Rapid Assessment Tool

Version 1.0, January 2018

Background

Introduction

Organizations working in sustainable seafood use a variety of tools to rapidly evaluate fisheries. For example, World Wildlife Fund US (WWF-US) has used a Marine Resources Assessment Group rapid assessment methodology to determine potential improvement time frames for specific fisheries. Ocean Outcomes (O2) developed an internal rapid assessment methodology to scope fisheries and develop fishery improvement projects (FIPs). The Sustainable Fisheries Partnership (SFP) assesses fisheries using FishSource. Although all three rapid assessments are based on the Performance Indicators (PIs) of the Marine Stewardship Council (MSC) standard, the difference in approaches makes it difficult for FIP developers to know which methodology best suits their needs, and limits the ability of prospective clients to compare the approach of one FIP implementer against another. In addition, there are many organizations new to the FIP implementation space that have developed rapid assessments that are not completely based on the MSC standard, and include other indicators such as social, policy, and financial indicators. And last, basic FIPs that are not positioned to conduct a MSC pre-assessment face challenges scoring their fisheries on FisheryProgress.org, the global platform for publicly tracking FIPs. Thus, O2, SFP, and WWF-US were funded by the Moore Foundation's Oceans Seafood and Markets Initiative (OSMI) to co-develop this rapid assessment tool to address these issues and streamline the improvement process, motivate more fisheries to join FIPs, and facilitate the reporting of more basic and prospective FIPs on FisheryProgress.org.

Objectives

We developed this assessment methodology to achieve the following:

- Identify major deficiencies in fishery sustainability for general scoping or to give sound advice on how the fishery can move forward into an improvement project.

- Be time and cost efficient (< USD $7000 per assessment). We developed the methodology to be faster to conduct than a full MSC pre-assessment, although efficiency will need to be tested.
- Be accepted by our organizations and as many other sustainable seafood organizations as possible for use in the FIP development process.
- Be posted on FisheryProgress.org as the Needs Assessment for basic FIPs.

Overall, the goal is to provide FIP implementers a low-cost method to develop science-based guidance, particularly in early stages when funding is limited and they are still motivating a fishery to join an improvement effort. This methodology is based on MSC's performance indicators and draws concepts/definitions from both the MSC and Monterey Bay Aquarium Seafood Watch (MBA SFW) standards, specifically the MSC Fisheries Certification Requirements Version 2.0 (MSC FCR v2.0) and the MBA SFW Standard for Fisheries Version 3.2 (SFW FS v3.2). Although it relies heavily on concepts developed and tested by MSC and MBA SFW, this methodology does not replicate or replace either an MSC pre-assessment or a SFW assessment. For example, it cannot be used as a scoping document for a comprehensive FIP under Conservation Alliance Guidelines, which specify that an MSC pre-assessment is required. A more detailed assessment may provide more rigor and help identify more specific recommendations.

Scope

We have designed this methodology to be applicable across a broad range of performance for wild capture fisheries. Fisheries that use harmful fishing methods such as dynamite or poison can theoretically be improved, so we have not explicitly excluded them and instead consider their impacts under applicable indicators (e.g. Habitat and Ecosystem Outcomes). Some fisheries with special characteristics, such as enhancement, may require a different set of criteria for evaluation, which we mention under Special Cases below.

Assessors are expected to have education or training in fisheries science. Experience in evaluating fisheries against sustainability standards, particularly the MSC standard, is also extremely helpful. In accordance with the Conservation Alliance Guidelines, we do not require a third party formally trained in the MSC standard to conduct the rapid assessment. However, we do recommend that any assessors with limited MSC experience attend an MSC Capacity Building Training Workshop, or secondarily, use the MSC Online Training. Additionally, assessors are expected to be objective when scoring, especially if they are not completely independent of the assessed fishery. If scores are overly positive, the resulting FIP is at risk being considered non-credible.

Because this is a rapid assessment tool, there are some limitations to the areas that are assessed. For instance, we primarily rely on a combination of productivity susceptibility analysis and population or catch trend data to score stock status for data-limited species, although such information does not provide a direct assessment of stock status. Other groups have developed tools that serve complementary purposes. For example, the Environmental Defense Fund's FISHE tool includes several components for evaluating management of fisheries with limited

stock abundance and catch data. In the appendix, we have included information on other resources that may help make an assessment more thorough, or that can help provide guidance for making management improvements.

Features and ideas for future development

This methodology is based on the MSC PIs to facilitate integration with FisheryProgress.org. To make the evaluation process more efficient, we have formatted the assessment as a questionnaire/decision tree. For example, if there is no information about a specific performance component such as habitat impacts, the decision tree directs the assessor to not score other performance indicators relating to habitat impacts and to highlight the information gap.

This methodology is a work in a progress, and we have several ideas about potential improvements for future versions:

- Additional performance tiers below the MSC 60 level to allow for tracking of performance improvements below that level.
- Online version of the methodology where information is entered online, and scoring is automatically generated.
- Inclusion of social, economic, and traceability components aligned with any relevant FIP guidelines developed in the future.

Our intention is to incorporate guidance developed by the Certification and Ratings Group into this methodology as it becomes available. For example, the group is developing multiple performance tiers, including tiers below the MSC 60 level, and definitions of those tiers may be applied to scoring guidance within this methodology.

Overview of the methodology

General framework

As with an MSC pre-assessment, assessors will evaluate indicators under the three main principles: (1) Status of Target Stock(s), (2) Ecosystem Impacts, and (3) Management. To streamline the scoring process, this methodology uses decision trees. We use a decision tree and questions to determine if an indicator has sufficient information to be scored, or to determine the scoring guideposts used. In cases where information is lacking, the indicator will either be skipped, or a default scoring category will be suggested.

An OSMI Rapid Assessment Tool Report Template is provided as a separate document. The assessor can fill out the template to create a report that describes assessment results.

Scoring

This methodology uses the following scoring categories, consistent with those used on FisheryProgress.org.

<60	High risk	Red
60-79	Medium risk	Yellow
80+	Low risk	Green

Within the scoring categories for each indicator, there may be multiple bullet points or 'guideposts.' By default, these bullet points are to be treated as 'AND' clauses, where all bullets within a category must be met to achieve that score. Otherwise the lower scoring (higher risk) category should be applied. When bullets are to be treated as 'OR' clauses, the OR will be explicitly mentioned in the scoring category text.

For all indicators, a written rationale for the score must be provided. Figures and tables can also be provided to support scores. Nevertheless, because this is a rapid assessment, several descriptive sentences may be sufficient as a rationale.

Information gathering

We expect that information will mostly be gathered through desktop research and, time permitting, interviews with fishers and other relevant fishery stakeholders. However, it is up to the assessor to determine the approach used for data collection. To allow for external verification of the information used, information should be publicly available, e.g. posted online or made available upon request. Information should be clearly attributable to the provider and the assessor.

Special cases

Assessors can use the following questions to determine if special considerations need to be applied for the fishery:

- Is the target species a low trophic level (LTL) species? (See Lower Level Trophic Species List in the appendix for a list of LTL families.) If YES, follow scoring category guidance for LTL species when scoring 'stock status outcome.'
- Is harvest augmented by artificial production? If YES, a modified assessment (such as the MSC Modified Default Tree structures for enhanced bivalve or salmon fisheries) may be more applicable. The current version of this methodology does not accommodate fisheries that are enhanced by artificial production.

Definitions of terms

This methodology includes a glossary with definitions of the terms used. The definitions were largely drawn from the MSC and SFW standards for wild capture fisheries, and the Food and Agriculture Organization of the United Nations (UN-FAO). Below are some the more important terms used in scoring.

Likelihood:
Likelihood can be based on quantitative assessment, plausible argument or expert judgment. The MSC standard provides quantitative definitions of likelihood that vary by PI (Table SA 9 on p. 129, MSC FCR v2.0), and we used the most frequently occurring definitions.

- Highly unlikely - less than 30% chance
- Unlikely - less than 40% chance
- Likely - 70% chance or greater
- Highly likely - 80% chance or greater

Basic fishery information and defining the UoA

The following pieces of information are used to describe the fishery and determine the Unit of Assessment (UoA). The UoA is defined by 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 this assessment. In some fisheries, the UoA may be further defined based on the specific fishing seasons and/or areas that are included.

- Target species scientific name and common name
- Fishery location
- Gear type(s)
- Catch quantity (weight)
- Vessel type and size
- Number of registered vessels
- Management authority (the regulatory authority with fishing management responsibilities; there may be multiple authorities where joint jurisdictional responsibilities occur)

Status of target stock(s) - Principle 1

Stock status outcome (1.1.1)

This indicator evaluates stock abundance following one of two pathways: non data-limited and data-limited. The non data-limited pathway is more applicable for fisheries where stock reference points exist, and stock abundance data have been collected over time (e.g. at least for 10 years). The data-limited pathway is more applicable for fisheries that lack reference points.

Non data-limited pathway

Under this pathway, stock abundance is evaluated relative to reference points, specifically a target reference point (TRP) and limit reference point (LRP). An abundance indicator is considered ‘at’ the reference point when it fluctuates around the reference point with no declining trend. Fishery management bodies use a variety of abundance indicators and reference points, so their appropriateness should be considered on a case by case basis. Commonly used indicators include biomass (B), spawning stock biomass (SSB), catch per unit effort (CPUE), and fishing mortality (F).

