Disclaimers:

This document is a draft for the purposes of public consultation. Content may change based on feedback or further testing, and should not be treated as a normative MSC scheme document. Links may not be functional at this stage, and some sections may include provisional language or policy changes pending further technical input.

For the purposes of presenting the changes to the Toolbox, only the following sections listed below are included in this draft document. Other sections, such as the Benthic Impacts Tool, are not included in this draft document as no changes are proposed therein. Page numbers will therefore not correspond with the currently published Toolbox.

Note:

The proposed changes to the MSC Fisheries Standard Toolbox can be found in track changes at:

- Guidance for Section 5: Requirements for CABs
- Tool A: Risk-Based Framework
- Guidance for Tool A: Risk-Based Framework
- Tool B: Evidence Requirements Framework
- Guidance for Tool B: Evidence Requirements Framework

Public consultation on these changes opens 10th July 2025 and will conclude on 10th September 2025. Please see more information about the consultation here.

The MSC welcomes your feedback on the proposed changes.

MSC Fisheries Standard Toolbox

Public Consultation Draft

July – September 2025

5 Requirements for CABs

5.1 General requirements

5.1.1 If the CAB is required to use a mandatory tool or chooses to use an optional tool, the team shall follow the requirements for that tool.

5.2 Determining whether a tool is applicable

5.2.1 The CAB shall use Tables 4, 5 and 6 to determine whether a tool is applicable to a UoA for Principles 1, 2 and 3 respectively.

5.2.1.1 The CAB shall apply the criteria in Tables 4, 5 and 6 to all scoring elements that the team has identified.

5.2.1.2 Where more than one triggering criteria are listed, but only one criterion is met the CAB shall trigger the tool.

5.2.2 The CAB shall not derive their own stock status reference points for the criteria for triggering and selecting tools for PI 1.1.1 and PI 2.1.1.

5.2.3 If a PI contains some scoring elements scored using the default assessment tree (and additional MSC Fisheries Standard sections for modified trees), and other scoring elements that trigger the use of a tool, the team shall only apply a tool to the relevant scoring element(s).

5.2.3.3 An exception to 5.2.3 is the Benthic Impacts Tool shall be used to inform scoring of PI 2.3.1 for all scoring element(s).

5.2.4 If some form of indicators and reference points are available for the UoA, the team shall not use uncertainties in the stock definition or stock assessment models as a justification for applying a tool to Principle 1 PIs.

5.2.5 If the Risk-Based Framework is selected, the team shall follow Tool A.

5.2.6 The team shall follow Tool B for required PIs (as per Tables 4, 5 and 6).

a. For all PIs in P2, if both the default tree and the Risk-Based Framework are used to score an Outcome PI (as per 5.3.1.1), the team shall use Tool B to score the Information PIs only for scoring elements whose Outcome PI has been scored using the default tree.

5.2.7 If the Benthic Impacts Tool is selected, the team shall follow Tool C.

5.2.8 If the early application process for Section SE is selected, the team shall follow Tool D.

5.2.9 The team shall not change the tool(s) it has selected after the date of the site visit.

5.2.10 If more than one optional tool is applicable for scoring the same PI(s), the team shall provide a rationale for the tool selected.

Table 1: Criteria for triggering and selecting tool(s) in Principle 1

Performance Indicator (PI)	Criteria	Next steps
1.1.1 Stock status	Stock status reference points are not available, derived either from analytical stock assessment or using empirical approaches.	If criteria met. use Tool A (Risk-Based Framework) for this PI and consult Table A1 for implications of using Tool A on other PIs.
1.2.1 Harvest strategy	Scoring shark finning. The target stock is managed by an RFMO and the majority (more than half) of overlapping UoCs (i.e. UoCs that include the same P1 target stock) agree to adopt Section SE ahead of reassessment or transition assessment.	Use Tool B (Evidence Requirements Framework) for shark finning SI. If criteria met. use Tool D (Early Application of Section SE) for PI 1.2.1 SI a & b
1.2.2 Harvest control rules and tools	The target stock is managed by an RFMO and the majority (more than half) of overlapping UoCs (i.e. UoCs that include the same P1 target stock) agree to adopt Section SE ahead of reassessment or transition assessment.	If criteria met, use Tool D (Early Application of Section SE) for PI 1.2.2
1.2.3 Information/monitoring	N/A	If Tool A is used to score PI 1.1.1, consult Table A1 and use the alternative PI in Section A1.2.
1.2.4 Assessment of stock status	N/A	Use default Performance Indicator Scoring Guideposts within default assessment tree for this PI.

Table 2: Criteria for triggering and selecting tool(s) in Principle 2

Performance Indicator (PI)	Criteria	Next steps
2.1.1 In scope species outcome	Stock status reference points are not available, derived either from analytical stock assessment or using empirical approaches	If criteria met. use Tool A (Risk-Based Framework) for this PI and consult Table A1 for implications of using Tool A on other PIs.
2.1.2 In scope species management	N/A	Use Tool B (Evidence Requirements Framework) for shark finning SI.
2.1.3 In scope species information	N/A	For this PI, use Tool B (Evidence Requirements Framework) only if PI 2.1.1 is scored with the default assessment tree. If some elements are scored with the default assessment tree, and others are scored with Tool A (Risk-Based Framework) in PI 2.1.1, then use Tool B only for those scored with the default assessment tree. If Tool A is used to score PI 2.1.1, consult Table A1 and use the alternative PI in Section A1.2.
2.2.1 ETP/OOS species outcome	1. The population status of the ETP/OOS unit is not known with respect to favourable conservation status (as defined in MSC Fisheries Standard SA3.9.2), **or** 2. The direct impacts of the UoA on the ETP/OOS unit in relation to favourable conservation status have not been quantitatively determined by an independent source. Note the team shall not trigger the Risk-Based Framework for PI 2.2.1 for marine mammal species that are subject to intentional killing or harassment as integral part of the fishing operation.	If either criteria is met, use Tool A (Risk-Based Framework) for this PI and consult Table A1 for implications of using Tool A on other PIs.
2.2.2 ETP/OOS species management	NA	Use Tool B (Evidence Requirements Framework) for shark finning SI.
2.2.3 ETP/OOS species information	NA	For this PI, use Tool B (Evidence Requirements Framework) only if PI 2.2.1 is scored with the default assessment tree. If some elements are scored with the default assessment tree, and others are scored with Tool A (Risk-Based Framework) in PI 2.2.1, then use Tool B only for those scored with the default assessment tree.

Performance Indicator (PI)	Criteria	Next steps
		If Tool A is used to score PI 2.2.1, consult Table A1 and use the alternative PI in Section A1.2.
2.3.1 Habitats outcome	1. Quantitative information on the substratum, geomorphology, and biota of the habitats encountered (such as habitat mapping of the managed area), is not available, **or** 2. Gear specific, quantitative information of impact of the UoA on habitats encountered is not available. This information shall include knowledge of habitat regeneration ability that is either specific to the UoA or provided by relevant research that considers impact of the gear(s) on habitats in the relevant area.	If either criteria are met, use Tool A (Risk-Based Framework) for this PI and consult Table A1 for implications of using Tool A on other PIs. Option to use Tool C (Benthic Impact Tool) to inform scoring of PI 2.3.1, SI (a) (may be used in conjunction with the default assessment tree or RBF)
2.3.2 Habitat management strategy	NA	Use Tool B (Evidence Requirements Framework) for this PI.
2.3.3 Habitat information	NA	For this PI, use Tool B (Evidence Requirements Framework) only if PI 2.3.1 is scored with the default assessment tree. If some elements are scored with the default assessment tree, and others are scored with Tool A (Risk-Based Framework) in PI 2.3.1, then use Tool B only for those scored with the default assessment tree. If Tool A is triggered and used to score PI 2.3.1, consult Table A1 and use the alternative PI in Section A1.2.
2.4.1 Ecosystem outcome	Quantitative information is not available to assess the impact of the UoA on the ecosystem	If criteria is met, use Tool A (Risk-Based Framework) for this PI and consult Table A1 for implications of using Tool A on other PIs.
2.4.2 Ecosystem management strategy	NA	Use default Performance Indicator Scoring Guideposts within default assessment tree for this PI.
2.4.3 Ecosystem information	NA	Use default Performance Indicator Scoring Guideposts within default assessment tree for this PI.

Table 3– Criteria for triggering and selecting tool(s) in Principle 3

Performance Indicator (PI)	Criteria	Next steps
3.2.3 Compliance and enforcement	NA	Use Tool B (Evidence Requirements Framework) for PI 3.2.3 SI (c)

5.3 Reporting tool results

5.3.1 The team shall report all scoring outcomes from using the Toolbox in the 'MSC Reporting Template'.

5.4 Period of validity of tool results

5.4.1 The team shall only consider results from any tool in the Toolbox as valid for use in an MSC fishery assessment if all the following conditions are met:

a. The tool was applied within 1 year of the publication of the Announcement Comment Draft Report for the assessment (FCP v2.3/v3.1 7.10.1).

b. The version of the Toolbox applied has not been superseded by a major version update (see **Error! Reference source not found.**).

c. The user manual for the tool has not been superseded by a major version update (see **Error! Reference source not found.**).

d. The CAB has reviewed the results and determined that the results are in compliance with the tool requirements.

End of Requirements for CABs

Guidance for Section 5: Requirements for CABs

G5.2 Determining whether a tool is applicable ▲

In Table 5, the second criteria for ETP/OOS states “The direct impacts of the UoA on the ETP/OOS unit in relation to favourable conservation status have not been quantitatively determined by an independent source.” The intent of this requirement is that the source is independent of the CAB (i.e., the CAB is not the one carrying out the evaluation).

The CAB should also consider the independence of the source in relation to the client, and where the source is not fully independent of the client, that there are processes in place that would ensure independence. For example, if the client were to contract a consultant or body to carry out a quantitative evaluation of the ETP/OOS unit in relation to favourable conservation status, the CAB may expect to see that this evaluation has been peer reviewed to ensure a level of independence.

End of Guidance for Section 5: Requirements for CABs

Tool A: Risk-Based Framework

A1 Introduction to the Risk-Based Framework (RBF)

A1.2 Applying the RBF in scoring different PIs

A1.2.1 There are 4 methodologies within the RBF:

a. Consequence Analysis (CA).

b. Productivity Susceptibility Analysis (PSA).

c. Consequence Spatial Analysis (CSA).

d. Scale Intensity Consequence Analysis (SICA).

A1.2.2 The team shall verify that they can trigger the RBF for a particular scoring element within a PI using Tables 4, 5 and A1.

A1.2.3 The team shall use Table A1 to determine which Risk-Based Framework methodology to use.

A1.2.4 The team shall score scoring elements that are not eligible for the RBF using the default assessment tree, taking account of any accompanying guidance specific to that PI.

A1.2.4.1 The team shall identify any implications for other PIs using Figure A1 and Table A1, prior to proceeding.

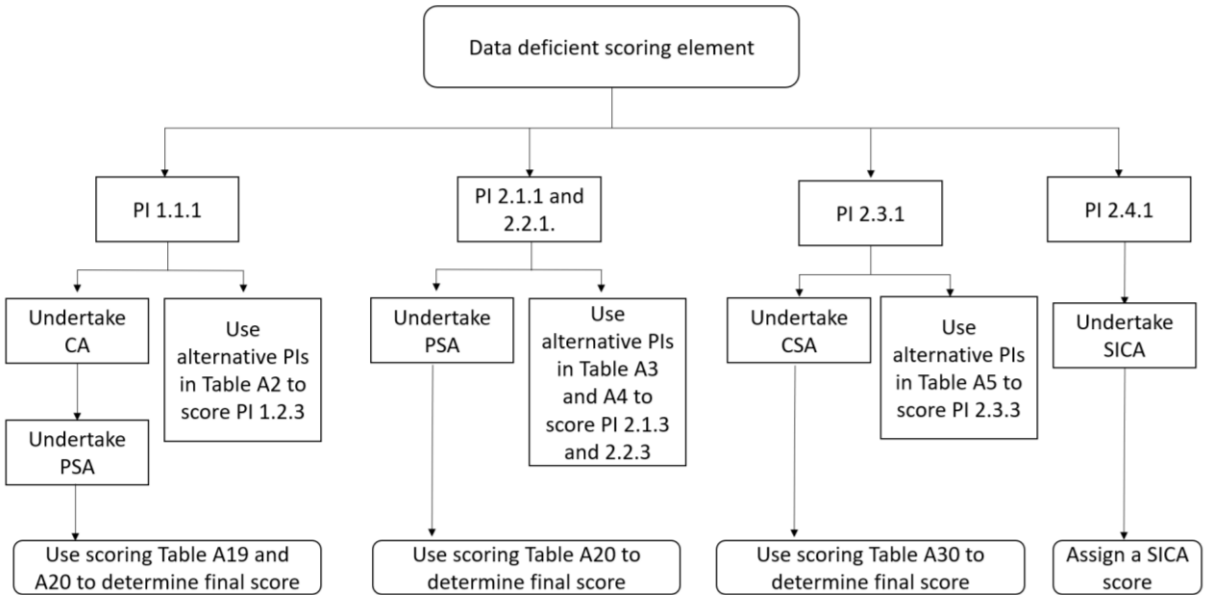


Figure A1: How to apply the RBF in scoring

Table A1: RBF PIs methodologies and implications for non-RBF PIs

PI	RBF	Notes
1.1.1 Stock status	**Yes**	**The team shall use both CA and PSA if the RBF is triggered.**
1.1.2 Stock rebuilding	No	If the RBF is used to score PI 1.1.1, the team shall not score this PI.
1.2.1 Harvest strategy	No	The team shall score this PI as normal.

PI	RBF	Notes
1.2.2 Harvest control rules and tools	No	The team shall score this PI as normal.
1.2.3 Information/monitoring	No	If the RBF is used to score PI 1.1.1, the team shall use the RBF alternative PI in Section A1.2.
1.2.4 Assessment of stock status	No	If RBF is used to score PI 1.1.1, the team shall assign a default score of 80 to this PI.
2.1.1 In scope species outcome	**Yes**	**The team shall use the PSA alone if the RBF is triggered.**
2.1.2 In scope species management strategy	No	~~The team shall score this PI as normal.~~ If the RBF is used to score PI 2.1.1, in PI 2.1.2 scoring issue (a), the team shall consider how elements of the management strategy combine to manage impact, such that susceptibility is maintained at or below acceptable levels given the productivity of the species.
2.1.3 In scope species information	No	If the RBF is used to score PI 2.1.1, the team shall use the RBF alternative PI in Section A1.2.
2.2.1 ETP/OOS Species outcome	**Yes**	**The team shall use the PSA alone if the RBF is triggered.**
2.2.2 ETP/OOS Species management strategy	No	~~The team shall score this PI as normal.~~ If the RBF is used to score PI 2.2.1, in PI 2.2.2 scoring issue (a), the team shall consider how the elements of the management strategy combine to minimise mortalities of the ETP/OOS unit and ensure that impacts on ETP/OOS species are managed such that susceptibility is maintained at or below acceptable levels given the productivity of the species.
2.2.3 ETP/OOS Species information	No	If the RBF is used to score PI 2.2.1, the team shall use the RBF alternative PI in Section A1.2.
2.3.1 Habitats outcome	**Yes**	**The team shall use the CSA alone if the RBF is triggered.**
2.3.2 Habitats management strategy	No	~~The team shall score this PI as normal.~~ If the RBF is used to score PI 2.3.1, in PI 2.3.2 scoring issue (a), the team shall consider how elements of the management strategy combine to manage impact, such that consequence is maintained at or below acceptable levels given the spatial attributes of the habitat.

PI	RBF	Notes
2.3.3 Habitats information	No	If the RBF is tiggered and used to score PI 2.3.1, the team shall use the RBF alternative PI in section **Error! Reference s ource not found.**.2. If the team has opted to use the CSA as per the MSC Fisheries Standard SA3.12.1.c, the team shall score the information PI in the default tree.
2.4.1 Ecosystem outcome	**Yes**	**The team shall use the SICA alone if the RBF is triggered.**
2.4.2 Ecosystem management strategy	No	~~The team shall score this PI as normal.~~If the RBF is used to score PI 2.4.1, in PI 2.4.2 scoring issue (a), the team shall consider how elements of the management strategy combine to manage impact, such that consequence is maintained at or below acceptable levels for the most vulnerable subcomponent of the ecosystem.
2.4.3 Ecosystem information	No	The team shall score this PI as normal.
Principle 3 PIs	No	The team shall not the apply the RBF to score any PIs within Principle 3.

A1.3 Alternative Performance Indicators

A1.3.1 The team shall use the alternative PIs listed in Tables A2 to A5 where applicable, as per Table A1.

A1.3.2 The team shall distinguish the alternative PIs for the RBF from default PIs with the use of the suffix ‘R’.

Table A2: PI 1.2.3R information/monitoring PISGs if the RBF is used to score PI 1.1.1 for the UoA ◙

Component	PI	Scoring issues	SG60	SG80	SG100
Harvest strategy	Information / monitoring **1.2.3R** Relevant information is collected to support the harvest strategy.	(a) Range of information	**Some** relevant information related to consequence analysis (CA) and productivity and susceptibility attributes for the target species are available to support the harvest strategy.	**Sufficient** relevant information related to consequence analysis (CA) and productivity and susceptibility attributes for the target species are available to support the harvest strategy.	A **comprehensive range** of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly relevant to the current harvest

					strategy, is available.
		(b) Monitoring ◙	Stock abundance and UoA removals are monitored and **at least 1 indicator** is available and monitored with sufficient frequency to support the harvest strategy.	Stock abundance and UoA removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest strategy, and 1 or more indicators** are available and monitored with sufficient frequency to support the harvest strategy.	**All information** required by the harvest strategy is monitored with high frequency and a high degree of certainty, and there is a good understanding of the inherent **uncertainties** in the information (data) and the robustness of assessment and management in dealing with this uncertainty.
		(c) Comprehen-siveness of information ◙		There is good information on all other fishery removals from the stock.	

A1.3.3 In considering the status of the stock in P1, the team shall consider information about mortality that is observed and mortality that is unobserved.

A1.3.4 The team shall interpret “sufficient” information at the SG80 level to mean that all information required to implement the harvest strategy is available at a quality and quantity necessary to demonstrate achievement of the SG80 outcome PI 1.1.1.

A1.3.5 The team shall interpret a “comprehensive range of information” and “all information” at the SG100 level to include information provided by a strategic research plan.

A1.3.5.1 This information shall go beyond the immediate short-term management needs to create a strategic body of research relevant to the long-term UoA-specific management system.

A1.3.6 The team shall assess the veracity of information.

Table A3: PI 2.1.3R In scope species information PISGs if RBF is used to score PI 2.1.1 for the UoA

Component	PI	Scoring issues	SG60	SG80	SG100
In scope species	Information **2.1.3R** Information on the nature and amount of in-scope species	(a) Information adequacy for assessment of impact on main in-scope species	Qualitative information is adequate to estimate productivity and susceptibility attributes for main in-scope species.	Some quantitative information is adequate to assess productivity and susceptibility attributes for main in-scope species.	

