes and understood how to participate?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	No scoring guidepost at the 60 level
SG80	*Tropical snapper line fishery:* Individual fishermen and fishing businesses alike are represented by a member of their sector sitting on the local fisheries advisory council, including a Snapper Working Group, or in attendance at ad hoc consultation events. In addition, NGOs can have observer status at the Snapper Working Group. Therefore, the consultation process provides opportunity for all interested and affected parties to be involved. SG80 is met.
SG100	*Scallop trawl fishery:* The scallop fishery manager is contactable by fishermen and other affected parties to discuss any matters that arise. The management agency holds monthly meetings with additional meetings, where necessary, giving additional opportunities fishermen to consult with managers. The timing of meetings is set to enable active fishermen to attend and this facilitates their effective engagement. The Government agency under which the scallop fishery is managed, consults on wider policy developments with all affected parties with any substantial developments the subject of open public consultation exercises. Hence, the consultation process not only provides opportunity and encouragement for all interested and affected parties to be involved, but also facilitates their effective engagement. SG100 is met.

Challenges and solutions to meeting PI 3.1.2

The important role of effective and constructive stakeholder engagement is increasingly recognised in successful fisheries management. However, such engagement was not always evident in the past. Where fisheries management systems are updated, the important role played by stakeholders can be enshrined in stakeholder communications and consultation processes. In situations where fisheries management systems are still to be updated, challenges of a lack of engagement may persist, which will need to be overcome. These include:

- Stakeholders may assume government runs the fishery and are unclear as to their role, as stakeholders, in providing information about the fishery and advice on issues that impact them.
- Lack of funding or staff resources to carry out necessary consultation and perform analysis and reporting of results.
- Lack of harmonised process for consultation at the national and state (local) levels.
- Inadequate flow of information to stakeholders, perhaps as a result of difficulty in communicating directly with a wide range of stakeholders due to issues such as poor rural online access or low levels of literacy.
- The committees or advisory committees established to ensure consultation and compliance may not be fishery-specific or may lack appropriate representation.
- Absence of systems to facilitate engagement for interested parties.
- Lack of explanation on how information collected from stakeholders is utilised – again the communication medium may be problematic.

Undertaking a review of roles and responsibilities within the fishery and determining the specific roles of various departments, agencies and institutions through a participatory approach can contribute to addressing these issues.

Example process and actions to improve performance against PI 3.1.2

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Review the degree to which all roles and responsibilities within the fishery are clearly defined. Consult with industry and other stakeholders to ascertain how well the functions and responsibilities of the different management agencies are understood.	(a)
	●			Ensure that all agencies within the fisheries management framework clearly identify their role, through publicity material, or website. This should include details of how stakeholders can provide input and feedback.	(a)
		●		The fishery management plan should clearly identify which agencies, departments or associations will undertake which roles in the fishery.	(a)
●				Identify all stakeholders with an interest in the fishery.	(b), (c)
	●			All management proposals should be fully and widely consulted upon. The findings of this consultation process should be communicated widely.	(b), (c)
	●			Encourage wider representation of different types of stakeholders like environmental NGOs or fishing sector representatives in relevant advisory bodies.	(b), (c)
		●		As management becomes more formalised, any management plan and enacting legislation should clearly identify the need for effective consultation and detail how and when this will be done.	(b), (c)
		●		Ensure all formal management decision-making processes are committed to stakeholder consultation and give full consideration to the findings of these consultation exercises.	(b)
	●			Develop strategy to ensure widespread engagement in consultations on management proposals is facilitated. This may include considering how those with limited literacy or limited access to communications tools, such as phones or internet, may still be engaged in the consultation.	(c)
		●		Develop communication strategies to disseminate the results of consultations. This may be through fishery meetings, industry press, or on-line resources.	(b)
			●	Periodically review the efficacy of the consultation processes and the degree to which the management process is understood and actively engaged with by all stakeholders.	(a), (b), (c)

Notes

3.1.3 Long-term objectives

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Scoring issue (a) 283
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Example process and actions to improve performance against PI 3.1.3 287

Performance Indicator overview

This PI seeks to ensure that management policy has clear long-term objectives to guide decision-making that are consistent with the MSC Fisheries Standard and incorporates the precautionary approach.

This PI therefore looks at the objectives which are contained in high level or broader government policy (beyond the particular fishery or UoA in question). It is not concerned with the operational implementation of day-to-day management decisions.

Typically, management decisions are taken in the context of broader pre-stated objectives and the success of management decisions is therefore judged against how well those decisions deliver against the objectives. To ensure clear strategic direction, government policy and laws should provide management with a clear set of objectives, against which to design and implement management. Fishery-specific management policy (such as, but not limited to, a fisheries management plan) is developed in the context of these high-level, long-term objectives, demonstrating how these will be met. Below are some key considerations in developing long term objectives:

- Clearly state that long term sustainable use of fisheries resources is the overriding objective of fisheries management in order to avoid overfishing or stock depletion.
- Clearly state how decisions will be based upon best available scientific evidence available and will be based on the precautionary approach. This should guide policy makers to be cautious when information is uncertain, unreliable or inadequate. The lack of scientific information should not be used as a reason to postpone or fail to take conservation or management measures.
- Clearly define the wider ecosystem objectives (aligned with the ecosystem approach to fisheries), indicating that fishing operations will be conducted in a manner that allows for the maintenance of the structure, productivity, function and diversity of the ecosystem on which the fishery depends.
- Finally, the management system should respect local, national and international laws and standards in providing effective governance.
- There may be other long-term, high-level objectives which are appropriate to the context of the fishery which may also be included here, but these should not be contradictory to any of those stated above.

Only one scoring issue is considered in this PI:

(a) Long-term objectives

Scoring issue (a) – Objectives

There is only one scoring issue for this PI. The scoring issue therefore addresses all aspects of the PI and assesses long-term objectives in the fishery and extent to which they ensure decision-making is consistent with the MSC Standard.

Scoring issue	SG60	SG80	SG100
(a) Objectives	Long-term objectives to guide decision-making, consistent with MSC Fisheries Standard and the **precautionary approach**, are **implicit** within **management policy.**	**Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the **precautionary approach**, are **explicit** within **management policy.**	**Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the **precautionary approach**, are **explicit within and required by management policy.**

Good practice

Good practice requires that high-level, long-term objectives are explicitly stated. This normally means being clearly written down in a binding document, which is relevant to both the fishery under assessment and the management jurisdiction of the fishery. High level management policy should also contain a requirement for there to be such objectives. This 'requirement' for objectives is therefore likely to be at a higher policy level, than the objectives themselves. In traditionally and informally managed fisheries the decision and practices in the fishery must be influenced by factors that are consistent with achieving the intent of the MSC Standard.

What CAB auditors check

The CAB auditors will review the content of the relevant acts and policies (as described in 3.1.1) to support the scoring of this scoring issue. These are likely to include:

- International legal instruments and binding international conventions.
- Overarching government policies which may include a requirement for all sectors / departments to set objectives.
- National fisheries legislation.
- Fisheries policy documents or fisheries sector strategy documents.
- The legal status of any such documents and how they shape decision-making.
- CAB auditors may refer to fishery management plans (where available), to ascertain to what extent these refer to overarching high level objectives (more fishery-specific and day-to-day operational objectives contained in fishery management plans will not be used to inform this scoring issue).

In traditionally or informally managed fisheries CAB auditors may look at alternative sources for information. These may include referring to the process and outcomes of recent management decisions, determining to what extent these have been guided by high level objectives, determining what extent these objectives appear to be in line with the needs of sustainability and whether there is evidence of management decision-makers adopting appropriate levels of precaution.

To help inform the scoring of this scoring issue in traditional or informal management situations, where explicitly stated objectives are absent in relevant documentation, CAB auditors may investigate the extent to which recent management decisions have been guided by a common understanding of the overarching objectives of management.

Scoring issue (a) – Objectives

Key questions to determine where further action is needed

Q Is there a requirement, within overarching management policy, that high-level, long-term objectives should be defined?

Q Are the high-level, long-term objectives explicitly stated and binding in relevant documents or legislation?

Q Are these objectives consistent with the MSC Standard and do they mention the precautionary approach?

Q Are the high level objectives relevant to the jurisdiction of the fishery?

Q Are all fisheries decisions taken in relation to these objectives?

Q Is there any higher level policy document which requires management to set out its long-term objectives?

Q Are decisions in the fishery guided by a notion of long-term objectives that are consistent with the MSC Standard?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Snapper gillnet fishery:* Long-term objectives are not explicitly defined in the Fisheries Act, which was enacted many years ago. In addition, there is no explicit mention of the precautionary approach in any legislation or management policy documents, however this is implied. The phrase 'long term sustainability' is regularly referred to in fishery policy documents and there is evidence of precautionary decision-making on issues such as licensing and fishery exploitation rates (relating to MSC Principle 1) and the closure to fisheries or a number of areas of sensitive seabed habitats (relating to Principle 2). SG60 is met.
SG80	*Tropical clam fishery:* The explicit long-term objective for fisheries management in the state where the UoA operates is "to conserve and utilise marine resources in a sustainable manner, as fishes are significant renewable resources in its territorial sea and exclusive economic zone.' This objective guides decision-making for fisheries management and is the basis of the precautionary management policy that has been developed for the clam fishery by the management agency and the associated research institute. The elements of this plan have been adopted and also the proposal to formalise the MSY objective through a regular stock assessment with the setting of a precautionary TAC based on this stock estimate. These actions provide explicit evidence that long-term objectives and a precautionary management policy are in place for the fishery. SG80 is met.

Scoring issue (a) – Objectives

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG100	*Saithe trawl fishery:* The UoA operates on the Doggerbank. The CFP Basic Document requires that member states apply the precautionary approach to fisheries management and aims to ensure that exploitation of living marine biological resources restores and maintains populations of harvested species above MSY. When targets relating to MSY cannot be determined, multiannual (management) plans shall provide for measures based on the precautionary approach to a comparable level. The Fisheries Act 2020 (UK) has a sustainability objective, the precautionary objective, the ecosystem objective and a scientific evidence objective. Through their fisheries act, Norwegian fisheries management are guided by the precautionary approach and by an ecosystem approach. Norway-UK agreements state that the parties shall cooperate to be ensure the long-term conservation and sustainable use of marine living resources and, in doing so, safeguarding the ecosystems in which these resources occur, through the application of the precautionary approach to fisheries management. Hence, clear long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are explicit within management policy. Such objectives are also made mandatory for lower-level regulations and policy implementation at the national level and are hence required by management policy. SG100 is met.

Challenges and solutions to meeting PI 3.1.3

The key challenges for many countries in meeting the requirements for PI 3.1.3 is often in highlighting exactly where explicit and binding long-term objectives are contained and secondly in showing that these meet the requirements, in terms of content, outlined above.

In some cases the documentation that the CAB auditors refer to for evidence of long-term objectives may either be absent, out of date, or lacking specific objectives. In particular, older fisheries acts, legislation and sector policies, may have been written before the need for stating overarching objectives was widely recognised. Older legislative tools tend to focus more on the 'what' and less on the 'why'.

Notions of the 'precautionary principle' and 'ecosystem approach' are also more recent in their widespread adoption, so again older pieces of legislation may not refer to these. In these instances, there may be a need to either update fisheries legislation, sector policies or point to other binding government policies, or evidence of binding international agreements, which do contain the types of binding long-term objectives required by this PI.

Example process and actions to improve performance against PI 3.1.3

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Review the high-level fisheries policies, regulations and acts to determine what long-term objectives are stated. Also review the objectives contained within any binding international conventions which the country may have endorsed.	(a)
●				Review past fishery management decisions to determine the extent to which these have been more informally guided by a notion of long-term, high-level objectives. Document how decisions made in the fishery are compatible with achieving ecological health of the fishery and associated ecosystems in the long term.	(a)
	●			Where long-term objectives are lacking, consider how these can be incorporated into management policy, ideally at a high legislative level, or potentially, within a fishery management plan.	(a)
	●			Consult on proposed long-term objectives, with sector and other stakeholders (NGOs). The findings of this consultation process should be communicated widely.	(a)
		●		Seek to incorporate binding long-term objectives in relevant legislation (giving full consideration to the findings of the consultation exercises).	(a)
		●		Ensure that all formal management decision-making processes recognise the long-term objectives and take decisions in relation to these guiding principles and objectives.	(a)
			●	Periodically review the extent to which long-term objectives are being adhered to, to ensure that the objectives are achieving their aims. Consider changes to objectives, or changes to the degree to which they are required to be considered.	(a)

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3.2.1 Fishery-specific objectives

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Example process and actions to improve performance against PI 3.2.1 295

Performance Indicator overview

Objectives are important statements of what an individual and/or organisation intends to achieve and against which progress can be measured. Fishery-specific objectives (or operational objectives) provide direction for individual management measures or regulations and are compatible with, and follow-on from the overarching national, international or regional goals and/or policies set by governments for their fishery sector (assessed in 3.1.3).

Objectives are usually located in the management or strategic plan for the fishery and while they may be unique to a specific fishery, they should still be consistent with the commitments, overarching goals, long-term objectives, and/or policies set for the whole fisheries sector.

For example, an overarching national policy may be to keep fish stocks at levels necessary to ensure their future biological productivity, while a fishery-specific objective addressing this policy could be to limit catches to maintain the stock at population levels equivalent to 40% of unexploited biomass. Fishery-specific objectives are usually precise and measurable so that decision-makers can determine whether the objective is being achieved or has been successfully implemented. Hence for fisheries under assessment, individual harvest or management strategies scored in Principles 1 and 2 are examined against the fishery-specific objectives score under Principle 3.

Apart from the need to establish clear and measurable fishery-specific objectives, it is also important to set out the process for defining such objectives, including the various elements that may be considered in decision-making. In almost every fishery there are multiple, and sometimes conflicting, economic, social and ecological objectives that would need to be negotiated amongst stakeholders and balanced by decision-makers.

For example, measures to improve employment in a fishery may not increase overall efficiency and profits of the fishing fleet. Stakeholders may need to agree what conflicting overarching goals should be expressed as fishery-specific objectives in the management plan before developing management measures to achieve them.

Only one scoring issue is considered under this PI:

(a) Fishery-specific objectives

Scoring issue (a) – Objectives

There is only one scoring issue for this PI. The scoring issue therefore addresses all aspects of the PI. It assesses the presence of objectives in the fishery and the extent to which these are leading to outcomes that are consistent with the MSC Standard.

Scoring issue	SG60	SG80	SG100
(a) Objectives	**Objectives**, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **implicit** within the fishery's management system.	**Short- and long-term objectives**, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery's management system.	**Well defined and measurable short- and long-term objectives**, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery-specific management system.

Good practice

Good practice requires that the objectives for the fishery management system, as well as being consistent with MSC Principles 1 and 2 must also include both short-term and long-term operational targets and must also be explicitly stated. This implies that it is stated in a fishery-specific management document or plan. At the highest scoring level, the stated objectives should be measurable, so that management can monitor appropriate indicators to enable a periodic empirical review of management performance against objectives.

What CAB auditor check

The range of documents CAB auditors will consult to find evidence of compliance with this scoring issue includes:

- Fishery-specific international, bilateral or multinational fisheries agreements.
- Fishery-specific management plans.
- Fishery-specific scientific management advice, which may detail the operational objectives shaping the advice.

Scoring issue (a) – Objectives

Key questions to determine where further action is needed

- **Q** Is there a management plan for the fishery, which clearly states the long and short term objectives of management?
- **Q** Are objectives stated elsewhere – for example, in an internationally agreed conservation measure?
- **Q** Are the objectives measurable against targets or timelines?
- **Q** Are there other relevant documents, legislation or plans which clearly state the objectives that shape management decision-making?
- **Q** Do stakeholders understand the objectives that managers are seeking to meet with their decisions?
- **Q** Do the stated objectives reflect the aims of MSC Principles 1 and 2, namely sustainable stock management and healthy ecosystems?
- **Q** Do management decisions follow these objectives – both in the short and longer term?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Cod, haddock and saithe trawl:* The UoA operates in the Barents Sea. Short- and long-term objectives are explicit in annual protocols and research programmes of the JNRFC, as well as national legislation in Norway and Russia. The basic principles of the JNRFC state that it shall follow the provisions for a responsible fishery as expressed in the FAO Code of Conduct for Responsible Fisheries. Main management objectives are defined: i) to attain high sustainable catches from exploited stocks in the ecosystems of the Barents and Norwegian seas without decreasing their productivity; ii) to keep exploited stocks within safe biological limits while maintaining the biodiversity and productivity of marine ecosystems; and iii) to ensure sustainable development of the fisheries industry while exploiting the stocks within safe biological limits. The decisions of the JNRFC are implemented at the national level in Norway and Russia. Objectives which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2 are in place in the fishery-specific management system. SG60 is met.

Scoring issue (a) – Objectives

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG80	*Small pelagic mid-water trawl fishery:* The fishery contains both explicit long-and short-term objectives relevant to Principle 1 and 2. For Principle 1, the short-term objectives include establishing TACs, stock assessment and monitoring, developing and reviewing the harvest strategy framework that includes appropriate decision rules and reference points. The long-term P1 objectives include maintaining stocks at agreed target reference points and above the limit reference point within agreed likelihood. For Principle 2, the short-term P2 objectives include understanding ecological impacts of fishing operations, gathering and collecting information about the impact of the fishery on bycatch species, taking all reasonable steps to minimise incidental interactions with seabirds, sharks, marine mammals and non-target fishes. The long-term objectives relevant to P2 include implementing rebuilding strategies if needed and having no incidental bycatch of a particular stock if it moves below B_{LIM}, or approximate proxy. SG80 is met.
SG100	*Temperate prawn trawl fishery:* Long and short-term specific objectives are documented in the Management Plan for the fishery. For instance, the Plan has a long-term management objective, which is demonstrably consistent with achieving outcomes expressed by MSC Principles 1 to maintain an ecologically sustainable prawn biomass. Short-term objectives exist that maintain catch levels at or below TAC. The long-term management objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC Principle 2, are also defined in the Plan e.g., fishery impacts on bycatch and benthic habitats. Short-term objectives, as they relate to P2, have to do with keeping annual bycatch limits below the threshold and minimising the fishery's impact on the habitat. Well-defined and measurable short and long-term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system. SG100 is met.

Challenges and solutions to meeting PI 3.2.1

The main challenge for many fisheries in meeting PI 3.2.1 is that many fisheries do not have explicit short and long-term objectives that meet the requirements of MSC Principles 1 and 2. Often fisheries managers will make good decisions and comply with high level objectives, but the more operational objectives that shape routine management decisions may not always be explicitly stated. However, where there is a comprehensive fishery management plan in place the objectives will often be explicitly stated.

Even in cases where a fishery-specific management plan is in place, it is not unusual for this to focus on Principle 1 objectives, relating to stock sustainability, and failing to state the Principle 2 objectives in relation to ecosystem impacts (habitat protection, minimising bycatch, interactions with ETP/OOS species, etc).

Countries or regions have also had difficulties in meeting the 'measurability' good practice requirements of the MSC. While many countries have explicit objectives formulated and explicitly state, they may not have the capacity or routine review system in place to measure the performance of the management authority in meeting both short- and long-term objectives.

Reviewing and documenting fishery-specific management objectives and making improvements to these objectives as appropriate, in consultation with stakeholders is a useful first step in addressing this issue.

Example process and actions to improve performance against PI 3.2.1

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Review the current fishery specific management objectives that are in place and determine the extent to which these are explicit, measurable and applicable to a full range of MSC Principle 1 and 2 criteria.	(a)
●				In situations where the fishery is managed by a traditional management system and where specific objectives are not documented, review and document the informal objectives which shape management decision-making in relation to fish stock health (P1), ecosystem impacts (P2).	(a)
	●			Seek to develop fishery-specific objectives, which serve as an operational interpretation of the long-term objectives (PI 3.1.3). These should be clearly defined and measurable. They should also include elements focused on stock health (P1) and ecosystem health (P2). Whilst these may also include objectives in relation to social/economic needs, these should not be at the expense of ecological considerations.	(a)
		●		Ensure all proposals for formal management objectives are committed to stakeholder consultation and show that there has been a full consideration of the findings of these consultation exercises.	(a)
		●		Formally adopt fishery specific management objectives into the management decision-making process. This may require objectives to be explicitly detailed in the fishery management plan or in relevant legislation or regulation.	(a)
		●		Consider whether additional monitoring of empirical indicators is required in order to demonstrate management performance against the objectives.	(a)
			●	Periodically review the appropriateness of fishery specific objectives to ensure that they are achieving the management aims, and that they are acting as indicators of performance of the fishery in a fully measurable manner.	(a)

Notes

3.2.2 Decision-making processes

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Responsiveness of decision-making processes

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Performance Indicator overview

There are many key decisions involved in successful fisheries management. How many fish to catch, when, where, how and by whom are just a few of these. But there are many more complex decisions such as how to balance the needs of different stakeholders, how to incorporate meaningful ecosystem considerations, how to ensure the management system is robust and reviewed or how to share resources between parties. The process by which these decisions are informed and made, and against what criteria is therefore critical to the success of fisheries management in meeting its stated objectives. It is the process of decision-making, rather than the outcomes of decisions that is the focus of this PI.

The importance of effective decision-making in the fisheries context is highlighted in the FAO Code of Conduct for Responsible Fishing, which states that countries should:

- "...ensure that decision-making processes are transparent and...facilitate consultation and the effective participation of industry, fishworkers, environmental and other interested organizations in decision-making with respect to the development of laws and policies related to fisheries management..." (FAO Code of Conduct para. 6.13). "... recognise that responsible fisheries requires the availability of a sound scientific basis to assist fisheries managers and other interested parties in making decisions" (FAO Code of Conduct para. 12.1).

Fishery decision-making may occur at various jurisdictions. National fisheries decision-making may be undertaken centrally within one organisation or regionally, among multiple organisations. Some fisheries-related decision-making powers may also be delegated to local governments. For shared or straddling stocks, decisions may be taken at a bilateral or multi-lateral level or within the framework of RFMOs. The role of RFMOs in international fisheries decision-making is recognised under the UN Fish Stocks Agreement, particularly Article 10, which includes the obligation for States to 'agree on decision-making procedures which facilitate the adoption of conservation and management measures in a timely and effective manner.' (UN Fish Stocks Agreement, Article 10(j)).

Regardless of the government system, there are key features of decision-making processes that facilitate effective fisheries management. These include:

- An established and understood process for making decisions.
- A timely and adaptive process, responsive to changes in circumstance.
- Access to relevant information – up to date, reliable, accessible.
- Decisions informed by best scientific evidence available and following the precautionary principle where evidence is lacking.
- A transparent process that is accountable to stakeholders.
- A framework for resolving fisheries disputes.

Most governmental decision-making frameworks have formal mechanisms for interest groups and the public to participate, which are based around advisory committees and working groups along with opportunities for public comment. The decision-making framework at both domestic and regional levels (at least with respect to the P1 stock) is usually based around an annual cycle where stock status and fishing mortality are assessed and where in use, TACs and regulations are modified to take into account current trends.
The decision-making framework in relation to the management of potential ecosystem impacts (Principle 2) may not always be part of the same process, so it is important that consideration is also given to these decisions, when preparing for or scoring this PI.

Five scoring issues are considered under this PI:

(a) Decision making processes

(b) Responsiveness of decision-making processes

(c) Use of the precautionary approach

(d) Accountability and transparency of management system and decision-making process

(e) Approach to disputes

Scoring issue (a) – Decision-making processes

The first scoring issue seeks to ensure that the process by which key management decisions are taken is established.

Scoring issue	SG60	SG80	SG100
(a) Decision-making processes	There are **some** decision-making processes in place that result in **measures** and **strategies** to achieve the fishery-specific objectives.	There are **established** decision-making processes that result in **measures** and **strategies** to achieve the fishery-specific objectives.	

Good practice

It is likely that all fisheries will be able to point to some decision-making process, but for good practice these processes should be well established. This would imply that the decision-making process is recognised within the management system and should be clearly described and well understood. There should be evidence to show that the process can be triggered and has been used in the past.

What CAB auditors check

The CAB auditors will seek to get an understanding of the process by which fisheries management decisions are taken through stakeholder interviews, in particular by focusing on the process by which past decisions have been taken. CAB auditors will also seek to support this through review of relevant documentation, such as:

- Fisheries legislation – indicating powers and responsibility.
- Management policy documentation, including the fisheries management plan – may set out decision-making process.
- Scientific advice – may refer to decision-making process.
- Sector studies or economic and social studies or papers.

Scoring issue (a) – Decision-making processes

Key questions to determine where further action is needed

- Q Is a decision-making process for key fisheries decisions established, documented and understood?
- Q Are there informal processes that can be triggered and which have led to decisions in the past?
- Q Where multiple jurisdictions are involved in management decisions, are the decision-making processes at each of these levels equally established and/or overlapping?
- Q Looking at a previous important decision relating to the fishery, can the process by which that decision was taken be clearly described?
- Q Is the decision-making process set out either in governing legislation or in relevant policy documents of the fishery management plan?
- Q Do relevant government departments describe their role in the decision-making process, for example on government websites?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Yellowfin tuna handline fishery:* Decisions have historically been taken as required by the management authority for issues such as licensing, area and gear restrictions and whether to adopt output controls. However, the fishery has undergone a recent management change and a new decision-making process is now in place at the national level which follows a more formal timeframe and stipulates how monitoring, scientific advice and stakeholder input will be used to take decisions in the context of the measurable objectives stated in the management plan Hence, there are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives. SG60 is met.
SG80	*Tropical prawn trawl fishery:* The prawn fisheries management plan (FMP) outlines the consultation and decision-making structure and hierarchy for the fishery. Management decisions are enacted by the management agency and the responsible Minister. There is clear evidence that this established decision-making process has resulted in measures being implemented which are directly linked to the fishery specific objectives. This includes the binding implementation of the prawn fishery's HCR on a national level and annual licence conditions which reflect decisions emanating from these decision-making processes e.g., the adoption of bycatch reduction devices and the requirement to record bycatch, ETP and OOS species, and habitat interactions. Hence, there are established decision-making processed in place that can be immediately triggered for fisheries-related issues, that have been triggered in the past and led to decisions about sustainability in the fishery. SG80 is met.
SG100	No scoring guidepost at the 100 level.

Scoring issue (b) – Responsiveness of the decision-making process

The second scoring issues seeks to ensure the decision-making processes (outlined in scoring issue (a)) are responsive to relevant information and enable decisions to be taken in a timely, transparent and adaptive manner.

Scoring issue	SG60	SG80	SG100
(b) Responsiveness of decision-making processes	Decision-making processes respond to **serious issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to **serious and other important issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to **all issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.

Good practice

Fisheries are expected to respond to serious issues and be transparent, timely and adaptive. In good practice fisheries, a broader range of issues (not just the most serious) are subject to the relevant decision-making process and greater consideration is given to the wider implications of decisions.

What CAB auditors check

CAB auditors will need to check the transparency, timeliness and range of issues that management decision-making responds to and the range of considerations given to the wider implications of decisions. This will be informed by stakeholder interviews along with reviewing a range of documents such as:

- Fisheries legislation – may detail the range of decisions and requirements for consideration of wider implications.
- Management policy documentation – the fishery management plan may detail what issues should be responded to and what implications of decisions should be taken.
- Evidence of management taking decisions in response to issues raised in scientific advice, research, management evaluations or consultancy.
- Evidence of assessments of potential impact of decisions (i.e., social or environmental impact assessments) being undertaken, prior to decisions being finalised.
- Economic and social studies or papers.