An appropriate TRP is a stock level at which high production is maintained (MSC FCR v2.0 p. 185), e.g. maximum sustainable yield (MSY). Examples of appropriate TRPs include $B_{MSY;}$ and $B_{40\%}$ (SFW FS v3.2, p. 39). An appropriate LRP is a level at which a stock has a high probability of persistence in the presence of directed fishing (MSC FCR v2.0 p. 185), which is generally considered equivalent to PRI, or the point below which recruitment may be impaired. Examples of appropriate LRPs include ½ B_{MSY} and ½ $B_{40\%}$ (SFW FS v3.2, p. 39).

Where information is not available on the stock status relative to biomass reference points, assessors may use proxy indicators and reference points such as fishing mortality or CPUE, but they will need to show how the proxies are consistent with MSY or PRI. Examples of proxies include the point of recruitment overfishing for an LRP and F_{MSY} for a TRP. For additional guidance on proxy indicators, please see GSA2.2.3.1 in the MSC FCR v2.0 (pp. 376-378).

Data-limited pathway

Under this pathway, a combination of species vulnerability and available information on stock health and/or abundance trends is used to score the indicator, an efficient approach that is used by SFW for data-limited fisheries (MBA SFW FS v3.2, pp. 7-9). A PSA score will be estimated and used to determine vulnerability as follows:

1. PSA score < 2.64 = low vulnerability
2. PSA score ≥ 2.64 and ≤ 3.18 = medium vulnerability
3. PSA score < 3.18 = high vulnerability

Examples of evidence suggesting good stock health include: age structure has been stable over time, average body length has been stable over time, or fish abundance/sizes do not differ between fishing areas and well-managed no-take zones. The Fair Trade USA Capture Fisheries Standard v1.0 includes examples of data-limited stock health indicators that can be considered (Appendix B, Table 1, p. 16).

Examples of evidence suggesting poor stock health include: age structure has shifted to younger ages, landings or CPUE have declined, geographic distribution has become more constrained for species that are not highly migratory, or fish abundance/sizes are significantly smaller in fishing areas than in well-managed no-take zones.

Note: although a PSA can provide an indication of likely stock status, it is not a substitute for a stock assessment. A responsible fisheries management strategy should include a robust stock assessment.

Special cases

When scoring an LTL species, please follow the specified guidance within scoring categories. Reference points for LTL species should be ‘buffered’ to consider the ecological role of the species and its importance as prey to higher trophic level species. Conceptually, the target reference point should be set at a level consistent with ecosystem needs (e.g. above 75% of virgin biomass, or 0.75 B_0 for a fishery with a moderate level of abundance information), while

PRI should be considered the point below which serious ecosystem impacts could occur (e.g. 0.4 B_0 for a fishery with a moderate level of abundance information). Additional information on appropriate reference points for LTL species can be found in the SFW FS v3.2 (p.40) and MSC FCR v2.0 (SA 2.2.13, pp. 112-113).

Question: Is there information about stock status relative to (biomass or fishing mortality) reference points?

If YES
Score this indicator using the non data-limited scoring categories for stock status outcome.

If NO
Use the Productivity Susceptibility Analysis (PSA; see appendix for details) to derive a PSA score for the stock. Use a combination of the PSA score and supporting information to score this indicator, using the data-limited scoring categories for stock status outcome.

Non data-limited scoring categories for stock status outcome

Red	• The target stock is likely at or below an LRP or proxy. OR • For LTL species: the stock is at or below a buffered LRP or proxy.
Yellow	• Stock is below the TRP or TRP proxy but likely above the LRP or LRP proxy. OR • For LTL species: the stock is likely above a buffered LRP or proxy.
Green	• The stock is at or above an appropriate TRP or TRP proxy. OR • For LTL species: the stock is highly likely to be above a buffered LRP or proxy. • The LTL stock is at or above a buffered TRP.

Data-limited scoring categories for stock status outcome

Red	• High vulnerability. • No clear evidence suggesting the stock is healthy.

	OR • Medium or low vulnerability. • Some evidence suggesting the stock is not healthy.
Yellow	• High vulnerability. • Some evidence suggesting that the stock is healthy with no conflicting information. OR • Low or medium vulnerability. • No clear evidence suggesting the stock is either healthy or not healthy.
Green	• Low or medium vulnerability • Some quantitative evidence the stock is healthy with no conflicting information.

Stock rebuilding outcome (1.1.2)

The MSC defines a generation time as "the average age of a reproductive individual in an unexploited stock" (Box GSA4 in MSC FCR v2.0, p. 380). The glossary provides additional detail about calculating generation time.

If such age-related information is lacking, it may also be helpful to consider SFW's definition of a reasonable timeframe for rebuilding: "dependent on the species' biology and degree of depletion, but generally within 10 years, except in cases where the stock could not rebuild within 10 years even in the absence of fishing. In such cases, a reasonable timeframe is within the number of years it would take the stock to rebuild without fishing, plus one generation" (MBA SFW FS v3.2, p. 47).

Question: Did the target species score green for stock status outcome (1.1.1)?

If YES

Skip this indicator.

If NO

Score this indicator.

Red	• No or some stock rebuilding measures are in place, but with no intended timeframe or accountability to provide likelihood of outcome. • There is limited monitoring in the fishery that would have some limited

	use to evaluate stock rebuilding evaluation.
Yellow	• An effective rebuilding timeframe is in being implemented for the stock that is the shorter of 20 years or 2 times its generation time. • There is monitoring to assess effectiveness of rebuilding strategies.
Green	• An effective rebuilding timeframe is in being implemented for the stock that is the shorter of 20 years or 2 times its generation time. • There is evidence of the strategy's effectiveness for rebuilding, or it is likely effective based on simulation modelling, exploitation rates or previous performance.

Harvest strategy (1.2.1)

A harvest strategy aims to control fishing mortality to biologically sustainable levels through a combination of monitoring (particularly in relation to stock abundance and exploitation rates), stock assessment, harvest control rules (HCRs) and management actions required for maintaining fishery sustainability. This indicator is closely related with the following three indicators (harvest control rules 1.2.2, information and monitoring 1.2.3, stock assessment 1.2.4). This particular indicator evaluates the overall performance of the harvest strategy, whether it includes all necessary components and whether those components work together to maintain the stock at levels consistent with appropriate target reference points. The HCRs, information, and stock assessment indicators examine those individual components of the harvest strategy more closely. We have kept the four indicators separate to maintain compatibility with FisheryProgress.org, while attempting to minimize overlap in the areas they evaluate.

Question: Is there a harvest strategy?

If YES

Score this indicator.

If NO

Score is red. Highlight the lack of a harvest strategy.

Red	• A harvest strategy exists, but at least one necessary component (monitoring, assessment, HCRs, or management actions) is missing or is weak/ineffective. OR • A harvest strategy with all necessary components exists, but based on the design and/or how the components interact, the strategy is not

	likely to be effective at achieving sustainability objectives, such as maintenance of stock biomass around or above B_{MSY} (or other proxy).
Yellow	• The harvest strategy includes all necessary components. • The harvest strategy is expected to achieve sustainability objectives, such as maintenance of stock biomass around or above a level consistent with B_{MSY} (or other proxy). • The strategy is likely to work based on prior experience or plausible argument.
Green	• As with the yellow scoring category, there is a complete harvest strategy with clear sustainability objectives. • There is evidence that elements of the harvest strategy work together to meet management objectives. • The harvest strategy is responsive to the state of stock.

Harvest control rules (1.2.2)

Harvest control rules (HCRs) are a set of defined, pre-agreed rules and management actions that will be taken in response to changes in indicators of stock status with respect to reference points. HCRs are regarded as 'well-defined' when they exist in some written form that has been agreed by the management agency, ideally with stakeholders, and clearly state what actions will be taken at what specific trigger reference point levels. They should be regarded as only 'generally understood' in cases where they can be shown to have been applied in some way in the past, but have not been explicitly defined or agreed (MSC FCR v2.0, p.396).

Under the red and yellow scoring categories, assessors may accept 'available' HCRs (versus HCRs that are 'in place') in cases where:

1. Stock biomass has not previously been reduced below the MSY level or has been maintained at that level for a recent period of time that is at least longer than 2 generation times of the species, and is not predicted to be reduced below B_{MSY} within the next 5 years; or
2. In UoAs where B_{MSY} estimates are not available, the stock has been maintained to date by the measures in use at levels that have not declined significantly over time, nor shown any evidence of recruitment impairment (MSC FCR v2.0, p.120).

Question: Are there harvest control rules (HCRs) for this fishery?

If YES

Score this indicator.

If NO

Score is red. Highlight the lack of HCRs.

Red	• HCRs may exist but are unlikely to result in sustainable fishing practices, where exploitation is reduced in response to evidence of stock depletion.
Yellow	• Generally understood HCRs are in place or available, and are expected to reduce the exploitation rate as the point of recruitment impairment (e.g. limit reference point) is approached. • There is some evidence that the tools used (or available) to implement HCRs are appropriate and effective in controlling exploitation.
Green	• There are well-defined HCRs that ensure reduction of exploitation rates as stock size approaches PRI. • Evidence clearly shows that management actions/tools in use are effective in achieving the exploitation levels required under the HCRs. • HCRs are likely to be robust to major uncertainties such as ecological uncertainties.