Component	PI	Scoring issues	SG60	SG80	SG100
	taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage in-scope species.	(b) Information adequacy for assessment of impact on minor in-scope species			Some quantitative information is adequate to **estimate** the impact of the UoA on minor in-scope species with respect to status.
		(c) Information adequacy for management strategy	Information is adequate to support **measures** to manage **main** in-scope species.	Information is adequate to support a **partial strategy** to manage **main** in-scope species.	Information is adequate to support a **strategy** to manage **all** in scope species, and evaluate with a **high degree of certainty** whether the strategy is achieving its objective.

A1.3.7 The team shall report the catch- and UoA-related mortality of all “main” species taken by the UoA.

A1.3.7.1 If the team has assessed a species or proportion of the catch of a species as “unwanted catch”, the team shall indicate the proportion of the catch that is unwanted for each of these species.

A1.3.8 In scoring issue (c), the team shall use its expert judgement to consider the adequacy of information in relation to supporting the management measures, partial strategy, or strategy, including the ability to detect any changes in risk level to in-scope species. ◙

Table A4: PI 2.2.3R ETP/OOS species information PISGs if RBF is used to score PI 2.2.1 for the UoA

Component	PI	Scoring issues	SG60	SG80	SG100
ETP/ OOS species	Information 2.2.3R Relevant information is collected to support the management of UoA impacts on the ETP/OOS unit, including:	(a) Information adequacy for assessment of impacts	Qualitative information is adequate to estimate productivity and susceptibility attributes for the ETP/OOS unit.	Some quantitative information is adequate to assess productivity and susceptibility attributes for the ETP/OOS unit.	
		(b) Information adequacy for management strategy	Information is adequate to support measures to manage the	Information is adequate to support a strategy to manage impacts on the ETP/OOS	Information is adequate to support a comprehensive strategy to manage impacts

	- Information for the development of the management strategy. - Information to assess the effectiveness of the management strategy. - Information to determine the outcome status of the ETP/OOS unit.		impacts on the ETP/OOS unit.	unit, and to measure trends to evaluate the effectiveness of the measures to minimise mortality.	on the ETP/OOS unit, and to evaluate the effectiveness of the measures to minimise mortality with a high degree of certainty.

A1.3.9 In scoring issue (b), the team shall use its expert judgement to consider the adequacy of information in relation to supporting the management “measures”, “strategy”, or “comprehensive strategy”.

Table A5: PI 2.3.3R Habitats information PISGs if CSA is used to score PI 2.3.1 for the UoA

Component	PI	Scoring issues	SG60	SG80	SG100
Habitats	Information / monitoring **2.3.3R** Information is adequate to determine the risk posed to habitats by the UoA and the effectiveness of the strategy to manage impacts on the habitats.	(a) Information quality	Qualitative information is adequate to estimate the types and distribution of habitats.	Some quantitative information is available and is adequate to estimate the types and distribution of habitats.	The distribution of habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.
		(b) Information adequacy for assessment of impacts	Qualitative information is adequate to estimate the consequence and spatial attributes of habitats.	Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of habitats.	
		(c) Monitoring ◙		Adequate information continues to be collected to detect any increase in risk to habitats.	Changes in habitat distributions over time are measured.

A2 Stakeholder involvement in RBF

A2.1 Announcing the RBF ◙

A2.1.1 If the team determines that the RBF is to be used, the team shall:

a. Describe and justify the use of the RBF ~~using the form 'MSC Use of the RBF in a Fishery Assessment Form'~~ in the Fishery Announcement template.

~~b. Upload the form to the MSC database for publication on the MSC website.~~

~~c. Inform stakeholders of the proposal to use the RBF.~~

~~a. Allow at least 30 days for comment.~~

~~d. Consider all stakeholder input, recording why each comment has been accepted or rejected.~~

~~b. Review the decision to use the RBF, taking into account stakeholder input.~~

b. If a decision is made not to use the RBF for any PI or scoring element for which it was previously announced, resubmit and update the 'MSC Use of the RBF in a Fishery Assessment Form' for publication on the MSC website.

~~e.~~c. If a decision is made to use the RBF after the point of Announcement, describe and justify the use of the RBF using the form 'MSC Use of the RBF in a Fishery Assessment Form'.

~~f.~~d. Inform stakeholders of the proposal to use the RBF and allow 30 days for comment.~~Repeat steps A2.1.1.a-g if the team determines that the RBF is to be used for PIs not previously announced.~~

A2.1.2 If the team determines that only main species will be assessed using the RBF (as per A4.1.5), then the team should announce the RBF only for those main species.

A2.1.3 If only minor species will trigger the RBF, but the team is confident that only main species will be scored during the assessment, or that there are no main species, then the team should not announce the RBF.

A2.1.4 If at the site visit, information comes to light that the RBF needs to be used to score more PIs or scoring elements than had been previously announced, the team shall conduct ~~an~~ additional ~~site visit~~stakeholder consultation as per ~~A2.1.1.h~~ A2.3.3.

A2.2 Information gathering ◙

A2.2.1 Prior to the ~~site visit~~fishery announcement, the team shall gather information needed for scoring, including:

a. Management arrangements in place together with any specific strategies, such as bycatch mitigation or recovery strategies. ◙

b. Descriptions of any monitoring strategies in place, including at-sea observer programmes (coverage, duration, objectives).

c. Maps of:

i. The distribution of fishing effort within the jurisdictional boundaries of the UoA.

ii. The distribution of all fishing effort on the target stock outside the UoA.

iii. Species, habitat and community distributions (including depth ranges).

d. When using the CA, information needed to:

i. Assist in identifying the most vulnerable subcomponent for a species.

ii. Score the consequence of fishing activity on the species.

e. When using the PSA, information needed for scoring:

i. The productivity attributes of each species.

ii. The susceptibility attributes of the species.

f. When using the CSA, information needed to: ◙

i. Define habitat(s).

ii. Score the consequence attributes of the Unit of Assessment's (UoA) habitat(s).

iii. Score the spatial attributes of the UoA's habitat(s).

g. When using the SICA, information needed for scoring:

i. The spatial scale of the UoA on the ecosystem.

ii. The temporal scale of the UoA on the ecosystem.

iii. The intensity of the UoA on the ecosystem.

iv. The consequence of the activity on the ecosystem.

A2.2.2 Information used for scoring shall comply with FCP 7.15.1.1.

A2.2.3 The team shall use all the data available as part of the assessment and reflect the analysis of this information when scoring the fishery.

~~A2.2.3~~A2.2.4 The team shall use the information gathered to present one of the following options in the Announcement Comment Draft Report:

a. Provide background information to inform the stakeholder consultation process and identify data gaps relating to the applicable methodology (CA, PSA, CSA, SICA), or

i. Provide background information and draft scores using the applicable methodology (CA, PSA, CSA, SICA) and identify any data gaps.

A2.3 Stakeholder consultation

A2.3.1 The team shall carry out a stakeholder consultation process to gather data and to seek expert opinions (see FCP Section 7.13 and 7.14).

A2.3.2 The CAB shall inform stakeholders of the use of the RBF in the fishery assessment by including in communication, as a minimum, text equivalent to the following: (A2.1; FCP 7.10.2.f & g). ◙

a. "A key purpose of the site visit is to collect information and speak to stakeholders with an interest in the fishery. For those parts of the assessment involving the MSC's Risk-Based Framework (RBF, see msc.org), we will be using a stakeholder-driven, qualitative and semi-quantitative analysis during the site visit. To achieve a robust outcome from this consultative approach, we rely heavily on participation of a broad range of stakeholders with a balance of knowledge of the fishery. We encourage any stakeholders with experience or knowledge of the fishery to participate in these meetings."

A2.3.3 The team shall plan the stakeholder consultation strategy to ~~ensure~~ facilitate effective participation from ~~a range of~~ stakeholders based on an evaluation of the number and types of PIs and scoring elements to assess, need for interaction between stakeholder groups, and language and cultural issues. ◙

A2.3.3.1 The team shall ~~consult a range of~~facilitate engagement with relevant stakeholder groups with knowledge on the operation and management of the UoA or on the scoring elements it interacts with. ◙

~~A2.3.3.1~~A2.3.3.2 The team shall provide a description of their stakeholder consultation strategy in the MSC Reporting Template.

~~A2.3.3.2 The team shall identify stakeholders early in the assessment process.~~ ◙

~~A2.3.3.3 The team shall organise in person or remote meetings to allow for the highest participation of stakeholders. ◙~~

~~A2.3.3.4 The team shall structure meetings to encourage engagement amongst stakeholders. ◙~~

~~A2.3.3.5 If different language groups, educational/vocabulary levels or cultural behaviours are present, the team shall consider separate consultations tailored to those specific interest groups.~~

~~A2.3.3.6 The team shall conduct stakeholder consultation in a language that can be understood by all stakeholders.~~

~~A2.3.3.7 The team shall prepare any materials required for the stakeholder consultation in a language understood by all participants.~~

~~A2.3.3.8 The team shall make available background information on the UoA (including that collected under A2.2.1) ahead of the meeting so that the stakeholder consultation process is focused on providing information required for the RBF scoring process, while allowing participants to express their expert opinions. ◙~~

A2.3.4 The team shall use the information gathered during the information gathering and stakeholder consultation process(es) to inform the final scoring of the CA, PSA, CSA and SICA.

A2.3.5 The team shall be responsible for scoring PIs on the basis of the objective evidence collected and considering the precautionary approach.

~~A2.3.5.1 If stakeholders do not reach consensus, the team shall assign the more precautionary score.~~

A3 Conducting a Consequence Analysis (CA)

A3.1 Preparation

A3.1.1 The team shall conduct a CA for each data-deficient scoring element identified under PI 1.1.1 (target species). ◙

A3.1.2 The team shall only conduct a CA if some qualitative or quantitative data exist from which trends in 1 or more of the 4 key consequence subcomponents listed in Table A6 can be identified.

A3.1.2.1 If there is no indicator data as defined in A3.1.2, the team shall not assess the UoA against the MSC Fisheries Standard.

A3.1.3 The team shall use the CA scoring template in Table A6 to present the scores and justifications of the CA. ◙

A3.1.3.1 The team shall include the CA scoring template in the 'MSC Reporting Template'.

A3.2 Stakeholder involvement within CA ◙

A3.2.1 The team shall use input from stakeholders to:

a. Provide information suitable for the semi-quantitative evaluation of the risks that the fishing activity poses to the species included in the risk assessment.

b. Assist in identifying the most vulnerable subcomponent for a species.

c. Assist in scoring the consequence of fishing for a species.

Table A6: CA scoring template

Principle 1: Stock status outcome	Scoring element	Consequence subcomponents	Consequence score
		Population size	
		Reproductive capacity	
		Age/size/sex structure	
		Geographic range	
Justification for most vulnerable subcomponent			
Justification for consequence score			

A3.3 Determine the CA score

A3.3.1 The team shall only score the subcomponent (population size, reproductive capacity, age/size/sex structure or geographic range) for which the team decides human-induced impact is the greatest. ◙

A3.3.2 Using Table A7, the team shall use data (as defined in A3.1.2) to assign a score for the consequence of the human-induced impact on the selected subcomponent. ◙

A3.3.2.1 The team shall work with stakeholders.

A3.3.2.2 If there is limited indicator information, the team shall consider the consequence as high-risk and score consequence at 60.

A3.3.2.3 If there is no agreement between stakeholders, the team shall use the consequence category with the lowest score (60, 80 or 100).

A3.3.3 The team shall interpret the terms “insignificant change”, “possible detectable change” and “detectable change” as follows: ◙

a. “Insignificant change” shall mean that changes in the subcomponents are undetectable or if detectable, these are of such a low magnitude that the impact of the human-induced impact cannot be differentiated from the natural variability for this population.

b. “Possible detectable change” shall mean that changes are detected and can be reasonably attributable to the human-induced impact, but these are of such a low magnitude that the impact of the UoA is considered to be minimal on the population size and dynamics.

c. “Detectable change” shall mean that changes to the subcomponent can be attributed to human induced impacts and changes are of such magnitude that cannot be considered as minimal.

A3.3.4 The team shall interpret the terms “full exploitation rate” and “maximum sustainable level” as the maximum level of exploitation that a population can sustain such that the long-term recruitment dynamic is not adversely affected.

A3.3.4.1 For application to Key LTL stocks, the team shall interpret the terms “full exploitation rate” and “maximum sustainable level” as the maximum level of exploitation that the ecosystem can sustain such that long-term serious ecosystem impacts do not occur.

A3.3.5 If the consequence of the activity is determined to be at higher risk than 60 level in Table A7, the team shall fail the UoA.

A3.3.6 The team shall use the final CA score as per Section A5.

Table A7: CA scoring of subcomponents

	Consequence category			
Subcomponent	**Fail**	**60**	**80**	**100**
Population size	Consequence is higher-risk than 60 level.	Full exploitation rate but long-term recruitment dynamics not adversely affected. OR for Key LTL species:	Possible detectable change in size/growth rate (r) but minimal impact on population size and none on dynamics. OR for Key LTL species: Possible detectable change to population	Insignificant change to population size/growth rate (r). Change is unlikely to be detectable against natural variability for this population.

	Consequence category			
		Full exploitation rate but long-term serious ecosystem impacts unlikely to occur.	size/growth rate (r) but minimal impact on population size and no impact on ecosystems.	OR for Key LTL Species: Insignificant change to population size/growth rate (r). Change is unlikely to be detectable against natural variability for this population. Impact on ecosystem considered to be negligible.
Reproductive capacity		Detectable change in reproductive capacity. Impact on population dynamics at maximum sustainable level, long-term recruitment dynamics not adversely affected. OR for Key LTL species: Detectable change in reproductive capacity. Impact on population dynamics at maximum sustainable level, long-term serious ecosystem impacts unlikely to occur.	Possible detectable change in reproductive capacity but minimal impact on population dynamics. OR for Key LTL species: Possible detectable change in reproductive capacity but minimal impact on population dynamics and none on ecosystems.	Insignificant change in reproductive capacity. Unlikely to be detectable against natural variability for this population. OR for Key LTL species: Insignificant change in reproductive capacity. Unlikely to be detectable against natural variability for this population. Impact on ecosystem considered to be negligible.
Age/size/sex structure		Detectable change in age/size/sex structure. Impact on population dynamics at maximum sustainable level, long-term recruitment dynamics not adversely affected.	Possible detectable change in age/size/sex structure but minimal impact on population dynamics. OR for Key LTL Species: Possible detectable change in age/size/sex structure but minimal impact on population dynamics and none on ecosystems.	Insignificant change in age/size/sex structure. Unlikely to be detectable against natural variability for this population. OR for Key LTL Species: Insignificant change in age/size/sex structure. Unlikely to be detectable against natural variability for this population.

	Consequence category			
		OR for Key LTL Species: Detectable change in age/size/sex structure. Impact on population dynamics at maximum sustainable level, long-term serious ecosystem impacts unlikely to occur.		Impact on ecosystem considered to be negligible
Geographic range		Detectable change in geographic range up to 10% of original distribution due to fishing activities. OR for Key LTL Species: Detectable change in geographic range up to 10% of original distribution due to fishing activities. Long-term serious ecosystem impacts unlikely to occur.	Possible detectable change in geographic range but minimal impact on population distribution and none on dynamics. OR for Key LTL Species: Possible detectable change in geographic range but minimal impact on population distribution and none on dynamics and ecosystems.	Insignificant change in geographic range. Unlikely to be detectable against natural variability for this population. OR for Key LTL Species: Insignificant change in geographic range. Unlikely to be detectable against natural variability for this population. Impact on ecosystem considered to be negligible

A4 Conducting a Productivity Susceptibility Analysis (PSA)

A4.1 Preparation

A4.1.1 The team shall use the 'MSC RBF Worksheets' to calculate PSA scores.

A4.1.2 The team shall document the scores and justifications for each PSA attribute in the PSA justification tables in the 'MSC Reporting Template'.

A4.1.3 The team shall conduct a PSA for each data-deficient scoring element identified within a given PI, unless the options in A4.1.5 or A4.1.6 are chosen.

A4.1.4 When evaluating the PSA PI 2.2.1, the team shall first identify the appropriate ETP/OOS unit as defined in MSC Fisheries Standard SA3.9.1.

A4.1.5 The team may elect to conduct a PSA on "main" species only when evaluating PI 2.1.1

A4.1.5.1 The team shall cap the final PI score as per A5.3.2.

A4.1.6 When assessing a large number of species under PI 2.1.1, the team may elect to group species according to similar taxonomies and undertake a reduced number of PSAs. ◙

A4.1.6.1 The team shall:

a. List all species and group them according to similar taxonomy. ◙

b. Within each taxonomic group, identify at least the 2 most at-risk species determined by: ◙

i. Selecting the species with the highest risk score when scoring the productivity part of the PSA for all species, and

ii. Working with stakeholders to identify qualitatively which species are most at risk within each group.

c. Score at least 2 species within each taxonomic group using the PSA.

A4.1.7 If several species appear to have a similar level of risk, and the team and majority of stakeholders cannot agree on which 1 is most at risk for a given PI, the team shall conduct a PSA on all species.

A4.1.8 The team shall include details of the process of grouping species and determining the species most at risk within each group in the 'MSC Reporting Template'.

A4.1.8.1 The team shall provide a justification for the determination of the species most at risk within each group.

A4.1.9 The team shall apply the PSA to the representative most at-risk species to determine the score for the species group. ◙

A4.1.9.1 The team shall assign the PSA-derived MSC score to each of the species in the species group.

A4.1.10 If the team decides to group species according to similar taxonomies, the team shall cap the final PI score as per A5.3.2.

A4.2 Stakeholder involvement within the PSA

A4.2.1 The team shall use input from stakeholders to:

a. Assist in the identification of ~~species~~scoring elements that are affected by the UoA.

b. Assist in the scoring of the productivity and susceptibility attributes within the PSA.

c. Assist in determining whether A5.2 can be applied and whether the criteria in Table X or Table Y are met, if necessary.

~~d. Assist in reviewing information on productivity related to out-of-scope species.~~

A4.3 PSA Step 1: Score the productivity attributes ◙

A4.3.1 The team shall score the productivity of each data-deficient scoring element. ◙

A4.3.2 The team shall score each productivity attribute on a three-point risk scale: low (3), medium (2) or high (1), using the cut-offs in Tables A8–A15.

A4.3.2.1 The team shall only score average maximum size and average size at maturity attributes for vertebrate species when using Table A8.

A4.3.2.2 The team shall only score the density-dependence attribute for invertebrate species.

A4.3.2.3 The team shall enter the 3-point scores into the 'MSC RBF Worksheets' to calculate the overall productivity score.

A4.3.2.4 If there is limited information available for a productivity attribute, the team shall assign the more precautionary score.

A4.3.2.5 In the absence of information on depensatory dynamics, or if no justification is provided supporting lower risk scores (1 or 2), the team should use the highest risk score (3, low productivity).

A4.3.2.6 When scoring productivity for birds, mammals and reptiles (Tables A9-14) the team shall: ◙

a. Use the mean or median values, if available.

b. If a range is provided rather than a mean or median value, use the most precautionary value in the range.

c. Only use proxies to score attributes if information is available for closely related species with similar demographic traits.

d. If information is not available on an attribute for the species or an appropriate proxy, assign a high risk score.