Scoring issue (b) – Responsiveness of the decision-making process

Key questions to determine where further action is needed

Q Are there examples of management taking timely action in response to scientific advice, the results of evaluation or recommendations from studies?

Q Does management consider the implications of management decisions, perhaps through impact studies, or modeling, or via consultation exercises?

Q Does the legislation, or management policy state what information should be used to inform decisions and how the implications of possible management action should be taken account of?

Q Is the timescale of management decision-making, appropriate to the possible impact?

Q Is the process transparent to enable all stakeholders to understand how management has responded to relevant issues?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	Sardine purse seine fishery: The fishery is a French flagged fishery that operates in the Bay of Biscay. At the EU level, the system responds to issues on wider implications through the decadal policy review process, regularly through an advisory council if necessary. At national and local levels, the French system is very reactive to changes in the state of stocks, through a transparent consultation process involving all co-management institutions, as demonstrated by the management plan for species assessed in P2 and various research projects. For sardine, abundance indices are discussed annually with the fleet association and relevant management and research agencies. Management measures including daily and overall vessel quotas are agreed in committee meeting under the supervision of the regional government authorities and form the basis of management measures. Hence, serious issues are addressed by the fishery's co-management partners in a transparent and timely fashion. SG60 is met.

Scoring issue (b) – Responsiveness of the decision-making process

Examples of scoring rationales – *continued*

Scoring issue (b)	Fishery Example
SG80	Cod trawl fishery: Established decision-making procedures respond to issues identified in research, monitoring, evaluation or by groups with an interest in the fishery. This is ensured through the formal and informal arenas for regular and ad hoc consultations between governmental agencies and the industry. In addition, there is close contact between authorities and scientific research institutions. This includes how enforcement practices are adapted according to specific compliance challenges, how regulations have been revised when new documentation of the fishery's impact on the ecosystem have become available, and how challenges highlighted in a management audit report was responded to in a timely manner by the establishment of a special commission and the subsequent introduction of new measures to ensure correct weighing of catches. Hence, serious and other issues are responded to. SG80 is met.
SG100	Demersal scale-fish longline fishery: The fishery operates within the USA EEZ, where federal fisheries are managed under a management plan, which sets out the decision-making process to be used by regional fishery management councils in the development of fishery management plans (FMPs). FMPs contain measures and strategies to achieve the fishery-specific objectives. The management agencies and departments associated with this fishery have in place processes to respond to all issues identified in relevant research, monitoring, evaluation and consultation. The process is transparent timely, and adaptive. SG100 is met.

Scoring issue (c) – Use of precautionary approach

The third scoring issue simply requires that decision-making processes follow the precautionary approach. The FAO Technical Guidelines define the precautionary approach as "the application of prudent foresight, taking account of the uncertainties in fisheries systems and the need to take action with incomplete knowledge".

Scoring issue	SG60	SG80	SG100
(c) Use of precautionary approach		Decision-making processes use the **precautionary approach** and are based on best available information.	

Good practice

There is a requirement that the management policy should be informed by best available information and an appropriate degree of precaution. Fisheries that perform well on this scoring issue have not only a formal commitment to the precautionary approach but are also able to evidence examples to demonstrate how precaution is being applied.

What CAB auditors check

CAB auditors are required to verify that the absence of adequate scientific information is not used as a reason for postponing or failing to take conservation and management measures. Examples of past management decisions may inform this, but it is also likely that relevant documents and legislation will point to the degree to which the precautionary principle has been formally adopted. The following documents may refer to the precautionary principle:

- International conventions that the country has ratified, which may commit them to the precautionary approach.
- Fisheries legislation – if this is more recent it may include an explicit commitment to the precautionary approach.
- Fisheries policy papers of fisheries management plans – may make formal commitment to the precautionary approach.

As this SI seeks to demonstrate that the precautionary approach is actually being used, it will be necessary to also go beyond these policy / legislative level commitments in order to identify examples of its application in fisheries management decision-making. Evidence will often come from fisheries management decisions, taken in the recent past, which have taken a precautionary response to issues raised in research, monitoring, evaluation or consultation even in the absence of complete scientific information.

Scoring issue (c) – Use of precautionary approach

Key questions to determine where further action is needed

Q Has the country ratified international conventions with a formal commitment to the precautionary approach?

Q Do any of the national legislation of fisheries sector policies (including management plans) make explicit reference to the precautionary approach?

Q Are there examples of conservation focused management decisions being taken in the fishery which have been precautionary, in the absence of adequate scientific information?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	No scoring guidepost at the 60 level
SG80	*Tropical rock lobster trap fishery:* The national fisheries management plan (FMP) under which the fishery operates explicitly commits to the precautionary approach. The harvest strategy is based on the precautionary principle. Evidence of the application of the precautionary approach in decision-making can be seen in the setting of a target reference point for rock lobster biomass which is 10% above the level that is expected to achieve B_{MSY}. SG80 is met.
SG100	No scoring guidepost at the 100 level

Scoring issue (d) – Accountability and transparency of management system and decision-making process

This scoring issue seeks to ensure that the management system is accountable to the stakeholders that it serves and that the decision-making process is transparent and that the reasons for management decisions are clearly communicated. It also focuses on the availability of information about the fishery to allow stakeholders to effectively contribute to decision-making.

Scoring issue	SG60	SG80	SG100
(d) Accountability and transparency of management system and decision-making process	Some information on the fishery's performance and management action is generally available on request to stakeholders.	**Information on the fishery's performance and management action is available on request**, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation, and review activity.	Formal reporting to all interested stakeholders **provides comprehensive information on the fishery's performance and management actions** and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation, and review activity.

Good practice

The scoring issue requires that explanations are provided which detail both the reasons for management action or lack of action. Information on fishery performance that is not legally confidential (fisheries data, allocation, management action, etc.) should be available at least on request by stakeholders.

Scoring issue (d) – Accountability and transparency of management system and decision-making process

What CAB auditors check

CAB auditors will seek to understand the degree to which openness and transparency is embedded within the management system. The ease with which CAB auditors have been able to obtain all relevant information necessary for the assessment, can itself sometimes provide a useful indication of the degree that transparency and stakeholder communication is enshrined within the overall ethos of the management system. The assessment team's understanding will also be informed by stakeholder interviews to ascertain the extent to which the reasons for management decisions are communicated and therefore understood. CAB auditors are also likely to review past management decisions to determine the degree to which the information basis, or reasons for those decisions has been communicated. CAB auditors will also look at documentary evidence such as:

- Management policy documentation – does this detail how management decisions will be communicated?
- Minutes of advisory group meetings – are these publicly available?
- Fishery performance data (stock assessments and management advice etc.) – are these widely communicated and available?
- Other means of stakeholder communication – annual fishery meetings, websites, direct mailing, notice boards?
- Descriptions of past fishery issues and their resolution, examples of past advice to stakeholders.

Key questions to determine where further action is needed

Q Are key documents related to the performance of the fishery and the details of management decision-making easily accessible to interested stakeholders?

Q Is there formal communication with fishery stakeholders explaining reasons for management action? This could be via stakeholder meetings, direct mailing, websites etc.

Q Is the information that informs management decisions, such as scientific advice, management evaluations, simple landings and effort data, made widely available to stakeholders?

Q Are there examples of past management decisions which have been effectively communicated to stakeholders, including the reasons for those decisions?

Scoring issue (d) – Accountability and transparency of management system and decision-making process

Examples of scoring rationales

Scoring issue (d)	Fishery Example
SG60	*Temperate lobster trap fishery:* Given this is a fishery of lower scale and intensity, with a relatively simple management framework, there is a less frequent requirement for management to communicate management changes or the outputs of research, review and monitoring. Nonetheless, there has been some formal reporting, in which the health of resources and the strategic management direction for the lobster trap fishery. This includes directives on concessions, management policies toward sustainability, and research studies such as of migrations and interconnectivity of subpopulations. SG60 is met.
SG80	*Tropical crab pot fishery:* The minutes of the monthly Crab Working Group (CWG) are available to all stakeholders online, and include discussion related to the management and performance of the fishery. An annual review of the fishery is also published which includes publication of catches, monthly rolling CPUE indices and management response. Resourcing issues and a decision to prioritise eliminating IUU fishing has meant the publication of annual reviews has been a lower priority. The national fisheries management plan (FMP) outlines an 'Operational Plan' with targets, strategies and actions, indicators and timelines for key aspects of the national fisheries sectors. These provide an indication of fishery performance. Management and research staff confirmed progress on meeting targets are comprehensively covered at committee meetings and CWGs that include fisheries staff and fishers. Members of the CWG confirmed their satisfaction that information on the fishery's performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.SG80 is met.
SG100	*Temperate cod trawl fishery:* The Directorate of Fisheries and the Marine Research Institute produce annual reports that are available to the public on request and via their websites. In these reports, actions taken or not taken by the relevant authority are accounted for, including those proposed based on information from research, monitoring, evaluation and review activity. This information is also conveyed at the frequent meetings between authorities and all interested stakeholders and, not least, on the website of the Directorate of Fisheries. The website contains detailed and updated information on quotas and catches broken down by individual vessels, species and gear, among other things. Availability on the respective management authorities' websites counts as formal reporting appropriate to the context of the fishery, as much as written letters to stakeholders. Reporting includes information on bycatch and other ecosystem elements, as well as commercial species. SG100 is met.

Scoring issue (e) – Approach to disputes

The final scoring issue of PI 3.2.2 assesses the approach taken by management to disputes.

Scoring issue	SG60	SG80	SG100
(e) Approach to disputes	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability of the fishery.	The management system or UoA is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or UoA acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.

Good practice

Good practice requires that the management system actively seeks to avoid disputes and that the management system is designed to enable this. Management should be seen to be making the effort to comply with any decisions resulting from any legal challenge. This includes the need for management to be 'proactive' in avoiding legal disputes.

What CAB auditors check

CAB auditors will ascertain if there have been past disputes or court challenges within the management system in order to determine their focus, frequency and to determine how these have been resolved. In addition, consultations with managers and stakeholders will provide insight into how the management system acts proactively to avoid disputes. The following documentary evidence may also be important:

- Proceedings of courts or other judicial processes relating to the fishery.
- Evidence of dispute avoidance and resolution mechanisms built into the management system as detailed in a fishery management plan.
- Evidence of implementation of any legal decisions.

Scoring issue (e) – Approach to disputes

Key questions to determine where further action is needed

- **Q** Is there general respect and compliance with the management system, as evidenced by a lack of continuing legal challenge of the management system?
- **Q** Are the results of any legal dispute decisions quickly enacted or applied?
- **Q** Does the management system specifically address the need for mechanisms which seek to proactively avoid disputes arising?
- **Q** Is there evidence of the management system responding to the results of any legal disputes?
- **Q** If disputes were to arise, within the fishery, how would the disputes be resolved?

Examples of scoring rationales

Scoring issue (e)	Fishery Example
SG60	*Tropical scallop trawl fishery:* Management and research staff and other stakeholders confirmed there have been no legal challenges or reports of any concerns or evidence of a disrespect or defiance of the law from the fishery repeatedly violating the same law or regulation necessary for the sustainability for the fishery. SG60 is met.
SG80	*Haddock trawl fishery:* When occasionally taken to court by fishing companies, the management authority complies with the judicial decision in a timely manner, in accordance with the formal procedures laid down in the fisheries acts and general legislation on the distribution of power in the country. This includes that if management authorities lose a court case, they will accept the verdict. SG80 is met.
SG100	*Sardine midwater trawl fishery:* The management authority works proactively to avoid legal disputes. This is done partly through the tight cooperation with user groups at the regulatory level, ensuring as high legitimacy as possible for regulations and other management decisions. Regulatory and enforcement authorities offer advice to the fleet on how to avoid infringements, on request but often on their own initiative. For example, compliance inspectors work in a dedicated manner to communicate with fishers on the fishing grounds, keeping them updated on changes in regulations and explaining the rationale of the rules to increase their legitimacy. The enforcement agencies have the authority to issue administrative penalties for minor infringements (serious enough to be met by a reaction above a written warning), thus referring only the more serious cases to prosecution by the police and possible transfer to the court system. SG100 is met.

Challenges and solutions to meeting PI 3.2.2

This PI focuses on the need for clear, fishery-specific decision-making processes. This implies that the fishery under assessment is subject to very clear management oversight, with clearly defined, fishery-specific jurisdiction and that appropriate management issues are considered, consulted upon and decided upon by the management authority in an appropriate, timely and transparent manner. It is particularly notable that for scoring issue (b), if a fishery management system does not respond to issues in a 'transparent, timely and adaptive manner' then it does not meet the minimum MSC Standard and would fail the overall assessment.

Simply allowing a fishery to take care of itself, based on assumptions that the level of fishing is low, or the impact of the gear is minimal, or that the fishery has been going on for a long time without any obvious problems is not sufficient, however plausible these arguments may be. This PI requires that there is an active and clear management oversight and an active decision-making process. This process should be carried out by those described in the 'roles and responsibilities' in PI 3.1.2 in accordance with the objectives described in PI 3.1.3 and PI 3.2.1.

It should be possible to explicitly describe the process by which management decisions will be taken. These may be routine management decisions, such as annual quota or effort adjustments in response to changing stock status, or these may be less frequent management decisions, such as adjustments to fleet operations, balance between sectors, or incorporation of ecosystem management measures. Above all departmental responsibility for fishery-specific decisions should be clearly defined and stakeholders should understand what decisions are taken, when, by whom and on what basis. This all implies the need for well organised departmental processes. This is not a costly or complex requirement, so lack of scientific capacity or available budgets should be less of a constraint here than in other PIs.

Example process and actions to improve performance against PI 3.2.2

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Review the current fishery specific management decision-making processes that are in place at all relevant jurisdictions and determine the extent to which these are clearly defined, transparent, timely and adaptive.	(a), (b)
●				Review the degree to which current fishery specific management decision-making seeks appropriate information and research on which to base decisions and how the management processes respond to issues and communicates the reasons behind management decisions.	(a), (b)
	●			Begin process to develop and clearly define fishery specific management decision-making processes. This should be defined within a fishery management plan and should include details relating to the scope of decisions, the information sources that will be used as a basis for decisions, the process for consulting upon decisions, the process for communicating outcomes and the process for rapid implementation.	(a), (b), (d)
	●			Consider how the precautionary approach will be formally committed to and how this will be practically applied within the management decision-making process.	(c)
	●			Seek to incorporate within the design of the management decision-making process a mechanism to help to proactively act to avoid disputes.	(e)
		●		Formally adopt fishery specific management decision-making processes into the management decision-making process.	(a), (b), (c), (d), (e)
	●			Begin routine management decision-making as part of an adaptive approach to P1 and P2 management.	(a), (b), (c), (d), (e)

Notes

Notes

3.2.3 Compliance and enforcement

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Performance Indicator overview

PI 3.2.3 assesses whether the Monitoring, Control and Surveillance (MCS) mechanisms are adequate to ensure the management and conservation measures in a fishery are enforced and complied with. The scoring for this PI considers the effectiveness of the overall system, the appropriateness of any sanctions for non-compliance and the overall record of compliance and cooperation within the fishery.

The design of the MCS system will depend upon the scale and nature of the fishery. Different fisheries will have different areas of risk of non-compliance, so the MCS system should be designed to recognise these. Typically, the MCS system for a fishery will comprise a variety of tools which may include logbook systems, port and dockside monitoring, VMS, fisheries observer programs, at sea monitoring (including electronic monitoring), boarding and inspection, IUU vessel listing and nominated landing ports and times. The MSC does not state which mechanisms should be employed in a given fishery, so the assessment team must determine whether the mechanisms in place constitute a system which is both appropriate to the scale and intensity of the fishery, and has a demonstrated effectiveness.

Another important component of an effective enforcement system is the application of consistent and transparent sanctions to provide effective deterrence against non-compliance. Effective sanctions should be clearly stipulated in regulatory provisions and mechanisms. Penalties should outweigh the benefits derived from conducting illegal fishing and sanctions should be applicable at all relevant jurisdictions for the fishery. Sanctions may include administrative and criminal penalties ranging from fines, withdrawal of fishing licence or other fishing opportunities and gear, denial of port landing and trade-related sanctions.

Finally, this PI considers the overall record of compliance of fishers with the controls and regulations in the fishery. Compliance is divided into two scoring issues in this PI – information (scoring issue (c)) and outcome (scoring issue (d)), where information refers to the availability and accuracy of information used to estimate compliance, and outcome refers to whether regulations related to governing sustainable fishing practices on the water are regularly complied with. The Evidence Requirements Framework (ERF) shall be used to score the information SI (scoring issue c).

Four scoring issues are considered under this PI:

(a) MCS system

(b) Sanctions

(c) Compliance (information)

(d) Compliance (outcome)

Scoring issue (a) – MCS system

The first scoring issue examines the mechanisms employed in monitoring, control and surveillance and assesses the extent to which these have been effectively linked together into a 'system' designed to address risks of IUU.

Scoring issue	SG60	SG80	SG100
(a) MCS system	MCS **mechanisms** exist within the UoA.	An MCS **system** exists within the UoA.	A **comprehensive** MCS **system** is well established within the UoA.

Good practice

Fisheries that perform well against this scoring issue will have a range of MCS mechanisms in place that work together to ensure compliance in the fishery. The scope of the MCS system should cover prior to fishing (e.g., valid documentation, training and vessel set-up), during fishing operations and during the landing / sale of catch. This may include inspections, monitoring, patrols, surveillance, vessel IUU lists, etc. The SG80 and SG100 both contain the word 'system'. This implies that MCS mechanisms not only exist, but these have been coordinated and integrated to ensure all areas of risk are covered, ideally comprehensively.

What CAB auditors check

Where possible the CAB auditors will seek independent and credible information, and would typically meet with the relevant compliance and enforcement agencies. In addition, the range of documents CAB auditors will consult include:

- Fisheries legislation.
- Records of court cases.
- MCS plans and strategies.
- Information on MCS mechanisms in place such as VMS, vessel inspections (both at sea and on landing), logbook, sales note and landing declarations, landing restrictions, etc.
- Regional MCS reports – including reviews/ evaluations of MCS efficacy.
- Conservation and management measures adopted by RFMOs.
- Fishery management plans.
- Any agency reports, such as fishery meetings, annual reports and stakeholder committee minutes which may detail compliance information and details of fishery offences and prosecutions.

CAB auditors may also use stakeholder interviews to review the existence and effectiveness of informal mechanisms such as social norms and peer to peer control.

Scoring issue (a) – MCS system

Key questions to determine where further action is needed

- **Q** Does the MCS system contain all relevant tools/mechanisms to minimise the risk of IUU, including informal mechanisms?
- **Q** Are the mechanisms used for MCS well-integrated?
- **Q** Is the MCS system well established and has it been demonstrated to work?
- **Q** Has the MCS system been designed with an understanding of the likely risks of IUU and shaped accordingly?
- **Q** Does the MCS system adequately cover all vessels in the fishery and all areas where the fishery operates?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Freshwater finfish net fishery:* The fishery takes place within the internal waters of Sweden. Sweden is a member of the EU, but the Common Fisheries Policy (CFP) does not apply to inland fisheries. The legal basis for enforcement of Swedish fishery regulations is found in the Fisheries Act, according to which fishery inspectors can be appointed both under the national fisheries management authority (SwAM) and the county boards. The lake fishers are obliged to submit catch data to SwAM every month while buyers have to report within 24 hours of delivery. Fisheries control services under the respective county authorities operate inspection vessels in each lake. Inspectors check location, mesh size, marking and catch, among other things. Hence, monitoring, control and surveillance mechanisms exist in the fishery. SG60 is met.
SG80	*Cod trawl fishery:* The fishery takes place in the Iceland EEZ, where enforcement is administered by the Directorate of Fisheries (DoF), in collaboration with the Coast Guard, the Marine Research Institute and coastal municipalities. Enforcement is based on reports from the vessels, physical inspections at sea and weighing in harbour, as well as information exchange with other states' enforcement authorities. The structure and procedures of the enforcement system are codified in the Fisheries Management Act, while requirements on the weighing system are laid out in the Act concerning the Treatment of Commercial Marine Stocks and in the Regulation on Weighing and Recording of Catch. All commercial Icelandic fishing vessels are required to keep an electronic logbook, which are used to report catches to the DoF. Inspectors from the DoF may accompany fishing vessels on trips or operate from Coast Guard vessels.

Scoring issue (a) – MCS system

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG80 – *continued*	At-sea inspections include control of the logbook, catch and gear. 100% of the landed fish is weighed by an authorised 'weighmaster', employed by the municipality and hence independent of both buyer and seller. Landing data are immediately added to the DoF's catch database, where the reported quantities of fish are deducted from the vessel's quota. In 2019, the Directorate started to publish data on their website on individual vessels' catch composition on trips with and without inspectors on board, which gives an indication of discarding in the fishery and also provides deterrence ('social shaming'). The enforcement mechanisms in place for the fishery work together in a way appropriate to the scale and intensity of the fishery and hence qualify as a system. SG80 is met.
SG100	*Saithe trawl fishery:* The fishery takes place in Norwegian waters by vessels under EU flag, and the catch is landed in Norwegian ports. Therefore , the UoA vessels are under enforcement jurisdiction of both the EU and Norway. The EU system for fisheries control is laid out in the Control Regulation, which applies to all activities covered by the CFP carried out by EU vessels within and outside EU waters. In Norway, the 2008 Marine Resources Act and the 1997 Coast Guard Act provide the legal basis for enforcement, which is taken care of through shared responsibility and close collaboration between the Directorate of Fisheries (DoF), the Coast Guard and the regional sales organisations. The DoF keeps track of how much fish is taken of the quotas of individual vessels, different vessel groups and other states at any given time, based on reports from the fishing fleet. Vessels are required to have electronic logbook, through which real-time data are forwarded to the DoF. The self-reported catch data can be checked at sales operations through the sales organisations, and through physical checks performed by the sales organisations, the DoF and the Coast Guard. The sales organisations are required to record all landings of fish in Norway and keep track of how much remains of a vessel's quota at any given time. This information is compared to the figures provided by the vessels to the DoF through the electronic logbook. The sales organisations have their own inspectors who carry out physical controls of landings. They check weighing equipment, quantity and size distribution of the catch, the quality of the fish and documentation. The DoF has seven regional offices along the coast, staffed with inspectors who carry out independent physical control of the fish at the point of landing, including total volume, species and fish size. All landings have to be reported six hours in advance in order to give the inspectors the possibility to check the landed catch. The landed volumes are compared to the volumes reported to the DoF through the logbooks. The Norwegian Coast Guard operates 15 inspection vessels, which perform spot checks at sea, including from helicopters during fishing activities and inspections at check points that foreign vessels have to pass through when entering or leaving the Norwegian EEZ and in connection with transshipments in Norwegian waters, which have to be reported in advance. Inspectors board fishing vessels and control the catch from last haul and fishing gear on deck and the volume of fish in the holds. Using the established conversion factors for the relevant fish product, the inspectors calculate the volume of the fish in round weight and compare this with the catches reported to the DoF through the electronic logbooks. Both landing and at-sea control are conducted using a risk-based framework aimed at utilising resources to optimise compliance at any given moment. Enforcement agencies in Norway and the flag states cooperate and exchange data on catches and inspections. Hence, the fishery has in place a comprehensive enforcement system in terms of coverage, independence of the system and internal checks and balances. SG100 is met

Scoring issue (b) – Sanctions

The intent of the second scoring issue of PI 3.2.3 is to ensure that the management system contains clear sanctions to deter fishers from participating in non-compliant activities and that these sanctions are consistently applied and effective.

Scoring issue	SG60	SG80	SG100
(b) Sanctions	Sanctions to address non-compliance exist within the UoA.	Sanctions to address non-compliance exist, which are appropriate to the UoA, and are applied.	Comprehensive sanctions to address non-compliance exist that are appropriate to the UoA and are consistently applied.

Good practice

Fisheries that perform well against this scoring issue have penalties or repercussions that are applicable when there are violations of fisheries regulations. To achieve higher scores requires greater evidence of consistent application of sanctions and a proven effective deterrence.

What CAB auditors check

Where possible the CAB auditors will seek independent and credible information and would typically meet with the relevant compliance and enforcement agencies. In addition, CAB auditors are likely to speak to fishers about their understanding of sanctions for different infringements. CAB auditors will also check documents such as:

- Provisions in fisheries legislation about penalties.
- Court cases as evidence of level of sanctions.
- Past records of regional fisheries management arrangements (delisted vessels etc.), and reports from national fisheries.
- Stock modelling may in some cases provide an indication of 'unaccounted mortality' which may provide an indication of IUU fishing.
- Reviews and evaluations (both internal and external) of the monitoring, control and enforcement system in the relevant jurisdictions of the fishery.

Scoring issue (b) – Sanctions

Key questions to determine where further action is needed

- **Q** Do fishermen have a clear understanding of the sanctions for different infringements and is this understanding consistent across the fleet?
- **Q** Are the penalties for repeat infringement also clearly and consistently understood (and applied)?
- **Q** Do regulations clearly state the sanctions for different infringements?
- **Q** Is there evidence of past infringements resulting in sanctions? Where infringements were similar, were the sanctions consistent?
- **Q** Are there any evaluations or reviews which provide a reliable indication of the effectiveness of the deterrence provided by the MCS system?

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Tropical lobster trap fishery:* Provisions of penal and administrative sanctions are given in the relevant Fisheries Act. The most important penal sanctions are fines, prison up to one year (up to two years for particularly serious infringements) and confiscation of catch, gear or vessel. Administrative sanctions include a 'sanction fee'. In addition, a point system is applied, whereby fishers are given a specified number of points for different kinds of violations. When a specific number of points is reached, the fishing licence shall be automatically suspended for a period of at least two months, increasing with repeated violations. Hence, sanctions to address non-compliance exist within the fishery. SG60 is met.
SG80	*Cod trawl fishery:* The fishery operates in the Iceland EZZ. The sanctioning system in Icelandic fisheries is codified in the Fisheries Management Act and the Act concerning the Treatment of Commercial Marine Stocks. A system for graduated sanctions is applied. For a first-time offence, a warning is given if the infringement is of a less serious nature. Withdrawal of fishing permits can be applied for a number of infringements, including fishing in excess of vessel quotas. If a vessel's fishing permit has repeatedly been suspended, the DoF may decide that a fishing inspector shall be stationed aboard the vessel at the expense of the vessel operator for a specific period of up to two months. If there is suspicion of more serious infringements, the case may be transferred to the Ministry or to a court. All decisions on the suspension of harvest rights are made publicly available. Hence, sanctions to deal with non-compliance in the fishery exist and there is evidence, for instance in the public information on suspension of harvest rights, that they are applied. SG80 is met.

Scoring issue (b) – Sanctions

Examples of scoring rationales – *continued*

Scoring issue (b)	Fishery Example
SG100	*Haddock demersal trawl fishery:* The fishery operates on the Doggerbank. In accordance with the EU Control Regulation, member states are required to ensure that appropriate measures are systematically taken when violations of fishing regulations are detected, including administrative action or criminal proceedings, in order to provide effective deterrence. For serious infringements, a point system is applied, whereby fishermen are given a specified number of points for different kinds of violations. When a specific number of points is reached, the fishing licence shall be automatically suspended for a period of at least two months, increasing with repeated violations. In Norway, statutory authority for the use of sanctions in the event of infringements of fisheries regulations is given in the Marine Resources Act. When judging the seriousness of the infringement, economic gain of the violation, is taken into consideration, and catch, gear, vessels or other properties can be confiscated. The Norwegian enforcement agencies use a graduated sanctioning system, with sanctions ranging from verbal warnings, written warnings and administrative fines to formal prosecution. If the fishers do not accept the fines issued by the enforcement or prosecution authority, the case goes to court. Published information on court cases, inspection statistics from the Dof and the Coast Guard as well as interviews with representatives of the enforcement bodies and other stakeholders at the site visit confirm that sanctions are consistently applied. SG100 is met.