Information and monitoring (1.2.3)

Question: Is any information on stock abundance and productivity, fishery removals, and fleet composition collected to support the harvest strategy?

If YES

Score this indicator.

If NO

Score is red. Highlight the lack of information monitoring.

Red	• Information related to stock structure, stock productivity, fishery removals, and fleet composition is insufficient for supporting the harvest strategy.
Yellow	• Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. • Information on fishery removals is collected, but there may not be reasonably accurate estimates of all sources of fishery removals (e.g. lack of quantitative estimates of IUU catches).
Green	• Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data are available to support the harvest strategy. • There is good information on all sources of fishery removals.

Assessment of stock status (1.2.4)

As pertaining to the yellow and green scoring categories, we follow SFW guidance for considering a stock assessment recent (SFW FS v3.2, p. 47) with an addendum for short-lived species. Generally, or for species whose generation time is unknown, stock assessments conducted within the last five years are considered recent. For short-lived species with a generation time of less than five years, a stock assessment conducted within the generation time is considered recent.

Question: Is there a stock assessment? Both traditional and data-limited assessments qualify.

If YES

Score this indicator.

If NO

Score is red. Highlight the lack of a stock assessment.

Red	• Very limited information is available by which to assess stock status; it has not been collected reliably or consistently to serve as a basis for establishing abundance. OR • General abundance indicators are tracked in the fishery, but no reference points or proxies have been established by which to guide harvest management.
Yellow	• There is a recent assessment that estimates stock status relative to reference points that are at least somewhat appropriate to the species, and identifies major sources of uncertainty.
Green	• An assessment has been recently conducted that is appropriate to the stock and HCRs. • The assessment estimates stock status relative to appropriate, species- or stock-specific reference points, takes uncertainty into account, and is peer reviewed.

Ecosystem impacts - Principle 2

Background information for Principle 2

Information on all of the species caught in the fishery and their catch quantities is necessary for scoring many of the indicators under this principle. If such data are lacking, collection of catch data may be one of the first areas a fishery will need to address when entering an improvement project.

Under the MSC standard, non-ETP (endangered-threatened-protected) Principle 2 species are classified as either 'primary' or 'secondary.' Primary species have management objectives (e.g. reference points) and stock status monitoring in place, whereas secondary species do not. For the following reasons, this methodology does not distinguish between primary and secondary species.

- The primary/secondary terminology is specific to MSC, and the terms may be misinterpreted outside of the MSC context.
- Basic FIPs are likely to be in fisheries with less management capacity and data, so there may be no primary species.
- Reducing the number of indicators saves time and effort on scoring.

Instead, all non-ETP, Principle 2 species will be classified as 'other' species, and scores will be entered under the secondary species PIs (2.2.1, 2.2.2, 2.2.3) in FisheryProgress.org. The reasoning for using the secondary species PIs is that, as noted above, basic FIPs are more likely to have secondary species than primary species, and hence the scores are more likely to carry over directly to a pre-assessment.

The order of indicators here is slightly different that that used in the MSC standard. Principle 2 includes multiple components (e.g. other species and habitat impacts), each of which has three indicators: outcome, management, and information. In this methodology, we score the information indicator first for each component, because the level of information affects ability to score outcome and also relates to management. For example, if there is no qualitative or quantitative information collected on habitat impacts from the fishery, then we know that habitat impacts outcome cannot be scored, and habitat impacts management will not receive a green score. This allows the assessment to be conducted more efficiently.

Important definitions used in Principle 2

Management measures and strategies, as defined by MSC:

- **Measures** - actions or tools in place within the management system that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.
- **Partial strategy** - a cohesive arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to manage the impact on that component specifically.
- **Strategy or full strategy** - a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/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 light of identification of unacceptable impacts.

Principle 2 scoring guidance

Scoring for non-target species can be complex when a fishery catches multiple species. We have laid out several steps (see below) to help guide the assessor and make scoring more efficient, by quickly identifying indicators that should score red, or that should not be scored due to lack of information.

List of other species

Identify all other species that are known to be caught, regardless of whether they are retained or discarded, and fill in the first two columns of the following table. Species used for bait should also be listed. Classifications will be determined in the next step.

Other species classification table

Species common and scientific names	**Approximate proportion of catch**	**Classification**
Example: Pacific herring (*Clupea pallasii*)	0.25	Main

Classification decision tree

Non-ETP Principle 2 species are classified as either ‘main’ or ‘minor’ depending on their proportion in the total catch by weight. For the purposes of the rapid assessment, only main species have to be assessed/scored. We have provided some guidance from MSC for designating main species below; more detailed guidance can be found in GSA3.4.2 (MSC FCR v3.2, pp. 412-414).

Question: is the catch composition (all species caught by the fishery and their relative catch quantities) known?

If YES
Proceed with remaining questions in the classification decision tree.

If NO
Other species information scores red. Do not score other species outcome.

Question: Is the species at least 5% of the total catch by volume? Where data exist, the 5% should be an average taken across recent years and/or seasons to account for fluctuations in catch composition.

If YES
The species is classified as main and will be scored.

If NO
Question: Is the species considered less resilient, known to be depleted (poor stock status), and/or are catches sufficiently large to be a significant risk to the population?

A species is considered less resilient if a productivity analysis (e.g. the productivity portion of the PSA) indicates it has low or medium productivity. Alternatively, a species may be considered less resilient, even if its intrinsic resilience is high, if existing knowledge suggests that its resilience has been lowered due to anthropogenic or natural changes to its life-history.

If YES
The species will be classified as 'main' if the species is at least 2% of the total catch by volume. Where data exist, the 2% should be an average taken across recent years and/or seasons to account for fluctuations in catch composition.

If NO
The species is not classified as 'main.'

After all other species have been classified, go through the other species decision tree.

Other species decision tree

Question: Are there any main other species?

If NO
Skip the other species information, outcome, and management indicators. However, we recommend providing comments about any other species including those categorized as minor, especially if those species are known to be or are potentially depleted.

If YES
Are stock status reference points available for main other species?

If YES
Proceed to the non data-limited decision tree for other species.

If NO
Proceed to the data-limited decision tree for other species.

Non data-limited decision tree for other species indicators
Question: Is qualitative or quantitative information regarding fishery impacts on main other species being collected?

Examples of impacts information include stock assessments and species-specific estimates of catch and/or discard quantities.

If NO
Score other species information as red. Don't score other species outcome and mark that indicator as data deficient, highlighting the lack of information about other species. Score other species management, which will receive either a red or yellow score.

If YES
Score the other species information, outcome, and management indicators.

Data-limited decision tree for other species indicators
The vulnerability of main other species to fishing will be evaluated using PSAs where possible.

Question: Is there sufficient qualitative information to conduct a PSA on the main other species?

If NO
Score 'other species information' as red. Do not score 'other species outcome' and mark that performance indicator as data deficient, highlighting the lack of information about other species. Score 'other species management,' which will receive either a red or yellow score.

If YES
Score the 'other species information', 'outcome,' and 'management' performance indicators.

Scoring multiple species within a Principle 2 indicator

Multiple species may be evaluated within each other species and ETP species indicator. When this occurs, each species is considered a 'scoring element.' The assessor will assign a score to each scoring element using the MSC RBF Worksheets tool, then combine scoring for all scoring elements using the following table.

Combining scores for scoring elements

Score	Combination of individual scoring elements
Red	At least one element scores red.
Yellow	All elements score at least a yellow, no element scores red.
Green	All elements score green.

Other species information (score applied to PI 2.2.3)

This performance indicator should always be scored.

Red	• Information is inadequate to estimate the impact of the UoA on main other species with respect to status.

	OR • If PSA is used to evaluate the vulnerability of other species to fishing: Qualitative information is inadequate to estimate productivity and susceptibility attributes for main other species.
Yellow	• Qualitative information is adequate to estimate the impact of the UoA on the main other species with respect to status. OR • If PSA is used to evaluate the vulnerability of other species to fishing: Qualitative information is adequate to estimate productivity and susceptibility attributes for main other species. AND • Information is adequate to support measures to manage main other species.
Green	• Some quantitative information is available and is adequate to assess the impact of the UoA on the main other species with respect to status. OR • If PSA is used to evaluate the vulnerability of other species to fishing: Some quantitative information is adequate to assess productivity and susceptibility attributes for main other species. AND • Information is adequate to support a partial strategy or full strategy to manage main other species.

Other species outcome (score applied to PI 2.2.1)

A biologically based limit is defined as the abundance indicator level below which a stock or population is considered to experience serious or irreversible harm. Acceptable examples include the PRI for a single species, a minimum viable population size (number of individuals required to have a specified probability of persistence over a given time period), and potential biological removal (maximum number of animals that may be removed from a stock while allowing for optimum sustainable population to be maintained; often used for cetaceans and

seabirds; see Table SA8 in MSC FCR v2.0, p. 126).

The green scoring category for this performance indicator diverges to some extent from the MSC standard. Specifically, if main other species are below biologically based limits, under the standard it is possible to achieve an 80 score if there is evidence of recovery or a demonstrably effective partial strategy such that the UoA does not hinder recovery. Requirements are slightly more stringent if the catches of the species are considerable (MSC's rule of thumb for defining considerable is ≥ 10% of the catch by weight). From our perspective, fisheries with depleted, main other species are much more likely to fit under the yellow scoring category than the green scoring category. For this reason, and for the sake of efficiency, we did not include the 'evidence of recovery' exception in the green scoring category. This makes our scoring potentially more conservative than the scoring for an MSC pre-assessment.