Table A8: PSA productivity attributes and scores for fish and invertebrates ◙

Productivity attribute	High productivity (Low risk, score = 1)	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	100-20,000 eggs per year	<100 eggs per year
Average maximum size (not to be used when scoring invertebrate species)	<100 cm	100-300 cm	>300 cm
Average size at maturity (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

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Density dependence (to be used when scoring invertebrate species only)	Compensatory dynamics at low population size demonstrated or likely.	No depensatory or compensatory dynamics demonstrated or likely.	Depensatory dynamics at low population sizes (Allee effects) demonstrated or likely.

Table A9: PSA productivity attributes and scores for birds

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Average age at first breeding: Where there are studies of only short duration used to estimate this, it is appropriate to consider whether the species value is anomalously low for the genus and score based on what is the norm for the genus rather than the individual species.	<3 years	3-7 years	>7 years
Average 'optimal' adult survival probability: Use the optimal average adult survival probability values, if available. The optimal value represents what the species is capable of achieving biologically with healthy, stable populations, i.e. the value is not unsustainably low due to population decline driven by anthropogenic impacts. If a species is in decline due to anthropogenic impacts, alternatives from other unaffected similar species should be used.	<0.81	0.81-0.94	>0.94
Fecundity: Considers both the number of chicks that the species is capable of fledging and the frequency of breeding.	>1 chick/year	1 chick/year	<1 chick/year

Table A10: PSA productivity attributes and scores for marine mammals: Mysticetes and sirenians

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Average age at maturity: Age at female sexual maturity in years.	<6	6-8	>8
Fecundity: Use 1/inter-birth interval (IBI).	>0.40	0.30-0.40	<0.30

Table A11: PSA productivity attributes and scores for marine mammals: Odontocetes

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Average age at maturity: Age at female sexual maturity in years.	<6	6-11	>11
Fecundity: Use 1/inter-birth interval (IBI).	>0.58	0.23-0.58	<0.23

Table A12: PSA productivity attributes and scores for marine mammals: Pinnipeds and sea otters

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Average age at maturity: Age at female sexual maturity in years.	<5	5-7	>7
Fecundity: Use average annual reproductive rate (birth rate or pregnancy rate).	>0.87	0.58-0.87	<0.58
Average 'optimal' adult survival probability: Use the optimal average adult survival probability values. The optimal value represents what the species is capable of achieving biologically with healthy, stable populations, i.e. the value is not unsustainably low due to population decline	<0.84	0.84-0.94	>0.94

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
driven by anthropogenic impacts.			

Table A13: PSA productivity attributes and scores for sea turtles

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Average age at maturity: Age at female sexual maturity in years.	< 15	15-25	> 25
Fecundity: Eggs per season per remigration interval Calculated as: (number of eggs per nest* number of nests per season) / remigration interval. Where ranges are provided, the most precautionary value shall be adopted for scoring.	> 150	100-150	< 100

Table A14: PSA productivity attributes and scores for sea snakes

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Average length at maturity (cm): Median or mean length at maturity. Use snout vent length, as this is most often recorded.	<61.5	61.5-109.0	>109.0
Average maximum size (cm): Use total length. If differences in size between sexes, use more precautionary value. Use snout vent length, as this is most often recorded.	<90.4	90.4-168.3	>168.3
Fecundity: Egg-laying: annual reproductive output should be	N/A	>5	≤5

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
calculated as: number of eggs per clutch / number of nests per year. Live bearing: clutch size / number of years between reproductive periods. No species are categorised as 'low' risk/ 'high productivity'.			

Table A15: PSA Productivity attributes and scores for amphibians

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Average age at maturity: Median or mean age at maturity. If range provided, use most precautionary (highest) value. Proxies may be used to score this attribute only where information is available for closely related species with similar demographic traits. Where this information is not available high risk shall be scored.	<5 years	5-15 years	>15 years
Average maximum age: Reptiles: Use median or mean reproductive lifespan. If range provided, use most precautionary (highest) value. Proxies may be used to score this attribute only where information is available for closely related species with similar demographic traits. Where this information is not available high risk shall be scored.	<10 years	10 – 25 years	>25 years
Fecundity: Proxies may be used to score this attribute only where information is available for closely related species with similar demographic traits. Where this information is not	>20,000 eggs per year	100-20,000 eggs per year	<100 eggs per year

Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
available high risk shall be scored.			
Average max size: Total length of adults. Where there are differences in size between males and females or a range is provided, use the more precautionary (higher) value.	<100 cm	100-300 cm	>300 cm
Average size at maturity: Total length of adults. Where there are differences in size between males and females or a range is provided, use the more precautionary (higher) value. Where information is not available, apply 'Average Max Size' value.	<40 cm	40-200 cm	>200 cm
Reproductive strategy: Consider parental investment in young in addition to method of reproduction. For live bearing or egg-laying species that make a nest or give birth and leave, score medium risk. For live bearing or egg-laying species that nest guard or care for their young, score high risk.	Broadcast spawner	Demersal egg layer	Live bearer
Trophic level: Where information on the trophic level of the amphibian is not available, scoring shall focus on the prey of the reptile. Where the principle dietary components consist of higher trophic level organisms, the reptile shall be considered high risk. Where the diet is primarily composed of lower trophic-level organisms the reptile shall be considered medium or low risk. Mean trophic level of principle prey may be calculated to derive the risk score.	<2.75	2.75-3.25	>3.25

A4.4 PSA Step 2: Score the susceptibility attributes ◙

A4.4.1 The team shall score the susceptibility of each data-deficient scoring element.

A4.4.2 The team shall score 4 susceptibility attributes (areal overlap (availability), encounterability, selectivity and post-capture mortality) on a 3-point risk scale: high (3), medium (2) or low (1), using the cut-offs in Tables A17 and A18.

A4.4.2.1 The team shall enter the 3-point scores into the 'MSC RBF Worksheets' to calculate the overall susceptibility score.

A4.4.2.2 If there is limited information available to score a susceptibility attribute, the team shall assign the more precautionary score.

A4.4.3 When scoring susceptibility attributes, the team shall take into account the impacts of overlapping UoAs (FCP PB 1.2.1), according to the following requirements:

a. The team shall identify and list separately each overlapping UoA that affects the given stock.

b. When scoring PI 1.1.1 or PI 1.1.1A, the team shall take into account the impacts of overlapping UoAs affecting the given target stock

c. When scoring PI 2.1.1 and PI 2.2.1, the team shall only take into account the impacts of the UoA.

A4.4.4 When taking into account the impacts of overlapping UoAs, the team shall score the susceptibility attributes cumulatively.

A4.4.4.1 To account for the impact of overlapping UoAs on a given stock, the team shall determine the contribution of each UoA on the total catch of the given stock.

a. If precise catch data are available, the team shall assign weightings for each fishery based on known proportions of total catch of the given stock. ◙

b. If catch data are not available, the team shall use and document a qualitative information-gathering process to apply a weight to each fishery as per Table A16. ◙

Table A16: Weighting of fisheries

% contribution of catch	Weighting score
0–25	1
25–50	2
50–75	3
75–100	4

A4.4.5 The team shall calculate a weighted average of PSA scores for each fishery affecting the given stock in order to derive the final overall PSA score, except in the following case. ◙

A4.4.5.1 If catch data cannot be estimated for a particular fishery (gear type) using either qualitative or quantitative data, the team shall base the susceptibility score for the overall PSA on the attributes of the gear with the highest susceptibility score.

Table A17: PSA susceptibility attributes and scores for fish and invertebrates

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	<10% overlap	10-30% overlap	>30% overlap
Encounterability: The position of the stock/species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the position of the gear	Low overlap with fishing gear (low encounterability).	Medium overlap with fishing gear.	High overlap with fishing gear (high encounterability). Default score for target species (Principle 1).
Selectivity of gear type: Potential of the gear to retain species	a Individuals < size at maturity are rarely caught.	a Individuals < size at maturity are regularly caught.	a Individuals < size at maturity are frequently caught.
	b Individuals < size at maturity can escape or avoid gear.	b Individuals < half the size at maturity can escape or avoid gear.	b Individuals < half the size at maturity are retained by gear.
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 released post-capture and survival. >66% of animals are returned alive and survive the encounter. Where observers can verify that >66% are released alive in combination with a high risk score for selectivity, the PCM score may be reduced to a low risk score (1).	Evidence of some released post-capture and survival. 33-66% of animals are returned alive and survive the encounter. Where observers can verify that 33-66% are released alive in combination with a high risk score for selectivity, the PCM score may be reduced to a medium risk score (2).	Retained species or majority dead when released. <33% of animals are returned alive and survive the encounter. Default score for retained species (Principle 1 or Principle 2).

Table A18: PSA susceptibility attributes for birds, mammals, reptiles and amphibians (OOS species)

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 concentration of the ETP/OOS unit.	<10% overlap	10-30% overlap	>30% overlap
Encounterability: The position of the ETP/OOS unit within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the position of the gear.	Low overlap with fishing gear (low encounterability).	Medium overlap with fishing gear.	High overlap with fishing gear (high encounterability).
Selectivity of gear type: Potential of the gear to retain species.	If encountered, individuals are rarely caught / impacted.	If encountered, individuals are regularly caught / impacted.	If encountered, individuals are frequently caught / impacted.
Post-capture mortality (PCM): The chance that, if captured or there is a direct interaction with the gear, a species would be released and that it would be able to survive.	Evidence of majority released alive post capture and survival. >66% of animals are returned alive and survive the encounter.	Evidence of some released alive post capture and survival. 33-66% of animals are returned alive and survive the encounter.	Retained species or majority dead or low probability of survival when released. <33% of animals are returned alive and survive the encounter.

A4.4.6 The team shall score areal overlap (availability) as follows: ◙

a. The team shall generate areal overlap scores after consideration of the overlap of the fishing effort with the distribution of the stock.

b. If the impacts of fisheries other than the UoA are taken into account, the team shall score the areal overlap as the combined overlap of all listed fisheries with the areal concentration of a stock.

c. The team shall enter the resulting areal overlap risk scores into those cells in the 'MSC RBF Worksheets' for all listed fisheries.

d. When scoring the areal overlap, the team shall consider the concentration of species and the overlap of the fishing gear with the concentration species. ◙

e. For species with good distribution maps, the team shall score areal overlap using detailed mapping analysis (the amount of overlap between fishing effort and species stock distribution).

f. For species without good distribution maps, the team may use stakeholder-generated maps.

g. For species with behavioural responses that increase the catchability of the gear (i.e., hyperstability of CPUE with schooling behaviour) the team shall estimate the areal overlap as high risk (3) unless:

i. The impact on the population is estimated at consequence score equal or higher than 80 (medium or low risk). ◙

A4.4.6.1 For birds, mammals, reptiles and amphibians (out-of-scope species), the team shall:

a. Consider and document seasonality in the ETP/OOS unit distribution (e.g. use non-uniform density or occurrence maps in preference to static range maps).

b. Adopt a precautionary approach and base the score on the time when there is the highest potential overlap with the fishing effort.

A4.4.6.2 For land-nesting species (e.g. birds, turtles, pinnipeds), if information on seasonal distribution is not available, the team shall consider and document the following:

a. Whether the UoA operates in proximity to breeding colonies at the time of breeding.

b. Information on the foraging radius and/or habitat preference for breeding and non-breeding ETP/OOS units.

A4.4.7 The team shall score encounterability as follows: ◙

a. The team shall generate encounterability scores after consideration of the likelihood that a species will encounter fishing gear that is deployed within the geographic range of that species.

b. If the impacts of fisheries other than the UoA are taken into account, the team shall score encounterability as the combined encounterability of all listed fisheries.

c. The team shall enter the resulting encounterability risk scores into those cells in the 'MSC RBF Worksheets' for all listed fisheries.

d. When scoring encounterability the team shall consider the concentration of species and the overlap of the fishing gear with the concentration species.

e. The team shall consider the deployment of fishing gear in relation to the adult habitat of each species.

~~e.~~f. The team shall consider if any aspects of the fishing operations would lead to an increased likelihood for encountering the species, such as use of bait or offal discharge.

~~A4.4.7.1 For birds, mammals, reptiles and amphibians (out-of-scope species), the team shall assign a default high risk score (3) for all air breathing species for active gear or gear set within the diving range of the species.~~

~~a. If mitigation measures that reduce encounterability with the gear are in place to reduce bycatch, the team may reduce the score as follows: ◙~~

~~i. The team may reduce the score from 3 to 2 if the UoA applies mitigation measures to reduce encounterability that are likely to work, based on use of accepted best practice or if bycatch has been minimised in a similar fishery.~~

~~ii. The team may reduce the score from 3 to 1 if there is independently verified data that the UoA has minimised bycatch to zero or negligible levels (MSC Fisheries Standard SA3.1.1.1.d.i).~~

A4.4.8 The team shall score selectivity as follows: ◙

a. The team shall generate a selectivity score for each gear type within the UoA after consideration of the potential of gear to capture or retain the species that encounters the fishing gear.

b. If the impacts of fisheries other than the UoA are taken into account, the team shall score selectivity for each gear type of all listed fisheries.

c. The team shall determine the selectivity risk scores for each combination of gear type and species within the UoA individually and enter them into the 'MSC RBF Worksheets'.

d. In Table A17, the team shall score gear selectivity using the 2 categories. ◙

i. If elements (a) and (b) indicate different risk scores, the team shall assign a score as the average of the 2 categories, rounded up to the nearest whole number on the 1:3 scale.

e. The team shall interpret the terms "rarely", "regularly" and "frequently" in Tables A17-A18 as follows:

i. "Rarely" means that the capture of individuals occurs in less than 5% few gear deployments.

ii. "Regularly" means that the capture of individuals occurs in 5% to 50% of the gear deployments.

iii. "Frequently" means that the capture of individuals occurs in more than 50% of gear deployments.

f. In Table A17, the team shall interpret the term "'individuals" to mean those smaller than the size at maturity.

A4.4.8.1 For birds, mammals, reptiles and amphibians (out-of-scope species), the team shall assign a risk score considering both the ability for the gear to capture or impact an adult individual if encountered.~~a default high risk score (3) for all air breathing species based on the likelihood that, if encountered, individuals are frequently caught or impacted (given that in some cases, a species may not be caught but still injured or killed by the gear).~~

a. The term 'impact' shall be interpreted to include any other injury or mortality that results from the fishing operations other than direct capture.

~~b. If mitigation measures that reduce selectivity of the gear type are in place, the team may reduce the score as follows: ◙~~

~~i. The team may reduce the score from 3 to 2 if the UoA applies mitigation measures that are likely to work to reduce selectivity if gear is encountered, based on use of accepted best practice or where bycatch has been minimised in a similar fishery.~~

~~ii. The team may reduce the score from 3 to 1 if there is independently verified data that the fishery has minimised bycatch to zero or negligible levels (MSC Fisheries Standard SA3.1.1.d.i).~~

~~iii. The team may reduce the score from 3 to 1 if there is independently verified evidence that the species is not caught in the gear, regardless of whether mitigation measures are applied.~~

A4.4.9 The team shall score Post Capture Mortality as follows:

a. The team shall use its knowledge of species biology and fishing practice together with independent field observations to assess the chance that, if captured, a species would be released and that it would be able to survive. ◙

b. If the impacts of fisheries other than the UoA are taken into account, the team shall score the post-capture mortality for each gear type of all listed fisheries.

c. The team shall determine the PCM risk scores for each combination of gear type and species within the UoA individually and enter them into the 'MSC RBF Worksheets'.

d. In the absence of observer data or other verified field observations made during commercial fishing operations that indicate the individuals are released alive and post-release survivorship is high, the team shall score the PCM of all species as default high risk (3).

e. The team may reduce the PCM score from a default high risk score to a lower (medium or low) risk score if:

i. A high risk score (3) has been allocated for the selectivity (relevant for in scope species only), and

ii. More than 66% (low risk score) or more than 33% (medium risk score) of the captured animals are returned alive and survive the encounter.

~~A4.4.9.1 For birds, mammals, reptiles and amphibians (out-of-scope species), in the absence of observer data or other verified field observations made during commercial fishing operations that indicate the individuals are released alive and post-release survivorship is high the team shall assign a default high risk score (3) for all air breathing species, as per A4.4.9.d.~~

A4.4.10 The team may adjust the susceptibility scores, if additional information regarding an attribute that justifies a change in score is available and the source of data is appropriate to the fishery(ies) or region(s).

A4.4.10.1 The team shall document the justification for all changes made.

A4.5 PSA Step 3: Determine the PSA score and equivalent MSC score

A4.5.1 The team shall use the 'MSC RBF Worksheets' to calculate the overall productivity and susceptibility risk scores (PSA score) and the equivalent MSC scores for each scoring element. ◙

A5 Scoring the UoA using the RBF for Species Performance Indicators (PIs 1.1.1, 2.1.1, and 2.2.1)

A5.1 Scoring species PIs

A5.1.1 When scoring PI 1.1.1 or PI1.1.1A, the team shall use both the CA and PSA to produce an overall score for each scoring element.

A5.1.1.1 The team shall assign the overall score for the scoring element as per Table A19. ◙

Table A19: Rules for use of CA and PSA scores

CA	PSA	Rule
80 or 100	≥80	Score assigned shall be at the midway point between CA and PSA scores.
80 or 100	≥60 and <80	Score assigned for PI shall be less than 80, as near to the midway point between CA and PSA scores as possible.
80 or 100	<60	Fail
60	≥80	Score assigned for PI shall be less than 80, as near to the midway point between CA and PSA scores as possible.
60	≥60 and <80	Score assigned for PI shall be at the midway point between CA and PSA scores.
60	<60	Fail
<60	≥80	Fail
<60	≥60 and <80	Fail
<60	<60	Fail

A5.1.2 When scoring PIs 2.1.1 and 2.2.1, the team shall use only the PSA to produce an overall score for each scoring element, subject to any adjustment in accordance with A5.2.

A5.2 Adjusting scoring element scores ◙

A5.2.1 After determining the overall score for each scoring element (A5.1.2), the team may elect to apply the residual risk assessment process described in this section to modify the scoring element score where at least one following are met:

a. There is information indicating that the scoring element population is stable or increasing,

b. There is information indicating that the population size is greater or equal to 5000 mature individuals, or

c. There is information indicating that the UoA fishing mortality is below the intrinsic rate of population increase.

A5.2.2 Where A5.2.1 is met and the team elects to follow the residual risk assessment process, they shall apply Table X and A5.2.4 (for In-scope species) or Table Y and A5.2.5 (for ETP/OOS).

A5.2.3 The team shall provide summary rationales when applying Table X and Table Y explaining how each criterion is met or not met.

~~b.~~a. The summary rationale shall, at a minimum provide a cross-reference to the relevant PI/SI rationale and summarise the main reasons why the criterion is met or not.