Scoring issue (c) – Compliance (information)

The intent of the third scoring issue in PI 3.2.3 is to ensure that there is an accurate information base on which to draw a conclusion (in SId) about the degree of compliance. It is focussed on evaluation of the information used to confirm the adoption and enforcement of management measures, rather than reviewing compliance data.

Scoring issue	SG60	SG80	SG100
(c) Compliance (information)	Information is adequate to **broadly understand** compliance in the UoA.	Information is adequate to **estimate** compliance in the UoA with a **high degree of accuracy.**	Information is adequate to **estimate** compliance in the UoA with a **very high degree of accuracy.**

Good practice

Fisheries that perform well against this scoring issue have a robust information system that is able to provide accurate information on adoption and enforcement of management measures.

What CAB auditors check

It will be important for CAB auditors to meet with fisheries enforcement personnel to ascertain the scope and quality of the information that will be used to judge the adoption and enforcement of management measures. The range of documents CAB auditors will consult include:

- Copies of relevant policies and management regulations that apply in the fishery.
- Communication with crew regarding the current implementation of policies and management regulations, including announcements and training material.
- Operating procedures for monitoring systems used in the fishery (e.g. logbooks, observers, electronic monitoring, landing reports).
- Logbooks, boarding reports and other evidence of inspections.
- Documents/records indicating past vessel and crew conduct.
- Reviews/evaluations of the effectiveness of the MCS system.

i It should also be noted that when assessing this scoring issue, CAB auditors are required to apply the MSC 'Evidence Requirements Framework' (which is contained within the 'MSC Fisheries Standard Toolbox') to help determine the accuracy of the available information. For this scoring issue, the assessment shall consider which trueness guidepost (TG) is met.

Scoring issue (c) – Compliance (information)

Key questions to determine where further action is needed

Q Is robust, reliable and independent information available which can provide a true representation of the level of compliance?

Q Where new regulations are introduced, is the MCS system updated appropriately in order to ensure that compliance with the new regulation can be objectively demonstrated?

Q Is the only evidence of compliance, an absence of non-compliance? If so, is information sufficient to demonstrate that this really reflects good compliance?

Q Do fisheries enforcement personnel have confidence in the information basis which is used to demonstrate the overall level of compliance?

Examples of scoring rationales

Scoring issue (c)	Fishery Example
SG60	*Tropical hand-gathered clam fishery:* Representatives of the compliance and enforcement agency involved in the monitoring of the fishery stated that there had been no compliance issues in the fishery in recent years. However, no quantitative information on inspections and infringements was presented, so it's uncertain whether information gives the full picture of compliance in the fishery and there are no other sources of information to corroborate the statements of the county boards. The information available to the assessment team, provided by the official enforcement body of the fishery, is considered to be objective, as it is provided by representatives of the official enforcement body of the fishery, and to be relevant as it addresses the matter at hand. Interviews with fishers from the UoA during the site visit confirm that they are aware of the regulations in place for the fishery. As such, there is potential for bias in the information, but its effect on trueness can be anticipated and is not considered to be consequential for the trueness of the information, TG1 of the Evidence Requirements Framework is met. Especially given the nature of the fishery, being a fishery of lower scale and intensity, the assessment team finds the views of county board representatives to be plausible and considers information adequate to broadly understand compliance in the fishery. SG60 is met.

Scoring issue (c) – Compliance (information)

Examples of scoring rationales – *continued*

Scoring issue (c)	Fishery Example
SG80	*Herring midwater trawl fishery*: Detailed quantitative information about inspections and compliance in the fishery is available in annual reports from both the Department of Fisheries (DoF) and the Coast Guard, who are both involved in compliance and enforcement activities. Some quantitative information is also made publicly available on a running basis on the website of the DoF, and at the request of MSC CAB auditors more detailed information, such as the types of infringements in different UoAs, was made available. The information is objective as it comes from professional enforcement bodies without any close ties to the fishing industry, relevant since it addresses compliance with the regulations of the fishery, and coherent as it is corroborated by two different agencies. Inspectors from the DoF sometimes stay onboard fishing vessels for several days, introducing some potential risk of conflict of interest, i.e. potential for inspectors to show tolerance for infringements. Interviews with fishers from the UoA during the site visit confirm that they are well aware of the regulations of the fishery. Hence, there is a potential for bias to exist in the information available to the assessment team, but it is limited, as the potential for conflict of interest only relates to a small part of the information available on compliance. In addition, inspectors stay on board fishing vessels only for short periods of time, so it can be argued that the risk of conflict of interest is also limited. Based on this, information about bias in information is broadly understood, and any bias existing is not considered to be consequential for the trueness of the information, TG2 of the Evidence Requirements Framework is met. In conclusion, information is considered adequate to estimate compliance in the fishery with a high degree of accuracy. SG80 is met.
SG100	*Hoki trawl fishery:* Detailed quantitative data on inspections and infringements in the waters where the fishery operates is available in annual reports of the Department of Fisheries (DoF) and the Coast Guard, who are both involved in compliance and enforcement activities. Inspection data are published on a running basis on the DoF website. The information is broken down by fishing area and the type of compliance actions taken, if required. Upon request, the DoF and Coast Guard provided bespoke information on inspections and types of infringements in the UoA vessels to the assessment team, broken down by nationality of the vessel. There is also ample information on compliance in the fishery waters within academic studies, independent reviews commissioned by the management authorities and comprehensive management audits that are conducted by the Office of the Auditor General. There is no reason to suspect any conflict of interest on the part of inspectors, and available information addresses the relevant issues related to compliance in the fishery. The information is detailed and coherent, with academic studies and public reviews corroborating information provided by enforcement agencies. As such, any bias in information from the enforcement agencies is well understood and is not considered to be consequential. It is also mitigated in the sense that the DoF, Coast Guard, sales organisations and relevant Ministry continuously review the accuracy of their compliance data in light of the independent evaluation of compliance from academia, the Office of the Auditor General and ad hoc committees. Interviews with fishers from the UoA during the site visit confirm they are aware of relevant regulations. Following the application of Evidence Requirements Framework, TG3 is therefore met and it can be concluded that information is adequate to estimate compliance in the UoA with a very high degree of accuracy. SG100 is met.

Scoring issue (d) – Compliance (outcome)

The intent of the fourth and final scoring issue at PI 3.2.3 is to confirm that there is no systematic non-compliance and that there are good overall levels of compliance.

Scoring issue	SG60	SG80	SG100
(d) Compliance Outcome	**Systematic non-compliance** of regulations specific to governing sustainable fishing practices on the water is not evident within the UoA.	Majority of regulations, including all regulations specific to governing sustainable fishing practices on the water, are **likely** to be complied with.	**Majority** of regulations, including all regulations specific to governing sustainable fishing practices on the water, are consistently complied with.

Good practice

Fisheries that perform well against this scoring issue have evidence of compliance (rather than an absence of evidence of non-compliance) in relation to the majority of regulations which impact directly upon the sustainability of the fishery. Any evidence of non-compliance in an area unrelated to the sustainability of the fishery, such as food hygiene or safety, would not necessarily lead to a lower score here unless it was an indication of a lack of respect for the overall regulatory system.

What CAB auditors check

Again, it will be important for CAB auditors to meet with fisheries enforcement personnel to ascertain whether there are any non-compliances that are particularly widespread across the fleet or whether there have been systematic attempts to circumvent particular enforcement controls. Interviews will be supported by referring to relevant documents such as:

- Reports from stakeholders of possible illegal practices that should be verified by the agencies MCS system.
- Evaluations of the MCS system.
- Records of infringements indicating persisting enforcement controls including the same offence occurring overtime.

Key questions to determine where further action is needed

Q Are there indications – either from enforcement officers, or other stakeholders, or fishers themselves – of particular enforcement issues (infringements) that continue to occur and which the management regime has not addressed?

Q Is there evidence of good compliance in relation to fishery regulations which have an impact on the overall sustainability of the fishery?

Q Is the evidence of good compliance robust, independent and unbiased?

Q Are there certain infringements that regularly occur and that the sanctions have not deterred?

Scoring issue (d) – Compliance (outcome)

Examples of scoring rationales

Scoring issue (d)	Fishery Example
SG60	*Tropical scale-fish line fishery*: At the interview with the assessment team during the site visit, representatives of the county board involved in the monitoring of the fishery stated that compliance is generally high in the fishery, attributing this primarily to the high degree of responsibility that fishers feel for the sustainable management of the resources. They also emphasised the social control that is present in the small coastal communities from which the fishery takes place. The most common infringements are inaccuracies in the logbooks (not related to material issues such as amount of catch and fishing location, but to procedural issues such as what information is provided in which columns) and insufficient marking of fishing gear. This has been a recurrent problem over several years. However, as this does not directly affect sustainable fishing practices on the water, it does not constitute systematic non-compliance in the context of this scoring issue. SG60 is met
SG80	*Ling trawl fishery*: According to official inspection data, 24 infringements were reported in 2020 and 9 in 2021. The annual average for the period 2015–2020 was 23. The number of inspections that revealed one or more infringements of the fishing regulations was 11% in 2020 and 8% in 2021. The average for the period 2015–2019 was 8%. While some infringements related to fishing rules, most concerned regulations of crew-registry, licensing and marking of vessels. All the infringements were relatively minor. Hence, it can be concluded that the majority of regulations, are likely to be complied with. SG80 is met.
SG100	*Saithe trawl fishery*: The UoA operates in the Norwegian EEZ, where the Coast Guard completes at-sea inspections, while the Directorate of Fisheries completes land-based inspections. In both at-sea and land-based inspections, no infringements were found in around 95% of the inspections. While this does not exclude the possibility that infringements are more common, it paints a picture of generally high level of compliance in Norwegian fisheries. This is in line with findings in academic studies on compliance in Norwegian waters and is corroborated by the Office of the Norwegian Auditor General in management audits of Norwegian fisheries management, including parallel audits with the Russian Auditor General in the Barents Sea. During interviews during the site visit, representatives of the enforcement agencies stated that there are no compliance issues with regulations concerning protected species and protected habitats. Hence, it can be concluded that the majority of regulations, including all regulations specific to governing sustainable fishing practices on the water, are consistently complied with. SG100 is met.

Challenges and solutions to meeting PI 3.2.3

MCS procedures directed to control the amount of catch and fishing effort have often given priority focus to the most commercially important or historically heavily targeted fisheries. Fisheries of lower scale and intensity, or more recently exploited and developed fisheries, or fisheries targeting resources that have been the subject of less management intervention, may have received a lower level of MCS. In some countries / fisheries MCS is challenging where there are potentially high number of fishers using small vessels, widely dispersed along extensive and sometimes inaccessible coastlines, which makes ensuring adequate surveillance and enforcement at landing sites more difficult.

Effective monitoring, control and enforcement can be expensive – both in terms of personnel and equipment cost. However, expensive MCS tools do not guarantee either effective enforcement or good compliance. As with any management system it is the design and performance of the system that is important. Demonstrating that the enforcement system is tailored to the risks of non-compliance is important; whatever the resources available for enforcement. Similarly, providing records of infringements and reviews/evaluations of the performance of the MCS system are as important in a poorly resourced MCS system as in a state-of-the-art system. In addition, fishers may use more informal and traditional approaches to ensure compliance through various forms of local stewardship or using peer pressure as a deterrent in the fishery.

Example process and actions to improve performance against PI 3.2.3

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Undertake a review of the MCS system in place in the fishery. This should identify the risk of potential infringements, the appropriateness / adequacy of the measures in place to address these risks and amend the degree to which the measures are strategically linked to tackle these risks.	(a)
●				A further review could be undertaken to review the history (and evidence) of non-compliance in the fishery, to determine the degree to which the existing system provides an effective deterrent. This should also consider the quality and independence of the evidence on which this conclusion is based.	(b), (c) (d)
	●			Design and start an action plan to address the weaknesses identified in the reviews focusing closing any gaps in the MCS system and addressing any systemic non-compliant practices.	(a), (b)
	●			Design any additional monitoring processes which may be necessary to provide robust and independent evidence of compliance.	(c)
	●			Proposed changes may require the amendment to existing laws, working practices and departmental structures or budgets. These proposals should be fully consulted upon.	(a), (b)
		●		With the increase in activity and the action plan, produce publicity on sanctions and penalties and work with local industry and regional partners to inform fishers of sanctions and penalties. Reinforce compliance with communication and education of the relevant stakeholders.	(b), (c)
		●		Implement new working practices which strategically allocate resources to main identified risks. This may include a requirement for staff training.	(a)

Notes

3.2.4 Monitoring and management performance evaluation

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Performance Indicator overview

Transparent and accountable fisheries institutions and decision-making processes allow for ongoing internal and external evaluation that ensure effective and improving management performance. This is the focus of the final PI of Principle 3.

The design of the evaluations and reviews should be appropriate to the cultural context, scale and intensity of the fishery. The focus of the evaluation should be both overarching (the overall performance against objectives) and also focused on particular components of the management system. The component parts evaluated may include the performance of the compliance and enforcement system, the effectiveness of scientific and research feedback and the effectiveness of consultation and decision-making processes.

The status of the resource, management priorities and stakeholder focus are dynamic. As such regular evaluation by the management institutions or agency will consider the suitability and cost effectiveness of current management practices and regulations to determine when appropriate modifications are required. Where there has been considerable investment in building management capacity, it is also good practice to carry out an evaluation of whether this investment has resulted in intended changes.

The process of evaluation or review should ideally be stated in legislation or regulation or be stated in an underlying business or corporate plan. Fishery management plans should also state the intended duration of the plan, the timing and process of evaluation and whether it is to be internal or external. Internal review has the advantage of being quicker and cheaper but may be less well suited to identifying more systemic issues. For this reason, it is good practice to have periodic external evaluations. Depending upon the scale and intensity of the fishery, the external review, which is required to meet good practices, could be:

- By another department or agency
- By another agency or organisation
- Through a government audit that is external to the fisheries management agency
- By a peer organisation nationally or internationally
- By external expert reviewers and consultants

Two scoring issues are considered in this PI:

(a) Evaluation coverage

(b) Internal and/or external review

Scoring issue (a) – Evaluation coverage

The intent of the first scoring issue of PI 3.2.4 is to ensure that various evaluations are undertaken of the component parts of the management system. The key parts may include (depending on the fishery) the decision-making process, data collection, scientific research, MCS, monitoring of management performance.

Scoring issue	SG60	SG80	SG100
(a) Evaluation coverage	There are mechanisms in place to evaluate **some** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **key** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **all** parts of the fishery-specific management system.

Good practice

To meet this requirement at SG80 requires that at the very least 'key' parts of the management system should be evaluated. Good practice may involve having a range of approaches for evaluation. These may include peer review of scientific papers, including stock assessments, by scientific committees, internal or external audits of components of the fishery or review of implementation of management regulations by government agency, NGO or donor.

What CAB auditors check

CAB auditors will look to obtain all evaluations that have been completed on different aspects of the management system in recent years. It is also likely that CAB auditors will ask stakeholders in site visit meetings, whether evaluations have been carried out relevant to their area of focus. CAB auditors will look to identify the following evaluations (both internal and external):

- High level evaluations of the overall fisheries management framework within the relevant jurisdictions.
- Evaluations of fishery-specific laws and regulations.
- Evaluations of the monitoring, control and surveillance system.
- Evaluations of any fisheries sector development plans or funding programs.
- Evaluations of the performance of stock assessment (benchmark assessments).
- Evaluations of performance in meeting environmental objectives and international commitments and targets.

Scoring issue (a) – Evaluation coverage

Key questions to determine where further action is needed

Q Have any evaluations been carried out in recent years on any parts of the management system, such as the management plan, consultation processes, MCS, or stock assessment procedures?

Q Are there processes in place which provide the management system with a clear indication of whether the measures and regulation in place are meeting the intended objectives?

Q Do stakeholders in the fishery have an opportunity to review the performance of the fishery management?

Q Do outside agencies (e.g. FAO) undertake reviews of the fisheries sector?

Examples of scoring rationales

Scoring issue (a)	Fishery Example
SG60	*Temperate scallop trawl fishery:* The Fishery Management Plan (FMP) for the scallop fishery describes the process and mechanisms in place to monitor and evaluate the fishery's management system. The FMP states that '… a performance review will be conducted annually and the plan will be updated and enhanced as necessary as a living document. The review will include an assessment internal to the fisheries agency, as well as an industry working group drawn from Advisory Committee members to assist in the review of the plan.'. Within the FMP there are defined areas of research, data limitations and policy development that will be improved upon to make further advances and improvements to the FMP. Typically, periodic reviews have been undertaken internally by fisheries staff and reported via the Science-based Resource Advisory Process (RAP) including stock status updates, and the Fisheries Management-led Advisory Committees. The RAP and stock status update processes are aligned to evaluate the performance and effectiveness of the strategies and tactics associated with the productivity, biodiversity and habitat ecosystem-based objectives for the fishery. The RAP process is also used to evaluate the performance of some of the system's key parts as defined by P1 and P2, and to generate proposals for future changes. Performance monitoring and evaluation undertaken by the Advisory Committees is generally focused on the elements of the harvest strategy and associated catch monitoring tools. Additional departmental supportive evaluations are triggered on an opportunistic basis, such as (i) stock assessment frameworks, (ii) inter-regional licensing policy, and (iii) economic outcomes (e.g. quota transferability provisions). Hence, there are in place mechanisms in place to evaluate some parts of the fishery-specific management system. SG60 is met.

Scoring issue (a) – Evaluation coverage

Examples of scoring rationales – *continued*

Scoring issue (a)	Fishery Example
SG80	*Albacore tuna longline fishery:* The UoA operates within a single EEZ in the WCPFC Convention area. The WCPFC has in place mechanisms to evaluate key parts of the management system as demonstrated by the various committees and working groups that meet regularly and report their findings to the Commission. Additionally, there was a review of the performance of the WCPFC in 2012. At the national level there are mechanisms in place to evaluate key parts of the management system. In 2016 the Auditor General produced a performance audit report, which covered the management of fisheries in the nation. The Packard Group has also produced a report on trends in marine resources and fisheries management. SG80 is met.
SG100	*Tropical prawn fishery:* The UoA operates within the Australian EEZ. The Australia government commissioned two independent reviews of the core 'Acts' governing the environment and fisheries. One review also included reviews of policy settings, recasting the management agency's objectives, fisheries management plans, the minister's powers to vary fisheries management plans, integrating fisheries and environmental assessments, research, fisheries management and industry levies, Offshore Constitutional Settlements (OCS), Recreational Fishing, Aquaculture, Compliance and enforcement and Co-management. The Government response to this review was announced with the relevant department thereafter initiating a public consultation process, followed by specific reports on the harvest strategy and bycatch management strategy. An independent statutory review of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) commenced in 2019. The Australian National Audit Office undertook a review of the Australian management system as applied by the management agency in 2021. The management agency regularly undertakes reviews into their management system, including a review of commercial fisheries regulation in Australia and an independent review of the management agency's fisheries management, organisation and governance. The fisheries management agency also operates a public consultation process for specific issues. The fishery has in place mechanisms to evaluate all parts of the management system. SG100 is met.

Scoring issue (b) – Internal and/or external review

This scoring issue focuses on the fishery-specific management, rather than the other component parts of the fisheries management framework.

Scoring issue	SG60	SG80	SG100
(b) Internal and/ or external review	The fishery-specific management system is subject to **occasional internal** review.	The fishery-specific management system is subject to **regular internal** and **occasional external** review.	The fishery-specific management system is subject to **regular internal** and **external** review.

Good practice

In fisheries that perform well against this scoring issue there is greater regularity of review and presence of external review, rather than just internal review.

What CAB auditors check

CAB auditors will check the following documents for evidence of reviews of the fishery-specific management system:

- The fishery management plan.
- The regulation or order which enshrines the management plan in law.
- Past evaluations of the fishery-specific management system.

Key questions to determine where further action is needed

Q Does the management plan or other binding document setting out the process of management of the fishery state the frequency and scope of evaluations?

Q Are there past evaluations of the management plan (either internal or external)?

Q Was the current management plan (or fishery-specific management system) reviewed prior to implementation?

Q Are there feedback mechanisms within the management system which means that the performance of the management (and the fishery) is subject to on-going review and refinement?

Scoring issue (b) – Internal and/or external review

Examples of scoring rationales

Scoring issue (b)	Fishery Example
SG60	*Shrimp trawl fishery:* The UoA operates within the USA EEZ. The management system provides regular internal and external review. Many of the participants in the system do not work for the government and represent a wide range of interests and competencies. Stock assessments are always peer reviewed by outside experts. The relevant fishery council staff and officers participate in periodic meetings of the Council Coordination Committee (CCC). The CCC consists of the chairs, vice chairs, and executive directors from each regional fishery management council, or other staff, as appropriate. This committee meets twice each year to discuss issues relevant to all councils, including issues related to the implementation of the Magnuson-Stevens Act (MSA). A variety of agencies and interest groups outside the fishery management system regularly review the system with regards to their particular field of interest. These include ETP Take Reduction Teams, the Department of Commerce Inspector General and others. On occasion, the U.S. Congress will direct the National Research Council to investigate some fishery management issue. The management system is clearly subject to a high degree of oversight. SG60 is met.
SG80	*Freshwater finfish net fishery:* The UoA operates in Sweden, where. the management agency has its own internal auditor who conducts regular internal review of the management system. Various inspection bodies under the Swedish Government and Parliament are involved in reviewing different aspects of the country's system for fisheries management; these are external as they are conducted by actors outside the Ministry of the Environment. The Swedish National Financial Management Authority reviews the finances and efficiency of management practice of the central bodies of governance in Sweden. Likewise, the Swedish National Audit Office, operating on behalf of Parliament, performs reviews of both financial spending and, increasingly, policy performance of the executive power. The Chancellor of Justice, also appointed by Parliament, has as its main task to detect systematic challenges in Swedish public administration. The management agencies Council for Public Access to Information consists of politicians and representatives of civil society, business and other state bodies of governance. Its aim is to ensure that the public receives necessary information on the working of the management agency. It meets for one day four times a year, where it receives presentations and updates from the management agency staff on issues throughout the latter's sphere of authority. Although they are set up by the management agency, they count as external in an MSC context. Hence, the system is subject to regular internal and occasional external review. SG80 is met.
SG100	*Cod trawl fishery:* The UoA operates on the Doggerbank. The European Commission reports annually to the European Parliament and to the Council on the status in EU fisheries management. There is also regular internal review within the Commission as well as within the Norwegian and UK systems for fisheries management. The Commission has commissioned independent evaluations in connection with the general reforms of the CFP. Enforcement activities are reviewed by the EFCA on a regular basis. The EU-Norway agreement is reviewed on an annual basis by the Storting and regularly by the Office of the Auditor General of Norway. Hence, the management system is subject to internal and external reviews of the CFP, the Norwegian management system and the EU-Norway agreement on a regular basis. SG100 is met.

Challenges and solutions to meeting PI 3.2.4

The process of on-going review and evaluation to ensure the performance of management is refined and improved may not be a common process across all government departments. Similarly, where management systems are changed it may not be common practice to formally review the outcomes of these changes against prior stated objectives. Where such reviews do occur, they may be irregular and only rarely external.

The process of review or evaluation can be slow and can be sometimes seen as an impediment, particularly where the findings indicate the need for management changes. Any changes resulting from review or evaluation may also have logistic or financial implications which may present a challenge to governmental budgets. Finally, most reviews or evaluations require some form of data to provide indications of performance and trends. Where there is a historical paucity of data or the management system is relatively new, there may be a reduced timeline with which to draw comparisons.

Some of the approaches to addressing some of the issues include using a provincial or national government agency, university, NGO or donor organisation to undertake the external evaluation as opposed to using expensive services to undertake the review.

Example process and actions to improve performance against PI 3.2.4

Process Chronology				Management Actions	
Step 1	Step 2	Step 3	Step 4	Example action	Scoring issue
●				Undertake a review of reviews. This should list all aspects of the fishery management process and ascertain the degree to which these management processes are subject to review or evaluation, whether or not any such reviews are regular, internal or external. In addition, it is important to identify whether a holistic review of the overall performance of the management system, as well as its component parts, is subject to evaluation.	(a), (b)
●				Check whether the management system, or its component parts require reviews or evaluations to be undertaken, and whether there is any stipulation over the frequency of these or the need for external evaluation.	(a), (b)
	●			Develop proposals for management review and evaluation, addressing any gaps identified in step 1 (above).	(a), (b)
		●		Incorporate commitments for review / evaluation into relevant legislation, management policy, strategic plans and departmental work plans. In particular, the fishery management plan should detail that parts of the management system that will be subject to review, indicating how this will be done, how often and by whom. This should also include practical considerations such as how reviews / evaluations will be funded.	(a), (b)
		●		Ensure that all (or at least 'key') parts of the management system are subject to review / evaluation, including external evaluation.	(a), (b)
			●	Continue to undertake reviews / evaluations as set out in the management plan or departmental guidelines.	(a), (b)

Notes

Section 4

Annexes

Annexes

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Annex 1
Risk-Based Framework

Introduction to the Risk-Based Framework

The Risk-Based Framework (RBF) is designed to score the 'outcome' Performance Indicators (PIs) associated with Principles 1 and 2 of the MSC Fisheries Standard when there is insufficient data to score a PI using the default assessment tree.

These outcome PIs score the performance of a fishery with regard to its impacts on the target species (dealt with in Principle 1); on species identified as in-scope or endangered, threatened or protected species/out-of-scope (ETP/OOS); on habitats; and on ecosystems (dealt with in Principle 2).

The RBF comprises a set of methods for assessing the risk of the fishery to each of these ecological components. Each method provides a risk-based estimate of the impact of the fishery on the ecological component (or on individual elements of that component, such as individual species or habitats). These risk estimates in turn translate into a parallel outcome score.

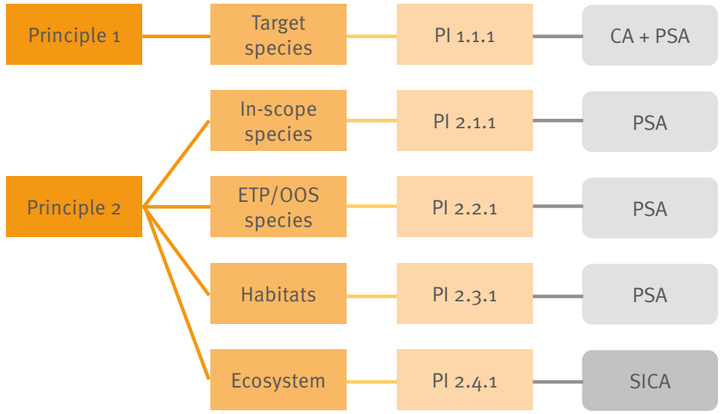
Triggering the RBF

The RBF is triggered when there is insufficient data to score one or more scoring elements categorised under an outcome PI. The schematic below shows when the RBF is triggered, and which assessment methods should be used for that PI

Table 1: Criteria for triggering the use of the RBF

PI 1.1.1 Stock status
• No stock status reference points are available, either derived from analytical stock assessment or using empirical approaches.
PI 2.1.1 In-scope species
• No stock status reference points are available, either derived from analytical stock assessment or using empirical approaches.
PI 2.2.1 ETP/OOS species
• The population status of the ETP/OOS unit is not known with respect to favourable conservation status, or • There is no independent, quantitative assessment of the direct impacts of the UoA on the ETP/OOS unit with respect to favourable conservation status, or • There is no evidence that the UoA impact on ETP/OOS species is 'negligible' (see Fisheries Standard clause SA3.8.2.5 for definition).
PI 2.3.1 Habitats
• There is no quantitative information available on the substratum, geomorphology, and biota (SGB) for encountered habitats, or • There is no quantitative, gear-specific information available on the impact of the UoA on habitats encountered. Note that this information must include knowledge of regeneration ability specific to the UoA or based on relevant research that considers impacts of the gear on habitats in the area.
PI 2.4.1 Ecosystem
• There is no quantitative information available to assess the impact of the UoA on the ecosystem.