If PSAs are used to evaluate the vulnerability of other species to fishery impacts, the score for this performance indicator will be based on PSA scores for all main other species combined. The assessor will assign a score to each scoring element (main other species) using the 'PI 2.2.1 PSA' sheet in the MSC RBF worksheets tool, and then combine scoring for all scoring elements following the guidance in the table 'Combining scores for scoring elements.'

Red	• Main other species are unlikely to be above biologically based limits. • Management measures are not in place to ensure that the UoA doesn't hinder recovery, or there is significant uncertainty that the measures will be effective.
Yellow	• Main other species are likely to be above biologically based limits. OR • If main other species are below biologically based limits, management measures are in place within the UoA that are expected to ensure the UoA doesn't hinder recovery.
Green	• Main other species are highly likely to be above biologically based limits.

Other species management (score applied to PI 2.2.2)

MSC defines 'alternative measures' as alternative fishing gear and practices that have been shown (experimentally or otherwise) to minimize the rate of incidental mortality of the species to the lowest achievable levels (SA 3.5.3.1, MSC FCR v2.0, p. 132). For this performance indicator, scoring for alternative measures should only be considered when unwanted catch occurs (catch that the fisher did not intend to catch but could not avoid, and did not want or chose not to use).

Red	• No management measures for main other species are available for the UoA. OR • Some management measures for main other species may be available for the UoA, but they are not established with an explicit intent to maintain or not hinder recovery of the species. • The efficacy of measures or the likelihood of them being implemented is uncertain, or the measures are known to be ineffective for species recovery. OR • Shark finning is taking place.
Yellow	• There are measures in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of main other species at/to levels which are likely to be above biologically based limits. • The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/species). • It is likely that shark finning is not taking place. • If there is unwanted catch: there is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main other species.
Green	• 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 other species at/to levels which are highly likely to be above biologically based limits. • There is some objective basis for confidence that the measure/partial strategy will work, based on some information directly about the UoA and/or species involved. • There is some evidence that the measures/partial strategy is being implemented successfully. • It is highly likely that shark finning is not taking place. • If there is unwanted catch: there is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main other species, and they are implemented as appropriate.

ETP species information (2.3.3)

This performance indicator should always be scored. ETP species refers to endangered, threatened or protected species, which under this methodology includes the following:

- Species of concern recognised by national legislation and/or binding international agreements to which the jurisdictions controlling the fishery under assessment are party, such as Appendix I of CITES and binding agreements concluded under the Convention on Migratory Species.
- Species listed as “vulnerable,” “endangered” or “critically endangered” by the International Union for the Conservation of Nature (IUCN).

This definition differs slightly from that used by MSC, which classifies IUCN-listed species as ETP only when they are ‘out of scope’ (amphibians, reptiles, birds, and mammals). More recent or more regional data can override these determinations, for example when it can be shown that the particular stock impacted by the fishery under assessment is not endangered.

Qualitative and quantitative information about fishery impacts on ETP species may include the following:

- Local knowledge from fishers, government agencies, research scientists, or environmental NGOs
- Plausible arguments based on knowledge or studies of the fishing gear
- Maps of ETP species distributions and fished areas
- Fisher or observer logbooks with records of ETP species encounters
- Direct monitoring or video surveillance
- Empirical modelling or scientifically robust studies

In situations where information about ETP species impacts is lacking, it may be possible to use a PSA to evaluate vulnerability of an ETP species to fishing. However, some experts have noted that while PSAs are appropriate for finfish and invertebrates, they are not calibrated for use with other taxa such as seabirds and sea turtles. For example assessors may score highly vulnerable turtle species as moderately vulnerable because the PSA fecundity scale is not calibrated appropriately for turtles. Thus we suggest not applying PSAs to non-finfish, non-invertebrate ETP species. If information about fishery impacts on such species is lacking, the assessor should assume high vulnerability.

Question: Is qualitative or quantitative information about ETP species mortality resulting from the assessed fishery available?

If YES

ETP species outcome (2.3.1) will be evaluated without using PSA. Score this performance indicator accordingly.

If NO

ETP species outcome (2.3.1) will be evaluated using PSA. Score this performance indicator accordingly.

Red	• Qualitative or quantitative information is inadequate to estimate the impact of the UoA on ETP species. OR • If PSA is used to evaluate ETP species outcome: Qualitative information is inadequate to estimate productivity and susceptibility attributes for ETP species.
Yellow	• Qualitative or quantitative information is adequate to estimate the impact of the UoA on ETP species. OR • If PSA is used to evaluate ETP species outcome: Qualitative information is adequate to estimate productivity and susceptibility attributes for ETP species. AND • Information is adequate to support measures to manage impacts on ETP species.
Green	• Some quantitative information is adequate to assess the impact of the UoA on ETP species and to determine whether the UoA may be a threat to protection and recovery of the ETP species. OR • If PSA is used to evaluate ETP species outcome: Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species. AND • Information is adequate to measure trends and support a strategy to manage impacts on ETP species.

Question: Does ETP species information (2.3.3) have a red score?

If YES

Do not score ‘ETP species outcome’ (2.3.1) and mark that performance indicator as data deficient, highlighting the lack of information about ETP species. Score ‘ETP species management,’ which will receive either a red or yellow score.

If NO

Score the 'ETP species outcome' and 'management' performance indicators (2.3.1, 2.3.2).

ETP species outcome (2.3.1)

Direct effects on ETP species include capture, entanglement and fishery mortality, whereas indirect effects include competition for resources, pollution, and habitat loss. The first bullet within each scoring category applies only when specific limits have been set by national legislation or international agreements to minimize fishery impacts on ETP species (e.g. no more than 30 individuals of the species can be caught per year).

If PSAs are used to evaluate the vulnerability of ETP species to fishery impacts, the score for this performance indicator will be based on PSA scores for all ETP species combined. The assessor will assign a score to each scoring element (ETP species) using the 'PI 2.3.1 PSA' in the MSC RBF worksheets tool, and then combine scoring for all scoring elements following the guidance in the table 'Combining scores for scoring elements.'

Red	• Where fishery impact limits on ETP species have been set: the effects of the UoA on the population/stock are likely not within these limits. • Direct effects of the UoA are likely to hinder recovery of ETP species.
Yellow	• Where fishery impact limits on ETP species have been set: the effects of the UoA on the population/stock are known and likely to be within these limits. • Known direct effects of the UoA are likely to not hinder recovery of ETP species.
Green	• Where fishery impact limits on ETP species have been set: the combined effects of UoAs on the population/stock are known and highly likely to be within these limits. • Direct effects of the UoA are highly likely to not hinder recovery of ETP species. • Indirect effects have been considered for the UoA and are thought to be highly likely to not create unacceptable impacts.

ETP species management (2.3.2)

ETP requirements refer to national and international requirements for the protection of ETP species that have been identified as vulnerable to the fishery under assessment.

Red	• If ETP requirements are in place: ○ There are no measures in place for minimising the UoA-related mortality of ETP species. OR

	○ There are some measures but they are not expected to be effective at achieving national and international requirements for the protection of ETP species. OR • If ETP requirements are not in place: ○ There are no measures in place that are expected to ensure the UoA does not hinder the recovery of ETP species OR ○ There are some measures, but they are considered unlikely to work. AND • There is no review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.
Yellow	• If ETP requirements are in place: ○ There are measures in place that minimise the UoA-related mortality of ETP species ○ The measures are expected to be highly likely to achieve national and international requirements for the protection of ETP species. OR • If ETP requirements are not in place: ○ There are measures in place that are expected to ensure the UoA does not hinder the recovery of ETP species. AND • The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/species). • There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.
Green	• If ETP requirements are in place: ○ There is a strategy in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which

	are designed to be highly likely to achieve national and international requirements for the protection of ETP species. OR • If ETP requirements are not in place: ○ There is a strategy in place that is expected to ensure the UoA does not hinder the recovery of ETP species. AND • There is an objective basis for confidence that the partial strategy/ strategy will work, based on information directly about the UoA and/or the species involved. • There is some evidence that the measures/strategy is being implemented successfully. • There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA related mortality of ETP species, and they are implemented as appropriate.

Habitats information (2.4.3)

This performance indicator should always be scored. Commonly encountered habitats are those that regularly come into contact with the gear used by the UoA, considering the geographic overlap of fishing effort with the habitat's range within the management area(s) covered by the UoA's relevant governance body(s).

Red	• The types and distribution of the commonly encountered habitats are not broadly understood. • Information is inadequate to broadly understand the nature of the main impacts of gear use on the commonly encountered habitats, including spatial overlap of habitat with fishing gear.
Yellow	• The types and distribution of the commonly encountered habitats are broadly understood. • Information is adequate to broadly understand the nature of the main impacts of gear use on the commonly encountered habitats, including spatial overlap of habitat with fishing gear.
Green	• The nature, distribution and vulnerability of the commonly encountered habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. • Information is adequate to allow for identification of the main impacts

	of the UoA on the commonly encountered habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. • Adequate information continues to be collected to detect any increase in risk to the commonly encountered habitats.