Table X Scoring element score modification for in-scope species

Criteria	**Met? (Y/N)**	**Rationale**
There is a demonstrably effective strategy in place between all MSC UoAs that categorise this species as main in-scope to ensure that they collectively do not hinder recovery and rebuilding of the species. (~~s~~See PI 2.1.2, SI a, SG80 alternative option)		
There is evidence that the strategy is achieving its objective based on information directly about the UoA and/or species involved. ~~-~~(See PI 2.1.2, SI b SG100)		
There is a review every 2 years of alternative measures to minimise the UoA-related mortality of unwanted catch of the in-scope species, and the measures are		

implemented as appropriate. -(See PI 2.1.2, SI c SG100) [Only evaluated if the in-scope species is 'unwanted' as defined in SA3.1.1.e. If it is not unwanted, it automatically meets this criteria.]		

A5.2.4 Where all of the criteria in Table X are met, the CAB shall increase the scoring element score as follows:

a. A score of <60 shall be increased to 60

~~c.~~b. A score between 60-79 shall be increased to 80

Table Y Scoring element score modification for ETP/OOS species

Criteria	**Met? (Y/N)**	**Rationale**
There is a strategy in place that is expected to minimise UoA-related mortality of the ETP/OOS element. (See GSA3.10.2)		
Evidence indicates that the strategy has reduced or minimised the mortality of the ETP/OOS unit. (See PI 2.2.2, SIb, SG80)		
There is a review every 2 years of alternative measures to minimise the UoA-related mortality of ETP/OOS, and the measures are implemented as appropriate. (See PI 2.2.2, SI c SG100)		

A5.2.5 Where all of the criteria in Table Y are met, the CAB shall increase the scoring element score as follows:

a. A score of <60 shall be increased to 60

b. A score between 60-79 shall be increased to 80.

~~A5.2~~A5.3 Combining scoring elements

~~A5.2.1~~A5.3.1 If there is only 1 scoring element for the PI, the team shall consider this as the overall MSC score.

~~A5.2.2~~A5.3.2 If there is a combination of both data-deficient scoring elements (scored using the RBF) and scoring elements scored using the default assessment tree, the team shall consider the scores for all scoring elements for this PI to derive a final MSC score as per Table A20. ◙

Table A20: Combining multiple species scores

MSC score	Requirement to gain score
None	Any scoring elements within a PI that fail to reach a score of 60 represent a failure against the MSC Fisheries Standard and no score shall be assigned.
60	All elements have a score of 60, and only 60.
65	All elements score at least 60; a few achieve higher scores, approaching or exceeding 80, but most do not reach 80.
70	All elements score at least 60; some achieve higher scores, approaching or exceeding 80; but some fail to achieve 80 and require intervention action.
75	All elements score at least 60; most achieve higher scores, approaching or exceeding 80; only a few fail to achieve 80 and require intervention action.
80	All elements score 80.
85	All elements score at least 80; a few achieve higher scores, but most do not approach 100.
90	All elements score at least 80; some achieve higher scores approaching 100, but some do not.
95	All elements score at least 80; most achieve higher scores approaching 100; only a few fail to score at or very close to 100.
100	All elements score 100.

~~A5.3~~A5.4 Adjusting PI scores

~~A5.3.1 If no additional information exists to score the PI, the team shall apply the score directly to the PI with the accompanying 'MSC RBF Worksheets' and a rationale provided as justification.~~

~~A5.3.1.1 If additional information justifies modifying the MSC score either upwards or downwards by a maximum of 10 points, the team shall use this information to reach the final MSC score for the PI. ◙~~

~~a. The team shall use all information that is available on the UoA to inform the assessment.~~

~~b. The team shall provide justification for any score modification.~~

~~A5.3.2~~A5.4.1 The team shall cap the final PI score if only a subset of the total number of species has been evaluated.

~~A5.3.2.1~~A5.4.1.1 If the team has only considered "main" species in the PSA analysis (as per A4.1.5), the team shall not assign a final PI score greater than 80.

~~A5.3.2.2~~A5.4.1.2 If the team has opted to use the species-grouping option (as per A4.1.6), the team shall not assign a final PI score greater than 80.

~~A5.3.3~~A5.4.2 If there are no main species, and minor species are not scored using the RBF (as per A2.1.3) the team shall cap the final PI score at 80.

~~A5.3.4~~A5.4.3 The team shall record the CA, PSA scores (equivalent MSC score), the rationale for adjusting PSA scores, and overall MSC scores in the Scoring Tables in the 'MSC Reporting Template'.

A6 Setting conditions using the RBF for Species PIs

A6.1 PIs 1.1.1, 1.1.1A, 2.1.1, and 2.2.1

A6.1.1 If any scoring element score is less than 80, the team shall set a condition on that PI.

A6.1.2 If a condition is set for a PI scored using the CA or PSA, the team shall make sure that the Client Action Plan proposed by the fishery client meets the following criteria: ◙

a. Is capable of raising the score to 80,

b. Addresses all the scoring elements for which the score falls below 80

c. Does not cause additional associated problems for other scoring elements.

A6.1.3 The team shall only apply the RBF to the scoring element in subsequent MSC assessments if the score is 80 or above and all related conditions have been closed by the 4th-year surveillance audit in the preceding certification cycle.~~at the point of entering reassessment.~~

A6.1.4 If the process in A5.2 was applied during an assessment, it can only be applied again at the subsequent assessment where the following is met: ◙

~~d.~~a. The PSA-derived MSC score for the relevant scoring element was at least 60 at the first assessment, and

~~e.~~b. The PSA-derived MSC score for the relevant scoring element is at least 60 at the subsequent assessment.

A7 Conducting a Consequence Spatial Analysis (CSA) ◙

A7.1 Preparation

A7.1.1 The team shall use the 'MSC RBF Worksheets' to calculate CSA scores.

A7.1.2 The team shall document scores and justifications for each scoring element (habitat) in the CSA justification tables in the 'MSC Reporting Template'.

A7.1.3 The team shall conduct the CSA for each data-deficient scoring element.

A7.1.4 The team shall apply expert judgement throughout the CSA.

A7.1.5 When scoring, the team shall consider the full range of possible interactions, and take a precautionary approach, scoring the highest possible risk score of the relevant ranges, if: ◙

a. Possible scores from fishing activity or impact cut across more than 1 threshold range or more than 1 proxy range.

b. Gear has been modified in a way that could increase its impact.

A7.2 Stakeholder involvement within the CSA

A7.2.1 The team shall use input from stakeholders to:

a. Assist in the identification of the habitat(s) that are affected by the UoA.

b. Assist in the scoring of the consequence and spatial attributes within the CSA.

A7.3 CSA Step 1: Define the habitat(s)

A7.3.1 The team shall list and define each habitat associated with the “managed area”.

A7.3.1.1 The team shall interpret the term “managed area” to mean each habitat in the full area managed by the governance body(ies) responsible for fisheries management in the area(s) where the UoA operates.

A7.3.1.2 The team shall refer to the MSC Fisheries Standard SA3.12.6 and the subclauses to further interpret the term “managed area”.

A7.3.1.3 Each habitat within the UoA shall be treated as a scoring element.

A7.3.2 The team shall categorise habitats in the UoA on the basis of their substratum, geomorphology, and (characteristic) biota (SGB) characteristics (Table A21). ◙

A7.3.3 The team shall list the biome, sub-biome, and features (Table A22). ◙

Table A21: SGB habitat nomenclature (modified from Williams et al., 2011[1])

Substratum	Geomorphology	Biota
Fine (mud, sand) Mud (0.1 mm) Fine sediments(0.1-1 mm) Coarse sediments (1-4 mm)	Flat Simple surface structure Unrippled/flat Current rippled/directed scour Wave rippled	Large erect Dominated by: Large and/or erect sponges Solitary large sponges Solitary sedentary/sessile epifauna (e.g. ascidians/ bryozoans) Crinoids Corals Mixed large or erect communities
Medium Gravel/pebble (4-60 mm)	Low relief Irregular topography with mounds and depressions Rough surface structure Debris flow/rubble banks	Small erect/ encrusting/burrowing Dominated by: Small, low-encrusting sponges Small, low-standing sponges Consolidated (e.g. mussels) and unconsolidated bivalve beds (e.g. scallops) Mixed small/low-encrusting invertebrate communities Infaunal bioturbators
Large Cobble/boulders (60 mm - 3 m) Igneous, metamorphic, or sedimentary bedrock (>3 m)	Outcrop Subcrop (rock protrusions from surrounding sediment <1 m) Low-relief outcrop (<1 m)	No fauna or flora No apparent epifauna, infauna, or flora
Solid reef of biogenic origin	High relief	Flora

[1] Williams, A., Dowdney, J., Smith, A.D.M., Hobday, A.J., and Fuller, M. (2011). Evaluating impacts of fishing on benthic habitats: A risk assessment framework applied to Australian fisheries. Fisheries Research 112(3):154-167.

Substratum	Geomorphology	Biota
Biogenic (substratum of biogenic calcium carbonate) Depositions of skeletal material forming coral reef base	High outcrop (protrusion of consolidated substrate >1 m) Rugged surface structure	Dominated by: Seagrass species

Table A22: List of example biomes, sub-biomes, and features (modified from Williams et al., 2011)

Biome	Sub-biome	Feature
Coast (0-25 m) Shelf (25-200 m) Slope (200-2,000 m) Abyss (>2,000 m)	Coastal margin (<25 m) Inner shelf (25-100 m) Outer shelf (100-200 m) Upper slope (200-700 m) Mid-slope (700-1,500 m)	Seamounts Canyons Abyss Shelf break (~150-300 m) Sediment plains Sediment terraces Escarpments Plains of scattered reef Large rocky banks

A7.4 CSA Step 2: Score the consequence attributes (Table A23) ◙

Table A23: Consequence attributes (modified from Williams et al., 2011)

Habitat-productivity attributes	Gear-habitat interaction attributes
Regeneration of biota Natural disturbance	Removability of biota Removability of substratum Substratum hardness Substratum ruggedness Seabed slope

Regeneration of biota

A7.4.1 The team shall score this attribute based on the rate of the recovery of biota associated with the habitat, using information on age, growth, and recolonisation of biota, if available (Table A24). ◙

A7.4.2 If information on age, growth, and recolonisation of associated biota is not available for the UoA, the team shall refer to comparable data from studies elsewhere.

A7.4.2.1 In the absence of such comparable studies, the team shall use the proxies in Table A24 as a surrogate for accumulation and recovery time. ◙

A7.4.3 The team shall record the “regeneration of biota” score for each habitat in the ‘MSC RBF Worksheets’.

Table A24: Scoring regeneration of biota based on age, growth, and recolonisation of biota (modified from Williams et al., 2011)

Sub-biome	Using available data			Using surrogate when data are not available					
	Annual	Less than decadal	More than decadal	No epifauna	Small erect/ encrusting	Large erect (sponges)	Large erect (ascidians and bryozoans)	Seagrass communities/ mixed faunal communities/ hard corals	Crinoids/ solitary/mixed communities/ hard and soft corals
Coastal margin (<25 m)	1	2	3	1	1	1	1	2	1
Inner shelf (25-100 m)	1	2	3	1	1	2	2	2	2
Outer shelf (100-200 m)	1	2	3	1	1	3	2	3	3
Upper slope (200-700 m)	1	2	3	1	1	3	3	3	3
Mid-slope (700-1,500 m)	1	2	3	1	2	3	3	3	3

Natural disturbance

A7.4.4 The team shall score this attribute based on the natural disturbance that is assumed to occur at the particular depth zone in which the habitat and fishing activity occurs (Table A25). ◙

A7.4.5 If information on disturbance is unavailable, the team shall use proxies as per Table A25. ◙

A7.4.6 The team shall record the “natural disturbance” score for each habitat in the ‘MSC RBF Worksheets’. ◙

Table A25: Scoring natural disturbance (modified from Williams et al., 2011)

Attribute	Score		
	1	2	3
Natural disturbance	Regular or severe natural disturbance	Irregular or moderate natural disturbance	No natural disturbance
Natural disturbance (in absence of information)	Coastal margin and shallow inner shelf (<60 m)	Deep inner shelf and outer shelf (60-200 m)	Slope (>200 m)

A7.4.7 The team shall use Table A26 and Table A27 to score the gear-habitat interaction attributes. ◙

A7.4.7.1 If the UoA’s gear type is not provided in Table A26 and Table A27, the team shall score the attributes using the most similar gear in terms of extent of bottom contact that is provided.

a. The team shall be precautionary when determining the most similar gear type.

b. The team shall provide justification for the selection of the most similar gear type.

c. The team shall provide justification for increasing or decreasing the default gear footprint score.

Removability of biota

A7.4.8 The team shall score this attribute based on the likelihood of attached biota being removed or killed by interactions with fishing gear (Table A26). ◙

A7.4.9 The team shall consider the removability and mortality of structure-forming epibiota and bioturbating infauna.

A7.4.10 The team shall record the “removability of biota” score for each habitat in the ‘MSC RBF Worksheets’.

Removability of substratum

A7.4.11 The team shall score this attribute based on clast (rock fragment or grain resulting from the breakdown of larger rocks) size and likelihood of the substratum being moved (Table A26).

A7.4.12 The team shall consider the gear type being assessed.

A7.4.13 The team shall record the “removability of substratum” score for each habitat in the ‘MSC RBF Worksheets’.

Table A26: Scoring the removability of biota and removability of substratum attributes (modified from Hobday et al., 2007[2])

Gear type	Removability of biota			Removability of substratum		
	Low, robust, small (<5 cm), smooth, or flexible biota OR robust, deep-burrowing biota	Erect, medium (<30 cm), moderately rugose, or inflexible biota OR moderately robust, shallow-burrowing biota	Tall, delicate, large (>30 cm high), rugose, or inflexible biota OR delicate, shallow-burrowing biota	Immovable (bedrock and boulders >3 m)	<6 cm (transferable)	6 cm - 3 m (removable)
Hand collection	1	1	1	1	1	2
Demersal longline	1	1	2	1	1	1
Handline	1	1	2	1	1	1
Trap	1	2	2	1	1	1
Bottom gill net or other entangling net	1	2	3	1	1	1
Danish seine	1	2	3	1	2	3
Demersal trawl (including pair, otter twin-rig, and otter multi-rig)	1	3	3	1	3	3
Dredge	3	3	3	1	3	3

Substratum hardness

A7.4.14 The team shall score attribute based on substrata composition (Table A27).

A7.4.15 The team shall consider the substrata identified via the SGB characterisation process (A7.3 - CSA step 1).

[2] Hobday, A. J., Smith, A., Webb, H., Daley, R., Wayte, S., Bulman, C., Dowdney, J., Williams, A., Sporcic, M., Dambacher, J., Fuller, M. and Walker, T.(2007). Ecological risk assessment for the effects of fishing: methodology. Report R04/1072 for the Australian Fisheries Management Authority, Canberra.

A7.4.16 The team shall record the “substratum hardness” score for each habitat in the ‘MSC RBF Worksheets’.

Substratum ruggedness

A7.4.17 The team shall score this attribute based on the extent to which available habitat is actually accessible to mobile gear given the ruggedness of the substratum (Table A27).

A7.4.18 The team shall consider the characteristics of the substratum and the gear type being used.

A7.4.19 The team shall record the “substratum ruggedness” score for each habitat in the ‘MSC RBF Worksheets’.

Seabed slope

A7.4.20 The team shall score this attribute based on the impact to habitat that occurs as a result of slope steepness and mobility of substrata once dislodged (Table A27).

A7.4.21 The team shall consider the degree of slope.

A7.4.22 The team shall record the “seabed slope” score for each habitat in the ‘MSC RBF Worksheets’.

Aggregate consequence score

A7.4.23 The team shall determine the aggregate consequence score for each habitat by using the ‘MSC RBF Worksheets’.

Table A27: Scoring the substratum hardness, substratum ruggedness, and seabed slope attributes (modified from Hobday et al., 2007)

Gear type	Substratum hardness			Substratum ruggedness			Seabed slope		
	Hard (igneous, sedimentary, or heavily consolidated rock types)	Soft (lightly consolidated, weathered, or biogenic)	Sediments (unconsoli-dated)	High relief (>1 m), high outcrop, or rugged surface structure (cracks, crevices, overhangs, large boulders, rock walls)	Low relief (<1.0 m), rough surface structure (rubble, small boulders, rock edges), subcrop, or low outcrop	Flat, simple surface structure (mounds, undulations, ripples), current rippled, wave rippled, or irregular	Low degree (<1): Plains in coastal margin, inner or outer shelf or mid-slope OR terraces in mid-slope OR rocky banks/ fringing reefs in coastal margin, inner or outer shelf, or upper or mid-slope	Medium degree (1-10): Terraces in outer shelf or upper slope	High degree (>10): Canyons in outer shelf, or upper or mid-slope OR seamounts/ bioherms in coastal margin, inner shelf, or upper or mid-slope
Hand collection	1	2	3	3	3	1	1	2	3
Demersal longline	1	2	3	2	3	3	1	2	3
Handline	1	2	3	2	3	3	1	2	3
Trap	1	2	3	2	3	3	1	2	3

Gear type	Substratum hardness			Substratum ruggedness			Seabed slope		
Bottom gill net or other entangling net	1	2	3	2	3	3	1	2	3
Danish seine	1	2	3	1	1	3	1	2	3
Demersal trawl (including, pair, otter twin-rig, and otter multi-rig)	1	2	3	1	3	3	1	2	3
Dredge	1	2	3	1	1	3	1	2	3

A7.5 CSA Step 3: Score the spatial attributes ◙

Gear footprint

A7.5.1 The team shall score this attribute based on the gear's potential for disturbance and the number of encounters required to produce an impact on a habitat, taking into account the size, weight, and mobility of individual gears and the footprint of the gears (Table A28). ◙

A7.5.2 The team shall apply A7.4.7.1 and its subclauses here.

A7.5.3 The team shall record the gear footprint score for each habitat in the 'MSC RBF Worksheets'.

Table A28: Scoring the gear footprint attribute (modified from Hobday et al., 2007)

Gear type	Gear footprint score
Hand collection	1
Handline	1
Trap	1
Demersal longline	2
Bottom gill net or other entangling net	2
Danish seine	2
Demersal trawl (including pair, otter twin-rig, and otter multi-rig)	3
Dredge	3

Spatial overlap ◙

A7.5.4 The team shall score this attribute based on spatial overlap between the habitat(s) distribution within the "managed area" (see A7.3.1.1 and A7.3.1.2) and the distribution of areas fished by the UoA (Table A29). ◙

A7.5.5 The team shall record the spatial overlap score for each habitat in the 'MSC RBF Worksheets'.

Encounterability ◙

A7.5.6 The team shall score this attribute based on the likelihood that a fishing gear will encounter the habitat within the "managed area" (see A7.3.1.1 and A7.3.1.2), taking into account the nature and deployment of the fishing gear and the possibility of its interaction with the habitat (Table A29). ◙

A7.5.7 The team shall record the encounterability score for each habitat in the 'MSC RBF Worksheets'.

Aggregate spatial score

A7.5.8 The team shall determine the aggregate spatial score by using the 'MSC RBF Worksheets'.