Figure 1: Performance Indicators and associated RBF methodologies



RBF methodologies

The MSC RBF comprises four methods:

Method 1: Consequence Analysis (CA) - Principle 1 species

The CA is a semi-quantitative analysis that assesses the consequence of fishing activity on a particular target species subcomponent. The CA is partly based on the structured collection of qualitative information from a diverse group of stakeholders, as well as using information on proxies that can be used to estimate changes to the relevant subcomponent in a fishery.

Method 2: Productivity Susceptibility Analysis (PSA) – Principle 1, In-scope and ETP/OOS species

The PSA is a semi-quantitative analysis that is based on the assumption that the potential risk to a species (scoring element) will depend on the extent to which the species is subject to impact from the UoA and the inherent productivity of that species (or its ability to recover from that fishing impact). The PSA uses information on species life-history and characteristics of the UoA's fishing activity to determine a risk score for a predefined set of attributes. There are specific PSA attributes for fish and invertebrates, birds, Mysticetes and sirenians, Odontocetes, Pinnipeds and sea otters, sea turtles, sea snakes and amphibians. Any attribute for which there is insufficient data is automatically assigned the highest risk score. At least some information is thus needed to demonstrate low risk in the fishery. These risk scores are entered into the RBF worksheet, which automatically calculates and converts these risk scores into MSC equivalent scores.

Method 3: Consequence Spatial Analysis (CSA) - Habitats

The CSA is a semi-quantitative analysis that assesses the impact of fishing activity on habitat structure and function. The CSA is based on the assumption that the potential risk to a habitat (scoring element) is a function of the interaction between the gear and the habitat, the productivity of the habitat being impacted and the spatial overlap of the fishery with the habitat. The CSA requires information about the gear type, habitat type and spatial overlap of gear with habitat types. This information is used to assign a risk score to a predefined set of attributes. Any attribute for which there is insufficient data is automatically assigned the highest risk score. At least some information is thus needed to demonstrate low risk in the fishery. These risk scores are entered into the RBF worksheet, which automatically calculates and converts these risk scores into MSC equivalent scores.

Method 4: Scale Intensity Consequence Analysis (SICA) - Ecosystem

The SICA is a qualitative analysis that assesses the impact of the fishery on the wider ecosystem. It considers the risk the fishery has on wider ecosystem structure and function by evaluating the scale and intensity of the fishery and how this affects the state of the ecosystem. The state of the ecosystem is determined by looking at indicators of health such as species composition, functional group composition, distribution of the community and trophic/size structure. SICA is based on the structured collection of qualitative information from a diverse group of stakeholders.

Note: all RBF methods take a precautionary approach in scoring. Where there is not enough data to support a low risk score an assessment team will assign a high risk score. Although the RBF has been developed to enable assessment of data-deficient fisheries, MSC encourages fisheries to collect more data to increase their understanding of the fishery. The increased certainty may also allow for reduced risk scores and thus higher MSC scores.

What data to collect and what is checked?

The methods included in the RBF can be used to manage fisheries, and data collected can support this. In an MSC assessment, the RBF is used to assess the risk of the effect of fishing activity on an ecological component in relation to the Fisheries Standard. Regardless of whether the methods included in the RBF are already being used to manage a fishery, if the fishery is being assessed against the MSC Standard, the assessment team will apply the RBF methods as detailed within the MSC Fisheries Standard Toolbox.

The following section provides an overview of what CAB auditors check. This is followed by examples of scores and corresponding rationales for each method. Note: in fisheries where an RBF assessment is triggered, there is likely to be limited information available in published form. CAB auditors additionally use stakeholder interviews and participatory methods to obtain information required to score the fishery.

Method 1: Consequence Analysis (CA)

What CAB auditors check

CAB auditors require indicator trend information about the target species to support scoring of this PI. Where no indicator information is available a fishery cannot be scored using the RBF, so a key question is whether there is enough indicator information available to score the data-deficient target species. Prior to scoring, CAB auditors will identify the most vulnerable subcomponent for each scoring element from the following options: Population size, reproductive capacity, age/size/sex structure or geographic range.

Information that can be used include:

- Landings.
- Empirical catch composition data (perhaps with seasonal and spatial patterns).
- Exploitation rates and CPUE time series.
- Geographical species distribution data.
- Biomass and recruitment estimates.

This information is used to assess the consequence of the most vulnerable subcomponent, relative to an MSC scoring guidepost based on pre-determined categories: Fail, 60, 80 or 100. There are specific considerations for each subcomponent where the target stock is a key low trophic level (key LTL) species (defined in Fisheries Standard v3.0 clause SA 2.2.9).

Examples of scoring rationales

CA score	Most vulnerable subcomponent	Rationale
60	Population size	*Sardine purse seine fishery:* Surveys which estimate abundance and distribution of sardine recruits and pre-recruits are carried out every three years. Combined with logbook data which provide catch per unit effort (CPUE) trends, it can be confirmed that the stock is exploited at full exploitation rate but long-term recruitment dynamics are not adversely affected.
60	Age/size/sex structure	*Crab pot fishery:* Landings data indicates that there is a detectable change in size/sex structure. However, information about abundance and recruitment indicates that the long-term recruitment dynamics have not been adversely damaged. There appears to be a reduced number of large males of sufficient size to mate with the largest females and that has potential effect of reducing the reproductive capacity of the largest females. Smaller male crabs may not be able to mate with large females. There is a concern that a reduced abundance of large male crabs may lead to sperm limitation and reduced levels of egg production if there are not sufficient males left in the population to mate with the larger females.
80	Reproductive capacity	*Redfish trawl fishery:* Redfish are a slow-growing, long-lived species (max reported age: 40 years). Results from a selectivity study indicate that the 50% selectivity (22 years) is well above the age at 50% maturity (6 years). Individuals should therefore have over 17 years of spawning before they enter the fishery, therefore ensuring the protection of a significant part of the adult population allowing for multiple spawning events. Although a significant part of the adult population is protected before they enter the fishery, size class indices suggest there has been a reduction in reproductive capacity, however, the impact on population dynamics is minimal.
80	Geographic range	*Snapper handline fishery:* Fishing effort is very low with four boats targeting the stock. Only 2% of the stock distribution area (1132 km^2) has been swept by the gear (26km^2). Species distribution time-series indicate a shift in the geographic range of the snapper. Additionally, information from a research program indicates there is no evidence of local depletion nor has there been a change in the population distribution.
100	Population size	*Cod longline fishery:* CPUE trends show stability over the last 20 years and recruitment indices have shown no major changes over the last 10 years. Changes to the population as a consequence of fishing are not detectable against the natural variability of the population.

Method 2: Productivity Susceptibility Analysis (PSA)

What CAB auditors check

CAB auditors require information about life history characteristics of a species as well as information about the degree of overlap between the distribution of the fishery and the distribution of the stock and whether the species occurs at the same depth in the water column as the fishing gear. Information sources can include the following:

- Reports or scientific papers describing life history characteristics of a species, including distribution by quarter or season.
- Fish species life history database, e.g. FishBase and SeaLifeBase.
- Maps showing the distribution of fishing effort by quarter or season (also including other and particularly MSC fisheries impacting the same species).
- Empirical catch composition data and specific tonnages or numbers of a species caught per fishery.
- Any information on gear selectivity or post-capture mortality.
- Any information on the effectiveness of mitigation measures applied to reduce the encounterability or selectivity of the fishery on unwanted catches or ETP/OOS species.

PSA scores that are entered into the RBF worksheet are risk scores that range from 1-3 that are determined based on pre-defined productivity attributes in Tables A8-15 and susceptibility attributes in Tables A17-18 in the MSC Fisheries Standard Toolbox. There are separate attributes for fish and invertebrates and for specific out-of-scope species groups (birds, mammals, reptiles and amphibians).

The final PSA score is calculated automatically within the RBF worksheet which can be downloaded from the MSC website. The final MSC score for PI 1.1.1 is a combination of the CA and PSA score, while for P2 species, the final score is solely determined by the PSA.

Examples of scoring rationales - Productivity attributes for fish and invertebrates

	Productivity attributes [1-3]								
Total productivity score	Average age at maturity	Average max age	Fecundity	Average max size	Average size at maturity	Reproductive strategy	Trophic level	Density dependence	Rationale
1.57	1	2	1	1	1	2	3		Herring matures when it is 2 years (average size at maturity). The maximum recorded age is approximately 18 years (average maximum age). Average size at maturity is approximately 27 cm and average maximum size is about 39 cm. Herring deposit approximately 10,000-60,000 demersal eggs on a variety of substrates in areas with strong tidal currents (fecundity & reproductive strategy). Trophic level of herring is 3.4 ± 0.1 SE.
1.50	1	1	1			1	2	3	Blue swimming crab (BSC) matures when it is approximately 1 year old (average age at maturity) and can reach an average maximum age of 3 years old. Each female produces a huge amount of eggs, between 180,000 and 2 million in a single spawning (fecundity). Berried females incubate eggs for 18 days and when embryos are mature the female shakes the eggs off her abdomen and they hatch into zoea (reproductive strategy). BSC has a trophic level of 3. There is no evidence that BSC display depensatory dynamics at low population sizes. BSC can be found in a large area but it is likely they have distinct brood stocks. If these distinct brood stocks are heavily fished there is a likelihood that the crab population will have reduced fitness (density dependence).
1.71	1	2	1	2	2	1	3		Cod matures when it is approximately four years old (average age at maturity) and it can reach an average maximum age of 20 years old. Cod is around 60 cm when it reaches maturity (average size at maturity) and can reach up to 160 cm (average maximum size). Cod form spawning aggregations (reproductive strategy) and they lay between 2.5 and 9 million eggs (fecundity). Trophic level is 4.4.

Examples of scoring rationales - Productivity attributes for birds

	Productivity attributes [1-3]			
Total productivity score	Average age at first breeding	Average optimal adult survival	Fecundity	Rationale
3	3	3	3	Antipodean albatross *(Diomedea antipodensis)* has an average age at first breeding of 11.5 years. They tend to breed once every two years and produce one chick. Modelled optimal adult survival is 0.96.
1.33	2	1	1	The UK breeding population of common goldeneye *(Bucephala clangula)* have an average age at first breeding of 3.2 years. They breed annually, producing 7-9 chicks. An estimate of average adult survival is 0.69, which is considered 'optimal' as population size has been stable for past 10 years.

Examples of scoring rationales - Productivity attributes for marine mammals: Mysticetes and sirenians

	Productivity attributes [1-3]		
Total productivity score	Average age at maturity	Fecundity	Rationale
3	3	3	The bowhead whale *(Balaena mysticetus)* has an age of sexual maturity of 25 years and fecundity of 0.11.
2	2	2	The fin whale *(Balaenoptera physalus)* has an average age of sexual maturity of 6.5 years and fecundity of 0.37.

Examples of scoring rationales - Productivity attributes for marine mammals: Odontocetes

Productivity attributes [1-3]			
Total productivity score	Average age at maturity	Fecundity	Rationale
2.5	3	2	The Atlantic spotted dolphin *(Stenella frontalis)* has an average age of sexual maturity of 15 years and fecundity is 0.33.
1	1	1	Dall's porpoise *(Phocoenoides dalli)* has an average age of sexual maturity of 4.4 years and fecundity is 1.0.

Examples of scoring rationales - Productivity attributes for marine mammals: Pinnipeds and sea otters

Productivity attributes [1-3]				
Total productivity score	Average age at maturity	Average optimal adult survival	Fecundity	Rationale
2	3	1	2	The New Zealand sea lion *(Phocarctos hookeri)* has an average age of sexual maturity of 8 years, fecundity of 0.59, and population models indicates that average adult female optimal survival is 0.82.
2	2	2	2	The grey seal *(Halichoerus grypus)* has an average age of sexual maturity of 6 years, fecundity of 0.83 and an increasing population size with average survival rate for females of 0.88.

Examples of scoring rationales - Productivity attributes for sea turtles

Productivity attributes [1-3]			
Total productivity score	Average age at maturity	Fecundity	Rationale
2.5	2	3	Loggerhead turtles *(Caretta caretta)* in the Mediterranean Regional Management Unit (RMU) have an average age at maturity of 25 years. This RMU has an average of 70 eggs per nest and 1.5 nests/season. The remigration interval is 3.2 years. The overall fecundity value for this RMU is therefore 32.8.
1	1	1	Olive ridley turtles *(Lepidochelys olivacea)* have an average age at maturity of 13 years. They have an average of 105 eggs/nest and have 2.5 nests/season. The average remigration interval is 1.5 years. The overall fecundity value for this species is therefore 175.

Examples of scoring rationales - Productivity attributes for sea snakes

Productivity attributes [1-3]				
Total productivity score	Average length at maturity (cm)	Average maximum size (cm)	Fecundity	Rationale
3	3	3	3	The elegant sea snake *(Hydrophis elegans)* has an average length at maturity of 118.3 cm and an average maximum length of 227.0 cm. The species gives birth to live young. The mean clutch size is 12.3 and there is an average of 3 years between reproductive periods, giving a fecundity of 4.1
2	2	1	3	The marbled sea snake *(Aipysurus eydouxii)* has an average length at maturity of 64 cm and an average maximum length of 85 cm. The species gives birth to live young. The mean clutch size is 3.6 and they reproduce annually. The fecundity score is therefore 3.6.

Examples of scoring rationales - Productivity attributes for amphibians

Productivity attributes [1-3]								
Total productivity score	Average age at maturity	Average max age	Fecundity	Average max size	Average size at maturity	Reproductive strategy	Trophic level	Rationale
1.57	1	1	2	1	1	2	3	An expert on amphibians indicated that Titicaca water frog *(Telmatobius coleus)* has an average age of maturity of ‹5 years and an average maximum age of ‹10 years. Studies on this species show that the clutch size is approximately 500 eggs, which the female lays and then leaves, most similar to the description of medium risk reproductive strategy. The average maximum size is 14 cm, with size at maturity around 7-10 cm. The trophic level is 3.5 for adult frogs.

Examples of scoring rationales - Susceptibility attributes for fish and invertebrates

Susceptibility attributes [1-3]				
Areal Overlap	Encounterability	Selectivity	Post-capture mortality (PCM)	Rationale
2	3			*Hake longline fishery:* Hake is widely distributed in a variety of habitats, from the shoreline to the continental shelf (180km). Adults are usually found in deeper, colder waters and depth range is 0-600 m, but they are more usually found between 150 and 200m. The fishery operates from 50km to 100km from shore. Longline has leaders fixed at regular intervals (every 2-2.5m) with baited hooks. Depth range of the longline line is between 150-250m. Areal overlap is 27%, while the encounter ability is high.
3	2			*Sea bass gillnet fishery:* Sea bass is distributed in a variety of habitats, from the shoreline to the continental shelf which is approximately 30nm from shore. The depth range of the seabass is thought to be from 0-20m (from sea level). The gillnet fishery operates in from 5nm to 30nm from shore. The gillnet fishery nets are set at all depths from 5-10m. Areal overlap is ›80% and encounterability is medium.
		2		*Cod longline fishery:* The fishery uses bait to attract cod. Looking at catch composition data it becomes clear that mature species (› 64cm) make up a high percentage of the catch. Occasionally individuals ‹60cm but ›40cm are caught. Undersize individuals are attracted to the bait but are not caught often.
		2		*Sardine gillnet fishery:* The gillnets have a minimum mesh size of 3cm. A study to determine optimum mesh sizes for gillnets in the fishery concluded that tangling is the most common way the fish are caught in the gillnet. Additionally, this study indicates that the mesh size retains individuals from 13-22 cm in length. Average length of sardine landed in the gillnet fishery is 18cm while length at maturity is 15cm. Individuals ‹ size at maturity are rarely caught therefore a risk score of 1 for scoring category (a) is assigned. Individuals from 13-22 cm are retained by the gear therefore individuals ‹ half size at maturity can escape or avoid the gear therefore a risk score of 2 is assigned for scoring category (b). An average score of 1.5 is determined which must be rounded to the nearest whole number to assign a precautionary risk score of 2.
			1	*Shrimp trawl fishery:* Trawls retain starfish all of which are sorted and put back into the sea. Scientific studies on the survivorship of starfish indicate that at least 60% survivorship of individuals returned to sea.
		3	1	*Octopus pot fishery:* The catch composition of the fishery indicates that approximately 60% of the catch is smaller than the size at maturity and they are captured often (selectivity). Evidence presented on the biology of the species and the handling of the individuals indicates that the majority of the juveniles are released alive (PCM). Studies on survivability in this fishery provide estimates of ›95% survival of juveniles post-release.

Examples of scoring rationales - Susceptibility attributes for birds, mammals, reptiles and amphibians

Susceptibility attributes [1-3]				
Areal Overlap	Encounterability	Selectivity	Post-capture mortality (PCM)	Rationale
2	2	3	1	*Hake trawl fishery:* Individual black-browed albatrosses (BBA) can be injured or killed when they hit trawl warps.. Maps of monthly distribution of BBA from tracking data and monthly fishing effort data show that the period of highest overlap is from May-August. Stakeholders agreed that, although this population of BBA are widely distributed in the South Atlantic, the high concentration of seabirds overlapping with the fishery during this season warrants a precautionary score of 2 for areal overlap. The default high risk score for encounterability has been reduced from 3 to 2 as best practice mitigation measures to reduce the likelihood of birds encountering the gear are implemented in the fishery (tori lines, offal management). The default high risk score (3) for selectivity is not changed from the default as there are no mitigation measure that reduce selectivity of the gear if encountered. There is evidence of some birds surviving warp cable strikes. Independent observations confirmed that approximately 20% of collisions could lead to serious injury or mortality (i.e. 80% are unharmed by encounters). A score of 1 is given for PCM.
2	1	1	3	*Mid-water anchovy trawl:* Population surveys and VMS data from the fishery indicate that a population of bottlenose dolphins partially overlaps with the area that the fishing takes place (~25% overlap) when the fishery is operational (April-August). The areal overlap score is therefore 2. The default high risk scores for both encounterability and selectivity are reduced from 3 to 1 as there is observer data with adequate trueness and precision that confirms that there have been negligible levels of bycatch of this species (1 interaction in 5 year period, breeding population size >5000 individuals). The one individual caught was dead upon capture. There is no evidence of survivability, so a default high risk score is given for PCM (3).
3	2	2	2	*Tropical tuna longline fishery:* The fishery overlaps with the East Pacific RMU of Leatherback turtles. Species and fishery distribution information by quarter indicate that there is >30% overlap between the fishery and the RMU during turtle pre-nesting and nesting seasons (Oct-March), so areal overlap is 3. The fishery applies some measures to reduce encounterability of the hooks with turtles, including using finfish bait when setting in areas <100m depth. This measure has resulted in reduced turtle mortalities in similar fisheries, so the default high risk score for encounterability is reduced to 2. The fishery is also required to use only large circle hooks (as defined in RFMO resolution) when setting in areas <100m depth. Studies have shown this to be an effective measure to reduce selectivity of the hooks, so the default score for selectivity is reduced from 3 to 2. Leatherback turtles are more likely to be foul-hooked or entangled than to bite a hook, so injury severity and mortality is likely lower than for other turtle species. Independent observations provide estimates of post-capture mortalities of between 10-50%, depending on injuries. Being precautionary, the lower survival estimate is used (50%) and PCM scores 2.

Examples of scoring rationales - Susceptibility attributes for birds, mammals, reptiles and amphibians – *continued*

Areal Overlap	Encounterability	Selectivity	Post-capture mortality (PCM)	Rationale
2	2	3	1	*Tropical prawn trawl:* The turtle-headed sea snake can be caught in prawn trawls. Although the fishery distribution is provided by month using VMS data, the exact distribution of the sea snakes are not well known, although experts indicate that this species is generally found in coral habitats outside the trawl footprint. However, there are records of some interactions with this species in the fishery, so there is some overlap. The RBF workshop participants determined based on species habitat preferences and known fishery distribution that the areal overlap is approximately 20%, risk score =2. The fishery uses bycatch reduction devices to reduce bycatch generally, and this has shown to be effective at reducing sea snake bycatch (across spcies) by about 40%. The encounterability default score is reduced from 3 to 2. There are no measures that reduce the selectivity of the gear, so the selectivity score remains default high risk (3). Independent observations from a directed study of this issue showed that 90% of sea snakes were returned to the water alive and in good condition, with high expected survival. PCM scores 1.
3	3	2	3	*Freshwater species fyke nets:* Mudpuppies can be caught in fyke nets targeting other lake species. The distribution of mudpuppies is unknown but experts indicate that there is likely 100% overlap with the fishery during spring. Areal overlap =3. The mudpuppies are generally caught in the top 1m of the water column (total depth 10m). There are no measures to reduce encounterability of mudpuppy catches. However, the mesh size used in the fyke nets (60mm) should allow some mudpuppies to escape. Thus, the default selectivity score is reduced from 3 to 2. Although there is no data on post-release survival, mudpuppies have very fragile gills and anecdotal evidence indicates that they are generally in poor condition when nets are landed. PCM score is 3.

Method 3: Consequence Spatial Analysis (CSA)

What CAB auditors check

CAB auditors require information about types of habitats encountered, their distribution and information about the interaction of the gear with the habitat. This can include the following:

- Maps showing the distribution of fishing effort.
- Maps showing the habitat distributions throughout and beyond the fishing areas.
- Information about the types of biota found in each habitat.
- Information about the types of substrata found in each habitat and its characteristics.
- Reports describing the regeneration of biota.
- Reports describing natural disturbance of habitat at depth.
- Information about the depths at which habitats are found.

CSA attribute scores that are inputted into the RBF worksheet are risk scores ranging from 1-3 and are determined based on pre-defined consequence and spatial attributes in Tables A21 to A29 in the MSC Fisheries Standard Toolbox.

The CSA score is automatically calculated in the RBF worksheet which can be downloaded from the MSC website. The final MSC score for PI 2.3.1 is a combination of CSA scores for all habitat types in the fishery.

Examples of scoring rationales - Consequence attributes

	Consequence attributes							
	Consequence score	Regeneration of biota	Natural disturbance	Removability of biota	Removability of substratum	Substratum hardness	Substratum ruggedness	Seabed slope	Rationale
	1.67	2	1	1	1	3	3	1	The habitat is categorised as follows using SGB nomenclature: Fine – Flat – small erect. It is distributed throughout the inner shelf from approximately 25-50m. The fishery utilises gillnets. There is no information available to score the regeneration of biota or the natural disturbance which is why the surrogates – small encrusting/ shallow inner shelf – are scored for those two attributes. Removability of biota score is based on gillnet/small biota while removability of substratum score is based on gillnet/ ‹6cm transferable combination. The substratum hardness score is based on fine sediments/gillnet combination while substratum ruggedness score is based on the flat surface of the habitat and gear type. The seabed slope is low degree.

Examples of scoring rationales - Consequence attributes – *continued*

Consequence score	Regeneration of biota	Natural disturbance	Removability of biota	Removability of substratum	Substratum hardness	Substratum ruggedness	Seabed slope	Rationale
2.11	3	2	3	1	1	3	1	The habitat is categorised as follows using SGB nomenclature: Large – Outcrop – Large erect. It is distributed on the outer shelf from approximately 60-200m. The fishery utilises demersal trawls. There is no information available to score the regeneration of biota score or the natural disturbance which is why the surrogates – large erect/outer shelf – are scored for those two attributes. Removability of biota is based on demersal trawl/large erect while removability of substratum score is based on demersal trawl/immovable boulders combination. The substratum hardness score is based on fine hard rock type/demersal trawl combination while substratum ruggedness score is based on the fact that habitat is a low relief outcrop and gear type. The seabed slope is low degree.

Examples of scoring rationales - Spatial attributes

Total Spatial score	Gear footprint	Spatial Overlap	Encounterability	Rationale
1.36	1	2.5	1	*Lobster trap fishery: T*he habitat is categorised as follows using SGB nomenclature: Solid reef – High relief – Small erect. It is distributed throughout the inner shelf from approximately 25-60m. The managed area is the EEZ of the country, but the habitat extends beyond the EEZ and has an area of approximately 1300km². The lobster is not found in the EEZ of the neighbouring country and the fishery operates from the shore up to 50m throughout the EEZ. The EEZ of the neighbouring country is about 1/3 of the size of the EEZ of the country where the fishery operates. This means that the spatial overlap of the fishery and the habitat is approximately 70%. The traps (gear footprint) are set on the bottom and close to crevices where lobsters are often encountered. Although the traps are set throughout a wide area they are small and do not encounter the habitat very often. Stakeholders indicate that there is approximately 25% probability that the gear encounters the habitat (encounterability).
2.08	2	1.5	3	*Cod demersal longline fishery: T*he habitat is categorised as follows using SGB nomenclature: Medium – Low relief – small erect. It is distributed throughout the inner shelf from approximately 25-50m. The managed area comprises the EEZ of the country, and the fishery operates along the coast from 0-35m as prescribed by the management agency. The spatial overlap of the fishery with the habitat is approximately 40%. The habitat does not extend beyond the EEZ. The fishery sets the demersal longline (gear footprint) on the bottom to attract the cod, so there is a high likelihood that it encounters the habitats ›75% (encounterability).

Method 4: Scale Intensity Consequence Analysis (SICA)

What CAB auditors check

CAB auditors require information about the key ecosystem elements relevant for the fishery, specifically their structure and function. The first three steps of the SICA are to determine the spatial and temporal scale and the intensity of the fishery on the ecosystem. Using this information, and similar to the CA, the CAB auditor then identifies the most vulnerable subcomponent from the following options: Species composition, functional group composition, distribution of the community and trophic/size structure. Once the most vulnerable subcomponent has been identified, the CAB auditor scores the consequence of the fishery on this subcomponent based on pre-determined categories associated with MSC scoring guideposts: Fail, 60, 80 or 100.

Information to inform scoring of the SICA may include:

- Empirical catch composition data (perhaps with seasonal and spatial patterns).
- Reports about (if any) keystone species retained in the fishery.
- Information about community distribution (maps, reports).
- Number of functional groups.
- Information on trophic levels within the ecosystem.
- Information about the fishing operation: where it operates and how often.