Question: Does habitats information (2.4.3) have a red score?

If YES

Do not score the 'habitats outcome' and 'management' performance indicators (2.4.1, 2.4.2). Highlight the lack of information about habitat impacts.

If NO

Score the 'habitats outcome' and 'management' performance indicators (2.4.1, 2.4.2).

Habitats outcome (2.4.1)

Vulnerable marine ecosystems (VMEs) have features that are physically or functionally fragile, and the most vulnerable are both easily disturbed and are very slow to recover. VMEs include seamounts, hydrothermal vents, cold water corals and sponge fields; additional guidance for recognizing VMEs is provided in GSA3.13.3.2 (MSC FCR v2.0, pp. 435-436).

MSC defines 'serious or irreversible harm' as "...changes caused by the UoA that fundamentally alter the capacity of the habitat or ecosystem to maintain its structure and function.
For the habitat component, this is the reduction in habitat structure, biological diversity, abundance and function such that the habitat would be unable to recover to at least 80% of its unimpacted structure, biological diversity and function within 5-20 years, if fishing were to cease entirely" (Table SA8, MSC FCR v2.0, p. 127).

Red	• The UoA is likely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm. • The UoA is likely to reduce structure and function of VME habitats to a point where there would be serious or irreversible harm. OR • Dynamite or poisons are used to harvest fish.
Yellow	• The UoA is unlikely to reduce structure and function of the commonly encountered and VME habitats to a point where there would be serious or irreversible harm. • The UoA is unlikely to reduce structure and function of VME habitats to a point where there would be serious or irreversible harm.

Green	• Based on some type of evidence, the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm. • Based on some type of evidence, the UoA is highly unlikely to reduce structure and function of VME habitats to a point where there would be serious or irreversible harm.

Habitats management (2.4.2)

Red	• There are no or few habitat measures in place, if necessary, to ensure the UoA is highly unlikely to reduce structure and function of the commonly encountered and VME habitats to a point where there would be serious or irreversible harm. • Any existing measures have uncertain efficacy based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/ habitats). • If the fishery impacts a VME: there is no or limited evidence that the UoA complies with its management requirements to protect VMEs.
Yellow	• There are habitat measures in place, if necessary, that are expected to ensure the UoA is highly unlikely to reduce structure and function of the commonly encountered and VME habitats to a point where there would be serious or irreversible harm. • The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/ habitats). • If the fishery impacts a VME: there is qualitative evidence that the UoA complies with its management requirements to protect VMEs.
Green	• There is partial strategy in place, if necessary, that is expected to ensure the UoA is highly unlikely to reduce structure and function of the commonly encountered and VME habitats to a point where there would be serious or irreversible harm. • There is some objective basis for confidence that the measures/ partial strategy will work, based on information directly about the UoA and/or habitats involved. • There is some quantitative evidence that the measures/ partial strategy is being implemented successfully. • If the fishery impacts a VME: there is some quantitative evidence that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs or non-

	MSC fisheries, where relevant.

Ecosystem information (2.5.3)

This performance indicator should always be scored. The intent is to consider whether there is adequate understanding of key ecosystem elements and the fishery's impact on the ecosystem. Key ecosystem elements are the features of an ecosystem considered crucial to giving the ecosystem its characteristic nature and dynamics. They may include trophic structure and function (in particular key prey, predators, and competitors), community composition, productivity pattern (e.g. upwelling or spring bloom, etc.), and characteristics of biodiversity. This and the other ecosystem indicators are not intended to repeat evaluation of fishery impacts on habitats and other species caught in the fishery, including ETP species.

Red	• Information is inadequate to identify the key ecosystem elements. • Main impacts of the UoA on these key ecosystem elements cannot be inferred from existing information.
Yellow	• Information is adequate to identify the key ecosystem elements. • Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but have not been investigated in detail.
Green	• Information is adequate to broadly understand the key ecosystem elements. • Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and some have been investigated in detail. • The main functions of the components (i.e., target species, other species, ETP species, and habitats) in the ecosystem are known. • Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred. • Adequate data continue to be collected to detect any increase in risk level. • Adequate data continue to be collected to detect any increase in risk level.

Ecosystem outcome (2.5.1)

MSC defines 'serious or irreversible harm' as "...changes caused by the UoA that fundamentally alter the capacity of the habitat or ecosystem to maintain its structure and function…. For the ecosystem component, this is the reduction of key features most crucial to maintaining the integrity of its structure and functions and ensuring that ecosystem resilience and productivity is

not adversely impacted. This includes, but is not limited to, permanent changes in the biological diversity of the ecological community and the ecosystem's capacity to deliver ecosystem services" (Table SA8, MSC FCR v2.0, p. 127).

Question: Does the ecosystem information indicator (2.5.3) have a red score?

If YES

Do not score this indicator.

If NO

Score this indicator.

Red	• The UoA is likely to disrupt the key ecosystem elements and function to a point where there would be a serious or irreversible harm. OR • Dynamite or poisons are used to harvest fish.
Yellow	• The UoA is unlikely to disrupt the key ecosystem elements to a point where there would be a serious or irreversible harm.
Green	• The UoA is highly unlikely to disrupt the key ecosystem elements to a point where there would be a serious or irreversible harm.

Ecosystem management (2.5.2)

This performance indicator should always be scored. Good practice requires that management explicitly consider fishery impacts on functionality of the ecosystem, and has a strategy to address those impacts. Full ecosystem based approaches with ecosystem models, though of value, are not required.

Red	• There are no measures in place, if necessary, which take into account the potential impacts of the UoA on key ecosystem elements. • If measures are in place, their efficacy is uncertain, or they are considered likely to be ineffective.
Yellow	• There are measures in place, if necessary, which take into account the potential impacts of the UoA on key ecosystem elements. • If measures are in place, they are considered likely to work based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ ecosystems).

Green	• There is a partial or full strategy in place, if necessary, which takes into account available information and is expected to restrain fishing impacts such that the UoA is highly unlikely to disrupt the key ecosystem elements to a point where there would be a serious or irreversible harm. • If measures or a strategy are in place, there is some objective basis for confidence that they will work, based on some information directly about the UoA and/or the ecosystem involved. • There is evidence that the measures/strategy is being implemented successfully.

Management - Principle 3

Under this principle it is important to look for evidence of a precautionary approach in management. The precautionary approach involves the application of prudent foresight, taking into account the uncertainties in fisheries systems and considering the need to take action with incomplete knowledge.

Legal and/or customary framework (3.1.1)

A legal framework is defined as a broad system of rules that governs and regulates decision making, agreements, laws etc. At a minimum, a legal framework for fisheries should define who can fish, where, when, for what species and under what conditions. The framework should also define management responsibilities. The applicable framework is generally assumed to be at the national level, although there may be some exceptions.

Question: Is there a legal or customary framework in place for the fishery?

If YES

Score this indicator.

If NO:

Score is red. Highlight the lack of a legal or customary framework.

Red	• There is some form of national legal system that could also potentially provide a framework for cooperation with other parties, where necessary, but its effectiveness to deliver management outcomes consistent with the following is unlikely: 1) management of the stock to MSY and 2) minimising impacts on other species, habitats, and wider ecosystem components. • The management system may have channels for resolving legal disputes arising within the system, but they are not directly incorporated into the management system nor are they legally binding.

	• The management system may have potential mechanisms, though not-well defined, to generally respect the legal or customary rights of people dependent on fishing for food or livelihood in a manner consistent with the two management outcomes described above, but they may not be well defined, and/or effectiveness is unlikely.
Yellow	• There is an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver the management outcomes consistent with the following: 1) management of the stock to MSY and 2) minimising impacts on other species, habitats, and wider ecosystem components. • 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 has a mechanism to 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 two management outcomes described above.
Green	• There is an effective national legal system and organised and effective cooperation with other parties, where necessary, to deliver the management outcomes consistent with the following: 1) management of the stock to MSY and 2) minimising impacts on other species, habitats, and wider ecosystem components. • 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 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 two management outcomes described above.

Consultation, roles, and responsibilities (3.1.2)

Question: Are functions, roles, and responsibilities within the fishery management system defined?

If YES

Score this indicator.

If NO:

Score is red. Highlight the lack of defined functions, roles, and responsibilities.

Red	• Organisations and individuals involved in the management process have not been clearly identified. Functions, roles and responsibilities may be defined but are not generally understood. • The management system periodically but inconsistently uses consultation processes to obtain relevant information from the main affected parties, including local knowledge, to inform the management system.
Yellow	• Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood. • The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.
Green	• 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. • 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 consultation process provides opportunity for all interested and affected parties to give input regarding decisions.

Long term objectives (3.1.3)

This indicator focuses on long term management objectives contained at a high or broad level in government policy, beyond the specific fishery being assessed. Examples of such objectives include ‘avoidance of overfishing’ or ‘sustainable use of resources.’ To score better than red, the objectives need to be consistent with ‘appropriate’ management, where ‘appropriate’ means consistent with sustainable outcomes expressed under Principles 1 and 2.

Question: Does the country/region have any long term objectives for fishery management?

If YES

Score this indicator.

If NO:

Score is red. Highlight the lack of long term objectives.