Table A29: Scoring spatial attributes (modified from Williams et al., 2011)

Spatial attribute	Score					
	0.5	1	1.5	2	2.5	3
Spatial overlap	UoA overlap with a habitat is ≤15%	UoA overlap with a habitat is ≤30%	UoA overlap with a habitat is ≤45%	UoA overlap with a habitat is ≤60%	UoA overlap with a habitat is ≤75%	UoA overlap with a habitat is >75%
Encounter-ability	Likelihood of encounter-ability is ≤15%	Likelihood of encounter-ability is ≤30%	Likelihood of encounter-ability is ≤45%	Likelihood of encounter-ability is ≤60%	Likelihood of encounter-ability is ≤75%	Likelihood of encounter-ability is >75%

A7.6 CSA Step 4: Determine the CSA score and equivalent MSC score

A7.6.1 The team shall use the 'MSC RBF Worksheets' to calculate the overall consequence and spatial scores, the CSA score and the MSC CSA-derived score for each scoring element (habitat).

A7.6.2 The team shall convert the MSC CSA-derived scores into a final MSC score for PI 2.3.1.

A7.6.2.1 If there is only 1 scoring element, the team shall:

a. The MSC CSA-derived score for the single scoring element shall be used as the final MSC score.

b. Round the final MSC score shall to the nearest whole number (e.g. 87).

c. Record the final MSC score in the Scoring Tables in the 'MSC Reporting Template'.

A7.6.2.2 If there is more than 1 scoring element and each scoring element has the same MSC CSA-derived score, the team shall:

a. Convert the MSC CSA-derived scores for the scoring elements into the final MSC score (e.g. if all scoring elements score 64, the final MSC score is 64).

b. Round the final MSC score to the nearest whole number.

c. Record the final MSC score in the Scoring Tables in the 'MSC Reporting Template'.

A7.6.2.3 If there is more than 1 scoring element and each scoring element has different MSC CSA-derived scores, the team shall:

a. Derive the final MSC score by applying the rules in Table A30.

b. Assign the final MSC score in an increment of 5 (e.g. 60, 65, 70)

c. Record the final MSC score in the Scoring Tables in the 'MSC Reporting Template'.

A7.6.2.4 If the MSC CSA-derived score of any scoring element scores less than 60, the team shall fail the PI.

Table A30: Combining multiple scoring element scores

Score	Combination of individual scoring elements
None	Any scoring elements within a PI that fail to reach a score of 60 represent a failure against the MSC Fisheries Standard and no score shall be assigned.
60	All elements have a score of 60 and only 60.
65	All elements score at least 60; a few achieve higher scores, approaching or exceeding 80, but most do not reach 80.
70	All elements score at least 60; some achieve higher scores, approaching or exceeding 80; but some fail to achieve 80 and require intervention action.
75	All elements score at least 60; most achieve higher scores, approaching or exceeding 80; only a few fail to achieve 80 and require intervention action.
80	All elements score 80.
85	All elements score at least 80; a few achieve higher scores, but most do not approach 100.
90	All elements score at least 80; some achieve higher scores approaching 100, but some do not.
95	All elements score at least 80; most achieve higher scores approaching 100; only a few fail to score at or very close to 100.
100	All elements score 100.

A7.6.3 If no additional information exists to score the PI, the team shall apply the MSC score directly to the PI within the 'MSC Reporting Template' and provide rationale as justification.

A7.6.3.1 If there is additional information regarding the attribute(s) that justifies modifying the MSC CSA-derived score either upwards or downwards by a maximum of 10 points, the team shall use this information to reach the final MSC score for the PI. ◙

a. The team shall use all information that is available on the UoA to inform the assessment.

b. The team shall provide the justification for any score modification.

A7.7 Setting conditions using the CSA

A7.7.1 If any scoring element score is less than 80, the team shall set a condition on the PI. ◙

A7.7.1.1 If a condition is set on a PI that was scored using the CSA, the team shall make sure that the proposed Client Action Plan meets the following criteria:

a. Is capable of raising the score to 80.

b. Addresses all the scoring elements for which the score was below 80.

c. Does not cause additional associated problems for other scoring elements.

A8 Conducting a Scale Intensity Consequence Analysis (SICA)

A8.1 Preparation ◙

A8.1.1 The team shall conduct a SICA for each data-deficient scoring element identified within PI 2.4.1.

A8.2 Stakeholder involvement within the SICA

A8.2.1 The team shall use input from stakeholders to:

a. Assist in the identification of ecosystems that are affected by the UoA.

b. Provide information suitable for the qualitative evaluation of the risks that the fishing activity poses to the ecosystem.

c. Assist in scoring the spatial and temporal scales and the intensity of the fishing activity.

d. Assist in scoring the consequence for the ecosystem.

A8.3 SICA Step 1: Prepare SICA scoring template for each data-deficient scoring element

A8.3.1 The team shall document scores and justifications in the SICA scoring template (Table A31), in the 'MSC Reporting Template'.

Table A31: SICA scoring template for PI 2.4.1 Ecosystem

Performance Indicator PI 2.4.1 Ecosystem outcome	Spatial scale of fishing activity	Temporal scale of fishing activity	Intensity of fishing activity	Relevant subcomponents	Consequence score
Fishery name and UoA				Species composition	
				Functional group composition	
				Distribution of the community	
				Trophic size/structure	
Justification for spatial scale of fishing activity					
Justification for temporal scale of fishing activity					

Performance Indicator PI 2.4.1 Ecosystem outcome	Spatial scale of fishing activity	Temporal scale of fishing activity	Intensity of fishing activity	Relevant subcomponents	Consequence score
Justification for intensity of fishing activity					
Justification for consequence score					

A8.4 SICA Step 2: Score spatial scale

A8.4.1 The team shall work with stakeholders to assign a spatial scale score.

A8.4.2 The team shall use the greatest spatial extent to determine the spatial scale score for the overlap of the ecosystem with the fishing activity (Table A32). ◙

A8.4.2.1 The team shall only take into account the overlap of the ecosystem with the fishing activity of the UoA.

A8.4.3 The team shall record the score for each component and the justification in the SICA scoring template (Table A31).

Table A32: SICA spatial scale scores

<1%	1-15%	16-30%	31-45%	46-60%	>60%
1	2	3	4	5	6

A8.5 SICA Step 3: Score temporal scale

A8.5.1 The team shall work with stakeholders to assign a temporal scale score.

A8.5.2 The team shall use the highest temporal frequency to determine the temporal scale score for the overlap of the ecosystem with the fishing activity (Table A33). ◙

A8.5.2.1 The team shall only take into account the number of the days of the fishing activity of the UoA.

A8.5.3 The team shall record the score for each component and the justification in the SICA scoring template (Table A31).

Table A33: SICA temporal scale scores

1 day every 10 years or so	1 day every few years	1-100 days per year	101-200 days per year	201-300 days per year	301-365 days per year
1	2	3	4	5	6

A8.6 SICA Step 4: Score the intensity

A8.6.1 The team shall work with stakeholders to assign a score for intensity. ◙

A8.6.1.1 The team shall base the score for the intensity of the activity on the spatial and temporal scale of the activity, its nature and extent.

A8.6.1.2 The team shall take into account the direct impacts of the fishing activity to the ecosystem under evaluation (Table A34). ◙

A8.6.2 The team shall record the score for each component and the justification in the SICA scoring template (Table A31).

Table A34: SICA intensity scores

Level	Score	Description
Negligible	1	Remote likelihood of detection of fishing activity at any spatial or temporal scale.
Minor	2	Activity occurs rarely or in few restricted locations and detectability of fishing activity even at these scales is rare.
Moderate	3	Moderate detectability of fishing activity at broader spatial scale, or obvious but local detectability.
Major	4	Detectable evidence of fishing activity occurs reasonably often at broad spatial scale.
Severe	5	Occasional but very obvious detectability or widespread and frequent evidence of fishing activity.
Catastrophic	6	Local to regional evidence of fishing activity or continual and widespread detectability.

A8.7 SICA Step 5: Identify the most vulnerable subcomponent of the ecosystem and score the consequence of the activity on the subcomponent

A8.7.1 The team shall work with stakeholders to select the single subcomponent on which the fishing activity is having the most impact. ◙

A8.7.2 When choosing which subcomponent to score, the team shall recognise that different subcomponents may be proxies for measuring the same effect but are much easier to observe and score on a qualitative basis.

A8.7.3 The team shall score the consequence of the activity using the SICA consequence Table A35.

A8.7.4 The team shall base the consequence score on information provided by all stakeholders and the team's expert judgement.

A8.7.4.1 The team shall take the scale and intensity scores into account. ◙

A8.7.4.2 If there is no agreement between stakeholders, the team shall use the consequence category with the lowest score (60, 80 or 100).

A8.7.4.3 If there is limited or no information, the team shall consider the consequence risk as high and assign a score of 60.

A8.7.5 The team shall record the consequence score as fail if the UoA does not meet the performance levels in consequence category 60.

A8.7.6 When assessing “changes” to subcomponents, the team shall only consider changes due to fishing activities.

A8.7.7 The team shall record the consequence score and justification in the SICA scoring template (Table A31).

Table A35: SICA consequence score

	Consequence category			
Subcomponent	**Fail**	**60**	**80**	**100**
Species composition	Consequence is higher risk than 60 level.	Detectable changes to the community species composition without a major change in function (no loss of function). Changes to species composition up to 10%. Time to recover from impact on the scale of several to 20 years.	Impacted species do not play a keystone role (including trophic cascade impact). Only minor changes in relative abundance of other constituents. Changes of species composition up to 5%. Time to recover from impact up to 5 years.	Interactions may be occurring that affect the internal dynamics of communities, leading to change in species composition not detectable against natural variation.
Functional group composition		Changes in relative abundance of community constituents up to 10% chance of flipping to an alternate state/ trophic cascade.	Minor changes in relative abundance of community constituents up to 5%.	Interactions that affect the internal dynamics of communities leading to change in functional group composition not detectable against natural variation.
Distribution of the community		Detectable change in geographic range of communities with some impact on community dynamics. Change in geographic range up to 10% of original. Time to recover from impact on the scale of several to twenty years.	Possible detectable change in geographic range of communities but minimal impact on community dynamics change in geographic range up to 5% of original.	Interactions that affect the distribution of communities unlikely to be detectable against natural variation.
Trophic/size structure		Changes in mean trophic level and	Change in mean trophic level and	Changes that affect the internal

	Consequence category			
		biomass/number in each size class up to 10%. Time to recover from impact on the scale of several to 20 years.	biomass/number in each size class up to 5%.	dynamics unlikely to be detectable against natural variation.

A8.8 Scoring PI 2.4.1 using the RBF

A8.8.1 The team shall use the SICA score to determine the final score for PI 2.4.1.

A8.8.2 The team shall consider whether there is additional information to score the PI.

A8.8.2.1 If there is no additional information, the team shall apply the converted score directly to the PI with the accompanying scoring template and a rationale provided as justification.

A8.8.2.2 If there is additional information that justifies modifying the MSC score either upwards or downwards by a maximum of 10 points, the team shall use this information to reach the final MSC score for the PI. ◙

A8.8.2.3 The team shall use all information that is available on the UoA to inform the assessment.

A8.8.2.4 The team shall provide the justification for any score modification.

A8.8.2.5 The team shall record all changes to the score and rationale for the changes.

A8.8.3 The team shall record the final PI score in the SICA table in the 'MSC Reporting Template'.

A8.9 Setting conditions using the RBF (PI 2.4.1)

A8.9.1 If any score is less than 80, the team shall set a condition on that PI.

A8.9.1.1 If a condition is set for a PI that was scored using the SICA, the team shall make sure that the Client Action Plan proposed by the fishery client is capable of raising the score to 80.

A8.9.1.2 The team shall only apply the RBF to the UoA in subsequent MSC assessments if the score is 80 or above at the point of entering reassessment.

End of Tool A: Risk-Based Framework

Guidance for Tool A: Risk-Based Framework

GA1 Introduction to the Risk-Based Framework (RBF) ▲

The FAO Guidelines on Ecolabelling for Fisheries and Fisheries Products from Marine Capture Fisheries provided the conceptual basis for the adoption of a risk-based approach to the evaluation of fisheries against certain PIs in circumstances where information is inadequate to evaluate those PIs conventionally.

In paragraph 32, the FAO guidelines state:

> *"…the use of less elaborate methods for assessment of stocks should not preclude fisheries from possible certification for ecolabelling". It goes on to note "...to the extent that the application of such methods results in greater uncertainty about the state of the 'stock under consideration', more precautionary approaches to managing such resources will be required which may necessitate lower levels of utilisation of the resource".*

The inference is that in the absence of detailed scientific information on fishery impacts and providing the existence of tools that provide a qualitative or semi-quantitative indication of the risk inherent in a fishery, it should be possible to assess such a fishery for certification based on the extent to which fishing activity is demonstrably "precautionary" or of "less risk".

The MSC adopted an approach that considers a combination of risk-based indicators to arrive at a risk score that translates to a parallel MSC score. The risk-based indicators used in this process include qualitative and semi-quantitative proxies that assess the impact of fishing activity or correspond with the level of utilisation of the resource. In addition, the team should adopt the worst-case scenario approach to scoring the risk indicators in the absence of credible evidence, information or logical reasoning to the contrary.

In the event of the RBF being used for a PI, the likelihood of being scored high risk and of receiving a low MSC scores on the specified indicator increases with increasing scale and intensity of utilisation of resources in the fishery. While the RBF allows the use of more qualitative information obtained under an extensive stakeholder consultation process, increased uncertainty around the information or evidence used, or the lack of consensus on information obtained in the process will result in the most cautious (worst plausible) score being applied, furthering the likelihood of lower MSC scores.

The MSC's intention in allowing the use of a risk-based approach is to ensure that its assessment process is accessible to data-deficient fisheries that are readily demonstrated as operating in a precautionary manner.

Implicit in the approach is a recognition that fisheries operating at relatively high levels of utilisation pose a greater risk to the ecological components with which they interact and that the assessment and management of such risks must be underpinned by comprehensive scientific information.

The MSC is aware of the existence of other risk-based analysis tools, as well as the fact that the development of these tools is a continuous process. The MSC has not calibrated any alternative risk-based approaches against the default assessment tree but would encourage interested parties to consider calibration of such equivalent risk-based approaches against the SGs in the default assessment tree.

The precaution built into the RBF methods creates an incentive to use the conventional process when data is available.

GA1.1 Applying the RBF in scoring different PIs ▲

Background

The RBF is designed for use in association with the default tree for Principles 1 and 2. The RBF was adopted by the MSC to enable scoring of fisheries in data-deficient situations, particularly for the outcome PIs associated with Principles 1 and 2.

The team may apply the RBF to the whole PI if the team determines that all scoring elements data-deficient. If quantitative information is available for some scoring elements within outcome PIs (i.e. species under PI 2.1.1) and not others, the team should determine which scoring elements should be scored using the RBF.

For Principle 1 PIs, the team usually scores only 1 scoring element (target species of the fishery), but under Principle 2, the team may score a range of in-scope species, ETP/OOS species, habitats, or ecosystems.

There may be UoAs that contain both data-deficient and non-data-deficient scoring elements (e.g. different in scope species).

GA1.1.1 RBF methodologies ▲

The RBF includes a set of methods for assessing the risk to each of the ecological components from activities associated with the fishery in assessment. The methods range in complexity and data requirements from a system based on expert judgment, to a semi-quantitative analysis to assess potential risk. Each of the methods provides a risk-based estimate of the impact of the fishery on a data-deficient scoring element being scored within outcome PI. These risk estimates are in turn related to the specific Scoring Guideposts used to assess the performance of the fishery against the PI for a component.

The robustness of these methodologies relies heavily on the inputs of a suitably broad stakeholder group with a good balance of knowledge about the fishery and the ecological components on which it has impacts. Table GA1 below provides a description of the 4 methodologies within the RBF.

Table GA1: Description of methodologies within the RBF

Methodology	Description
Consequence Analysis (CA)	The CA is a semi-quantitative analysis that assesses the consequence of fishing activity on a particular species subcomponent. The CA is partly based on the structured collection of qualitative information from a diverse group of stakeholders, as well as using information on proxies that can be used to estimate changes to the relevant subcomponent in a fishery.
Productivity Susceptibility Analysis (PSA)	The PSA requires information about the productivity and susceptibility of each species in a given PI, and uses this information to individually score a set of attributes using pre-established PSA tables. Any attribute for which there is insufficient data is automatically assigned the highest risk score: at least some of information is needed to demonstrate low risk in the fishery.
Consequence Spatial Analysis (CSA)	The CSA requires information about the consequence of fishing activities and spatial distribution of habitat types and uses this information to individually score a set of attributes using pre-established CSA tables. Any attribute for which there is insufficient data is automatically assigned the highest risk score: at least some level of information is needed to demonstrate low risk in the fishery.
Scale Intensity Consequence Analysis (SICA)	The SICA is a qualitative analysis that aims to identify which activities lead to a significant impact on any ecosystem. A SICA is partly based on the structured collection of qualitative information pertaining to the PI in question from a diverse group of stakeholders.

GA1.1.2 PIs scored using the RBF ▲

Table GA2 defines which PIs within the default tree may be scored using RBF methodologies. PIs for which the RBF may directly be used are indicated below. PIs for which special guidance applies when the RBF is used are indicated below.