Examples of scoring rationales

SICA score	Most vulnerable subcomponent	Rationale
60	Species composition	*Scallop dredge fishery:* The fishery affects the wider ecosystem through alterations in invertebrate community structure. Besides scallops, dredges capture rocks, shells, sponges, tunicates, sea urchins and lobster. There is evidence that the fishery affects the species composition such that robust and fast-growing species are favoured, but information about historical community distributions does not indicate that the species composition has changed more than 10%. Additionally, large closed areas indicate a slow process of recolonisation by some invertebrate that are vulnerable to scallop dredging.
80	Trophic/size structure	*Sardine purse seine fishery:* Sardine are a forage species which play a key role in the ecosystem. A scientific study concluded that there has been a 4% change in the number of in each size class due to a reduction in plankton (sardine prey). This change was attributed to a combination of temperature and salinity conditions in the ecosystem.
100	Functional group composition	*Mussel hand collection fishery:* Mussels are filter feeders and play a key role in the wide estuarine ecosystem. The role they play is key in combination with other filter feeders in the functional group. The level of removals from the fishery both of target species (mussels) and secondary species (clams) is low. Stakeholders indicated that dynamics of community constituents are not detectable against natural variation.

Annex 2
Data-limited methods

Introduction

The MSC assessment methodology is an auditing procedure and therefore must be based on evidence. A lack of evidence that a fishery meets Performance Indicators (PIs) could lead to more conditions and, at worst, a failure of the fishery to meet the MSC Standard.

This annex is designed to help identify or produce the evidence that is required specifically for Principle 1. However, this guide may also be useful for managed and unmanaged bycatch performance indicators, which form part of the ecosystem Principle 2 (PI 2.1.2; 2.1.3; 2.2.2; 2.2.3). Note, the Annex is designed to mostly cover information and discuss cases when it is possible to establish some status reference points and thus the Risk-Based Framework (RBF) is not triggered (see Annex 1 Risk-Based Framework).

The main constraints to meeting the MSC requirements for these PIs are a lack of capacity to conduct the technical work or to sustain a scientific monitoring program. However, there exist opportunities to develop simple approaches based on testable assumptions and independent review, which are within the technical capacity of many fisheries.

This annex should help you to i) review what useful data you might have, and ii) what you need to do with it to produce the information required for good fisheries management decision-making and, by extension, the MSC assessment. It could reduce costs of the MSC assessment and increase the chance of passing if evidence is well prepared.

If independent or scientific evidence is lacking, there is a need to be aware that the stock may be overfished, and the first task is to evaluate stock status. Stock status may be estimated explicitly using a variety of scientific methods and research.

In data-rich fisheries, stock assessment typically involves the statistical fitting of an age-structured population and fishery dynamics model to data that are sufficiently informative to estimate the exploitation history, current stock size and stock biomass depletion as a measure of stock status. This approach is not feasible in “data-limited” fisheries for which data are either too sparse or insufficiently informative.[2]

Similarly to its data-rich counterpart, data-moderate stock assessment attempts to empirically estimate stock status or proxies of stock status, but requires assumptions about fishery and population dynamics in-lieu of sufficiently informative data to empirically estimate these (note, there is guidance within the MSC Fisheries Standard with respect to using proxies to score within Principle 1, e.g., in GSA2.2.3 Fisheries Standard v.3.0).

In data-poor fisheries, data are not sufficient to explicitly estimate stock status using even a data-moderate approach. However, it is still possible to evaluate stock status implicitly. Such evaluation occurs by testing the current or proposed management measures (e.g., a minimum size limit, spatial closure, restricted fishing season) or empirical harvest control rule (e.g., which modifies catch limits according to an index of relative abundance) via computer simulation that accounts for feedbacks between management policy and the observed data. Referred to as ‘closed-loop simulation’ these calculations are the basis for the wider approach of Management Strategy Evaluation (MSE).[3]

[1] Newman, D., et al. 2014. Improving the Science and Management of Data-Limited Fisheries: An Evaluation of Current Methods and Recommended Approaches. Natural Resources Defense Council. NY. DOI. 10.13140/2.1.3764.4481

[2] The term ‘data-limited’ (or ‘data-deficient’) encompasses ‘data-moderate’ and ‘data-poor’ situations that differ in their amount of data and approaches that can be applied. These terms are not defined in the MSC Fisheries Standard or requirements, but these concepts help frame the relevance of this annex. Further, per the requirements, the use of the RBF is designed for use in cases where measures of stock status, such as estimates of biomass compared to a reference point or proxies, are not available.

[3] Punt, A.E., Butterworth, D.S., de Moor, C.L., De Oliveira, J.A.A. and Haddon, M. 2016, Management strategy evaluation: best practices. Fish Fish, 17: 303-334. https://doi.org/10.1111/faf.12104

What is required?

There are a variety of ways to evaluate stock status. However, even simple methods are based on biology, ecology and population dynamics, and defensible scientific principles. The more informative the data, the more precise the estimate of stock status should be.

Current best practice in stock status evaluation consists of:

- Combining all data sources together into a single analysis, if possible. This deals with apparently conflicting information explicitly as part of the stock status evaluation.
- Developing sensitivity analyses and other methods to assess uncertainty.
- Using projections (simulations) to test proposed harvest control rules[4] (HCR) and provide evidence that they will achieve fishery objectives.
- Carrying out an independent expert review of the approach to ensure it meets minimum quality and provide guidance on future improvements.

However, the choice of approach should also take account of the scale and context of the fishery. Strictly speaking, all that is needed is to show that the stock is not at risk given the level of exploitation, which is generally much easier than determining stock status precisely.

Generally, the more information is available, the more the status estimate is precise. When less information is available, there will be more uncertainty in the assessment, leading to the need for more precautionary levels of exploitation. When less information is known, to safely increase the yield from the fishery, additional monitoring may be needed and the stock assessment improved to show that the probability of overfishing remains low.

[4] In most settings 'harvest control rule' (HCR) refers to a function which calculates a recommended fishery exploitation rate based on stock status estimated by a data-rich stock assessment. Here, as is the case for the MSC standard, the term 'harvest control rule' refers more broadly to any formal system for adjusting management advice based on observed data. That could include, for example, a rule that adjusts annual catch limits based on an observed index of abundance, or a size limit that varies according to observed fishery catch rates. It follows that in this context, HCR is synonymous with 'management procedures' or 'harvest strategy'.

Annex 2 - Data-limited methods

Stock status evaluation and HCRs

Two key areas relevant to meeting the MSC requirements in Principle 1 include determining stock status from the outputs of stock assessment and the implementation of an appropriate HCR. Though there are other aspects to consider as well (e.g., relevant information and monitoring) these two areas are key when developing a pathway to MSC certification.

Stock assessment should provide outputs pertinent to Principal 1 and include:

- Maximum sustainable yield (MSY), which is defined as the highest theoretical equilibrium yield that can be continuously taken (on average) from a stock under existing (average) environmental conditions without affecting significantly the reproduction process. The fishing mortality level that gives MSY is referred to as F_{MSY}, and the average spawning stock biomass on the water while the fishery is exploited at MSY levels is B_{MSY}. The MSC requirements provide a default precautionary B_{MSY} level of 40% of the unexploited stock biomass (40% B0) as acceptable for stocks with average productivity.
- Point of recruitment impairment (PRI) is the stock level below which recruitment may be impaired. Recruitment failure can lead to long recovery times as well as the possibility of ecosystem change. Default precautionary PRI levels are provided in the MSC requirements (50% B_{MSY} or 20% B0), which typically apply to stocks with average productivity. Values different to these would need some scientific justification and expert agreement.
- Current stock status needs to be determined in relation to the MSY and/or PRI reference points described above. MSC allows that some assessments may operate with only one or the other reference point, but in these cases, the nature of the reference point should be clearly identified.

In data-poor situations, where explicit estimates of the quantities above are not available, the likely outcomes of management prescriptions including HCRs are all calculated implicity using closed-loop simulation (e.g., the probability that a sizelimit will achieve near BMSY levels without a highly probability of dropping below the PRI), provided that the theoretical basis for the stock dynamics is known.

Principle 1 also requires an evaluation of the harvest control rule (HCR), specifically:

- Whether the HCR is well-defined and likely to maintain the stock at a target level that is fluctuating around MSY, whilst ensuring the exploitation rate is reduced as the PRI is approached.

The role of an HCR is to achieve the management objectives set for the stock, usually to maintain the stock at a productive level (e.g., a target near B_{MSY} or more precautionary status). It should recognise risks, however, by allowing for reduced fishing if the status is determined to be temporarily below the target level, driving it back towards its target level. In this way an appropriate HCR reduces the risk of recruitment overfishing by reducing the exploitation rate when necessary.

To assess the performance of HCRs, it may not be necessary to carry out frequent extensive stock status evaluations as long as there is some monitoring of stock trends and/or exploitation between major analyses. Simple monitoring indices might be used to check for any significant changes between full stock assessments, triggering a new stock assessment, data collection or management response.

How to Review Your Data and Research Program

The main types of data are measurements of the removals of fish from the population (catches), indices of abundance (a time series of values related to changes in fish abundance), and stock age- or size-structure (sampling of catches or surveys for size, age and/or sex of individual animals). With more data, and more types of data, more types of stock status assessment become possible (Table 1). However, it is worth noting that preparing data is often the most time consuming task in completing a stock status assessment.

The best stock assessments model how the fish population changes over time (dynamics). To understand this, a long period of time is needed. This is often not appreciated by some sources of data (such as industry) who may view older data as less valuable. In fact, all data may be equally useful in assessing the current status, and data from early periods in the history of the fishery can be particularly valuable.

For some short-lived species, such as many crustaceans (shrimp) and molluscs (squid, octopus), it is possible to lengthen the effective time series by choosing a time-step other than annual, such as month or week. This may have the additional advantage of creating contrast in the data series where recruitment is strongly seasonal. For this, dates and times of fishing or landing should be as accurate as possible so that alternative time steps can be explored.

It is also important that data have contrast throughout the time-series which the model can fit to. Contrast can be provided by different levels of depletion and/or exploitation occurring through time. Observing how the stock responds to contrasting levels of depletion or exploitation, can improve estimates of the productivity of the stock.

If the data lacks contrast in depletion levels, you might consider creating contrast in the management that is applied. For example, closed seasons or well-designed closed areas (or no-take zones) provide information on the stock under low exploitation.

When these types of observations are missing, more assumptions need to be made, increasing uncertainty around model outputs.

Data-limited fisheries usually rely on fishery-dependent data (e.g., catch, fishing effort, commercial size category or catch sampling). The availability of fishery-independent data (e.g., sampling surveys) although highly informative, are normally associated with data-rich fishery stock assessment, as they are expensive and resource intensive. However, short-term monitoring, if well-designed, can greatly enhance the fishery-dependent monitoring. Where budgets are limited, the first priority should be to ensure that the fishery-dependent data are reliably sampled.

Background research, particularly biological research, will be useful and is sometimes necessary to interpret data correctly. Research to estimate key parameters or test key assumptions include estimates of somatic growth models, natural mortality, selectivity, length-weight relationships, size/age at maturity and stock identification.

Research to enhance data already being collected should have priority. If length data are collected routinely, it would be worth conducting a research project to estimate length-weight and length-age parameters so that length can be routinely linked to age and biomass.

Research should also be prioritised on the basis of its likely impact on management decisions. For example, research on spawning areas, if area closures are being discussed, is likely to be more impactful than improving understanding of stock structure if the stock is under a coherent strategy anyway.

Infrequent frame surveys, IUU catch and change in catchability are common problems for data-limited fisheries. These are critical in stock status assessments. One of the best ways to deal with these sorts of problems is to conduct a workshop with local experts with the aim of providing one or more alternative approaches that minimise their negative effects. Experts could, for example, generate scenarios for likely historical changes in exploitation rates, with upper and lower bounds around their 'best guess'.

Table 1 – Data sources you might have for use in a stock assessment.

Data Type	Description	Uses
Log books	Log books record activities at-sea, including catch and fishing operations. The data are particularly useful for providing a standardised measurement of fishing effort and to record catches (landings and discards). Where location information is collected also, this can help to explain changes in fishery catches over time.	To estimate total catch and indices of abundance.
Observer records	Scientific or other observers on board vessels at sea can provide useful information on the catch and vessel operations, as for log books, but data are verified. They can also provide scientific samples (length, sex and age) from catches.	To estimate effective fishing effort (proxy for fishing mortality) and other reliable data from at-sea activities.
Landing site trip interviews	In the same way as for log books, interviews can provide catch and effort data, but may be limited to a sample of trips. Because the data are collected at the end of a trip, measures of both effort and catch may be imprecise.	To estimate total catch and indices of abundance.
Purchase receipts	Purchase receipts from transactions between buyers and sellers, record commercial category landings and value. These data are usually accurate because the buyer and seller verify the information. Commercial categories records product which is used in the same way and has the same price, may separate species or size dependent on whether markets recognise differences.	To estimate catches by species or size class and for abundance indices, depending on where data are recorded and what the commercial categories are.
Processor Records	Processor records can include purchase and sales receipts as above, but can also include information on commercial categories and size composition collected for commercial reasons (e.g., quality control). These data would most likely be available where product is exported (for example the EU requires information linking fish imports to individual fishing trips).	To estimate catches by species or size class and for abundance indices, depending on where data are recorded and what the commercial categories are.
Length, sex and age samples	Scientific sampling may be carried out routinely where landings are sampled for size or for aging. If this is done routinely, it is likely that it would be carried out by the government research institute responsible for stock assessment. However, length samples may also have been taken to estimate growth parameters or for other research purposes (e.g., international surveys, a university research project or as part of an environmental impact assessment).	Length and age data are useful for stock assessments that include age structure, and will contribute to estimates of mortality rates.
Research and project work	Reports from scientific and monitoring projects that have been conducted in the past often contain useful information, including data tables, observations, estimates of key parameters as well as more general descriptions of species, distributions and fishing activity. Qualitative information can also be useful for providing baseline information on the fishery and species concerned. Any such reports or sources of information should be secured if at all possible for review and reference.	To provide independent estimates of key population parameters such as maximum size, growth and mortality rates.

Suitable Fisheries Models

Methods of stock status evaluation make use of various data streams and assumptions. Many new data-moderate stock assessment methods are being developed and proposed all the time and it is not possible to provide an exhaustive list[5]. In any particular situation, a review of the data you have should give an expert an idea of what might be possible. The availability of data is often the limiting factor on what methods can be used, so data types and methods can be linked to some extent (Table 2).

In general, no specific method can be supported above any other. All methods have key weaknesses and key assumptions. In all cases, assumptions need to be critically evaluated to ensure results and subsequent scientific advice is valid. It will be the responsibility of the fishery to demonstrate a credible monitoring programme and stock assessment.

All methods share the requirement to identify a management unit (or stock), from which the data are taken. Ideally this should be an isolated self-recruiting fish population, but such units can rarely be proved. Fishery management units are more pragmatic. They represent a fishery and the stock which is exploited and, most importantly, can respond to management actions. As long as the stock can be managed, it can form a management unit. It is important to ensure that the unit considers all population stages. For many species of crustaceans and molluscs, the adults do not move much, and it would likely be only the larval stages which mix before settlement. It is generally appropriate and precautionary to attempt to consider the potential boundaries of such units even before their extent is well understood, while research might continue that can lead to better stock definitions.

A data-rich fishery would have total catch, data sufficient for an abundance index and typically a time series of size- or age-composition data. If you have all these data, an integrated data-rich stock assessment should be conducted using the more sophisticated approaches. (e.g., such as CASAL[6], MULTIFAN[7], SAM[8] or Stock Synthesis[9]). Note that most computer software used for stock assessment is freely available and no licences are required. Appropriate skills and training are however needed (see Section 7 below).

Independent assessments could be conducted on each data type. So, for example, a production model could use available total catch and the catch and effort data, while a length-converted catch curve could separately use length frequency data. However, it is considered best practice to include all these data into a single model, as this allows the assessment to look for consistency and compromise between these different information sources. Otherwise, it is difficult to reach a conclusion if there is an apparent inconsistency in the results of different stock assessment methods.

[5] Documents for stock assessment methods and reviews of methods can be freely downloaded, such as:
Sparre, P., Venema, S.C. 1998. Introduction to Tropical Fish Stock Assessment - Parts 1 (Manual) and 2 (Exercises). FAO Fisheries Technical Paper 306 Rev. 2.
Honey, K.T., Moxley, J.H., Fujita, R.M. 2010. From Rags to Fishes: Data-Poor Methods for Fishery Managers. Managing Data-Poor Fisheries: Case Studies, Models & Solutions 1:159–184, 2010.
However, it should be noted that new methods are being introduced all the time, so it is always worth searching for new articles and software.

[6] https://www.niwa.co.nz/fisheries/tools-resources/casal

[7] https://mfcl.spc.int/

[8] Nielsen A., Berg C. W. 2014. Estimation of time-varying selectivity in stock assessments using state-space models. Fisheries Research, 158: 96–101.

[9] https://vlab.noaa.gov/web/stock-synthesis

There is always considerable uncertainty that should be communicated with any stock assessment. An important advantage of situations where more data are available is that methods can supply diagnostics and assess their own accuracy to some extent. This means that the level of confidence in results can be used in the scientific advice. Generally, methods that use limited data are unable to assess their own accuracy.

The main way to approach assessments of uncertainty is to deal with observation and process error within the estimation method (e.g., estimate parameter standard errors, 'bootstrapping' or using Markov Chain Monte Carlo (MCMC) methods), and structural error through sensitivity analysis. Sensitivity analysis conducts the same stock assessment, but changes the assumptions across the range of likely alternatives to check how results and scientific advice might change. This allows the assessment process to map out the uncertainty. Clearly, ensuring that an appropriate range of alternative assumptions are included in the analysis is important.

As the number of data-streams is reduced and data are more sparse, integrated data-rich stock assessment is not possible. Instead, data-moderate approaches may be applied that require larger assumptions but require fewer or even individual data streams to estimate stock status (Table 2).

Simulation Testing HCRs and Data-limited approaches

Data-moderate HCRs, data-poor management approaches (e.g., size limits, total effort controls, spatial closures) and data-poor management procedures (e.g., that vary catch limits based on index or size data) require simulation testing. Various platforms are available to conduct such simulation testing, including FLR[10], openMSE[11] and MERA[12].

[10] https://flr-project.org/

[11] https://openmse.com/

[12] Carruthers, T. R. et al. (2023). Method evaluation and risk assessment: A framework for evaluating management strategies for data-limited fisheries. Fish and Fisheries, 24, 279– 296. https://doi.org/10.1111/faf.12726

Table 2 – Data types and possible stock assessment model approaches. 'Main' data types are essential to the method, while 'Additional' can be used in combination with the 'Main' data types. This is not an exhaustive list, but outlines some types of analyses that are available.

Data Types (PI 1.2.3)		Method (PI 1.2.4)	Key Assumptions and Tests
Main	Additional		
Life history parameters	Stakeholder knowledge on distribution of stocks and fishing	Productivity Susceptibility Analysis	Simple risk-based scoring methods are static and need to be highly precautionary. Therefore, they are only able to identify lightly exploited stocks. All scoring should be justified as much as possible with observations and research. See Annex 1 Risk-Based Framework for an outline of the PSA methodology.
Total Catch	None	Catch-only methods such as Depletion-Corrected Average Catch (DCAC)[13], Depletion-Based Stock Reduction Analysis (DB-SRA)[14], or simple Stock Synthesis[15].	There is considered to be little to no information regarding stock status in only catch data. It follows that in one way or another, catch-only methods require some estimate of initial depletion as an input to the model rather than something that is estimated. As such they cannot be considered as an approach for status evaluation on their own.
	Survey Index or Catch and Effort	Production models such as ASPIC[16] and JABBA[17].	These models require complete total catch and an abundance index that is a good proxy for biomass.
	Size Composition	Length based cohort analysis (LCA).	The classical LCA method assumes long-term equilibrium, but with a time series it may be possible to allow a more dynamic approach analogous to an age-based Virtual Population Analysis. In all cases, mortality and stock size is estimated.

[13] MacCall, Alec. (2009). Depletion-corrected average catch: A simple formula for estimating sustainable yields in data-poor situations. Ices Journal of Marine Science - ICES J MAR SCI. 66. 10.1093/icesjms/fsp209.

[14] Dick, E.J., MacCall, A.D., 2011. Depletion-Based Stock Reduction Analysis: a catch based method for determining sustainable yields for data-poor fish stocks. Fish. Res.v110, 331-341.

[15] https://github.com/shcaba/SSS

[16] https://www.mhprager.com/aspic.html

[17] Winker, H., Carvalho, F., Kapur, M. 2018. JABBA: just another Bayesian Biomass Assessment. Fish. Res. 204: 275-288. https://doi.org/10.1016/j.fishres.2018.03.010.

Table 2 – continued

Data Types (PI 1.2.3)		Method (PI 1.2.4)	Key Assumptions and Tests
Main	Additional		
Survey Index or Catch and Effort	None	Abundance index trends. Index-based management procedures[18].	It will be necessary to establish reference points for the abundance indices. These could be control points in an index-based management procedure. There is no standard way to do this, but ways to estimate what the index would be if the stock was lightly fished (e.g., a reference lightly exploited area) may be sufficient.
Size Composition	None	Length converted catch curve Equilibrium LB-SPR or non equilibrium LB-SPR[19]. 'Per recruit' methods[20] Size-based management procedures[21]	A growth model is required and measures of size at maturity are very useful. These can be used to generate a time series of mortalities. Reference points might be estimated using 'per recruit' and LB-SPR methods. Size-based management procedures require control points relating to mean size or percentiles of the size distribution.
		Length frequency data analysis	Length frequency data analysis can be used to estimate growth and mortality rates, if discrete cohorts can be identified in the data as modes in the length frequency.
Survey Index or Catch and Effort	Size Composition	Simple stock synthesis, RCM[22]	Combining these data into a single assessment will be difficult without the total catch. Separate assessments of each data type can be used to see if a consistent picture emerges.

[18] Carruthers T.R. et al. 2016. Performance review of simple management procedures, ICES Journal of Marine Science, Volume 73, Issue 2, January/February 2016, Pages 464–482, https://doi.org/10.1093/icesjms/fsv212

[19] Adrian R. Hordyk, Kotaro Ono, Jeremy D. Prince, and Carl J. Walters. 2016. A simple length-structured model based on life history ratios and incorporating size-dependent selectivity: application to spawning potential ratios for data-poor stocks. Canadian Journal of Fisheries and Aquatic Sciences. 73(12): 1787-1799. https://doi.org/10.1139/cjfas-2015-0422

[20] Chen, Y., Liggins, G. & West, R. A yield-per-recruit model for sequential fisheries and its application in evaluating the management strategy of changing incidental inshore fishing mortality. Aquat. Sci. 60, 130–144 (1998). https://doi.org/10.1007/s000270050030

[21] Geromont, H. F., and Butterworth, D. S. Generic management procedures for data-poor fisheries: forecasting with few data. – ICES Journal ofMarine Science, doi:10.1093/icesjms/fst232

[22] Huynh Q. 2023. Rapid Conditioning Model. OpenMSE. https://openmse.com/tutorial-rcm/

Table 3 – Stock assessment methods and how they might address Principle 1 PIs.

Method	PI 1.1.1 - Stock status	PI 1.1.2 - Stock rebuilding	PI 1.2.2 - Harvest control rule	PI 1.2.3 - Information and monitoring	PI 1.2.4 - Assessment of stock status
Data-moderate (status estimated explicitly)					
Production models (e.g., JABBA, ASPIC)	These methods provide estimates of stock status and exploitation rate relative to an MSY reference point.	These methods can be used to project the fishery under an HCR, as long as the link between the HCR and catches can be determined.		These methods provide formal stock assessments and supporting information which can be evaluated.	
Complete catch and either: recent size composition or abundance index (e.g., RCM, simple stock synthesis)					
Current absolute biomass estimate (e.g., density survey scaled to estimate of total habitat.	Stock status is not estimated explicitly but can be evaluated implicitly by simulation.	No explicit estimates of B_{MSY} or PRI are available but the approach can be tested for performance using simulation.		These methods can provide an excellent basis for monitoring biomass and inferring stock status.	
Data-poor (status evaluated implicitly by simulation testing)					
Abundance index (or other empirical approaches)	Without catch information, the methods provide estimates of stock status relative to a reference point, which may be derived through research or rational argument.	Although an abundance index provides a very good monitoring index on which the HCR might be based, a method limited to an abundance index only may not provide a sufficient basis to justify any particular HCR. It would be necessary to simulation test the HCR to evaluate biological performance relative to the BMSY and PRI refernece levels.		These methods track a proxy of stock status (the index) and can be checked for consistency with simulated projected data (exceptional circumstances)	

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Annex 2 - Data-limited methods

Table 3 – continued

Method	PI 1.1.1 - Stock status	PI 1.1.2 - Stock rebuilding	PI 1.2.2 - Harvest control rule	PI 1.2.3 - Information and monitoring	PI 1.2.4 - Assessment of stock status
Length based cohort analysis (LCA)	LCA provides estimates of stock status and exploitation rate relative to an MSY reference point. However, this represents an average state over the lifespan of the fish.	Although in theory LCA estimates the exploitation rate, because it assumes the stock is at equilibrium, it is not suitable to develop or test a HCR by itself. Further computer simulation work may be necessary to do this.		LCA provides a formal stock assessment and supporting information which can be evaluated. However, the assessment will need to show in particular that the results are robust to the equilibrium assumption.	
Length converted catch curve Other methods based on capture size statistics: 'Per recruit' methods Length frequency data analysis LB-SPR	These methods provide estimates of the exploitation rate relative to an MSY reference point. The stock state in terms of biomass may need to be inferred from a time series of information on fishing activity or proxies for landings.	These methods, by themselves, are not suitable to develop or test a HCR. It may be possible to propose HCR on the size composition or mean size or some other measurement of the catch which meets the PI requirements, but further information and computer simulation work may be necessary.		These methods provide formal stock assessments and supporting information which can be evaluated.	
Productivity Susceptibility Analysis	The PSA method provides a determination of risk at the current exploitation rate, which can be converted directly to an MSC score.			PSA does not provide any direct information on HCRs. These will need to be developed separately, but a PSA might be used to determine when risk levels will increase so that timely management action can be planned.	
Management prescription. E.g: Total allowable effort, time-area closure, constant catch, minimum size limit (or combinations thereof)	Stock status is not estimated explicitly but can be evaluated implicitly by simulation.	No explicit estimates of B_{MSY} or PRI are available but the approach can be tested for biomass performance using simulation.		These methods provide a limited basis for monitoring and require additional data collection to support the evaluation under these PIs.	

Developing and Justifying the HCR

Although it is not the main focus of this Annex, the harvest control rule (HCR) is an important target for the data collection and stock assessment activities. In data-moderate fisheries, the HCR links determinations of stock status to management action. In data-poor fisheries, the HCR can adjust mangement advice according to empirical observations of relative abundance or other data such as length compositions. It is worth noting that stock status estimates need not be accurate and can rely on proxies, but the response must always be appropriately precautionary to allow for any errors in the approach taken.

A simple HCR (Figure 1) consists of three parts.

1) A maximum limit on harvest rate when the stock is in its 'normal state', at or above the target stock status

2) A reducing harvest when the stock is below some trigger level

3) A minimum harvest when it is below the limit level.

The trigger is set between the limit and target stock levels when the stock is unacceptably below the target and may not be able to climb back up without management intervention. MSC does not explicitly require any particular form, except that the exploitation rate must be reduced as the PRI is approached, and the HCR should be expected to keep the stock fluctuating around a target level consistent with (or above) MSY, or a similar highly productive level.