Red	• There are some implicit, long term objectives within management

	policy, which have the potential to partially guide decision making, but they are not adequate to be consistent with the precautionary approach and appropriate management of target stocks and ecosystem impacts.
Yellow	• Long term objectives to guide decision making, consistent with the precautionary approach and appropriate management of target stocks and ecosystem impacts, are implicit within management policy.
Green	• Clear long term objectives that guide decision-making, consistent with the precautionary approach and appropriate management of target stocks and ecosystem impacts, are explicit within management policy.

Fishery-specific objectives (3.2.1)

This indicator focuses on fishery-specific management objectives, which provide direction for management measures or regulations that directly apply to the assessed fishery. Such objectives can often be found in a management plan for the fishery.

Question: Does this specific fishery have any management objectives?

If YES

Score this performance indicator and the decision making processes performance indicator (3.2.2).

If NO:

Both this performance indicator and the decision making processes performance indicator (3.2.2) score red. Highlight the lack of fishery-specific objectives and associated decision-making processes.

Red	• Some objectives are implicit within the fishery specific management system but are likely inadequate to be broadly consistent with the precautionary approach and appropriate management of target stocks and ecosystem impacts.
Yellow	• Objectives, which are broadly consistent with the precautionary approach and appropriate management of target stocks and ecosystem impacts, are implicit within the fishery specific management system.
Green	• Short and long term objectives, which are consistent with the precautionary approach and appropriate management of target stocks and ecosystem impacts, are explicit within the fishery specific management system.

Decision-making processes (3.2.2)

Decision-making processes include rules for voting on decisions and public comment periods.

Red	• There are some decision-making processes in place, but they are unlikely to result in measures and strategies to achieve the fishery-specific sustainability objectives. • Decision-making processes do not respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner, nor do they take some account of the wider implications of decisions. • Information on the fishery's performance and management action is generally not available on request to stakeholders. • The management authority or fishery may repeatedly violate the same law or regulation necessary for the sustainability for the fishery.
Yellow	• There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific sustainability objectives. • 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. • Some information on the fishery's performance and management action is generally available on request to stakeholders. • 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 for the fishery.
Green	• There are established decision-making processes that result in measures and strategies to achieve the fishery-specific sustainability objectives. • 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 use the precautionary approach and are based on best available information. • 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.

	• The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.

Compliance and enforcement (3.2.3)

Monitoring, control, and surveillance (MCS) mechanisms relate to enforcement used to support fisheries management, in addition to data collection and legislation. These mechanisms are aimed at reducing non-compliance with regulations and may involve tools such licensing, vessel registration, logbooks, port and dockside monitoring, vessel monitoring systems (VMS), fisheries observer programs, at sea monitoring, boarding and inspection, and IUU vessel listing. For small-scale fisheries with limited financial capacity for implementing MCS, community-based mechanisms (e.g. fisher patrols, clear enforcement protocols and codes for behavior) or cost-effective technologies (e.g. vessel registration, smartphone applications for tracking vessels and their catches) can be useful.

When evaluating sanctions, it is important to consider whether they are actually applied and significant enough to deter non-compliance.

Question: Does this fishery have any MCS mechanisms in place?

If YES

Score this performance indicator.

If NO

Score is red. Highlight the lack of MCS mechanisms.

Red	• Some MCS mechanisms exist, and are implemented in the fishery, but there is not a reasonable expectation that they are effective. • Some sanctions to deal with noncompliance may exist, but there is no clear evidence that they are applied. • Fishers do not consistently comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.
Yellow	• MCS mechanisms exist and are implemented in the fishery, and there is a reasonable expectation that they are effective. • Sanctions to deal with noncompliance exist and there is some evidence that they are applied. • Fishers are generally thought to comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.
Green	• An MCS system has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures,

	strategies and/or rules. • Sanctions to deal with noncompliance exist, are consistently applied, and are thought to provide effective deterrence. • Evidence exists to demonstrate that fishers comply, including, when required, providing information important to the effective management of the fishery. • There is no evidence of systematic noncompliance.

Monitoring and management performance evaluation (3.2.4)

This performance indicator focuses on evaluation and review of the overall management system as well as its components or parts. MSC has not explicitly defined what 'key' parts are, but from our perspective they include monitoring and evaluation of stock status, management of ecosystem impacts (e.g. catches of other species and habitat issues), and performance of the compliance and enforcement system. Additional parts of the management system may include incorporation of scientific feedback/information and effectiveness of consultation and decision-making processes.

Question: Are there any mechanisms in place for monitoring and evaluating performance of the fishery-specific management system?

If YES

Score this indicator.

If NO

Score is red. Highlight the lack of mechanisms for evaluating performance of the fishery-specific management system.

Red	• There may be mechanisms in place to evaluate some parts of the fishery-specific management system, but they are not used. • The fishery-specific management system is not subject to internal or external review.
Yellow	• There are mechanisms in place to evaluate some parts of the fishery-specific management system. • The fishery-specific management system is subject to occasional internal review.
Green	• There are mechanisms in place to evaluate all parts, or at least key parts, of the fishery-specific management system. • The fishery- specific management system is subject to regular internal and occasional external review.

Appendices

Much of the material in the appendices below, including the definitions, were taken from other sources. Superscripts denote source material as follows.

F - FAO Glossary and Term Portal
M - MSC Fisheries Certification Requirements (v 2.0)
S - Monterey Bay Aquarium Seafood Watch Fisheries Standard (v 3.2)

Lower trophic level species

For certain taxa that have an exceptionally important role in the ecosystem, reference points should be based on ecosystem considerations (i.e. maintaining enough biomass to allow the species to fulfill its ecological role), rather than MSY or single-species considerations.[S] Forage species, which often belong to lower trophic levels, are generally considered to be exceptionally important within ecosystems. MSC has identified families of lower trophic level (LTL) fish species, described in Box SA1 in the MSC Fisheries Certification Requirements (FCR) v 2.0.

Species types that are defined by default as “key LTL stocks” for the purposes of an MSC assessment.

Family *Ammodytidae* (sandeels, sandlances)
Family *Clupeidae* (herrings, menhaden, pilchards, sardines, sardinellas, sprats)
Family *Engraulidae* (anchovies)
Family *Euphausiidae* (krill)
Family *Myctophidae* (lanternfish)
Family *Osmeridae* (smelts, capelin)
Genus *Scomber* (mackerels)
Order *Atheriniformes* (silversides, sand smelts)
Species *Trisopterus esmarkii* (Norway pout)

A potentially useful resource is the ASFIS List of Species, which provides information on species included in different families and orders.

It is also possible to identify LTL species on the basis of biological and ecological criteria. For example, MSC suggests that assessors treat species as LTL if the species feeds predominantly on plankton, has a trophic level 2-4, is characterized by small body size/early maturity/high fecundity/short lifespan, and meets at least two of the following criteria (see SA2.2.9 in the MSC FCR v2.0):

1. A large proportion of the trophic connections in the ecosystem involve this stock, leading to significant predator dependency
2. A large volume of energy passing between lower and higher trophic levels passes through the stock
3. There are few other species at this trophic level through which energy can be transmitted from lower to higher trophic levels, such that a high proportion of the total

energy passing between lower and higher trophic levels passes through this stock

Productivity Susceptibility Analysis (PSA)

Instructions for conducting a PSA

These instructions are adapted from the MSC and SFW standards.

1. To conduct a PSA, the assessor needs to use the MSC Risk Based Framework (RBF) Worksheet, which can be downloaded at: https://www.msc.org/documents/scheme-documents/forms-and-templates/rbf-worksheets/view

2. For each data-deficient stock combination (gear type, location, body of water) that is assessed using PSA, a separate PSA score will be calculated. Both productivity and susceptibility will be scored on a three-level risk scale: low, medium and high. Where there is limited or conflicting information for a productivity or susceptibility attribute, use the more precautionary (higher value) score.

3. For Productivity: See the Productivity Table below for guidance. Note that lower productivity corresponds to higher risk (and vice versa). Additional information below for certain attributes:

- Score the average maximum size and average size at maturity for fish species only.
- Score density dependence for invertebrate species only.

Attribute information for fish species can generally be found at Fishbase.org

Productivity Table[M]

Productivity attribute	High productivity (Low risk, score=2)	Medium productivity (Medium risk, score=2)	Low productivity (High risk, score=3)
Average age at maturity	< 5 years	5-15 years	> 15 years
Average maximum age	< 10 years	10-25 years	> 25 years
Fecundity	> 20,000 eggs per year	100-200,000 eggs per year	< 100 eggs per year
Average maximum size (not to be used when scoring invertebrate species)	< 40 cm	40-200 cm	> 200 cm
Reproductive strategy	Broadcast spawner	Demersal egg layer	Live bearer
Trophic level	< 2.75	2.75 - 3.25	> 3.25
Density dependence	Compensatory	No depensatory or	Depensatory

(to be used only when scoring invertebrate species)	dynamics at low population sizes demonstrated or likely	compensatory dynamics demonstrated or likely	dynamics at low population sizes (Allee effects) demonstrated or likely

4. For Susceptibility: See the Susceptibility Table below for guidance. The Susceptibility Table was originally developed by MSC, and then MBA SFW made edits to the table for their own standard because mathematically, the original scoring was such that a low score in any one of the susceptibility attributes would almost always lead to a low or medium vulnerability rating, even in cases where other susceptibility attributes were medium to high risk, and even if the species productivity was very low. As an example, a fishery targeting mature individuals or spawning aggregations would score a "low risk" of susceptibility. In practice, however, there are some very ecologically unsustainable fisheries that target mature fish, such as the fisheries for bluefin tuna. We have used the SFW Susceptibility Table because it is important to score conservatively, especially for a rapid assessment.