Table GA2: RBF methodologies available for scoring PIs and implications for non-RBF PIs

PI		RBF applicability
1.1.1 & 1.1.1A	Stock status	**Both CA and PSA applicable.**
1.1.2	Stock rebuilding	The RBF is designed for use in cases where direct measures of stock status, such as estimates of biomass, are not available. There is no direct measure to determine whether the stock is actually depleted and would need to consider rebuilding measures under PI 1.1.2 therefore it is not scored if using the RBF. What is known after scoring PI 1.1.1(A) using the RBF is the risk of the stock being fished such that recruitment would be impaired.
1.2.1	Harvest strategy	RBF not applicable.
1.2.2	Harvest control rules and tools	RBF not applicable.
1.2.3	Information and monitoring	RBF not applicable, but there is an RBF alternative PI (PI 1.2.3R). This alternative PI has been included since the information required to meet default scoring issues would not be expected to be available in data-limited situations applicable to the RBF. If the RBF is used to score PI 1.1.1(A), it is recognised that the information is not sufficient to estimate outcome status with respect to stock status reference points.
1.2.4	Assessment of stock status	For data-limited fisheries the application of the RBF may be the only “assessment of stock status” available.
2.1.1	In-scope species outcome	**Only PSA applicable.**
2.1.2	In-scope species management strategy	In scoring the management PI for in-scope species when the PSA has been used to score the outcome status, there is no equivalent RBF methodology to use for management. Here, teams should instead be guided by the language on using informal approaches against PI 1.2.1 (GSA 2.4). This means that for data deficient fisheries, management should consider how elements of the management strategy combine to manage impact, such that susceptibility is maintained at or below acceptable levels given the productivity of the species. Data-deficient fisheries might not have a management strategy in place designed to keep a species above a reference point, but the strategy should instead aim to maintain or reduce the current susceptibility score and give confidence that the fishery is operating at a low-risk level. It is up to the team to then evaluate this and determine the equivalence of the fisheries management regime with the specific scoring issue. ~~RBF not applicable.~~

PI		RBF applicability
2.1.3	In-scope species information	RBF not applicable, but an RBF alternative PI (2.1.3R) has been included since the information required to meet default scoring issues would not be expected to be available in data-limited situations applicable to the RBF. If the RBF is used to score PI 2.1.1, it is recognised that the information is not sufficient to estimate outcome status with respect to stock status reference points.
2.2.1	ETP/OOS species outcome	**Only PSA applicable.**
2.2.2	ETP/OOS species management strategy	In scoring the management PI for ETP/OOS species when the PSA has been used to score the outcome status, there is no equivalent RBF methodology to use for management. Here, teams should instead be guided by the language on using informal approaches against PI 1.2.1 (GSA 2.4). This means that for data deficient fisheries, management should consider how elements of the management strategy combine to manage impact, such that susceptibility is maintained at or below acceptable levels given the productivity of the species. Data-deficient fisheries might not have a management strategy in place designed to keep a species above a reference point, but the strategy should instead aim to maintain or reduce the current susceptibility score and give confidence that the fishery is operating at a low-risk level. It is up to the team to then evaluate this and determine the equivalence of the fisheries management regime with the specific scoring issue. ~~RBF not applicable.~~
2.2.3	ETP/OOS species information	RBF not applicable, but there is an RBF alternative PI (PI 2.2.3R). This alternative PI has been included since the information required to meet default scoring issues would not be expected to be available in data-limited situations applicable to the RBF. If the RBF is used to score PI 2.2.1 it is recognised that the information is not sufficient to estimate outcome status with respect to ~~biologically based limits~~favourable conservation status.
2.3.1	Habitats outcome	**Only CSA applicable.**
2.3.2	Habitats management strategy	In scoring the management PI for habitats when the CSA has been used to score the outcome status, there is no equivalent RBF methodology to use for management. Here, teams should instead be guided by the language on using informal approaches against PI 1.2.1 (GSA 2.4). This means that for data deficient fisheries, management should consider how elements of the management strategy combine to manage impact, such that consequence on the habitat is maintained at or below acceptable levels given the spatial attributes of that habitat. Data-deficient fisheries might not have a management strategy in place designed to keep a habitat above a reference point, but the strategy should instead aim to maintain or reduce the current consequence score and give confidence that the fishery is operating at a low-risk level. It is up to the team to then evaluate this and determine the equivalence of the fisheries management regime with the specific scoring issue. ~~RBF not applicable.~~
2.3.3	Habitats information	RBF not applicable, but there is an RBF alternative PI (PI 2.3.3R). This alternative PI has been included since the information required to meet

PI		RBF applicability
		default scoring issues would not be expected to be available in data-limited situations applicable to the RBF. If the RBF is used to score PI 2.3.1 it is recognised that the information is not sufficient to identify habitats encountered by the fishery or to determine the impact of the fishery on habitats encountered.
2.4.1	Ecosystem outcome	**Only SICA applicable.**
2.4.2	Ecosystem management strategy	In scoring the management PI for ecosystems when the SICA has been used to score the outcome status, there is no equivalent RBF methodology to use for management. Here, teams should instead be guided by the language on using informal approaches against PI 1.2.1 (GSA 2.4). This means that for data deficient fisheries, management should consider how elements of the management strategy combine to manage impact, such that consequence on the habitat is maintained at or below acceptable levels for the most vulnerable subcomponent of the ecosystem. Data-deficient fisheries might not have a management strategy in place designed to keep an ecosystem above a reference point, but the strategy should instead aim to maintain or reduce the current consequence score and give confidence that the fishery is operating at a low-risk level. It is up to the team to then evaluate this and determine the equivalence of the fisheries management regime with the specific scoring issue. ~~RBF not applicable.~~
2.4.3	Ecosystem information	RBF not applicable.
	Principle 3	The RBF is designed to allow the team to determine the level of risk that a fishery is posing undue harm to a species, habitat, or ecosystem. The RBF does not apply to Principle 3.

Guidance to Table A2 Information monitoring PI (PI 1.2.3R) ▲

Scoring issues (b) and (c) – scoring fishery removals ▲

The distinction between scoring issues (b) and (c) for PI 1.2.3R at SG80 relates to the relative amount or quality of information required on fishery removals.

Scoring issue (b) relates to fishery removals specifically by those vessels covered under the unit of assessment, which need to be regularly monitored and have a level of accuracy and coverage consistent with the HCR. For example, where depletion methods are used, they should be tested against catch and effort data at a determined frequency consistent with the HCR; for example, weekly, or monthly.

The reference to “other” fishery removals in scoring issue (c) relates to vessels outside or not covered by the UoA. These require good information but not necessarily to the same level of accuracy or coverage as that covered by scoring issue (b).

GA1.2.8 Information adequacy - in-scope species information PI (PI 2.1.3R) ▲

The team should use information that is adequate to support understanding of the effectiveness and practicality of measures used by the UoA and potential “alternative measures”, if:

There is unwanted catch., and

Scoring issue (c) on the “review” of “alternative measures” is scored in the management PI 2.1.2.

Guidance to Table A5 Habitats information PI (PI 2.3.3R)

Scoring issue (c) – monitoring ▲

When scoring issue (c) at the SG80 level, the team should consider all potential increases in risk, such as changes in:

The scoring of the outcome PI.

The operation of the UoA.

The effectiveness of the measures.

GA2 Stakeholder involvement in RBF

GA2.1 Announcing the RBF ▲

If the team decide to trigger the RBF for a scoring element after the fishery assessment is announced (FCP Section 7.10), the team should ensure there is additional communication to stakeholders ~~prior to the site visit~~at that time. If it is not clear whether a scoring element meets criteria in Section 5.2, the team should announce the possibility of using the RBF at the fishery announcement stage. In this case, and to improve efficiency of the assessment process, the CAB should announce use of the RBF at fishery announcement, in the Announcement Comment Draft Report, and plan the site visit as if it were an RBF assessment as set out in the Toolbox. If information is found at the site visit that indicates the RBF is not necessary, the fishery may proceed with a non-RBF assessment for this scoring element.

GA2.2 Information gathering ▲

The team should use existing data and reports, if available, to identify target stocks, in scope species, ETP/OOS, habitats and ecosystems that may be affected by the UoA. In addition, they should review information available to support the scoring for the applicable methodology (CA, PSA, CSA, SICA) as described in A2.2.

The team is required to include this information in the ACDR so that stakeholders can familiarise themselves with it before the consultation process. In addition to this, the team can choose to either provide information on the data gaps for scoring or provide draft scoring using the applicable methodology.

The team may use expert judgement and anecdotal evidence to compile preliminary lists of information, but it should be noted where this is the case. ~~The team should use existing data and reports, if available, to identify target stocks, in scope species, habitats and ecosystems that may be affected by the UoA.~~

~~The team may use expert judgement and anecdotal evidence to compile preliminary lists of information. The team should then consult with stakeholders, either individually or at fishery management meetings, on the preliminary list. The team should document and justify any additions to or deletions from the preliminary list of information.~~

GA2.2.1.a Management arrangements ▲

For example, information of management arrangements, such as quotas, limited entry, gear restrictions, spatial closures, depth limits, etc.

GA2.2.1.f Information about UoA/habitats ▲

If there is limited information available about habitat(s) encountered by the UoA, the team may use local knowledge and/or participatory methods to define the habitat(s).

Example

For example, if there is no detailed understanding of a habitat's substratum, geomorphology, and (characteristic) biota (SGB), the team may use other sources of local information, such as data collected by local dive operators, to support the determination of habitats. Furthermore, the team could conduct RBF stakeholder workshops to determine, for example, biome classification or depth ranges of habitats using participatory methods to gather stakeholder knowledge.

GA2.3 Stakeholder consultation

GA2.3.2 Text to inform stakeholders ▲

The MSC's intent for the recommended text is to encourage a broad range of stakeholders to ~~attend~~ participate in site visits and to provide some advance notice on the nature of the RBF approach. All stakeholders should be informed of the risk assessment process and given the opportunity to participate.

GA2.3.3 Planning stakeholder engagement ▲

The team should plan the stakeholder engagement process prior to the site visit to ensure effective participation of stakeholders. Early identification of stakeholders is vital to ensuring effective consultation during the assessment process. The team should identify stakeholders both through contacts made available by the fishery client and via active stakeholder engagement methods. The choice of which method(s) to use depends on the circumstance of the UoA. ~~The team should conduct background work to ensure that time with stakeholders is focussed on new issues that are raised by stakeholders.~~

~~GA2.3.3.1 Stakeholders ▲~~

Stakeholder consultation with a suitably broad stakeholder group with a good balance of knowledge about the fishery is critical in a risk assessment, particularly at the qualitative (CA/SICA) level of an assessment. Stakeholders provide expert judgement, local knowledge, hands-on experience, fishery-specific and ecological knowledge and raise issues that may not be covered in material provided to the team.

~~The team should ensure the stakeholder group includes at least fishers, scientists, conservationists, indigenous representatives, managers, local residents, fish processors and others, as necessary.~~

~~GA2.3.3.2 Effective consultation ▲~~

~~Early identification of stakeholders is vital to ensuring effective consultation during the assessment process. The team should identify stakeholders both through contacts made available by the fishery client and via active stakeholder engagement methods. The choice of which method(s) to use depends on the circumstance of the UoA.~~

~~GA2.3.3.3 Location ▲~~

~~The location of the meetings is very important to ensure good participation of stakeholders. The team should consider the following factors when deciding the location of meetings:~~

- ~~If stakeholders are spread over a wide area, it might be necessary to hold more than 1 set of meetings to allow for participation or consider whether a remote setting would be more beneficial.~~
- ~~The choice of venue needs to be considered depending on the number of stakeholders attending the meetings and the space needed for engagement.~~

~~Meetings can be both formal and informal.~~

~~Engagement can be effective in any location whether inside or outside as long as the team is prepared to run the workshop in that setting.~~

~~GA2.3.3.4 Meetings ▲~~

The team may organise stakeholder ~~meetings~~ consultation using ~~a number of~~one or more approaches, such as: workshops, focus groups, separate meetings, surveys or a blended approach. The team should consider the following factors when deciding the format and structure of ~~meetings~~consultation:

The number of PIs that are being assessed using the RBF. It might be better to hold a separate RBF workshop with those who have information relevant to the PIs with other stakeholders attending a different meeting(s).

Stakeholder dynamics within the group, which will affect who should meet together and who should meet separately.

There may be conflicting opinions among group members. It might be useful to allow these opinions to be shared to help the team draw conclusions from the stakeholders.

~~GA2.3.3.7 Background information ▲~~

~~The objective of providing materials and background information is to ensure that stakeholders can be brought up to the same level of understanding ahead of the meeting.~~

GA3 Conducting a Consequence Analysis (CA)

GA3.1 Preparation

GA3.1.1 How to complete a CA template ▲

The team may do this by defining each species as a separate UoA or by scoring the species as separate scoring elements within a combined UoA.

GA3.1.3 CA scoring template ▲

Table GA3 provides an example of how to complete a CA template.

Table GA3: Example of CA score and justification

Principle 1: Stock status outcome	Scoring element	Consequence subcomponents	Consequence score
XXX scallop fishery	Placopecten *magellanicus*	**Population size**	60
		Reproductive capacity	
		Age/size/sex structure	
		Geographic range	
Justification for most vulnerable subcomponent	Population size was considered the most vulnerable subcomponent based in the impact of exploitation patterns on biomass.		
Justification for consequence score	Information on fleet structure, fishing area and exploitation rates indicate that the stock is exploited at full exploitation rate. However, trends in exploitation rates, biomass and recruitment indicate that fishing is not adversely damaging recruitment in the long term. As the fishery is defined as fully developed and operating at full capacity it cannot be concluded that its impact on population size is minimal or its impact on dynamics is none. Indicators used are: Fleet structure: There are 3 scallop fleets operating in the area: the AAA, BBB and CCC fleets. The AAA fleet, of which scallop fishing is the primary activity, has access to the whole area and is subject to quota limits and seasons. The BBB and CCC fleets have access to a portion of the area. Exploitation rates: Management aims for exploitation rates of 15%, considered as the exploitation rate that will not pose a risk on the productivity of the scallop population. Exploitation rates have been maintained generally at consistent levels with this management target. Fishing area and seasonality: Detailed distributional information of the AAA fleet's fishing effort is collected on a routine basis. Overall approach to scoring the AAA stock/biological unit: The scallop biological unit/stock was defined as area XXX. Therefore PI 1.1.1 was scored by considering scallops in the area XXX as a single stock. This approach was considered appropriate due to the biology of scallops.		

GA3.2 Stakeholder involvement within CA ▲

See guidance GA2.

GA3.3.1 “Human-induced impacts” ▲

The team should refer to the MSC Fisheries Standard GSA2.2.7 to interpret the term “human-induced impacts".

GA3.3.2 Examples of indicator (proxy) data to score consequence ▲

Table GA4 provides some examples of indicator (proxy) trend data that the team may use to score consequence. The list is not exhaustive but seeks to give an indication of the types of indicator data needed to score the subcomponents.

The team may support the interpretation of indicator and trend data with other information known about the UoA and the expert judgment of the team.

Table GA4: Examples of indicator (proxy) data to score consequence

Subcomponent	Indicator/Proxies
Population size	Catch, effort and catch per unit effort (CPUE) time-series. Sex ratio in male-only fisheries.
Reproductive capacity	Size class indexes. Catch composition time-series (sex ratio).
Age/Size/Sex structure	Catch length/age index or time-series. Catch composition (sex ratio) time-series.
Geographic range	Time-series species distribution.

In the application of the Consequence Analysis, the team should determine the risk that the UoA poses on stock status without the use of reference points. Measures and trends of fishing effort, landings, exploitation rates, biomass and recruitment estimates and spawning events before recruiting to the fishery are examples of indicators that the team may use to determine the risk associated to the fishing activity. The Consequence Analysis is intended to be a measure of the risk that fishing poses to long-term recruitment dynamics.

Fisheries operating at full exploitation levels (the so-called large-scale fisheries) will likely score below the 80-mark level. The team should only score above 60 if available indicators provide evidence of recruitment not being adversely damaged. The team may score higher if fisheries are operating at low exploitation levels in relation to the size of the stock and biology of the species. The team should only score a higher CA score of up to 100, if the impact of the fishing activity cannot be differentiated from the natural variability for this population.

The team should score 80 if available information shows changes in the population subcomponent that can be reasonably attributable to the fishing activity, but these are of such a low magnitude that the impact of the fishery is considered to be minimal on the population size and dynamics.

The team should score 60 if available information shows changes to the population subcomponent attributed to the fishing activity and these changes are of such magnitude that they cannot be considered as minimal.

Examples of consequence score rationales for each subcomponent are shown below:

Examples:

<table>
<tr><th>Population size justification</th><th>CA score</th></tr>
<tr><td>Information on CPUE trends show stability over the last 20 years. Fishing mortality trends indicates that the fishery has occurred under low or very low exploitation rates relative to stock biomass. Recruitment indices showed no major changes in the last 10 years. It can be reasonably concluded that changes in the population due to fishing are of low magnitude that cannot be detectable against the natural variability of the population.</td><td>100</td></tr>
<tr><td>Annual production is estimated to be higher than the removals by the fishery. Analysis of CPUE time-series suggests that the fishery over 23 years has not had a significant detrimental impact on the stock, which is estimated to be still near the virgin biomass level.</td><td>80</td></tr>
<tr><td>Trends in catches indicate that biomass removed has been kept below any levels that could have an effect on population dynamics. Exploitation rates are estimated not to pose a risk on population size or population dynamics. The stock is considered to be above the point where recruitment could be impaired. The current catches are lower than they were 10-20 years ago.</td><td>80</td></tr>
<tr><td>Information on landings and CPUE trends show stability over the last 10 years.

<table><tr><td>Year</td><td>2003</td><td>2004</td><td>2005</td><td>2006</td><td>2007</td><td>2008</td><td>2009</td><td>2010</td><td>2011</td><td>2012</td></tr><tr><td>CPUE</td><td>978</td><td>900</td><td>950</td><td>925</td><td>1000</td><td>1010</td><td>975</td><td>1023</td><td>1099</td><td>1050</td></tr></table>
Fishing mortality trends indicate that the fishery has occurred under low exploitation rates with catch and effort decreasing over the last 10 years (due to low prices and high fuel). Recruitment indices showed no major changes in the period 2004–2012. The stock has recently increased. It cannot be concluded that changes in population due to fishing are not detectable against the natural variability of the population.</td><td>80</td></tr>
<tr><td>Information on fleet structure, fishing area and exploitation rates indicate that the stock is exploited at full exploitation rate. However, trends in exploitation rates, biomass and recruitment indicate that fishing is not adversely damaging recruitment in the long term. Surveys are used to estimate the abundance and distribution of commercial and pre-recruits. In addition to surveys, the status of the resource is evaluated from trends in CPUE from logbook and observer data. As the fishery is defined as fully developed and operating at full capacity it cannot be concluded that its impact on population size is minimal or its impact on dynamics is none.</td><td>60</td></tr>
<tr><td>Information on landing, effort, and fishing mortality indicates that the crab fishing is a fully developed fishery likely to be occurring at full exploitation rates. CPUE on fully recruit crab indicates a decreasing trend in abundance. However, CPUE for per recruit show that long-term recruitment dynamics are not adversely damaged.</td><td>60</td></tr>
<tr><td>Stock indicators on biomass show that biomass has decreased in recent years from peak levels reached in year 2005. The biomass level seems to be higher than the lowest level experienced at which recruitment was not impaired. Therefore, it can be concluded that the fishery has not adversely damaged the long-term recruitment dynamics.</td><td>60</td></tr>
<tr><td>Available evidence indicates that recruitment dynamics are adversely affected. Therefore, consequence is higher risk than 60. Spawning stock biomass (SSB) has continuously declined since 2001. The 2013 SSB is the lowest observed in the time-series. The fishing mortality has shown a declining trend since the mid-1980s; it has been relatively stable in recent years, but still is considered to remain high given current SSB levels. Recent recruitments have been lower than earlier in the time- series, with the 2011 recruitment being the lowest.</td><td>fail</td></tr>
</table>

Reproductive capacity justifications	CA score
A slow-growing, long-lived species (more than 40 years of age). The estimated age at 50% selectivity (22 years) is well above the age at 50% maturity (5.3 years). Individuals should therefore have more than 17 years of spawning before they enter the fishery, therefore ensuring the protection of a significant part of the adult population (survival of discards is assumed to be high). It can be concluded that the fishery has minimal impact on population size and no impact on dynamics.	80
The moderate to low exploitation rates, together with minimum landing size (MLS) that allows multiple spawning events indicates that the fishery has minimal impact on population dynamics. The status of the stock of crab in the area, informed by stock indicators on biomass and fishing mortality, is considered good.	80
The cockle stock is intensively fished (33% of the estimated biomass). Available evidence suggests that there may be a detectable change in reproductive capacity as cockles are caught in their second year of growth. The MLS implemented for this fishery allows for catching individuals in their second year of growth. A retained cockle is defined as one that is retained by a gauge having a square opening of 20 mm measured across each side. Cockles of this length are in their second year of growth and will have spawned at least once before being caught. The harvest strategy ensures that long-term recruitment dynamics is not adversely damaged by fishing.	60

Age/Size/sex structure justifications	CA score
Size frequency distribution of the species is available from a fully developed fishery, showing that recruitment is not being adversely damaged. However, the level of catch and the fleet structure do not enable a qualitative assessment to determine that the impact on population dynamics is minimal.	60
In a crab fishery, available evidence indicates that there is a detectable change in size/sex structure. However, information on abundance and recruitment indicates that long-term recruitment dynamics have not been adversely damaged. There appears to be a reduced number of large males of sufficient size to mate with the largest females, and that has the potential effect of reducing the reproductive capacity of these largest females. There is concern that reduced abundance of large male crabs may lead to sperm limitation and reduced levels of egg production if there are no males left in the population to mate with the larger females.	60

Geographic range justifications	CA score
With only 2 or 3 boats fishing, fishing effort is very low, with exploitation rates of only 1 - 2% per year, and, in some years, considerably less. Since the fishery began in 1989, it has been calculated that 1,132km^2 have been swept by the gear, with most of that in the period 1990–1998. This represents only 2% of the known stock distribution area (i.e. surveyed area). During the last 5 years, fishing effort has been very low with an average annual swept area of only about 26km^2, and there is no evidence of serial depletion of grounds.	80

GA3.3.3 The difference between ‘insignificant change’, ‘possible detectable change’ and ‘detectable change’ when scoring CA ▲

Changes in population size/ intrinsic growth rate (r) are assessed by the CA. The team should review biological indicator data to assess trends. The team should assess change in relation to whether or not such change is both detectable over and above natural variability and can be attributed to the

impact of the fishing activity. If the trend is beyond natural variability, the team should reflect this the scoring and rationale.