If the HCR is based on outputs from a data-moderate model it may require regular and frequent model updates, which can be prohibitively expensive. Simulation testing can determine the appropriate frequency of management updates. If the HCR is defined in terms of simple proxies, such as CPUE, rather than model estimates, not only may this make it easier to test the HCR, but also it avoids the need to have frequent model updates, keeping the interim analysis within the technical capacity of the local management system. Evidence on whether the HCR meets the MSC requirements will still be needed. Although this can be based on evidence that assumptions are met, in many cases computer simulations based on the stock assessment can be used to provide basic evidence in choosing and supporting an HCR (Figure 2).

Some stock assessment methods described in this document may provide an indication of current stock status, but do not lend themselves to developing HCR (Table 2 and Table 3). These methods are relatively static rather than dynamic, and cannot be used for population projections. Projections are the main way for computer simulations to test HCRs.

As well as proposing an HCR which includes an active management response, it is possible to conceive of passive controls which also might meet the MSC Standard. These work by protecting a proportion of the unexploited stock from the fishery (see Table 4). As long as that protected portion remains unexploited, as the remaining stock is depleted, the overall exploitation rate will decline. The stock would not become overexploited as long as a sufficiently large proportion is protected. In these cases, there should still be some 'strategic' stock assessments, perhaps updated on an occasional basis that confirm that the approach taken should maintain the fishery at sustainable levels.

Before embarking on a stock assessment, you should have a broad harvest strategy and potential HCR identified. A stock assessment should be used to fine tune these and test them, at least in theory, to check that they will work. The harvest strategy includes the list of all controls that you will apply to avoid overfishing and could include the following:

- Limits on the overall harvest level: either setting a Total Allowable Catch (TAC) that is taken, or limiting somehow the amount of fishing that is done (Total Allowable Effort, TAE). These methods are often used in heavily managed, industrial fisheries and have high management and monitoring costs. Without limited entry (limited licensing), effort controls could still be based on local population size, socio-economic factors such as opportunity cost and other limits on access to the fishery (vessels, skills, fishing gear etc.).
- Size/condition limits: This may be applied through gear controls (e.g., mesh size) or regulation. In the latter case, it is important to assess whether the regulation leads to greater discarding of dead fish, which will undermine the value of the management measure. Maximum size could be applied with similar effect to minimum size, but is rarely used. In some cases, actively reproductive females cannot be landed (e.g., berried lobsters). Some innovative local controls may be highly effective (e.g., prohibiting the removal of more than one claw from captured crabs).
- Closed areas: These are areas which may be closed to protect habitat, improve selectivity, protect main spawning areas, or reduce conflicts between gears (e.g., trawls and gillnets). To be effective as a control to protect the stock, closed areas need to reduce catch at least in the short term, so establishing closed areas where there is little or no fishing will not benefit the target stock directly.
- Closed seasons: These are usually established to protect key life history stages, such as juveniles or spawners. They usually also reduce fishing effort overall, especially where combined with some limitations on the numbers of vessels in the fishery.

A stock assessment in data-limited situations should focus on risk assessment rather than a precise estimate of stock status. Key is to recognise that a harvest strategy will exclude or minimise the possibility that the stock is overfished.

The stock assessment should also be able to model the effect of the HCR. Both the proposed management controls and stock status indicator should be modelled as part of the stock assessment or as a separate analysis. This will allow the stock assessment to assess whether the HCR, at least in theory, should achieve the stated objectives. For example, a HCR using minimum size may not be assessed appropriately using a stock assessment based on total catch and fishing effort – some modelling of selectivity would be required.

Closed-loop simulation can be used to test whether the HCR will achieve the management objectives. Such simulations project the stock forward under the HCR incorporating uncertainties, such as variable recruitment and alternative scenarios to test alternatives to default assumptions (e.g., stock structures or changing catchability). In data-poor situations, where explicit estimates of the quantities above are not available, the likely outcomes of management measures including HCRs are all calculated implicity using closed-loop simulation (e.g., the probability that a sizelimit will achieve near BMSY levels without a highly probability of dropping below the PRI).

Table 4 – Some HCR which could work automatically without management intervention.

Management Measure	Description	Key Assumptions
Minimum Size »» Size at maturity	A minimum size or technical measure (e.g., mesh size) is set so that only fish well above the size at first maturity suffer fishing mortality. This means that a significant proportion of the spawning stock is protected.	Fish are not caught and discarded dead.
Mark and release	Some fish are released through an operational rule applied after capture. For example, v-notching and release of berried female lobsters. This could provide additional protection to the spawning stock as an increasing proportion are released marked, effectively decreasing exploitation.	As well as demonstrating that the rules are adhered to, this type of more complex HCR will need to be supported by computer simulation to show that it is effective and robust.
Single Claw Removal	Specific fisheries may have attributes that can be used to ensure their sustainability. For example, for a fishery based on crab claws, limiting the claw removal so that all male crabs retained at least one claw would most likely meet the HCR requirements.	Survival of single claw male crabs was significant.
Closed area over spawning and recruitment sites	A closed area can be used to protect a proportion of the stock from fishing. Unfortunately, it may be difficult to show such protection is sufficient without significant increased data collection.	The area is large enough so that the animals do not move to the extent they are not vulnerable to fishing and a significant proportion are protected.

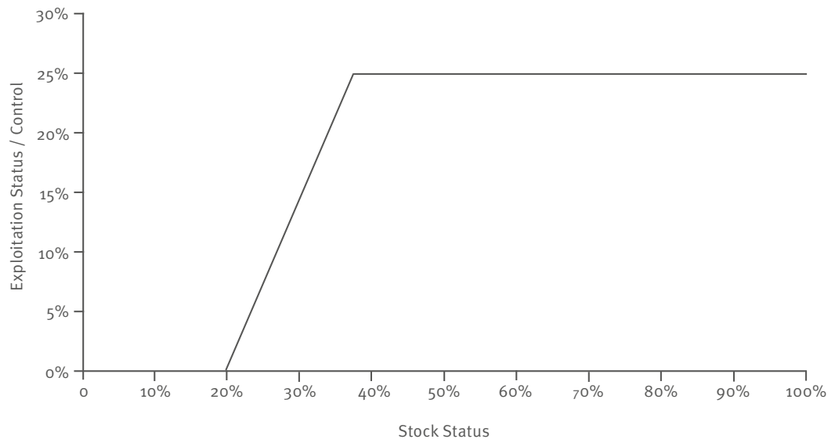

Figure 1 – Example simple harvest control rule that links an indicator of stock status to the exploitation level, controlled by management measures.

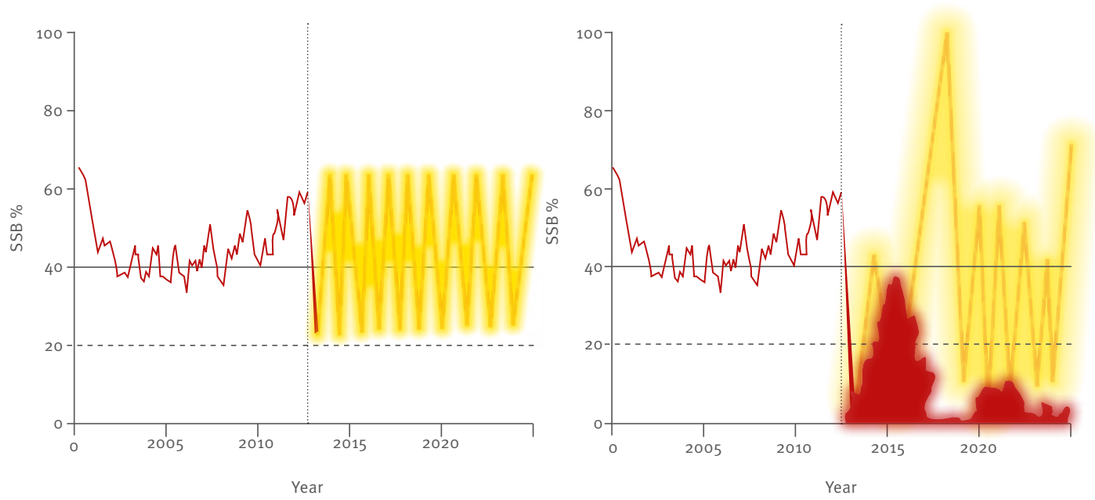

Figure 2 – The graphs illustrate how stock assessment projections might be used to test harvest control rules and provide evidence that a particular HCR is sustainable. The graphs show a stock assessment for a shrimp species for two harvest control rules. In both cases, the stock assessment indicates the stock status to 2013, to the left of the vertical dotted line. To the right of the line, different HCR have been applied. Uncertainty is represented by ink density, and red histograms in the right-hand graph indicate stock collapse. The simulation clearly indicates the HCR tested on the right is not precautionary.

Using Independent Scientific Review

It will be very useful to have an independent scientific review of the data collection, stock assessment, and HCR. It is not the job of the CAB auditors to carry out a technical review of your harvest strategy, but they will rely to a large extent on general evidence that is available. An independent peer review adds considerably to the credibility of the desired approach, including any expert judgement that has had to be made.

Apart from having access to experts with relevant skills who have no prior exposure to the fishery, you will need to state their terms of reference carefully to ensure they produce the information you require. Reviews can be innefective if they are not well designed, and every effort should be made to ensure reviews provide constructive recommendations that lead to a better monitoring and assessment system in future. Specifically, it is important that the review:

- Takes into account the context and size of the fishery, so that recommendations are appropriate and can be achieved.
- Provides a strong recommendation on how to fix each short-coming, where the stock assessment may not be providing the 'best science available'. Only pointing to a problem without a corresponding solution is generally not helpful (but sometimes unavoidable).
- Addresses specific technical requirements of the MSC scoring guideposts (PI 1.1.1; 1.2.4), and where the data or assessment falls short, makes one or more recommendations to bring the system up to the necessary level.

It is worth noting that reviewers are not automatically correct in their opinions. In most cases, consensus can be reached between scientists who have undertaken the assessment and the invited experts as to issues such as weak points in the assessment and what needs to be done to correct these. Key is that discussions are constructive. If such consensus cannot be reached, you may need some system to lead to a final conclusion through some sort of additional independent expert judgement. This problem is a possibility in cases where demands placed on a fishery in terms of research and data collection are beyond the local capacity and so are not considered appropriate. Note that even if such demands are not considered possible, they may prevent MSC certification because without them the fishery cannot meet the MSC Standard.

Annex 3
Scoring Data-Limited Harvest Strategies

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1. Purpose of this Annex

This Annex on **Scoring Data-Limited Harvest Strategies** describes how Principle 1 of the MSC Fisheries Standard and Guidance v3.0 (herein the 'Standard' and 'Guidance'[23] is applied to fisheries with harvest strategies informed by data-limited methods. These are fisheries that do not rely on data-rich analytical assessment outputs to drive adjustments of their management measures, such as a Total Allowable Catch (TAC) or opening/closing the fishing season. Conventionally, a harvest strategy includes a harvest control rule (HCR) that specifies how the harvest rate should be modified in response to changes in stock biomass, as estimated by a data rich analytical stock assessment. Data-limited harvest strategies, instead, adjust management measures in response to simple indicators or estimates of stock status derived from simplified analytical models that require little data, or use static measures that are not meant to be dynamically adjusted.

Key definitions

Data-limited harvest strategies
Harvest strategies informed by data-limited methods. These harvest strategies do not rely on data-rich analytical assessment outputs to drive adjustments of their management measures. For the purpose of this document, data-limited harvest strategies may be categorised based on whether they rely on: (a) static management measures (such as male-only harvest, size limits and fixed seasons in crab fisheries), (b) an empirical indicator to drive changes in management measures (e.g., an indicator of abundance based on a survey, as in some bivalve fisheries) to drive changes in management measures, and/or (c) simple analytical models used as inputs to HCR.

Data-limited methods (DLMs) and data-limited analytical assessments
DLMs are approaches that rely on simplified models or empirical indicators to evaluate the status of a fishery and/or inform its harvest strategy. Such an approach differs from using conventional data-rich analytical assessments such as Stock Synthesis. There is a wide range of DLMs ranging from data poor to data moderate. Some involve analytical assessments that can generate proxy reference points for status, such as catch-only methods that estimate the ratio of catch over MSY (e.g., CMSY), or size-based methods to estimate spawning potential ratio (e.g., lb-SPR) to be used as an indicator when divided by a generic reference point (e.g., SPR40), or management reference points such as a catch limit (e.g., DCAC). Some generate more conventional MSY-based reference points, such as B_{MSY} using Stock Reduction Analysis (SRA), but on the basis of models that are simpler than data rich analytical assessments. Some involve empirically-derived trigger reference points, such as a target or limit CPUE based on some observed historical average. Given the broad variety and diversity of DLMs, and the fact that they serve different purposes, it is not always possible or even appropriate to rank them from simplest to more complex. However, for data-limited analytical models, it is possible to rank them based on the amount and type of information required, from data poor (e.g., CMSY, lb-SPR) to data moderate (e.g., CMSY++, SRA). No method is more robust than others in absolute terms and robustness must be verified on a case-by-case basis. Different DLMs may be more or less appropriate, depending on a fishery's target stock biology, harvest methods, data availability and management context. For further details and references on methods see Annex 2 – Data-Limited Methods.

Data- rich analytical assessments
A data-rich analytical assessment of a fishery requires good quality data on total catch, data sufficient for an abundance index and, typically, a time series of size- or age-composition data. These data allow the implementation of an integrated stock assessment model such as Stock Synthesis. They typically involve the statistical fitting of an age-structured population and fishery dynamics model to data that are sufficiently informative to estimate the exploitation history and time series of stock biomass and recruitment, together with MSY-based reference points. They provide estimates of current stock size and stock biomass depletion as a measure of stock status.

[23] References in this chapter to requirements (SA clauses) and guidance (GSA clauses) are specific to the Fisheries Standard v3.0.

Annex 3 - Scoring Data-Limited Harvest Strategies

Data-limited harvest strategies may still meet the Standard's Principle 1 sustainability requirements, if appropriately developed and implemented, as illustrated by several references in the Guidance (e.g., GSA2.2.3 Use of proxy indicators and reference points for PRI and $B_{MSY,}$ v3.0). Further, fisheries may be certified even when they lack reference points to estimate status. In this case the MSC Risk Based Framework (RBF) must be used to score the fishery's stock status, while their harvest strategy still needs to meet the relevant requirements under Principle 1. An overview of Principle 1 PIs and where the RBF is applied, when triggered, is shown in Table 1.

Fisheries that use data-limited methods do not necessarily have limited data, but might have data quality or data type constraints. Even though multiple data streams may be available, only few might be of sufficient quality to be reliable and informative for status assessment. Further, there may be limited resources and capacity to analyse the available data, or the data that are available might not be suited to inform a data-rich analytical assessment (refer to Annex 2 of this Toolkit "Data-limited methods" for a full list of methods and data types). Fisheries that have a data rich analytical assessment might still use data-limited proxies or indicators to inform their harvest strategies. This can occur, for example, if data-limited proxies or indicators are more sensitive and respond more quickly to changes in the system, or because they can be updated more frequently (e.g., see 'Hake' and 'Shrimp' fishery examples in Section 3).

The goal of this guide is to help better understand how fisheries using data-limited harvest strategies may meet MSC requirements, by providing:

- A summary of Principle 1 Fisheries Standard Guidance or Requirements relevant to data-limited harvest strategies all in one place;
- Examples of types of approaches based on certified fisheries and how their scoring rationales were constructed.

The guide is meant to assist experts who understand fisheries modelling principles and have some familiarity with data- limited methods. These experts include those such as technical consultants, assessors and practitioners engaged in fishery improvement projects, though other stakeholders may find it useful as well. For a first introduction to data-limited methods we recommend reviewing Annex 2 of this Toolkit.

Table 1 – Brief overview of the PIs under Principle 1, indicating where the RBF (Tool A in the Toolbox, see Annex 1 in this Toolkit) can be used in cases where no status reference points are present.

Principle 1 PI	Short description	Use of RBF
1.1.1 (1.1.1A for key Low Trophic Level species)	Stock status relative to B_{MSY} and PRI reference points	Yes, if no Reference Points
1.1.2	Stock rebuilding (only scored if PI 1.1.1b does not meet SG80)	Not scored if RBF used to score 1.1.1/1.1.1A
1.2.1	Responsiveness of the harvest strategy and integration of its parts	
1.2.2	Harvest Control Rules (HCR) and tools	
1.2.3	Data availability and monitoring systems	
1.2.4	Appropriateness of the assessment and peer review	Default score of SG80 if RBF used to score 1.1.1/1.1.1A

2. Introduction to Key concepts

2.1. Data-limited assessments and harvest strategies

Data-limited harvest strategies may be categorised based on whether they rely on: (a) static management measures (such as male-only harvest, size limits and fixed seasons in crab fisheries), (b) an empirical indicator (e.g., an indicator of abundance based on a survey, as in some bivalve fisheries), and/or (c) simple analytical models used as inputs to HCR (Table 2). For b and c above, these typically drive dynamic management measures. The latter can range from simpler methods requiring one or two data streams, such as Depletion Corrected Average Catch (DCAC), or length-based Spawning Potential Ratio (lbSPR), to methods of intermediate complexity relying on additional data and parameters, such as simple Stock Reduction Analysis (SRA) (for more details and references on specific methods see Annex 2 of this Toolkit).

Table 2 – Typology of data-limited harvest strategies. An example fishery is provided in Section 3.

		Harvest control rules (HCR)		
Type of HS	**Based on static measures**	**Based on empirical indicators**		**Model-based**
Example fisheries (see section 3)	Crab	Cockle, Hake	Shrimp	Octopus
Main management measures	Male-only harvest, season and size limit	TAC	Fishing season	TAC and size-limits
How are management measures adjusted (this includes static measures and HCR – see section 4.3 for more details)	Static measures, only adjusted when exceptional circumstances are encountered	Dynamic measures (HCR) set as a fixed harvest fraction of survey estimate of biomass (cockle) or adjusted as a function of standardized index of stock status (hake)	Dynamic measures (HCR) adjusted as a function of CPUE and environmental index	TAC adjusted based on updated estimates of lower confidence bound of multi-annual average surplus production. The TAC is intended to be stable and sustainable

Data-limited harvest strategies will often rely on proxy reference points that are indirectly linked to B_{MSY}, F_{MSY} and MSY. This means that direct estimates of stock status relative to the reference points mentioned in PI 1.1.1 (i.e., B_{MSY} or PRI) might not be available. Examples of proxy reference points are:

- for harvest strategies relying on static management measures, such as a fixed TAC or a male-only harvest regulation, in the absence of historical estimates of stock biomass, an observed historical low level of catch per unit of effort (CPUE) from which the stock recovered could be used to ensure the stock does not go below the PRI;
- for harvest strategies using empirical indicators, such as CPUE or a survey estimate of stock biomass, the average value of the indicator during a historical reference period when the stock was deemed to be at a productive state could be used as a proxy for demonstrating it has been fluctuating around a level consistent with MSY. In most cases, this would be akin to a target reference point;
- for dynamic harvest strategies using simple assessment models, such as a HCR that adjusts fishing effort as a function of spawning potential ratio, a default generic reference point such as SPR40 used to ensure the stock is fluctuating around or above B_{MSY}.

In all these cases, the scoring rationale for PI 1.1.1 will need to demonstrate how these proxies are appropriate.

In the case of fisheries that do not have status reference points, the RBF is triggered to score status ('Tool A: Risk-Based Framework' in Toolbox v1.2, see Annex 1 of this Toolkit), while the performance of the harvest strategy will still have to be evaluated under the Harvest Strategy components of Principle 1 (PI 1.2.1, 1.2.2, 1.2.3), as shown in Table 1.

In some fisheries that use empirical indicators to inform the harvest strategy or only use static management measures, a model-based stock assessment may also be conducted periodically or occasionally. The assessment model can be defined as data-limited, or data-rich, depending on the type and amount of data it requires (for a detailed list, see Annex 2 of this Toolkit). These fisheries differ from fisheries using more conventional harvest strategies in that the stock assessment estimates may be used to determine stock status (and whether PI 1.1.1 requirements are met), but they are not used in the HCR to drive adjustments of management measures. As previously mentioned, this can occur, for example, because data rich models are not sufficiently responsive, or are too cumbersome to update frequently compared to the indicators selected to inform the harvest strategy. Typically, fisheries that use fully-specified harvest strategies that have been tested through Management Strategy Evaluation (MSE) (see Box1), referred to as "Management Procedures", use data-rich methods (e.g., integrated age-size structured statistical models) to measure status, but use empirical rules or much simpler models to adjust TACs. The use of simple empirical or model-based rules to drive the management procedure, in place of the actual stock assessment model, facilitates the implementation of MSE which uses model simulations to fine-tune the HCRs and evaluate their robustness to a wide range of uncertainties.

Even when a model-based status estimate is available, if this is based on a data-limited analytical model, it may be necessary to include information about the harvest strategy to further support the status scoring rationale, similarly to fisheries using proxy reference points. This is because these models might not be sufficiently robust on their own to determine the degree of confidence associated with a particular scoring guidepost (SG).

In summary, because fisheries using data-limited methods might not necessarily use the same information to calculate status and to inform their harvest strategy, and data-limited methods may rely on more assumptions and implicit information than data-rich assessments, this has implications for what should be considered in scoring PI 1.1.1. Different combinations of status and harvest strategy methods and how this can influence the rationale provided to score PI 1.1.1 are shown in Table 3.

Key take-homes:

- An important difference between data-rich and data-limited harvest strategies is that, for the former, a data-rich stock assessment outcome is used both to assess status and to drive the HCR. For the latter, this is not typically the case as either there is no analytical assessment, or a stock assessment is conducted periodically but the outcome (e.g., an estimate of Bmsy) is not what is used to drive the harvest strategy. When there is no analytical stock assessment, the rationale for scoring PI 1.1.1., in addition to examining whether the fishery is meeting its management Reference Points (RPs), must also show whether the harvest strategy results in an outcome that is consistent with the reference points required by PI 1.1.1 (i.e., biomass above PRI and fluctuating around B_{MSY}).

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Table 3 – Source of evidence that can be used to score stock status (PI 1.1.1), for every combination of data-limited harvest strategy type and type of reference points available that may occur. Grey cells indicate a combination that is very unlikely to occur.

		Status Reference Points (RP)			
		No RPs?	Empirical proxy RPs	Data poor/ moderate analytical assessment RPs	Data rich analytical assessment RPs
		NA	(e.g., target CPUE from survey or limit commercial CPUE)	(e.g., target SPR from lbSPR, TAC from Catch-MSY or DCAC, MSY-based RPs from SRA)	(e.g., MSY-based RPs from Stock Synthesis)
Type of harvest strategy (HS)					
Based on static measures	(e.g., male-only harvest; time-invariant TAC)	RBF	Proxy RPs achieved + show harvest strategy delivers PI1.1.1 RPs when working as intended	Model-based RPs met + show harvest strategy delivers PI1.1.1 RPs when working as intended (e.g., static catch rule based on DCAC model)	
Based on empirical indicators	(e.g., HCR adjusts TAC based on CPUE index or recruitment index)		Proxy RPs achieved + harvest strategy working as intended	Model-based RPs achieved + show harvest strategy delivers PI1.1.1 RPs when working as intended	Model-based RPs achieved + harvest strategy working as intended
Model-based	(e.g., harvest control rule adjusts TAC based on model-based B and F indicators)			Model-based RPs achieved	Model-based RPs achieved

2.2. Overview of how Data-Limited harvest strategies may differ from data rich in how they are scored

The nature of data-limited harvest strategies has implications for how the elements of the harvest strategy are scored throughout P1. This includes the design and responsiveness of the harvest strategy itself (PI 1.2.1), the HCR used to control exploitation (1.2.2), what indicators should be monitored (PI 1.1.2 and 1.2.3) and, the review approach for the status determination (PI 1.2.4). These different implications are briefly summarised in this section and discussed in detail in the following section.

The fact that explicit measures of stock status relative to biomass reference points might be missing, particularly for fisheries using empirical indicators and static management measures, affects the scoring of harvest strategy design and harvest strategy evaluation (PI1.2.1, scoring issues a and b). To meet MSC requirements, it must be shown that the harvest strategy is able to maintain the stock above the limit reference point and fluctuating around the target reference point defined in PI 1.1.1. Therefore, the scoring rationale will need to demonstrate the link between the harvest strategy and the objectives in PI 1.1.1 (similarly to the rationale provided for scoring stock status). This demonstration may be based on performance in practice, if the harvest strategy has been in place for long enough, or on simulations.

Testing harvest strategies through MSE is considered 'state of the art' (i.e., SG100) and is often used for fisheries with data-rich analytical assessments. Yet, it can be especially useful to implement an MSE when scoring fisheries that use data-limited harvest strategies, especially if long time series of data or additional sources of information are not available that could be used to justify a particular score in the rationale.

Due to the many assumptions and uncertainties of data-limited methods, the evaluation of the harvest strategy and, in particular, of the HCR and tools, requires considering their suitability to the context of the fishery and harvest strategy in place.

The presence of multiple proxies and indicators can also be helpful in providing stronger evidence when scoring the harvest strategy and monitoring PIs. However, clarity about which indicators are being used for which PIs is needed, given that fisheries with data-limited harvest strategies may use different information/proxies to measure status than to inform their harvest strategy. The indicators used to drive the harvest strategy, i.e., 'primary' indicators, may be the same indicators considered to assess status, as is the case of the cockle fishery example, or may be different, as in the case of the hake and octopus fisheries (Section 3). Harvest strategies may also include additional 'secondary' indicators to check if the system is working as intended. Examples of secondary indicators are estimates of the extension of fishing areas, as in the shrimp case, or the proportion of berried females, as in the crab example.

When scoring PIs referring to monitoring, it is useful to consider which indicators will help check whether the assumptions made for the harvest strategy are reasonable and are not violated in practice. Fisheries whose harvest strategies have been tested with model-based simulations (i.e., MSE) might have specific protocols to check whether observed primary indicator values fall outside the respective ranges projected by the. Such unforeseen situations are usually referred to as 'exceptional circumstances'. Provisions for handling exceptional circumstances (sometimes referred to as 'meta-rules') may include the need to make ad-hoc adjustments to management measures or to initiate an expedited review of the harvest strategy (Punt et al., 2016). Monitoring of secondary indicators, and checks for exceptional circumstances, may be performed in data-rich fisheries but are especially important to consider in evaluating fisheries using data-limited harvest strategies.

Annex 3 - Scoring Data-Limited Harvest Strategies

Key definitions

Primary indicators
The main indicators used to drive the harvest control rule. They may coincide with the indicators used to infer stock status, or separate estimates of stock status may be available. For fisheries where the harvest strategy has been tested with MSE, observed primary indicators may be compared against the values simulated when the strategy was evaluated to check whether they fall within the projected range of values or, instead, they may point to the existence of exceptional circumstances (see definition).

Secondary indicators
Indicators used to check whether the assumptions underlying the harvest strategy hold true, and the harvest strategy in use is working as intended. For example, they help determine whether environmental conditions might be altering the population's recruitment rates or fecundity rates relative to those assumed when the harvest strategy was adopted. They provide complementary information to a primary indicator. Secondary indicators may also be simulated during MSE so that when a harvest strategy is implemented it can be determined whether observed values fall outside the ranges projected during the testing of the harvest strategy, similarly to what is done with primary indicators to check for exceptional circumstances (e.g., Carruthers & Hordyk, 2018).

Exceptional circumstances
'Exceptional circumstances' are generally defined to apply when the future data fall outside of the range indicated for the projections considered in the MSE" (Punt et al., 2016). The presence of 'exceptional circumstances' is normally checked through the harvest strategy primary indicators, but often secondary indicators (see definition) are also used to evaluate if MSE assumptions are met. Since the phrase 'exceptional circumstances' is used with a different meaning in MSC Fisheries Certification Process (FCP) v2.3, 7.16.6, we use it here in quotes and only to assist in cross-referencing the examples used to illustrate how they may be checked.