Note that lower susceptibility corresponds to lower risk (and vice versa). Additional information for certain attributes is described below:

- "Areal overlap" and "vertical overlap" should be scored with consideration of all fisheries impacting the species.
- "Selectivity" and "post-capture mortality" should be scored with reference to the fishery under assessment only.
- Default values are provided in the table. Default values should be used unless there is evidence to the contrary.

Susceptibility will generally be high for target species because fishing gear and effort will be aimed at maximizing catches.

Susceptibility Table[S]

Susceptibility attribute	Low susceptibility (Low risk, score=1)	Medium susceptibility (Medium risk, score=2)	High susceptibility (High risk, score=3)
Areal overlap (availability) Overlap of the fishing effort with a species concentration of the stock	Vast majority (>90%) of species concentration (main geographic range) is unfished. (Must have evidence.)	Most (70%-90%) of species concentration is unfished by any fishery. (Must have evidence.)	>30% of the species concentration is fished, considering all fisheries. **Default score if unknown.**

Vertical overlap (encounterability) The position of the stock/species within the water column relative to the fishing gear	Low overlap between fishing depths and depth range of species, i.e. most of the species depth range (>=66%) is unfished. (Must have evidence; unlikely for any "main species.")	Medium overlap between fishing depths of depth range of species, i.e. species has considerable portion (>=33%) of depth range that is unfished. (Must have evidence.)	High degree of overlap between fishing depths and depth range of species. **Default score for target species, as well as any air-breathing animal, or when unknown.**
Selectivity of gear type Potential of the gear to retain species	Species is not targeted AND is not likely to be captured by gear (e.g., average body size at maturity is smaller than mesh size (net fisheries), or species is not attracted to the bait used (line fisheries), or is too large to enter trap (pot/trap fisheries), etc. (if known, <33% of individuals of this species encountering gear are captured). Must have evidence.	Species is targeted, or is incidentally encountered AND is not likely to escape the gear, BUT conditions under 'high risk' do not apply. **Default score when conditions under 'high risk' do not apply.**	Species is targeted or is incidentally encountered AND Attributes of the fishery, in combination with the species' biology or behavior, e.g. migratory bottlenecks, spawning aggregation, site fidelity, unusual attraction to gear, sequential hermaphrodite, semelparity, segregation by sex, etc. increase its susceptibility to the gear: e.g. net mesh size allows retention of individuals below size at maturation, or fishery targets spawning aggregations or large fecund females. If effective management measures are in

			place to mitigate the effect of the behavior or requirement, the behavior and/or requirement need not be considered.
Post-capture mortality (PCM) The chance that, if captured, a species would be released and that it would be in a condition permitting subsequent survival	Evidence of majority of captured individuals (>66%) released and survive post-capture.	Evidence of some released postcapture and survival.	Retained species or majority dead when released. **Default score for retained species.**

5. Enter scores into appropriate sheet within the MSC RBF Worksheet, using one row for each species. Check the 'Automated scores' tab for indicator-level (PI) scores.

Glossary

Alternative measures - fishing gear and practices that have been shown (experimentally or otherwise) to minimize the rate of incidental mortality of the species to the lowest achievable levels.[M]

Biologically based limit - the abundance indicator level below which a stock or population is considered to experience serious or irreversible harm.[M]

B_{MSY} - biomass necessary to produce maximum sustainable yield

$B_{40\%}$ - 40% of estimated unfished biomass

Commonly encountered habitats - habitats that regularly come into contact with a gear used by the UoA, considering the geographic overlap of fishing effort with the habitat's range within the management area(s) covered by the governance body(s) relevant to the UoA.[M]

Data-limited or data-poor - refers to fisheries for which there are no estimates of MSY, stock size, or certain life history traits. There may be minimal or no stock assessment data, and uncertainty measurements may be qualitative only.[S]

Depleted - in reference to stocks, at a very low level of abundance compared to historical levels, with dramatically reduced spawning biomass and reproductive capacity. Stocks should be classified as "depleted" if the stock is likely to be below an appropriate limit reference point.[S]

Ecological role - the trophic role of a stock within the ecosystem under assessment.[M]

Ecosystem elements - elements may include trophic structure and function (in particular key prey, predators, and competitors), community composition, productivity pattern (e.g. upwelling or spring bloom, abyssal, etc.), and characteristics of biodiversity.[M]

Effective - management or mitigation strategies are defined as "effective" if a) the management goal is sufficient to maintain the structure and function of affected ecosystems in the long-term,

and b) there is scientific evidence that they are meeting these goals.[S]

Endangered, Threatened or Protected (ETP) Species - species recognised as "threatened," "endangered" or "critically endangered" by national legislation and/or binding international agreements to which the jurisdictions controlling the fishery are party.

Relevant binding international agreements include:[M]

a. Appendix 1 of the Convention on International Trade in Endangered Species (CITES), unless it can be shown that the particular stock of the CITES listed species impacted by the UoA under assessment is not endangered.
b. Binding agreements concluded under the Convention on Migratory Species (CMS), including:
    - Annex 1 of the Agreement on Conservation of Albatross and Petrels (ACAP);
    - Table 1 Column A of the African-Eurasian Migratory Waterbird Agreement (AEWA);
    - Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS);
    - Annex 1, Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS);
    - Wadden Sea Seals Agreement;
    - Any other binding agreements that list relevant ETP species concluded under this Convention.

ETP species also include those classified as 'out-of scope' (amphibians, reptiles, birds and mammals) that are listed in the IUCN (International Union for the Conservation of Nature) Redlist as vulnerable (VU), endangered (EN) or critically endangered (CE).[M] To be precautionary, the ETP classification should also include non 'out-of scope' taxa (i.e. fish and shellfish) listed as EN or CE.[S]

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.[M]

Fishing mortality (*F*) - the rate at which animals are removed from the stock by fishing.[F]

Generation time (*G*) - the average age of a reproductive individual in an unexploited stock, consistent with the definition of Goodyear:[1]

$$G = \frac{\sum_{a-1}^{A} aE_a N_a}{\sum_{a-1}^{A} E_a N_a}$$

where *a* is age, *A* is the oldest age in an unfished state, E_a is the maturity at age *a*, and N_a is the

[1] Goodyear, C.P. 1995. Red snapper in U.S. waters of the Gulf of Mexico. NMFS/SEFSC. Cited by Thompson, G. G., Mace, P. M., Gabriel, W. L., Low, L. L., Maccall, A. D., Methot, R. D., ... Witzig, J. F. (1998). Technical Guidance On the Use of Precautionary Approaches to Implementing National Standard 1 of the Magnuson- Stevens Fishery Conservation and Management Act.

number per recruit alive at age *a* in the absence of fishing.

Habitat - the chemical and bio-physical environment, including biogenic structures, where fishing takes place.[M]

Harvest control rules (HCRs) - 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.[M]

Harvest strategy - the combination of monitoring, stock assessment, harvest control rules and management actions.[M]

Likelihood - The definitions below can be based on quantitative assessment, plausible argument or expert judgment. (See Table SA9 on p. 128 of MSC Fisheries Certification Requirements v2.0.)

- Highly unlikely - less than 30% chance.[M]
- Unlikely - less than 40% chance.[M]
- Likely - 70% chance or greater.[M,S]
- Highly likely - 80% chance or greater.[M]

Limit reference point (LRP) - the point beyond which the state of a fishery and/or a resource is not considered desirable and which management is aiming to avoid.[M] To be considered appropriate, biomass LRPs should generally be no less than half of B_{MSY}, or half of an appropriate target reference point such as $B_{40\%}$.

Management system - the framework of processes and procedures used to ensure that an organisation can fulfil all tasks required to achieve its objectives. In a fisheries context includes agencies involved in the management of the fishery, the legislative framework within which the fishery is undertaken and the core management measures implemented.[M] An appropriate management system uses the best available science to implement policies that minimize the risk of overfishing or damaging the ecosystem, taking into account species vulnerability along with scientific and management uncertainty.[S]

Management strategies or measures:

- *Measures* - actions or tools in place within the management system that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.[M]
- *Partial strategy* - a cohesive arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to manage the impact on that component specifically.[M]
- *Strategy or full strategy* - a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/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 light of identification of unacceptable impacts.[M]

Maximum sustainable yield (MSY) - 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.[M]

Overfishing - a generic term used to refer to a level of fishing effort or fishing mortality such that a reduction of effort would, in the medium term, lead to an increase in the total catch; or, a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis.[F]