GA4 Conducting a Productivity-Susceptibility Analysis (PSA)

GA4.1.6 Grouping species ▲

The team may interpret the term “large number of species” as more than 15 species. The team may decide to conduct a PSA on all species as it may allow for a score that is above 80 for a particular PI (as per A4.1.10 and A5.3.2.2).

GA4.1.6.1.a Example of grouping by species ▲

The team should determine the taxonomic level at which species may be grouped based on the Principle 2 species characteristics. The team should not group species higher than the family taxonomic level.

Table GA5 below represents a list of Principle 2 species in a fictional fishery. Before the site visit, the team determined that there is 1 group (with 15 species) and 8 separate species needing to be scored using the RBF for PI 2.1.1.

Table GA5: Example of grouping by species

Example: Grouping by Species

Species	Taxonomy (Order/Family)	Group
Yellowfin tuna (*Thunnus albacares*)	Perciformes/Scrombridae	Group 1
Bigeye tuna (*Thunnus obesus*)	Perciformes/Scrombridae	Group 1
Blackfin tuna (*Thunnus atlanticus*)	Perciformes/Scrombridae	Group 1
Bluefin tuna (*Thunnus thynnus*)	Perciformes/Scrombridae	Group 1
Cod (*Gadus morhua*)	Gadiformes/Gadidae	n/a
European anchovy (*Engraulis encrasicolus*)	Clupeiformes/Engraulidae	n/a
Flying fish (*Exocoetus obtusirostris*)	Beloniformes/Excoetidae	n/a
Flying halfbeak (*Euleptorhamphus velox*)	Beloniformes/Hemiramphidae	n/a
Grouper (*Epinephelus striatus*)	Perciformes/Serrandidae	n/a
Porcupinefish (*Diodon hystrix*)	Tetraodontiformes/Diodontidae	n/a
Rainbow runner (*Elagatis bipinnulata*)	Perciformes/Carangidae	n/a
Remora (*Remora remora*)	Perciformes/Echeneidae	n/a
Atlantic mackerel (*Scomber scombrus*)	Perciformes/Scrombridae	Group 1

Pacific sierra (*Scomberomorus sierra*)	Perciformes/Scrombridae	Group 1
Wahoo (*Acanthocybium solandri*)	Perciformes/Scrombridae	Group 1
King mackerel (*Scomberomorus cavalla*)	Perciformes/Scrombridae	Group 1
Longtail tuna (*Thunnus tonggol*)	Perciformes/Scrombridae	Group 1
Slender tuna (*Allothunnus fallai*)	Perciformes/Scrombridae	Group 1
Bullet tuna (*Auxis rochei*)	Perciformes/Scrombridae	Group 1
Frigate tuna (*Auxis thazard*)	Perciformes/Scrombridae	Group 1
Leaping bonito (*Cybiosarda elegans*)	Perciformes/Scrombridae	Group 1
Butterfly kingfish (*Gasterochisma melampus*)	Perciformes/Scrombridae	Group 1
Atlantic bonito (*Sarda sarda*)	Perciformes/Scrombridae	Group 1

GA4.1.6.1.b Scoring groups ▲

The team may score productivity attributes ahead of the stakeholder meetings using information sources such as FishBase (fishbase.org).

The team should determine which species is most at risk qualitatively based on knowledge of inherent species vulnerability, as well as frequency of interaction with the fishery, and level of damage done (e.g. released alive vs. always killed).

The team may score more than 2 species in each taxonomic group, as appropriate.

GA4.1.9 Determining PSA - MSC score for species groups ▲

The RBF worksheet in Table GA7 shows the results of the above-mentioned example.

The RBF worksheet automatically combines multiple scoring elements using the rules in Table A20. If there are multiple scoring elements, the team should either use the results from the RBF worksheet or use the rules in Table A20.

Table GA6: Example of scoring most at-risk species

Species group	Representative species	PSA score	MSC score	Number of species in group	Final group score
Scrombridae	Bluefin tuna (*Thunnus thynnus*)	2.70	78.0	15	75
	Wahoo (*Acanthocybium solandri*)	2.89	71.7		

Table GA7: Scoring elements and grouping species into the RBF worksheet

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
1	Only main species scored?			---						Productivity Scores [1-3]									Susceptibility Scores [1-3]						Cumulative only							
2	Scoring element	First of each scoring element	Species Grouping only ID 'At Risk' species with associated species group	Species Grouping only Number of species in species group which this species represents	Family name	Scientific name	Common name	Species type	Fishery descriptor	Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level	Density Dependance	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	Catch (tons)	Weighting	Weighted Total	Weighted PSA Score	MSC PSA-derived score	Risk Category Name	MSC scoring guidepost	
3	1	First	Species Group 1	7	Scombridae	Thunnus thynnus	Bluefin tuna	Non-invertebrate	Purse seine UoA	2	3	1	3	2	1	3		2.14	3	3	3	1	1.65	2.70					78	Med	60-79	
4	2	First	Species Group 1	8	Scombridae	Acanthocybium solanc	Wahoo	Non-invertebrate	Purse seine UoA	1	2	1	2	2	1	3		1.71	3	3	2	3	2.33	2.89					72	Med	60-79	
5	3	First			Gadidae	Gadus morhua	Cod	Non-invertebrate	Purse seine UoA	1	2	1	2	2	2	3		1.86	3	3	2	2	1.88	2.64					80	Low	≥80	
6	4	First			Engraulidae	Engraulis encrasicolus	European anchovy	Non-invertebrate	Purse seine UoA	1	1	1	1	1	1	2		1.14	2	2	3	3	1.88	2.20					91	Low	≥80	
7	5	First			Excoetidae	Exocoetus obtusirostr	Flying fish	Non-invertebrate	Purse seine UoA	1	1	1	1	1	1	2		1.14	1	1	3	3	1.20	1.66					99	Low	≥80	
8	6	First			Hemiramphidae	Euleptorhamphus velo	Flying halfbeak	Non-invertebrate	Purse seine UoA	2	2	2	1	1	2	2		1.71	2	2	3	3	1.88	2.54					83	Low	≥80	
9	7	First			Serrandidae	Epinephelus striatus	Grouper	Non-invertebrate	Purse seine UoA	2	2	1	2	2	2	3		2.00	2	2	3	3	1.88	2.74					77	Med	60-79	
10	8	First			Didonidae	Diodon hystrix	Porcupinefish	Non-invertebrate	Purse seine UoA	1	2	1	1	1	1	3		1.43	2	2	2	3	1.58	2.13					93	Low	≥80	
11	9	First			Carangidae	Elagatis bipinnulata	Rainbow runner	Non-invertebrate	Purse seine UoA	2	3	2	2	2	1	3		2.14	2	3	2	3	1.88	2.85					73	Med	60-79	
12	10	First			Echeneidae	Remora remora	Remora	Non-invertebrate	Purse seine UoA	3	3	3	1	2	3	2		2.43	2	3	1	3	1.43	2.82					74	Med	60-79	
13																																

GA4.3 PSA Step 1: Score the productivity attributes ▲

The level of fishing impact a species can sustain depends on the inherent productivity of the species. The productivity determines how rapidly a species can recover from depletion or impact due to fishing. The productivity of a species is determined by species attributes such as longevity, growth rate, fecundity, recruitment and natural mortality. Information about productivity attributes can be found in scientific literature and websites like FishBase (fishbase.org).

GA4.3.1 ▲

The team should review various sources of information to determine correct productivity characteristics for scoring elements being assessed under the PSA.

GA4.3.2.6 Application of PSA for birds, mammals and reptiles ▲

The team should consider the quality of the information used to generate the mean or median, where these values are provided. For example, where there are studies of only short duration used to estimate attributes such as age at first breeding or sexual maturity, it is appropriate to consider whether the species value is anomalously low for the genus. If it is, the team should score based on what is the norm for the genus (i.e. using an appropriate proxy from a closely related species), or, if not possible, be precautionary and score high risk for that attribute.

Guidance to Table A8 Productivity attributes and scores – density dependence ▲

Depensatory effects (Allee effects) can arise from the reduced probability of fertilisation, and they should therefore be taken into consideration when scoring species productivity.

Depensatory effects may have a profound effect on the resilience of marine invertebrates to fishing mortality, as shown in some crabs and lobsters, and often also sedentary bivalves.

The team should score the density-dependent attribute as 3 (high risk, low productivity) if the species slow down the rate of population growth at low densities (depensatory dynamics). The team may score the density-dependent attribute as 1 (low risk, high productivity) if the species show compensatory dynamics at low densities because density dependence acts to stabilise the populations.

Guidance to Tables A9 and A12 ▲

Fecundity for birds

The fecundity for birds considers the number of chicks rather than the number of eggs a species is capable of producing. This is because in some families (e.g. boobies, penguins), one egg is often just an insurance egg and the species never actually fledges more than one chick even if they lay more than one egg (Anderson 1990; Lamey 1990[3]).

Average ‘optional’ adult survival probability for birds and pinnipeds

The productivity tables for birds and pinnipeds (Tables A9 and A12 respectively) contain an additional attribute on ‘optional’ adult survival probability. This attribute is only used for these two species groups as there is more reliable data on adult survival for these groups than for the others.

[3] Anderson, D.J. (1990) Evolution of obligate siblicide in boobies. 1. A test of the insurance-egg hypothesis. American Naturalist, 135, 334-350.
Lamey, T.C. (1990) Hatch asynchrony and brood reduction in penguins. Penguin biology, pp. 399- 416. Academic Press San Diego.

The attribute instructions indicate that the optimal average adult survival probability values should be used, if available. The optimal value represents what the species is capable of achieving biologically with healthy, stable populations (i.e. the value is not unsustainably low due to population decline driven by anthropogenic impacts). If a species is in decline due to anthropogenic impacts, the team should use either proxies from a closely related species, or, if there are no reliable values for closely related species, the team should score the attribute as high risk as per A4.3.2.6.d

For example, published estimates of adult survival for Balearic shearwater *Puffinus mauretanicus* are low relative to the genus at 0.809 and largely influenced by bycatch (Genovart et al 2016[4]). The adult survival values from the closely related Manx shearwater *Puffinus puffinus* is 0.93 (Schreiber and Burger 2001[5]). In this case, the team should use the value for the closely related species to score this attribute and provide a rationale.

GA4.4 PSA Step 2: Score the susceptibility attributes ▲

The level of fishing impact that a species can sustain depends on its vulnerability or susceptibility to capture or damage by the fishery activities. The susceptibility of a species is determined by attributes such as the degree of overlap between the distribution of the fishery and the distribution of the species; and whether the species occurs at the same depth in the water column as the fishing gear.

Susceptibility is estimated as the product of 4 independent aspects; Areal overlap (availability), encounterability, selectivity and post-capture mortality (PCM).

GA4.4.3.c and GA4.4.3.d ▲

If catch percentages are unknown or too uncertain to make a determination on which species are 'main' the CAB should refer to the MSC Guidance to the Fisheries Standard.

GA4.4.4.1.a ▲

This could be tonnage of total catch for each of the fisheries being considered.

In the 'MSC RBF Worksheets' the team should manually input data on catch per gear/fishery affecting the stock (for PI 1.1.1 column W, for PI 2.1.1 and PI 2.2.1, column Y).

GA4.4.4.1.b ▲

The team should consult with stakeholders.

GA4.4.5 ▲

Example

Catch data indicates that the UoA (longline fishery) catches approximately 1000t of the target species Atlantic cod. The catch data of the gillnet fishery that also retains Atlantic cod from the same stock cannot be estimated. During the RBF stakeholder workshop stakeholders agreed that the longline catch of 1000t comprises approximately 40% of the total catch while the gillnet fishery contributes about 10% of total catch. The weighting score for the longline fishery will be 2 and the weighting score for the gillnet fishery will be 1.

[4] Genovart, M., Arcos, J.M., Álvarez, D., McMinn, M., Meier, R., Wynn, R., Guilford, T. & Oro, D. (2016) Demography of the critically endangered Balearic shearwater: the impact of fisheries and time to extinction. Journal of Applied Ecology, 53, 1158–1168.
[5] Schreiber, E. A. and Burger, J. A., eds. (2001) Biology of marine birds. Hoboken, USA: CRC Press.

Guidance on Table A18 Susceptibility scores for birds, mammals, reptiles and amphibians (OOS species) ▲

Given the highly migratory nature of marine birds, mammals and reptiles, the areal overlap of the fishery and species should take account of the highly seasonal changes in distribution of both the fishing effort and the distribution of the ETP/OOS unit. For many ETP/OOS units, distribution maps may be available based on tracking data. For example, Carneiro et al 2019[6] provide a framework for estimating population-level density distributions of seabirds across the main life history stages for 22 species of albatross and petrels. They use this framework to compare the overlap of the distributions of these species with pelagic longline fisheries at a 5x5 degree grid on an annual and quarterly basis, identifying hotspots of fishery overlap with the species.

However, where there is an absence of accurate data on species distribution it may be more appropriate to use other methods to estimate overlap. For seabirds, Small et al 2013[7] outline a range of approaches that may be used to estimate seabird distribution, including: 1) expert opinion; 2) use of range maps assuming homogeneous distribution; 3) range maps representing non-breeding distributions alongside a foraging radius from a breeding colony to represent breeding distribution; 4) a foraging radius from breeding colony refined according to known habitat preference; 5) a combination of range map, foraging radius and tracking data; 6) tracking data only or 7) modelling of distribution based on analysis of habitat preference. These approaches are likely to be similar for other out-of-scope species. Small et al 2013 provide some advice when it comes to estimating seabird distribution that is also useful to consider when evaluating the areal overlap in the MSC context. This includes:

- The best available measure of foraging radius from seabird breeding colonies is likely to be the mean maximum of all trips based on tracking data.
- For species for which no tracking data exist, data substitutions with similar species should be treated with caution.
- Estimation of distribution should be at least year quarterly to account for changes in species distribution and fishing effort.
- The risk assessment should match the resolution of the species distribution to fishing effort – at a 5x5 degree resolution fine scale inaccuracies in estimating distribution may be of little consequence. However, in small, localised fisheries the information on distribution may not be of sufficient resolution.
- Experts should be invited to review the species distribution maps and refine as necessary.

Noting the above, where there is little reliable data on species distribution that takes account of heterogeneity of distribution by season or life history stage, the team should assign a more precautionary risk score for this attribute.

GA4.4.6 ▲

The areal overlap is the sum of the total percentage overlap of all fishery activity with the areal concentration of a stock. For example, if there are 2 fisheries both affecting 20% of the distribution of the species, the result would be 40% overlap, and the team should score areal overlap as high-risk.

If the PSA has not considered specific attributes (e.g. the intensity of the fishery), the team should use additional information (e.g. evidence of very high intensity) that justifies modifying the MSC score downward by a maximum of 10 points as per A5.3.1.1.

[6] Carneiro, A.P.B. [et al.] 2019. A framework for mapping the distribution of seabirds by integrating tracking, demography and phenology. Journal of Applied Ecology 57: 514-525.
[7] Small, C.; Waugh, S.M.; Phillips, R.A. (2013) The justification, design and implementation of Ecological Risk Assessments of the effects of fishing on seabirds. Marine Policy 37: 192-199.

Example: Areal overlap

A demersal species has a wide stock distribution. However, due to its preferred habitat, the species is found in the area shaded in grey for 95% of the time. Such behavioural patterns reduce the overlap between the species and the fishing activity (from 40% to ~20%) of fishery A and B (if considering the susceptibility cumulatively and this should be considered in scoring) (Figure GA1). If the species in the example showed migratory behaviour the situation would be different.

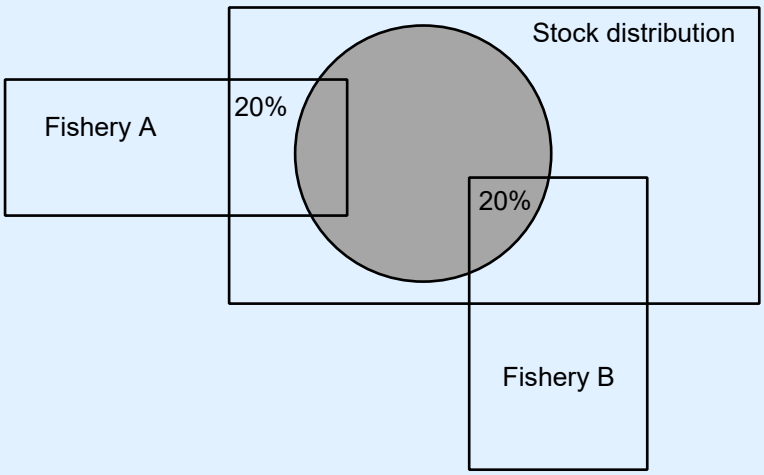


Figure GA1: Scoring areal overlap

This introduces appropriate precaution in the case where neither qualitative nor quantitative data is available.

If a fishery overlaps a large proportion of a stock distribution range the risk is high because the species has no refuge, and the potential for impact is high.

GA4.4.6.d ▲

The team should consider and document any uneven distribution or concentration of the stock, including core and marginal ranges, when estimating areal overlap.

Example

For example, for species that are known to school, and when the gear interacts with the schools, the team should score areal overlap as high-risk.

GA4.4.6.g.i Key LTL Areal Overlap ▲

The team should score fisheries that are estimated to operate at full exploitation rates or maximum sustainable levels (as defined in A3.3.4.1) as high risk for areal overlap (> 30%) due to the schooling behaviour of LTL species which increases the catchability of the gear.