For examples of these different types of indicators, see Table 4.

Table 4 – Differences between types of reference points used for status determination, harvest strategies, primary and secondary indicators, and rationales used to justify scoring of PI 1.1.1, for specific example fisheries.

	Crab	Cockle dredge	Octopus	Hake	Shrimp
Type of status RPs	No B_{MSY} TRP, Empirical limit RP	Proxy RP Empirical target RP (CPUE)	Proxy RP Data moderate model-based (B_{MSY} default proxy based on B_0)	MSY-based RPs estimated by data-rich assessment	
Type of Harvest strategy	Static management measures on harvested sex, season, size and vessel pot limits	Empirical based – HCR adjusts TAC based on empirical indicator - Fishing areas are opened when empirical indicators exceed a threshold density and a minimum CPUE	Model-based. TAC set at low precautionary value based on model outputs; Static input controls	Empirical based – HCR adjusts TAC based on empirical indicators; MSE- tested	Empirical based – HCR adjusts duration of fishing season based on empirical indicators

	Crab	Cockle dredge	Octopus	Hake	Shrimp
Primary indicators?	No primary indicators needed for the harvest strategy, as management measures are fixed provided assumptions underlying the harvest strategy are met. CPUE is used to check if the stock falls below the LRP, which would trigger a management response	- Survey estimate of biomass by area used in ⅓ rule to set TAC - CPUE by area used to trigger area closures when below a limit RP	CPUE and landed weight used as inputs to generalized depletion model	CPUE and survey abundance over the last three years relative to a reference period; these indicators are also used to check if they fall outside plausible ranges (Exceptional circumstances)	CPUE for abundance and Sea Level Height (SLH) as a recruitment predictor
Secondary indicators?	Other indicators are collected to evaluate the presence of unusual biological conditions ('Exceptional Circumstances') Key indicators used to check that the harvest strategy is protecting reproductive output: % fertilization; mortality of discarded females.	No secondary indicators	CPUE and number of boats used (informally) to evaluate if effort is changing (e.g., fishers switching gear and target)	Species composition of the catch	Size composition to assess strength of incoming year classes; spatial distribution of fishing effort to check for potential reduction of fishing area as a sign of stock depletion
Justification of status confidence intervals	Plausible argument based on (i) harvest strategy not affecting female reproduction, (ii) long-term trends in CPUE above LRP and (iii) checks of secondary indicators satisfactory. Could use retrospective MSE to support the scoring rationale.	Plausible argument based on long-term stability of the stock and recruitment over time (since 1994)	Quantitative assessment	Quantitative assessment	Quantitative assessment conducted periodically, but plausible argument used to justify meeting MSC guidelines for short-lived species

Key take-homes:

- Because data-limited methods make additional assumptions compared to data rich, to make up for missing information, additional arguments are needed to ensure they are meeting P1 requirements. These additional arguments that are evaluated in scoring the harvest strategy component of P1 could include:
    - monitoring secondary indicators to check harvest strategy assumptions are met;
    - testing the harvest strategy robustness to uncertainty with MSE.
- The evaluation of data-limited harvest strategies, especially because of the additional ad-hoc assumptions made, requires that the harvest strategy as a whole be considered together with its appropriateness to the specific management measures in place and characteristics of the fishery. This implies:
    - Even for PIs that are examining one element of the harvest strategy (e.g., the HCR), it is important that the rationale includes considerations about why the specific elements are suited to the harvest strategy as a whole. For example, it is not enough to show that a particular rule is generally robust, but it must be demonstrated that the rule is robust in that particular fishery (i.e., even if a 'generic' version of the HCR had been tested, the rationale and evidence should be based on evaluating the suitability of the HCR when working in conjunction with the indicators or data-limited assessment method used to drive it in that particular fishery).
- In data-limited harvest strategies, either there is no stock assessment, or a stock assessment exists but it is not what is used to drive the harvest strategy. As such, peer review of the assessment in 1.2.4 could consider a review of the information used to drive the harvest strategy (e.g., the empirical indicators) in addition to the peer review of the analytical assessment and/or the peer review of the MSE or other types of evaluation that verified that the harvest strategy satisfies the PI 1.1.1 requirements.

3. Example fisheries

We describe here a set of example fisheries that are used as illustrative cases for data-limited harvest strategies. They are based on certified fisheries, anonymised by removing names and geographic information, and changing some of the details.

Example 1	Cockle fishery
Ecology and biology	Bottom-dwelling bivalve, short life cycle (2 to 4 years), reproduces at around 18 months of age and undertakes annual spawning.
Fishing gear	Dredge.
Stock assessment type	Empirical.
Stock status indicators and RPs	Direct estimates of biomass and 1+ and 2+ age classes through fishery-independent surveys of cockle beds.
Harvest strategy type	Informed by direct (empirical) indicators of abundance.
Harvest strategy	The harvest strategy is based on a combination of input and output controls applied by area. The main input controls include a limited entry on the number of vessels permitted, individual effort limitations and closed seasons. The main output control is a TAC set at 1/3 of the annual biomass estimated from fisheries-independent surveys, distributed equally among permit holders. Each vessel is allocated a variable number of fishing days depending on the TAC and on a maximum catch per day. Specific areas are closed to fishing if local CPUE falls below 1t / hour of dredging (Limit Reference Point). A threshold density is also applied as a condition to open areas. Juvenile and small adult cockles are protected by technical measures on gear configurations permitted, along with limits on damage rates.
Types of indicators used	Primary • CPUE relative to limit CPUE. • Estimated biomass from fishery-independent surveys of main cockle beds.
How it could meet the requirements	While PRI and BMSY or Bo have not been estimated, the MSC requirements allow the use of proxies. In this case, good evidence is provided that stock biomass has been relatively stable and recruitment has been maintained despite inter-annual variability driven by environmental conditions. The HCR responds directly to changes in stock size and has resulted in long-term stability. The stock is closely monitored, and the harvest strategy has many input and output controls to respond effectively to changes in the fishery.

Example 2	Crab fishery
Ecology and biology	Bottom-dwelling, short life cycle (2-3 years), reproduces at around 12 months of age and undertakes annual spawning.
Fishing gear	Trap and pot.
Stock assessment type	Empirical indicators.

Example 2 – *continued*	Crab fishery
Stock status indicators and RPs	Logbook CPUE compared to an empirical limit RP based on the average CPUE over a specified period. Recent trends in catches showing no persistent declines.
Harvest strategy type	Based on static management measures.
Harvest strategy	The harvest strategy is based on four types of measures: harvest only male crabs larger than a fixed size limit, a fixed fishing season, fixed vessel pot limits. If CPUE drops below the limit RP and recent catch trends indicate a decline to less than 20% of long-term average, additional management measures would be implemented. Depending on the evaluated cause of the decline, measures may include seasonal closures, reduction in pot limits, trip limits, area closures and/or an increase in the minimum size limit. Secondary indicators are also used to check that the fixed measures are working as intended: % fertilised females, mortality of discarded females. If these indicators detect anything unusual, a management response may also be triggered.
Types of indicators used	Primary • CPUE relative to the limit RP • Catch trends Secondary • % fertilised females • mortality of discarded females
How it could meet the requirements	An empirical limit RP is based on a historical low value of CPUE from which the fishery recovered. The fishery should not be impacting the reproductive success of females, if the male-only harvest strategy works as intended. The harvest strategy is highly precautionary and has been in place for a very long time; it relies on static measures, but primary and secondary indicators are also monitored to evaluate if the harvest strategy requirements are met or to identify whether additional management intervention is needed.

Example 3	Octopus fishery
Ecology and biology	Bottom-dwelling, short life cycle (1-2 years), reproduces once (semelparous).
Fishing gear	Trap and pot.
Stock assessment type	Model-based – data moderate model.
Stock status indicators and RPs	Biomass estimated from intra-annual generalized depletion model fitted separately to each fishing season data. Resulting annual estimates used as input to a Pella-Tomlinson stock-production model. Biomass estimates compared to default RP for B_{MSY} = 40%B_o and PRI=20% B_o, estimated from the stock-production model.
Harvest strategy type	Static management measures (input controls) and dynamic TAC (output control) informed by the status model.

Example 3 – *continued*	Octopus fishery
Harvest strategy	The harvest strategy uses static input controls and output controls. Input controls include a fixed fishing season, set days and hours of operation (e.g., no fishing at night), access limitations through licenses and maximum number of traps per crew and per vessel, fishing area assigned by "cofradias" territorial rights. The main output control is a TAC determined based on a precautionary estimate of multi-annual long-term average surplus production (lower confidence bound) from the Pella-Tomlinson model. Other output controls include individual annual quotas and minimum size limits (i.e., cannot retain individuals below 1kg).
Types of indicators used	Primary • Model-based estimates of annual biomass.
How it could meet the requirements	The fishery has a model-based assessment to determine status with respect to default RPs for B_{MSY} and PRI. A TAC established recently was set at a precautionary (lower confidence bound) estimate of a multi-annual average surplus production over the entire time series analysed. While the TAC is adjusted based on updated model outputs, it is designed to be stable instead of responding to changes in stock size as in a conventional HCR. The harvest strategy has input and output controls, which in combination with monitoring, indicate that management can and has responded when needed.

Example 4	Hake fishery
Ecology and biology	Demersal species, slow growing (mature 14 years), serial spawner.
Fishing gear	Demersal trawl.
Stock assessment type	Model-based – data rich.
Stock status indicators and RPs	Biomass relative to BMSY estimated by a statistical age-structured model fitted to catches, CPUE, survey abundance and catch-at-age data.
Harvest strategy type	Dynamic based on empirical indicators.
Harvest strategy	The HCR determines a TAC based on two indicators: standardized CPUE and survey biomass, relative to a reference period, averaged over the last three years. The estimate of biomass produced by the stock assessment model is not used to set the TAC. Input controls include spatial closures and gear restrictions.
Types of indicators used	Primary • Standardised commercial CPUE index • Survey-based biomass
How it could meet the requirements	A stock assessment producing an estimate of biomass relative to a level consistent with MSY and to the PRI is a central tenet to certification. Having a harvest strategy that may not use the biomass estimate to set the TAC is acceptable, provided the indicators used to drive the HCR are appropriate. The harvest strategy has a HCR that responds directly to fishery independent and dependent indicators and the TAC is an effective tool to reduce exploitation. The harvest strategy has been tested for robustness to a wide range of uncertainties using MSE.

Example 5	Shrimp fishery
Ecology and biology	Bottom-dwelling species, fast growing (4 years), annual spawner.
Fishing gear	Demersal trawl.
Stock assessment type	Empirical indicators. Data moderate model.
Stock status indicators and RPs	• Current year fishery CPUE relative to empirical RPs for in-season standing stock biomass • Limit and target RPs based on standardized historical fishery CPUE (lbs/single-rig equivalent hour) • Stock reconstruction using Virtual Population Analysis conducted periodically.
Harvest strategy type	Based on empirical indicators.
Harvest strategy	The harvest strategy includes a HCR that shortens or closes the harvest season when target or limit RPs are breached. It takes into account both oceanic conditions affecting larval survival, as well as fishery CPUE as in-season indicator of stock status. Sea Level Height (SHL) is used as a pre-season predictor of recruitment. Management responds by closing the fishing season earlier (from October to April of the following year) when June catch-per-trip is less than 12,500 lb (a target RP); and by closing it as soon as possible if June catch-per-trip is less than 10,000 lbs (a limit RP) and SHL exceeds 7.5 ft. Input controls include temporal closures, spatial considerations and gear restrictions. Output controls require "count per pound" of landings to be under 160 shrimp per pound.
Types of indicators used	Primary: • June CPUE. • Environmental index (SHL) as pre-season recruitment predictor. Secondary: • Size composition of landings. • Extension of shrimping areas known to vary with stock size.
How it could meet the requirements	The harvest strategy is consistent with MSC guidance for short-lived stocks. The stock has remained healthy throughout the 65-year history of the fishery. Long-term fishery impacts are not detectable, and recruitment is heavily influenced by environmental factors. The MSC requirements allow proxies for the determination of the PRI and a level consistent with maximum sustainable yield (MSY). Generally, the more proxies, the better. The empirical limit RP is based on the historical minimum CPUEs from which the stock was able to rebuild quickly. The harvest strategy includes an indicator of changing environmental conditions affecting recruitment, which in combination with CPUE, trigger specific management responses indicating that the harvest strategy is responsive and the HCR tools (e.g., seasonal closure) are effective.

4. Scoring guide by Performance Indicator (PI)

4.1. PI 1.1.1 – Stock status

Performance Indicator (PI) 1.1.1 examines the impact of the fishery on the target stock and whether or not its stock status is at a sustainable level. This applies to the entire stock that is under assessment (i.e., not only to the portion affected by the fleet under assessment) and therefore the combined impact of all fisheries. To meet PI 1.1.1, it is required that the stock status is likely to be above the Point of Recruitment Impairment (PRI) and secondly that the stock is fluctuating around a target level consistent with MSY. The PRI is the point below which there is an increased risk that recruitment may be substantially impaired (GSA2.2.1.1).

Fisheries that do not have sufficient data to inform status from complex stock assessments can still be certified if the information available (e.g., proxies) can be used to demonstrate that the fishery is managed using robust approaches (refer GSA2.2.3 Use of proxy indicators and reference points for PRI and BMSY).

One challenge with fisheries using data-limited harvest strategies is that they might not have status estimates expressed in terms of stock biomass with respect to a reference point. There are data-limited methods that provide an estimate of biomass depletion and thus status can directly be evaluated against MSY-based biomass reference points set out by PI1.1.1, (e.g., depletion-based Stock Reduction Analysis (db-SRA)). However, many cases of data-limited harvest strategies use empirical proxy reference points based on CPUE during some specified historical period, spawning potential ratio relative to a default proxy reference point, or length-based indices or other indicators that do not explicitly estimate stock biomass (e.g., see examples in Table 3).

Therefore, to meet PI 1.1.1 (Stock Status performance indicator, Table SA1, Fisheries Standard v3.0), a rationale must be provided to demonstrate why the indicators and proxies are appropriate (SA2.2.3 and associated guidance).In addition, to assign the appropriate score, the likelihood that stock biomass is meeting those requirements will need to be evaluated (i.e., whether it is "likely", "highly likely", or there is a "high degree of certainty" that the biomass is above PRI or fluctuating around B_{MSY}).

This implies that the scoring rationale will not only need to show that the measure used for status is an adequate proxy for biomass relative to the RPs as required in PI1.1.1, but also justify the degree of confidence. To do so, the Standard offers two options: quantitative or qualitative approaches. Specifically, GSA2.2, Fisheries Standard v3.0 states:

"The terms "likely", and "highly likely" are used to allow scoring by either qualitative or quantitative approaches:

- *Examples of qualitative interpretation include:*
    - *Analogy with similar situations.*
    - *Plausible argument.*
    - *Empirical observation of sustainability.*
    - *Qualitative risk assessment.*
- *Examples of quantitative interpretation include:*
    - *The use of measured data from the relevant fishery.*
    - *Statistical analysis.*
    - *Quantitative risk assessment.*
    - *Quantitative modelling."*

Use of data or analytical methods to provide a quantitative interpretation might not always be necessary (or possible) and qualitative interpretations, such as plausible argument, may be useful in these cases, especially for very lightly exploited fisheries or when a highly precautionary harvest strategy is in place. One option for providing a plausible argument that the stock complies with required biomass RPs, in the absence of an explicit MSY-based indicator, is showing that fishing mortality (F) has been 'low enough for long enough' (SA2.2.4 and associated Guidance 'Scoring stock status using fishing mortality rate', Fisheries Standard v3.0). This includes considering the generation time of the target species (Guidance Box GSA4: Generation time, Fisheries Standard v3.0) and the potential implications for rebuilding or the HCR (Guidance Box GSA5: Consideration of fishing mortality rate in MSC assessments, Fisheries Standard v3.0).

These considerations may all apply to scoring PI 1.1.1A (Low Trophic Level species).

Example

- For the cockle fishery example, which uses empirical indicators to inform its harvest strategy, a passing score on PI 1.1.1 was justified by citing the fact that the fishery has been operating for a long time while spat abundance has remained stable. A similar argument was used in the crab example to justify how a harvest strategy based on static management measures of harvesting only males above a limit size, and with seasonal closures to prevent impacts on females during the reproductive season, is highly precautionary.

Other possible scenarios

Retrospective Management Strategy Evaluation (MSE) projections, showing the likely biomass trajectory followed since the current harvest strategy was implemented, can be used to provide evidence that the harvest strategy is likely to be delivering the population biomass objectives required by 1.1.1a and 1.1.1b and to quantify the associated probabilities (e.g., see Box 1). Additional details on the use of MSE with data-limited methods are available in Annex 2.

While it is easier to make a case for meeting PI 1.1.1 when a fishery has shown a stable yield for many decades, an argument could be made that fishing mortality has been "low enough for long enough" even in some cases where only a shorter time series of fishing mortality estimates is available. This may apply if the time-series covers the years when the fishery first started and it can be argued that the fishery has been pursued for a sufficient length of time, relative to the generation time of the target stock.

Box 1 – Management Strategy Evaluation (MSE) of data-limited methods

Management Strategy Evaluation (MSE) is an analytical approach, using model-based closed-loop simulation to test harvest strategies. It can be used, for example, to provide evidence that different components of a harvest strategy are working together to deliver biomass objectives as stated in PI 1.1.1 (i.e., PRI and B_{MSY}). Further details of how MSE can be used to test data-limited methods are provided in Annex 2 ("Data-Limited methods") of this Toolkit.

A broad variety of analytical software packages are available to conduct an MSE. We mention as example the MERA software (Carruthers et al., 2023) because it is specifically designed to test harvest strategies using data-limited methods and it provides a graphic interface, guiding the user step-by-step, that does not require coding expertise and can take qualitative information as inputs. The software provides diagnostic outputs relevant to the requirements of the MSC Standard PI 1.1.1 reference conceptual points (i.e., PRI and B_{MSY}) and probability ranges matching those required at SG60, SG80, and SG100. The software also includes the capability to check for 'exceptional circumstances' by comparing real observed data or indicators with those data predicted when the harvest strategy was evaluated (Carruthers & Hordyk, 2018b). Thus, it can assist in understanding the examples illustrated in this Chapter where MSE could be applied in data-limited harvest strategies.

4.2. PI 1.1.2 – Stock rebuilding

PI 1.1.2 assesses the rebuilding and recovery of a stock that is depleted below the levels required to achieve an 80 score on PI 1.1.1. The PI is only scored where the score for 1.1.1 (stock status) is less than 80, indicating that the stock is either not regarded as 'fluctuating around' MSY or is less than highly likely (i.e., 80th percentile) to be above the PRI. This PI seeks to verify that where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe.

This PI looks not only at the management (i.e. the design of the plan) but also the outcome (i.e., the extent to which the plan is achieving its aims).

Similarly to scoring stock status for PI 1.1.1, also scoring the stock rebuilding PI 1.1.2 requires particular considerations when a fishery is managed with a data-limited harvest strategy. Specifically, in the absence of a model-based estimate of biomass that may be used to track whether the stock is rebuilding, MSC requirements allow monitoring rebuilding using proxies or indicators. Just as discussed for scoring PI 1.1.1, it will be important to show whether the reference points in use are adequate to represent the rebuilding target, as stated in SA2.3.5: *"In UoAs that use assessments and reference points that are regarded as proxies of F_{MSY} and/or biomass at MSY (B_{MSY}), the team shall, in their scoring, take account of any differences between the proxy reference levels and MSY levels."* Typically, if biomass estimates are lacking, demonstrating that F being is less than Fmsy is usually needed to meet the SG80 level of PI 1.2.1b (SA2.3.4).

4.3. PI 1.2.1 – Harvest strategy

PI 1.2.1 seeks to verify that there is a robust and precautionary harvest strategy in place. A harvest strategy is the combination of monitoring, stock assessment, harvest control rules (HCRs) and management actions that are required to bring about the sustainable management of the fishery.

To perform at 'best practice' (SG80) for PI 1.2.1a, a harvest strategy must, among other things, be **responsive** to the state of the stock and its elements must **work together** towards achieving management objectives. To meet 'best practice' in PI 1.2.1b, quantitative or informal approaches can be used to show it has been **'tested'** (i.e., there is evidence it is working). If it has been **'evaluated'** using simulation-testing, it can help attain even 'state of the art' levels (SG100 of PI 1.2.1b).

In general, harvest strategies should be pragmatic (or appropriate to the fishery given the economic and data limitations), easy to understand to all stakeholders, and adaptive (able to change as more information becomes available).

Harvest strategies that rely on data-rich assessment models usually include a HCR that adjusts the target fishing mortality as a function of estimated biomass relative to MSY-based reference points. In the case of data-limited methods, where biomass and even fishing mortality estimates might be missing, a harvest strategy might achieve the outcome of avoiding the PRI and fluctuating around B_{MSY} through control rules that involve adjusting management measures as a function of a wide array of indicators, other than stock biomass. As discussed for scoring PI 1.1.1, this requires demonstrating that the harvest strategy is successful in maintaining the stock above PRI and fluctuating around B_{MSY}, even in the absence of explicit estimates of these reference points.

Scoring 1.2.1a - Harvest strategy design, if the harvest strategy has been in place for sufficient time, the rationale for the harvest strategy being 'expected' to achieve MSY reference points could be based on similar evidence as what was used for scoring 1.1.1a and b (e.g., MSE tests or plausible argument that the harvest strategy is working as intended).

Example

- For the shrimp fishery, the rationale for 1.2.1a is based on logical arguments on the harvest strategy design and past experience. The rationale mentions: *"The harvest strategy for Shrimp relevant to these objectives was designed to avoid recruitment overfishing by protecting spawning females (closed season) and protecting recruiting shrimp by reducing fishing mortality of age-1 shrimp (count per pound, mesh size), thereby increasing the size of spawning stock at the end of each season and ensuring shrimp are taken at a marketable size [...] Evidence supports that environmental variability apparently has a greater effect on stock abundance than fishing mortality. Nevertheless, the longstanding harvest strategies provide additional protection to the recruitment (count per pound) and spawning biomass (closed season) [...]."*

Other possible scenarios:

To demonstrate the harvest strategy is working, one option is to evaluate the past biomass trajectory using a simple analytical model (see Annex 2), showing how the estimated harvest rates have responded to stock status in the past, for example, in a Kobe plot.

In cases where the harvest strategy has not been in place for long, the demonstration can be based on a depletion estimate from a data-limited method, provided that information is available from the start of the fishery, similarly to what was mentioned for scoring 1.1.1 in the case of fisheries with shorter time-series.

Evaluating HS responsiveness:

GSA2.4 Harvest strategy PI (PI 1.2.1), indicates that a harvest strategy does not need a 'well-defined' HCR for it to be 'responsive'. Fisheries using static management measures, such as those applied in the Crab example or in the case of a fishery with a fixed TAC, which are not regularly adjusted as a function of an indicator of stock status, may still have a harvest strategy that can be considered 'responsive'. This would be the case if it can be shown that the static management measures (e.g., size limits, closed fishing seasons) would be revised by the management system if unforeseen circumstances occur and there is some evidence that the status of the stock requires remedial action. In other words, the harvest strategy, as a whole, may be considered responsive even if it is based on management measures/tools that are static themselves, if it can be shown that management can be adaptive and adjust the measures in place and implement them when required (SA2.4.1 a, Fisheries Standard v3.0). This can be done by showing that:

- There is some mechanism to periodically review the evidence that the harvest strategy is still expected to achieve stock management objectives reflected in PI 1.1.1.
- There is a mechanism for managers to intervene if the periodic review of evidence suggests further actions to reduce fishing pressure or change management measures are needed.

Key definitions

Static management measures
A management measure is an intervention used to modify fishing mortality (e.g., a Total Allowable Catch (TAC), closed area, mesh size, etc.). These measures are akin to the 'tools' used to score PI 1.2.2 c. A static management measure implies that the same measure is applied regardless of what information may be coming from an assessment (e.g., a fixed seasonal closure, minimum size limit or a fixed TAC). It is possible for a harvest strategy that uses a static management measure to be considered 'responsive' provided it can be adaptive and adjust the measures in place and their implementation when required (i.e., it can override the fixed measure, if monitoring suggests that circumstances have changed).

Harvest Control Rules (HCR) using fixed rates
Harvest Control Rules determine how to dynamically adjust the management measure in response to an assessment of stock status, so they differ from static measures in that the measure is adjusted as a function of an assessment of status. A HCR might use a fixed harvest rate, for example, but it would vary the TAC, as a function of the stock assessment, in order to achieve this fixed rate.

Example

- The Crab fishery, though relying on static management measures, has a limit reference point for CPUE. This is based on an average value predicted to have occurred during two historical periods of low yield, that triggers a management response if CPUE falls below it and if a substantial drop in catches over several seasons has been registered. It also has secondary indicators that are monitored (% fertilised females and survival of discarded females) to detect if biological conditions have changed and management intervention is needed. While several candidate measures have been listed (seasonal closures, reduction in pot limits, trip limits, area closures and/or increase in minimum size), the specific interventions will depend on the evaluated cause of the decline.

In fisheries with data-limited harvest strategies that include a HCR, these can be used to make a case that the strategy is responsive, similarly to data-rich fisheries.

- In the Shrimp fishery, the fact that there is an empirical indicator based on Sea Level Height used to forecast recruitment for the coming year supports claiming that the management system is responsive: *"Annual and in-season monitoring of fishing patterns and biological data, as well as forecasting of the next season's recruitment, provide guidance for the harvest strategy [...], ensuring that it is responsive to the state of the stock, and that appropriate management action (shortening the fishing season), [is taken if needed]."*

Ideally, the harvest strategy should also include specific protocols to check for rare and unforeseen conditions it was not designed to handle. There could also be a course of action to be followed if monitoring suggests that the harvest strategy is no longer working as expected. Because it is not possible to anticipate every kind of exceptional circumstance that may occur and remedial measures may vary depending on the circumstance (or what went wrong), often possible actions are listed but not prescribed, as in a HCR.

- The Hake fishery is managed by a fully-specified and MSE-tested Management Procedure, where a formula to calculate the TAC is pre-defined and cannot be overridden except in the case of exceptional circumstances. These are declared if observed abundance indices are outside the 95% probability range projected by the MSE simulations. Specific responses are planned, with clear roles and responsibilities. The immediate response may involve a further reduction of the TAC. In the medium term, depending on scientific advice, exceptional circumstances may even lead to a revision of the management procedure. In normal circumstances, the HCR constrains year-to-year changes in TAC to no more than 5%; however, a TAC reduction of up to 25% is allowed when exceptional circumstances are declared.

Evaluating the components of the harvest strategy jointly

In considering 1.2.1b, for harvest strategies where the control rule is not driven by a data-rich model-based estimate of stock status, but by a simpler indicator, it is important to consider the robustness of the harvest strategy as a whole, so as to ensure the assumptions made around the indicators used are holding in the particular context where they are being used.