- *Biological overfishing*: Catching such a high proportion of one or all age classes in a fishery as to reduce yields and drive stock biomass and spawning potential below safe levels. In a surplus production model, biological overfishing occurs when fishing levels are higher than those required for extracting the Maximum Sustainable Yield (MSY) of a resource and recruitment starts to decrease.[F]
- *Recruitment overfishing*: the rate of fishing above which the recruitment to the exploitable stock becomes significantly reduced. This is characterized by a greatly reduced spawning stock, a decreasing proportion of older fish in the catch, and generally very low recruitment year after year. Recruitment may lead to stock collapse if prolonged and combined with poor environmental conditions.[F]
- *Growth overfishing*: Occurs when too many small fish are being harvested too early through excessive fishing effort and poor selectivity (e.g., excessively small mesh sizes), and the fish are not given enough time to grow to the size at which maximum yield-per-recruit would be obtained from the stock. Reduction of fishing mortality among juveniles, or their outright protection, would lead to an increase in yield from the fishery. Growth overfishing occurs when the fishing mortality rate is above Fmax (in a yield-per-recruit model). This means that individual fish are caught before they have a chance to reach their maximum growth potential. Growth overfishing, by itself, does not affect the ability of a fish population to replace itself.[F]
- *Economic overfishing*: Occurs when a fishery is generating no economic rent, primarily because an excessive level of fishing effort is applied in the fishery. This condition does not always imply biological overfishing.[F]

Precautionary approach - approach involving the application of prudent foresight, taking into account the uncertainties in fisheries systems and considering the need to take action with incomplete knowledge. The precautionary approach requires, inter alia: (i) consideration of the needs of future generations and avoidance of changes that are not potentially reversible; (ii) prior identification of undesirable outcomes and measures to avoid or correct them promptly; (iii) initiation of any necessary corrective measures without delay and on a timescale appropriate for the species' biology; (iv) conservation of the productive capacity of the resource where the likely impact of resource use is uncertain; (v) maintenance of harvesting and processing capacities commensurate with estimated sustainable levels of the resource and containment of these capacities when resource productivity is highly uncertain; (vi) adherence to authorized management and periodic review practices for all fishing activities; (viii) establishment of legal and institutional frameworks for fishery management within which plans are implemented to address the above points for each fishery, and (ix) appropriate placement of the burden of proof by adhering to the requirements above.[S,F]

Principle - a fundamental element, in the MSC's case, used as the basis for defining a well-managed and sustainable fishery.[M]

Productivity-Susceptibility Analysis (PSA) - this semi-quantitative approach examines several attributes of each species that contribute to or reflect its productivity or susceptibility, in order to provide a relative measure of the risk to the scoring element from fishing activities.[M]

Qualitative data - data describing the attributes or properties that an object possesses. The properties are categorized into classes that may be assigned numeric values. However, there is no significance to the data values themselves, they simply represent attributes of the object concerned.[M]

Quantitative data - data expressing a certain quantity, amount or range. Usually, there are measurement units associated with the data, e.g. metres, in the case of the height of a person. It makes sense to set boundary limits to such data, and it is also meaningful to apply arithmetic operations to the data.[M]

Recent stock assessment - as a rule of thumb, stock assessments or updates conducted within the last five years are considered to be recent. If the stock assessment is very out of date – as a rule of thumb, >10 years old – the stock status should be considered unknown and rated accordingly.[S]

Recruitment impairment - Situation where fishing activity impacts the stock—either through reduced abundance, changes in size, sex or age distribution, or reduction of reproductive capacity at age—to a degree that will diminish the growth and/or reproduction of the population over the long-term (multiple generations); or, the stock is below an appropriate limit reference point.[S]

Reference points - reference points used to define management action in response to stock biomass, stock status, or fishing mortality. Appropriate reference points are designed with the goal of maintaining stock biomass at or above the point where yield is maximized (target reference points; TRPs) and safely above the point where recruitment is impaired (limit reference points; LRPs). Fishing mortality reference points should be designed with the goal of ensuring that catch does not exceed sustainable yield and has a very low likelihood of leading to depletion of the stock in the future.[S]

Reliable data or information - data produced or verified by an independent third party. Reliable data may include government reports, peer-reviewed science, audit reports, etc. Data are not considered reliable if significant scientific controversy exists over the data, or if data are old or otherwise unlikely to represent current conditions.[S]

Retained species - species that are retained by the fishery (usually because they are commercially valuable or because they are required to be retained by management rules).[M]

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.[M]

Species of concern - species about which management has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species as endangered.[S]

Stakeholder - any person or group (including governmental and non-governmental institutions, traditional communities, universities, research institutions, development agencies and banks, donors, etc.) with an interest or claim (whether stated or implied) which has the potential of being impacted by or having an impact on a given project and its objectives. Stakeholder groups that have a direct or indirect "stake" can be at the household, community, local, regional, national, or international level.[M]

Standard - a document established by consensus and approved by a recognised body that provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.[M]

Stock - the living resources in the community or population from which catches are taken in a fishery. Use of the term stock implies that the particular population is a biologically distinct unit, i.e. not strongly linked to other populations through interbreeding, immigration, or emigration.[M,S] Some species form a single stock (e.g. southern bluefin tuna) while others are composed of several stocks (e.g. albacore tuna in the Pacific Ocean comprises separate Northern and Southern stocks).[F]

Stock assessment - an integrated analysis of information to estimate the status and trends of a population against benchmarks such as reference points.[M]

Strategy - a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/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 fishing practices in the light of the identification of unacceptable impacts.[M]

Susceptibility - a stock's capacity to be impacted by the fishery under consideration, depending on factors such as the stock's likelihood to be captured by the fishing gear.[S]

Sustainable level (of fishing mortality) - a level of fishing mortality that will not reduce a stock below the point where recruitment is impaired, i.e., above F reference points, where defined. The F limit reference points should be around either FMSY or $F_{35\%}$ to $F_{40\%}$ for moderately productive stocks; low productivity stocks like rockfish and sharks require F in the range of F50–60% or lower. Higher F values require a strong scientific rationale. The F reference points are limit reference points, so buffers should be used to ensure that fishing mortality does not exceed these levels. Where F is unknown but MSY is estimated, fishing mortality at least 25% below MSY is considered a sustainable level (for fisheries that are at or above BMSY).

Target reference point (TRP) - the point which corresponds to a state of a fishery and/or resource which is considered desirable and which management is trying to achieve.[M] To be considered appropriate, biomass TRPs should generally not be lower than B_{MSY} or $B_{35\%}$ to $B_{40\%}$.[S]

Tools - mechanisms for implementing fishery management strategies. For example, total allowable catches, mesh regulations, closed areas, etc. could be used to implement harvest control rules.[M]

Uncertainty - lack of perfect knowledge of many factors that affect stock assessments, estimation of biological reference points and management, and the consequence of this lack of

perfect knowledge.[M]

Vulnerable marine ecosystem (VME) - VMEs have features that are physically or functionally fragile, and the most vulnerable are both easily disturbed and are very slow to recover. VMEs include seamounts, hydrothermal vents, cold water corals and sponge fields.[F] MSC also provides guidance on identifying VMEs in GSA3.13.3.2 (MSC FCR v2.0, pp. 435-436).

Additional resources

Data-limited Methods Toolkit

The Data-limited Methods Toolkit, or DLM Tool, was developed by a collaboration between the University of British Columbia's Fisheries Centre and the Natural Resources Defense Council (NRDC). It can be used to identify appropriate data-limited management procedures for fisheries that lack the data to conduct a conventional stock assessment, and includes the following three components:

- Management Strategy Evaluation (MSE) – compares management procedures through simulation testing and identifies acceptable harvest control rules.
- Management Procedure Application – recognizes which methods can be applied with the actual data available for the stock to provide guidance for fisheries managers.
- Value-of-Information Analysis - identifies which operating model and observation parameters are most important based on the MSE results, to assist with prioritization of data collection in the future.

The DLM Toolkit can be useful for setting harvest control rules, if the rapid assessment identifies a need for their development. It can also be used to provide recommendations on fisheries data to be monitored.

FishPath

The Nature Conservancy has supported development of FishPath and describes the tool as "A Decision Support System for Assessing and Managing Data- and Capacity- Limited Fisheries." FishPath is being developed by a team of scientists and is designed to help managers of data-limited fisheries identify appropriate monitoring, assessment and decision rules for their system. The tool can be useful for engaging with fisheries that have identified a need to improve management practices, and to provide them with specific recommendations.

Framework for Integrated Stock and Habitat Evaluation (FISHE)

The FISHE framework developed by EDF provides scientific guidance for the management of data-limited fisheries. FISHE includes several tools for assessing stocks and setting management goals, including harvest control rules. Below are descriptions of some of these tools that may be relevant for fishery evaluation and FIP development.

Principle 1

- Step 4 of FISHE provides guidance on a handful of the simplest, quickest, most common data-limited methods for obtaining information on stock status, which can be applied

rapidly and paired with the PSA outcomes to inform Principle 1 evaluation, particularly for the stock status outcome and stock rebuilding outcome indicators.

- For stocks with more data, Step 9 of FISHE may be useful for evaluating stock status outcome.
- Step 8 of FISHE provides guidance on setting harvest control rules, which relates to the harvest strategy and harvest control rules indicators.
- The FISHE Method Matrix can help inform which stock evaluation methods are appropriate for a given fishery, based on data availability.
- FISHE also includes guidance for designing a data collection/ monitoring system, which could be improve the information and monitoring indicator.

Principle 2

- Step 2 of FISHE provides tools that can be used to assess habitat and ecosystem health and vulnerability.
- Step 5 of FISHE gives guidance on prioritizing species for further assessment.

Principle 3

- Step 11 of FISHE could be valuable to users wanting more information on what types of management "measures" are available to them.
- Step 1 of FISHE is about setting management goals, which could be helpful both to users and designers of this assessment for the long term and fishery-specific objectives indicators.