GSA2.4, under "Assessing informal approaches against PI 1.2.1", explains that *"Assessment of data-deficient fisheries against this indicator should consider how elements of the harvest strategy combine to manage impact, such that susceptibility is maintained at or below acceptable levels given the productivity of the species. [...] Teams should further consider how elements of the strategy are combining to ensure that the fishery is moving in the desired direction or operating at a low risk level and that qualitative or semi-quantitative objectives are being achieved."*

The use of simulation-testing with MSE to evaluate robustness of the combination of fully-specified data and HCRs in place to various sources of uncertainties is commonly associated with data-rich fisheries. Yet, it can be particularly valuable for data-limited harvest strategies that rely on many assumptions and where simulations can check performance under a wide range of plausible scenarios (e.g., see Box 1 and references to MERA software for MSE of data-limited methods). It is worth noting here that, when scoring a data-limited harvest strategy, just having an MSE might not be sufficient to justify a score at SG100: it must also be shown that the MSE demonstrated that the harvest strategy was robust to a wide range of uncertainties consistent with the available information.

Example

- The Hake fishery is managed through a fully-specified harvest strategy, i.e., all elements including the different data sources and how the data are processed to calculate adjustments in TAC are all explicitly defined. Though a data-rich analytical assessment is available, the HCR used to adjust the TAC is based on an empirical index, constructed as an average of commercial and survey CPUE indicators. The empirical nature of the rule and the fact that it is fully-specified has facilitated its testing with MSE. The TAC is actually based on combined catches with another hake species, because both are caught together and are practically inseparable. Thus, the indicators and control rules are tested for both species simultaneously and alternative scenarios are considered to account for the main sources of uncertainty, including the proportion of the two species in the commercial catch. The scenarios tested consider for each species various productivity levels, uncertainty in current and future data and uncertainty in controlling exploitation appropriately, given that they are managed with an aggregated TAC for both species.

Fisheries do not necessarily need to have conducted an MSE to pass 1.2.1b. However, the considerations above about evaluating how the elements of the harvest strategy are working together still would apply for meeting SG60 ("The harvest strategy is likely to work based on prior experience or plausible argument") or SG80 ("The harvest strategy has been tested and is expected to meet the objectives reflected in PI 1.1.1/ PI 1.1.1A SG80 or there is evidence that the harvest strategy is achieving its objectives reflected in PI 1.1.1/ PI 1.1.1A SG80"). GSA2.4.1 further states: "For tested and evaluation in scoring issue (b) at the harvest-strategy level, the team should consider the full interactions between different components of the harvest strategy, including:

- The HCRs
- Use of information.
- Assessment of stock status."

Review of the harvest strategy

When scoring 1.2.1d, the monitoring program should be checked for potential improvement in the data collected to ensure it is representative and informative. A review of the harvest strategy, particularly in data-limited contexts, would benefit from considering data that have not previously been utilised, exploring new analytical methods (including standardisation and other data processing methods) applied to existing data, or starting to collect new data to inform an improved version of the harvest strategy.

4.4. PI 1.2.2 – Harvest control rules and tools

PI 1.2.2 assesses whether a fishery has a 'well-defined' and effective harvest control rule (HCR) in place. A HCR is a set of 'well-defined', pre-agreed rules or actions used for determining a management action in response to changes in indicators of stock status with respect to reference points. HCRs are sometimes described as a set of 'if' and 'then' rules, defining the circumstances that will lead to what management responses (i.e., if the stock falls to 'x', then the management will respond by 'y').

When considering this PI, three important aspects to determine are: (i) the degree of common understanding of the rule, i.e., whether the HCR is 'generally understood' or ''well-defined'', (ii) whether it is demonstrably 'in place', and (iii) whether it is 'fully agreed' or 'pre-agreed' with stakeholders.

Fisheries using data-limited harvest strategies may perform well against this PI provided they are linked to reliable indices of stock status and uncertainties are well considered. For fisheries for which MSY-based measures of status are not estimated directly, evaluating the HCR will likely include considering whether the rule is delivering the objective of avoiding the PRI and, in the case of PI 1.2.1 a at SG80, expected fluctuate around target level consistent with MSY.

This PI evaluates both the HCR itself, which defines a decision-making system, and the tools used to put it in action. To score this PI, it is important to establish if the measures/tools used, such as a TAC, season closure, or size limit, are working to produce the expected outcome set out by the harvest strategy.

Annex 3 - Scoring Data-Limited Harvest Strategies

For PI 1.2.2a, a key aspect is to determine if the HCR is 'generally understood' at the SG60 level or 'well-defined' at the SG80. A 'well-defined' HCR is defined as (SA2.5.2b):

- *HCRs exist in some written form that has been agreed by the management agency, ideally with stakeholders and state what actions will be taken at what specific TRP levels.*

Fisheries that use data-limited harvest strategies can be determined to have a 'well-defined' HCR, even if the HCR is only based on proxy indicators of status. If HCRs are more generic or perhaps not explicitly defined or developed, they could be determined as 'generally understood'. 'Generally understood' HCRs, per SA2.5.2a, are:

- *HCRs that can be shown to have been applied in some way in the past but have not been explicitly defined or agreed.*

For both 'generally understood' and 'well-defined' HCRs, they need to be demonstrably in place. This means they have been adopted by the management agency and apply directly to the target stock.

For PI 1.2.2a as well, SA2.5.3 provides an indication of how to use simulation-testing results from an MSE: "In scoring issue (a) at the SG100 level, where quantitative simulation testing is available "most of the time", the team shall interpret the stock as being maintained at or above B_{MSY} or some ecologically more relevant target point at least 70% of the time."

Demonstrating the HCR and tools are appropriate when harvest rate estimates are not available

When scoring 1.2.2c - Evaluation of HCRs, the Scoring Guideposts involve assessing that the tools used to implement the HCRs are effective and can control exploitation levels. For fisheries using data-limited harvest strategies, it is possible to demonstrate that these requirements are being met even if estimates of fishing mortality or exploitation rates are not available, as long as it can be shown that the HCRs and tools in place are achieving the intended outcomes. This demonstration could entail providing empirical evidence that the assumptions underlying the use of the tools are being met.

Such tools may include, for example: male-only harvest; size limits; area closures; move-on provisions; gear selectivity management, as well as others mentioned in GSA2.5.4. Similarly to factors discussed for PI1.2.1, it will be important to demonstrate that, even if there are no explicit estimates of the reference points required by PI 1.1.1 (i.e., Bmsy and PRI), the reference points in use ensure that those objectives are met. As stated in Guidance GSA2.5.4 *"the team is required to review the ability of the tools associated with the HCRs to achieve the exploitation levels […] For this examination, the team may consider the overall history of effectiveness of the tools used in the fishery, in terms of their ability to achieve the desired exploitation rates and biomass levels"*.

For fisheries that do not have explicit measures of fishing mortality, and rely on the implementation of rules and tools to ensure the stock is within management RPs, the following requirements make it clear that exploitation levels are not the only ways of providing evidence for PI 1.2.2c (emphasis added):

- SA2.5.4 In scoring issue (c), for "evidence" the team shall use the current levels of exploitation in the UoA, such as measured by the fishing mortality rate or harvest rate, where available.
- SA2.5.4.1 If information is not available on the exploitation rate consistent with achieving a long-term MSY, the team shall provide justification where available proxy indicators and reference points are used as reasonable proxies of the exploitation rate.

Examples

- For the Cockle fishery, an indicator of abundance tracked over time shows that there is no long-term decline in the stock, suggesting the current rule ensured it has remained above recruitment-impairment during the period when it was in use. The HCR is 'well-defined' as it specifies how management measures (TAC and area closures) respond to status indicators.
- In the case of the Crab, where maturity and female fertilization rates are monitored as secondary indicators, the evolution in time of these proxies for reproductive capacity of the population may also be used to show that the static, male-only management measures are working to deliver the desired outcome.

Other potential scenarios

A time series generated with a data-limited analytical model could be used to show that by applying the tools in use there is no long-term decline in the stock and it has remained above the PRI.

Similar arguments can be used in the case of escapement strategies. These strategies are where a target amount or percentage of individuals needed to survive and reproduce ("escapement") is determined so as to ensure there is sufficient spawning biomass. Biomass escapement strategies are used in a variety of fisheries including those that target stocks that are short-lived, semelparous, exhibit high natural mortality, and/or a weak stock-recruit relationship (e.g., salmon or squid). Provided the stock can be shown to be fluctuating around a "highly productive" level and is above any point where recruitment could be impaired, proxies and rules in use may be seen as resulting in a stock that fluctuates around or above a level consistent with MSY (GSA2.2.3 Use of proxy indicators and reference points for PRI and BMSY, Fisheries Standard v3.0).

4.5. PI 1.2.3 – Information and Monitoring

PI 1.2.3 requires that relevant information is collected to support the harvest strategy. Sound and precautionary fisheries management requires the timely use of reliable information to enable analysis and ultimately management feedback response. The information and monitoring required for the management of stocks should include everything that is needed to inform the harvest strategy, HCRs and control tools.

The information needs of a given fishery will vary according to its scale and operational characteristics, but it is crucial that the information (and the monitoring that provides this) is tailored to the needs of the management system. This PI considers not just the breadth and depth of information available but also whether it is suitable to support decision-making processes, and accurate.

Data-limited harvest strategies might involve multiple indicators and proxies, so it is useful to consider which ones would be most appropriate to evaluate in the Information and Monitoring PI 1.2.3. For scoring 1.2.3b - Monitoring and 1.2.3c - Comprehensiveness of information, in particular, monitoring can be based on the primary indicators, i.e., those used as inputs to the harvest strategy, as well as other measures that can help verify the assumptions and effective implementation of the harvest strategy, such as monitoring of removals, harvested fraction, CPUE, survey estimate of abundance. This can also include biological indicators (e.g., recruitment, changes in environmental conditions).

Annex 3 - Scoring Data-Limited Harvest Strategies

Example

- In the Crab example, the proportion of berried females and the mortality of discarded females are regularly monitored and used as secondary indicators to check that the underlying assumptions of the harvest strategy are being met, namely that the number of surviving males are sufficient to fertilise the females and that fishing induced mortality of females is minimum.
- In the case of the Shrimp, Sea Level Height (SLH) is used to forecast recruitment, taking into account information about changing environmental conditions affecting larval survival. The distribution of fishing effort is mapped given existing evidence that shrimping areas vary with stock size.
- For Octopus, indicators around fishing effort (i.e., CPUE and number of boats used) were used to check assumptions about harvest rates.

Other potential scenarios

Additional sources of information can include:

- the indicators relevant to the implementation of the technical measures (checking implementation of move-on rules and area fished in relatively sedentary species, whose fisheries may be subject to local depletion)
- changing conditions in the fishing capacity e.g., increased entry rate of new participants into the fishery.
- new or additional data collected that are not currently used to inform the HS.
- indicators to identify exceptional circumstances in the ecosystem or outlier events, e.g., in a coastal fishery subject to flooding, this could include water level/rainfall indicators.

4.6. PI 1.2.4 – Assessment of stock status

PI 1.2.4 requires that there is an adequate assessment of the stock status. There are many different approaches to stock assessment and a key consideration for this PI is that the assessment method should be appropriate to the stock biology and the harvest strategy. There are also requirements for reference points, whether the stock assessment identifies major sources of uncertainty and whether the assessment method has been evaluated and internally or externally peer reviewed.

The complexity of assessment methods used for a given stock generally reflects the availability of data and the value or importance of the fishery. To be classified as an assessment, an analysis must at least produce some measure of stock or fishery status relative to a reference point or benchmark such as a fishing target or an overfishing limit.

When information is scarce and data-limited methods are used, it can be informative to consider a variety of different assessment methods. Variations in outcomes between different approaches can help to refine the process of assessment, help to identify uncertainties and enable more informed decisions.

Annex 2 provides an overview of a number of methods that can be used in data-limited situations.

When the method used to assess stock status differs from the indicators used to inform the harvest strategy, scoring under PI1.2.4 needs to consider both the analytical components used for scoring status in PI1.1.1 and the indicators used for PI1.2.1 and PI1.2.2. In such situations, it is therefore expected that the scoring rationales will refer to the harvest strategy and how it works together with the indicators and reference points that inform it.

GSA2.7 explains that in the case of fisheries lacking an analytical assessment but where the harvest strategy relies on empirical indicators, the 'assessment' to be evaluated under this PI is the empirical indicator and associated control rules (e.g., in the Cockle example it is the survey estimate of abundance and the CPUE). "This PI refers to stock assessments, but in some circumstances, particularly under SG100, the team may find it useful to consider whether management procedure / management strategy evaluation approaches were used to test the robustness of the stock assessment to uncertainty and alternative hypotheses."

Lastly, if the RBF is used to score PI 1.1.1, this PI scores 80 by default.

Example

- For the Cockle fishery, a score of 100 at 1.2.4a - Appropriateness of assessment to stock under consideration - is justified considering the sedentary nature of the stock and the high variability of recruitment, which implies that a fishery-independent survey of the main local beds is appropriate to provide a consistent estimate of cockle abundance and population structure (recruits and older year classes of cockles) over time, as well as the spatial distribution of cockles of different ages. The frequency and timing of the cockle stock assessments provide an estimate of biomass in spring, used to determine the annual TAC, and in autumn to monitor both the post-harvest stock status and the level of recruitment to the stock."

The rationale for scoring 80 for 1.2.4b - Assessment approach -was that annual reports provided evidence that the stock assessment and reference points work effectively together to drive a successful implementation of the HCR. A historical event where a change in stock status detected during the course of a fishing season triggered a management response (a 2-week suspension of the fishery and a reduction of the TAC) was used as evidence to demonstrate that the status indicators are informative and effective. The status of the cockle stock over 27 years indicates that the estimates of stock abundance, the chosen reference points and the management measures implemented in response have maintained a consistently high stock biomass and are thus appropriate for this stock, meeting the SG80 requirements.

Similar considerations apply also to fisheries that have analytical assessments conducted periodically, but do not rely on data-rich assessments for their harvest strategy.

- The Shrimp, though analytical models were used to estimate recruitment trends and investigate possible environmental factors, because of the environmentally-driven nature of the stock, the rationale for scoring 1.2.4a refers both to the analytical assessment and the information base of the harvest strategy: "The stock does not lend itself to traditional, fishery assessment models that can be used to produce abundance based target and limit reference points. Rather, the assessment relies on empirical data to assess current stock status and an environmentally-driven recruitment model to forecast recruitment for the next fishing season. Therefore, the assessment is appropriate for the stock because it explicitly captures the biology of the species (recruitment dynamics) and nature of the fishery (largely dependent on recruitment). As control measures (i.e. closed season, count per pound and shortening the season as target or limit reference indicators are reached) are designed to help avoid recruitment overfishing, the assessment is equally appropriate for the harvest control rule."

Annex 3 - Scoring Data-Limited Harvest Strategies

Other potential scenarios:

The rationale for 1.2.4a could mention similar arguments as presented for scoring the harvest strategy PIs, but here attention should focus on the information basis and on how the data are collected (e.g., coverage of sampling design) and treated (considering possible biases and variability) to ensure they are used appropriately in the harvest strategy. For example, if the harvest strategy is based on a survey, estimates may be averaged to smooth over yearly fluctuations; or if tagging is involved, a choice might have been made of using the most recent 5 years, etc. The effect of having treated the data in this way could be part of what is considered to ensure the method used is appropriate.

For scoring 1.2.4d, the external peer review could review how the information used to drive the harvest strategy has performed in practice (if it has been implemented for sufficient time), as well as, if an MSE was implemented, the MSE methods and process.

5. References

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Punt, A.E., Butterworth, D.S., de Moor, C., de Oliverira, J.A.A., and Haddon, M. (2016) Management strategy evaluation: best practices. *Fish & Fisheries*, 17(2): 303-334. DOI: https://doi.org/10.1111/faf.12104

6. Definitions

6.1. Definitions of terms in the MSC vocabulary v.1.6

Harvest strategy: The combination of monitoring, stock assessment, harvest control rules and management actions, which may include an MP or an MP (implicit) and be tested by MSE.

Harvest Control Rule (HCR): A set of well-defined pre-agreed rules or actions used for determining a management action in response to changes in indicators of stock status with respect to reference points.

Management Strategy Evaluation (MSE): A process whereby the performances of alternative harvest strategies are tested and compared using stochastic simulations of stock and fishery dynamics against a set of performance statistics developed to quantify the attainment of management objectives.

Management Procedure (MP): The combination of pre-defined data, together with an algorithm to which such data are input to provide a value for a TAC or effort control measure; this combination has been demonstrated, through simulation trials, to show robust performance in the presence of uncertainties. Additional rules may be included, for example to spread a TAC spatially to cater for uncertainty about stock structure.

MP (implicit): A set of rules for management of a resource that contains the elements of an MP but has not yet been evaluated through simulation trials.

MP approach: Management of a resource using a fully specified set of rules incorporating feedback control; the approach is explicitly precautionary through its requirement for simulation trials to have demonstrated robust performance across a range of uncertainties about resource status and dynamics.

Stock assessment: An integrated analysis of information to estimate the status and trends of a population against benchmarks such as reference points.

6.2. Definitions of additional terms used in this document

Data-limited methods (DLMs): DLMs are approaches that rely on simplified models or empirical indicators to evaluate the status of a fishery and/or inform its harvest strategy, instead of using conventional 'data-rich analytical assessments' (see in this section) such as Stock Synthesis. For the purpose of this document harvest strategies based on DLMs are classified as using either (i) static management measures (e.g., male-only harvest), or dynamic management measures adjusted as a function of (ii) empirical indicators of biomass or fishing mortality and corresponding reference points (e.g., a catch rate limit based on average CPUE from a reference period of low abundance) or (iii) proxy or direct estimates based on simple 'data-limited analytical assessments' (see in this section) that rely on very few data streams (e.g., simple Stock Reduction Analysis (SRA), or length-based SPR (lb-SPR)). Included in this document are fisheries that, although assessed using data-rich analytical models, use DLMs to inform their harvest control rules.

Data-limited analytical assessment: methods for the assessment of a stock that may provide an explicit (data moderate) or implicit (data poor) measure of status in terms of biomass with respect to an MSY reference point. They rely on fewer data streams than a data-rich analytical assessment and will often require a greater number of assumptions and have higher uncertainty as data limitations can make it more difficult to conduct checks and diagnostics. Data-poor analytical assessments provide an estimate of exploitation rate from which status could be indirectly inferred, and may use as little as one data stream, such as catch time series or catch size composition (e.g., catch-MSY, length-based cohort analysis, and lb-SPR). Data moderate methods provide an explicit estimate of status in terms of a measure of biomass relative to an MSY-related reference point, and require additional data streams, though not as many as for a data-rich model. They include production models (e.g., JABBA, ASPIC) and models such as simple Stock Synthesis (requiring a combination of complete catch records and either size composition or an abundance index). For further details see Annex 2 – Data-Limited Methods.

Data-rich analytical assessment: A data-rich analytical stock assessment requires good quality data on total catch, data sufficient for an abundance index and, typically, a time series of size- or age-composition data. These data allow the implementation of an integrated statistical stock assessment, e.g., using more sophisticated methods such as Stock Synthesis. These methods typically involve the statistical fitting of an age-structured population and fishery dynamics model to data that are sufficiently informative to estimate the exploitation history and time series of stock biomass and recruitment, together with MSY-based reference points so that current stock size and stock biomass depletion can be provided as a measure of stock status. For further details see Annex 2 – Data-Limited Methods.

Primary indicators: The main indicator used to drive the harvest control rule. They may coincide with the indicators used to infer stock status, or separate estimates of stock status may be available. For fisheries where the harvest strategy has been tested with MSE, observed primary indicators may be compared against the values projected by the model to check whether they fall within the projected range of values or, instead, there might indicate the existence of exceptional circumstances (see definition).

Secondary indicators: An indicator used to check whether the assumptions underlying the harvest strategy measures hold true, and the harvest strategy in use is working as intended. For example, it helps determine whether environmental conditions might be altering the population's recruitment rates or fecundity rates relative to those assumed when the harvest strategy was adopted. It provides complementary information to a primary indicator. Secondary indicators may also be simulated during MSE so that when a harvest strategy is implemented it can be determined whether observed values fall outside the ranges projected during the testing of the harvest strategy, similarly to what is done with primary indicators to check for 'exceptional circumstances' (e.g., Carruthers & Hordyk, 2018).

Exceptional circumstances: Situations where environmental and biological conditions are different from what previously thought, so that the assumptions or parameters required by the harvest strategy in use are no longer suitable and the advice provided by the harvest strategy may be misleading (e.g., an ecosystem regime shift changing stock recruitment rates or natural mortality). These circumstances may be caused by unprecedented environmental changes, changes in the conduct of the fishery or availability of new knowledge. The presence of 'exceptional circumstances' is often checked by comparing observed data and indicators with the corresponding projected ranges in MSE simulations.

Management measure: A management measure is an intervention used to modify fishing mortality (e.g., a Total Allowable Catch (TAC), closed area, mesh size, etc.). Static management measures imply that the same measure is applied regardless of the assessment (e.g., a fixed seasonal closure, or a fixed TAC). Harvest Control Rules, on the other hand, determine how to dynamically adjust the management measure in response to an assessment of stock status.

Annex 4 Glossary

Glossary

This glossary defines terms used throughout the guide. For the complete MSC vocabulary please refer to the MSC scheme documents.

Term	Definition
Assessment	A process that connects knowledge and action regarding a problem. Review and analysis of information derived from research for the purpose of informing the decision-making process. It may not require new research and involves assembling, organising, summarising, interpreting and reconciling existing knowledge, and communicating it to the policymaker or other actors concerned by the problem. Assessment is used to refer to the initial certification and re-certifications of fisheries.
Assessment Tree	The hierarchy of Principles, Components, Performance Indicators and Scoring Guideposts that is used as the basis for assessment of the fishery for conformity with the MSC Fisheries Standard.
CAB auditors	The independent assessment team that is put together by a Conformity Assessment Body (CAB) to audit a fishery against the MSC requirements
Certification	Procedure by which a third party gives written or equivalent assurance that a product, process or service conforms to specified requirements
Certifier(s)	Person(s) conducting a fishery assessment on behalf of a body that performs conformity assessment services and that can be the object of accreditation.
Chain of Custody (CoC)	The procedures implemented by a fishery and subsequent entities handling fish and fish products to ensure that products from a certified fishery are not mixed with products from any other fishery and remain fully traceable during processing, storage, distribution and sale.
Component	The second level of three within the assessment tree structure.
Condition	A requirement to achieve outcomes in order to achieve a score of 80 or above.
Default tree	The standard assessment tree used as a starting point to develop an assessment tree for each fishery assessment.
Ecolabel	A label that conforms to the principles described in ISO 14020:2000 Environmental labels and declarations: General Principles.
Fishery	FAO defines a fishery as a unit determined by an authority or other entity that is engaged in raising and/or harvesting fish. Typically, the unit is defined in terms of some or all of the following: people involved, species or type of fish, area of water or seabed, method of fishing, class of boats and purpose of the activities. The MSC requirements also use this term to refer to a Unit of Assessment (or a group of such UoAs) that is under assessment or certified against the MSC Fisheries Standard. In Principle 3, however, it is the management of the wider fleet which denotes the specific 'fishery' that is the subject of assessment under the fishery-specific management system PIs (i.e., 3.2.1-3.2.4).
Maximum Sustainable Yield	The highest theoretical equilibrium yield that can be continuously taken (on average) from a stock under existing (average) environmental conditions without affecting significantly the reproduction process.

Term	Definition
MSC Fisheries Standard	Sets out the requirements across three Principles that a fishery must meet to enable it to claim that its fish come from a well-managed and sustainable source.
P1	Principle 1 of the MSC Principles and Criteria. Principle 1 focuses on sustainable target fish stocks.
P2	Principle 2 of the MSC Principles and Criteria. Principle 2 focuses on the environmental impact of fishing.
P3	Principle 3 of the MSC Principles and Criteria. Principle 3 focuses on the effective management.
Performance Indicator (PI)	The lowest level of sub-criterion of a MSC Criterion in the decision tree; the level at which the performance of the fishery is scored by the certifier.
Principle	A fundamental element, in the MSC's case, used as the basis for defining a well-managed and sustainable fishery.
Risk-Based Framework (RBF)	A framework of assessment tools for scoring 'outcome' Performance Indicators in cases where insufficient information is available to score the UoA using the default Scoring Guideposts.
Scoring Elements	A list of matters that are to be taken into account when determining the performance score on an indicator; also the matters used in determining a SG benchmark. In the case of Principles 1 or 2, used to mean a sub-division of individual parts of the ecosystem affected by the fishery, such as different species/stocks/ sub-stocks or habitats within a Component.
Scoring Guidepost	The benchmark level of performance established by the team in respect of each numeric score or rating for each indicator sub-criterion.
Scoring Issues	The different parts of a single scoring guidepost, where more than one part exists and covering related but different topics.
Shark finning	The practice of removing any of the fins of a shark (including the tail) while at sea and discarding the remainder of the shark at sea.
Stock Assessment	An integrated analysis of information to estimate the status and trends of a population against benchmarks such as reference points.
Unit of Assessment (UoA)	The target stock(s) combined with the fishing method/gear and practice (including vessel type/s) pursuing that stock, and any fleets, or groups of vessels, or individual fishing operators or other eligible fishers that are included in an MSC fishery assessment. In some fisheries, the UoA and UoC may be further defined based on the specific fishing seasons and/or areas that are included.
Unit of Certification (UoC)	Target stock(s) combined with the fishing method/gear and practice (including vessel type/s) pursuing that stock, and any fleets, or groups of vessels, or individual fishing operators that are covered by an MSC fishery certificate. Note that other eligible fishers may also be included in some Units of Assessment but not initially certified (until covered by a certificate sharing arrangement)

Annex 5 Further sources and guidance

Sources and further guidance

Marine Stewardship Council website
www.msc.org

MSC accessibility tools

MSC Fisheries Improvement Projects website
https://www.msc.org/for-business/fisheries/developing-world-and-small-scale-fisheries/fips

In-transition to MSC
https://www.msc.org/for-business/fisheries/developing-world-and-small-scale-fisheries/fips/in-transition-to-msc

In-transition to MSC requirements
https://www.msc.org/docs/default-source/default-document-library/for-business/program-documents/chain-of-custody-supporting-documents/in-transition-to-msc-(itm)-program-requirements-and-guidance-pilot-v2.pdf?sfvrsn=45eab433_4

MSC Fisheries Improvement Tools
https://www.msc.org/for-business/fisheries/developing-world-and-small-scale-fisheries/fips/fishery-improvement-tools

Technical Consultants Register
https://www.msc.org/for-business/fisheries/developing-world-and-small-scale-fisheries/fips/technical-consultants

MSC Capacity Building Training
https://www.msc.org/for-business/fisheries/developing-world-and-small-scale-fisheries/our-capacity-building-program

More information

Overview of the MSC Fisheries Standard
https://www.msc.org/en-us/standards-and-certification/fisheries-standard

MSC Track a Fishery
https://fisheries.msc.org/en/fisheries/

MSC Fisheries Program Documents
https://www.msc.org/for-business/certification-bodies/fisheries-standard-program-documents

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MSC Global Headquarters and Regional Office – Europe, Middle East and Africa

Marine House
1 Snow Hill
London
EC1A 2DH

info@msc.org

Tel: + 44 20 7246 8900

Registered Charity number: 1066806
Registered Company number: 3322023

MSC Regional Office – Americas

2445 M Street NW
Suite 550
Washington, DC 20037
USA

Non profit status: 501 (C) (3)
Employer Identification Number: 91-2018427

MSC Regional Office – Asia Pacific

PO BOX 61

Caringbah 1495

New South Wales

Australia

Charity Status: ACNC Certified

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www.msc.org
fisheries@msc.org

@MSCecolabel

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