GA4.4.7 ▲

The team should interpret low, medium and high risk based on the likelihood of a gear encountering a species.

If a fishery overlaps a large proportion of a stock distribution range, the team should consider the risk as high because the species has no refuge, and the potential for impact is high. Table GA8 shows an example of how to score encounterability.

The team should score encounterability as the sum of the depth range of gear types. If 2 gear types are deployed at depth ranges where more than 30% of the concentration of a species are likely to occur, the team should score encounterability as high risk.

Each fishery will have the same encounterability score as it is an aggregate of all gear types affecting the stock. The team should score encounterability as high-risk for a targeted species.

For pelagic gears the team should take a percentage overlap approach to determine the encounterability of the scoring element. For demersal gears, particularly static ones set on the seabed, the team should consider the likelihood of encounter of the scoring element on the seabed rather than the percentage overlap of the gear (on the slope) and concentration of the species. The team should consider gears set on the seabed such as pots and bottom gillnets to have high encounterability for their target species. The overlap of the spatial distributions of the scoring element and the gear may be affected by the depth and slope, but the team should consider this under Areal Overlap rather than encounterability.

Table GA8: Example of scoring encounterability

Scenario	Encounterability score
Pelagic species has a total depth range of 0-100m, and the depth range of the gear is 0-10m.	Low
Pelagic species has a total depth range of 0-100m, and the depth range of the gear is 0-10m. If the diurnal behavioural patterns are targeted by a fishery that operates at night this greatly increases the overlap of the gear with the species. See Figure GA2.	High
The species is known to migrate diurnally, and the gear interacts with a high concentration of the species at a particular time of the day.	High
If the fishery uses a gillnet, the chances of encounter for lobsters living in crevices is low.	Low
If a pot fishery uses attractive bait, the chance of encounter for lobsters is high.	High
A species occurring principally near the bottom will have low encounterability from a gear fishing in mid-water.	Low
A pot fishery would have high encounterability even in a highly rugged environment if it uses bait as an attractant.	High
Target species	High
Pelagic species has a total depth range of 0–100m, and the depth range of the gear is 0–50m.	Medium
A benthopelagic species inhabits both the sea floor and the area just above it (e.g. up to 50m from the sea bottom). The species has a total depth range of 200–400m. A mid-water gear with a depth range of 50–250m will have medium encounterability with this species.	Medium

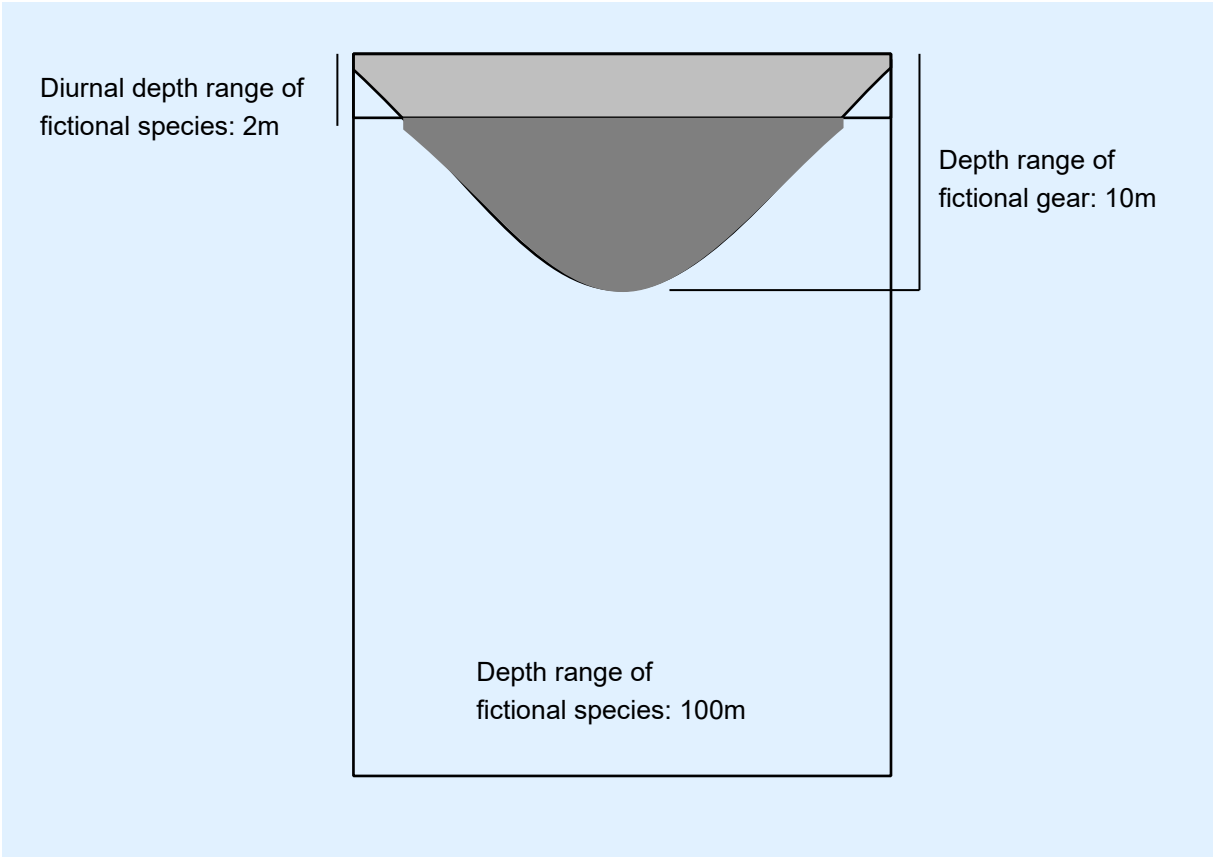


Figure GA2: Example of scoring encounterability

~~GA4.4.7.1.a ▲~~

~~Measures that reduce encounterability include those that reduce the opportunity for the species to interact with the gear, (e.g. that reduce attraction to the gear, reduce ability to reach gear through scaring techniques, improve visibility of gear).~~

GA4.4.8 ▲

Selectivity provides an estimate of retention by the fishing gear and is scored based on the risk that the gear operation retains individuals smaller than the size at maturity.

The team should base the assessment of risk on a review of empirical or analogous catch profile data or should be considered unlikely (or improbable) based on information for the species, fishing gear and operation of the UoA.

GA4.4.8.d ▲

The team should score the selectivity of the gear type considering its potential to retain immature fish. 2 elements have been defined in order to adequately assess the selectivity attribute.

When scoring the element (a), the team should determine the frequency of deployments in which immature fish are caught. The team should only consider the frequency and not the number or proportion of juveniles caught. For example:

- If juveniles are caught in 70% of gear deployments, the team should score susceptibility element (a) as 3 (high susceptibility).
- If juveniles are caught in 70% of gear deployments but the proportion of juveniles in each deployment is very low, the team should score susceptibility as still 3 (high susceptibility).

If juveniles are caught in only 1% of gear deployments, but when it occurs the proportion of juveniles is very high (e.g. 80%), the team shall score susceptibility as 1 (low susceptibility).

When scoring the element (b), the team should focus on determining the potential of the gear/fishing method to retain juveniles or, in other words the ability of the juveniles to escape or avoid that particular gear.

~~GA4.4.8.1.a ▲~~

~~Measures that reduce selectivity, if encountered, include changing size or shape of gear to reduce ability to retain or impact species or including escape options from gear.~~

GA4.4.9.a ▲

In assessing the probability that if a species is captured it would be released in a condition that would permit subsequent survival, the team may consider, for example: biological factors that may limit the potential of a species to be captured alive; handling practices of the fishery or fisheries being considered; the time taken to clear discards from the deck, etc.

If possible, the team should verify observer data in face-to-face observer meetings to make sure that the observer is qualified to identify the species concerned.

GA4.5 PSA Step 3: Determine the PSA score and equivalent MSC score

GA4.5.1 ▲

This is done automatically using the 'MSC RBF Worksheets' for RBF assessments.

PSA score is automatically rounded to 2 decimal points and MSC score per scoring element is rounded to the nearest whole number.

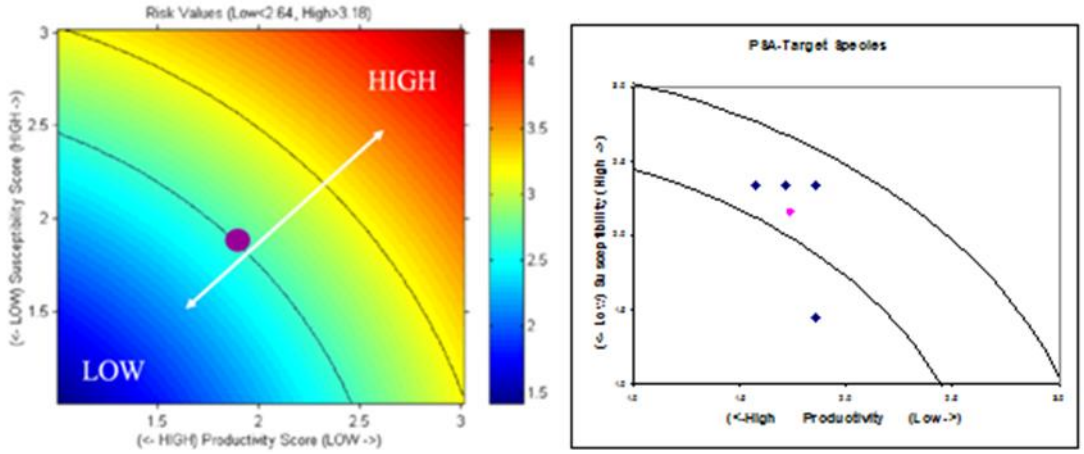
Box GA1: Calculation of the overall risk score

Calculation of Euclidean distance:

For each component unit (e.g. species) the attributes for productivity are scored [1 3] (high, medium, low productivity). These attribute scores are averaged to provide an overall productivity score in the interval [1 3]. Similarly, for each unit the attributes within the 4 aspects of susceptibility are also scored [1 3] (low, medium, and high susceptibility). These aspects are multiplied and rescaled to the interval [1 3] to provide a susceptibility score. These 2 scores are then plotted on the PSA diagnostic plot. A single risk score is calculated as the Euclidean distance from the nominal origin (0.5, 0.7), calculated as $R = \sqrt{(P^2 + S^2)}$; where R is the risk score, P is the productivity score, and S the susceptibility score. This single risk score allows a ranking of all units considered.

The divisions between risk categories and hence Scoring Guideposts are based on dividing the area of the PSA plots into equal thirds, as shown in Figure GA3.

Figure GA3: Examples of diagnostic charts for displaying PSA values for each species



Left chart: Low-risk species have high productivity and low susceptibility, while high-risk species have low productivity and high susceptibility. The curved lines divide the potential risk scores into thirds on the basis of the Euclidean distance from the origin (0, 0).

Right chart: Example PSA plot for a set of target species. Note the curved lines that divide the risk space into equal thirds.

When assessing PIs 1.1.1, 2.1.1 and 2.2.1 using the RBF, the quadratic equation used for the PSA is:

MSC Score = -11.965(PSA)2 + 32.28(PSA) + 78.259

There is a direct quadratic relationship (R2=1) between overall PSA scores and MSC score equivalents. This has been derived by setting the lowest possible risk score (i.e. all attributes score low risk) as equivalent to an MSC score of 100 and setting the lower and upper bounds of the "medium risk" range as equivalent to MSC scores of 60 and 80, respectively. A curve through these points is described by the conversion equation above.

However, when scoring data-deficient scoring elements in PI 2.2.1, a different quadratic equation is used in order to reflect the precautionary levels expected for this PI, as outlined in Section GA1.

MSC Score = -5.8(PSA)2 + 6.9(PSA) + 105.0

GA5 Scoring the fishery using the RBF for species Performance Indicators (PIs 1.1.1, 2.1.1, and 2.2.1)

GA5.1.1.1 ▲

In the 'MSC RBF Worksheets', the team should input the CA score manually. This generates the MSC score for each PI 1.1.1 scoring element automatically using rules set out in Table A19.

GA5.2 Adjusting scoring element scores ▲

The intent of the requirements in A5.2 on adjusting the scoring element scores is to allow a pathway for scoring elements that score greater or equal to 60 but less than 80 to increase their score to an 80 level if they can demonstrate that they have good management measures in place. This is consistent with a 'residual risk assessment' process, which first considers the inherent risk of a situation and

then allows consideration of mitigating circumstances that reduce the risk. In this case, the mitigating factors relate to having an effective management strategy in place for that scoring element.

The MSC is aware that in some cases where there are high risk productivity scores, that even low risk susceptibility scores will not be enough for the fishery to reach an 80 score. This creates a situation where a fishery is unable to close a condition unless it no longer meets the RBF triggering criteria. In some circumstances this would be realistic and achievable within a reasonable timeframe. However, in others where there are no stock status reference points available (PI 2.1.1) or the population status is not known with respect to favourable conservation status (PI 2.2.1 criteria 1) or the direct impacts of the UoA relative to favourable conservation status have not been quantitatively determined by an independent source (PI 2.2.1 criteria 2), this would present a challenge that it may be beyond the fishery's ability to address, or to address in a reasonable time period, even considering application of 'exceptional circumstances'. In these situations, a condition would be created that could not be addressed, meaning that the assessment team may not be able to accept the condition following FCP v3.1: 7.18.9 ("The CAB shall not accept a Client Action Plan if the client is relying upon the involvement, funding and/or resources of other entities, such as fisheries management or research agencies, authorities, or regulating bodies that might have authority, power, or control over management arrangements, research budgets, and/or priorities, without: […] b. Being satisfied that the closure of conditions is both achievable by the client and realistic in the period specified.")

The requirements in A5.2 allow the team to decide about whether to apply the 'residual risk assessment' criteria for modifying the scoring element score. This initial decision on whether to apply the residual risk assessment process is required to include consideration of indicators on the population size or status or on the UoA-specific mortality relative to the intrinsic population growth rate. These considerations are in place because, applying a precautionary approach, the MSC intent is to avoid situations where the fishery is having a negative consequence on the population of a species, even with an effective management strategy in place.

If the team proceeds with the residual risk assessment, they will consider several criteria including whether a management strategy is in place for the species, evidence of its success and whether alternative measures are reviewed regularly. If all criteria are met, the scoring element score can be increased as specified in the requirements.

GA5.3~~2~~.2 ▲

In the 'MSC RBF Worksheets', if there are multiple scoring elements and they are all data-deficient the final PI score is automatically calculated in the 'automated scoring' tab.

~~GA5.3.1.1 ▲~~

~~The team should interpret the term "additional information" as any other relevant information not specifically addressed in A3.3 (determining the CA score), A4.3 (scoring productivity attributes) or A4.4 (scoring susceptibility attributes). The use of additional information does not exempt the team from the requirement of assessing all required information in the sections above. The team should assign the more precautionary score if the required information is limited.~~

~~Additional information could include information on the population status of a species / population. For example, where the number of breeding individuals in the population is very such that any fishing mortality could adversely impact the population. This information should be used to ensure that the resulting MSC score is appropriate and precautionary.~~

~~On the other hand, where there is data from the fishery that meets the evidence requirements for the species group at 80 or above demonstrating that there is no or negligible levels of interaction with the species, this information should be used to ensure that the resulting MSC score is appropriate.~~

GA6 Setting conditions using the RBF for species Performance Indicators (PIs 1.1.1, 2.1.1, 2.2.1 and 2.3.1)

GA6.1.2 ▲

The team may test whether the proposed Client Action Plan will have the desired effect at the time of verifying and accepting the Client Action Plan by re-running the PSA.

The team may use PSA results to assist with condition setting, by identifying the set of productivity and susceptibility attributes that have contributed to a high risk score. The fishery client could include actions to reduce the risk, for example by implementing changes in the attributes identified as high risk (i.e. by the setting of a condition related to reducing susceptibility).

Since productivity attributes are inherent to the species, these attributes cannot be changed through Client Action Plans. If individual productivity attributes have been scored as “high risk” because of lack of information, these risk scores could be reduced if additional studies were conducted and provided information that indicated a lower risk score. For example, if the risk score for a particular in-scope species was due to high encounterability and high PCM, then the Client Action Plan might include actions to restrict fishing to night time or reduce the mortality when that species is captured. The team may test these actions by simulating changing the PSA attribute scores and observing whether the risk category changes.

The team should consider whether actions proposed in the Client Actin Plan (e.g. alternative gear) could have negative consequences on other scoring elements.

GA6.1.4 ▲

The MSC’s intent is that if a scoring element does not meet the 60 level when applying the PSA (before A5.2 is applied) in an assessment, that it cannot move from <60 to an 80 by applying A5.2 at the subsequent assessment.

In the situation where a scoring element is <60 in an assessment and A5.2 is applied allowing it to reach 60, it would be expected that the fishery would either need to ensure that the scoring element meets the ‘negligible’ criteria or that the default assessment tree is applied at the subsequent assessment (see Table Z).

Table Z.

PSA-derived MSC score at first assessment	Maximum possible score when applying A5.2 (at first assessment or through condition)	Able to apply A5.2 again at subsequent assessment?
<60	60	No
60	80	Yes

GA7 Conducting the Consequence Spatial Analysis (CSA) ▲

Background

The CSA was structured around a set of attributes that describe gear impacts (consequence) and the habitat (spatial) for each habitat being affected by different fishing gears. The CSA methodology and attributes were based on the ‘Ecological Risk Assessment for the Effects of Fishing’ methodology

(Hobday et al., 2007[8], Williams et al., 2011[9]), which was derived from images, expert opinion, and scientific literature. Both the method and attributes were modified to enable their application to MSC assessments.

The CSA consists of the following steps:

PC1 **CSA Step 1**: Define the habitat(s).

PC2 **CSA Step 2**: Score the consequence attributes.

PC3 **CSA Step 3**: Score the spatial attributes.

PC4 **CSA Step 4**: Determine the CSA score and equivalent MSC score.

The CSA examines attributes of each habitat associated with the UoA in order to provide a relative measure of the risk on the scoring element (habitat) from fishing activities.

GA7.1 Preparation

GA7.1.5 ▲

In the absence of detailed scientific information, the team should assess the UoA's impacts based on the extent to which fishing activity is demonstrably 'precautionary' or of 'less risk'. The team should consider the worst-case scenario. For example, if fishing takes place on both the outer continental shelf and slope, the team should score the natural disturbance score as 3 and not 2, reflecting the higher potential risk of impact on the slope. Another example is that the team should score removability of biota as 2 if a Danish seine UoA affects both low, robust biota and erect, medium biota.

The team should consider UoA specifics in the absence of credible evidence, information, or logical reasoning to the contrary. For example, the addition of rockhoppers to trawl gear allows the UoA to contact previously inaccessible areas, which may contain more complex habitats. The team should consider the impacts on these more complex habitats when scoring the attributes. Conversely, some modifications may lessen the gear's impact on the habitat, which the team should also consider.

GA7.3 CSA Step 1: Define the habitat(s)

GA7.3.2 ▲

For example, a habitat may be defined as "Medium-Outcrop-Large erect".

GA7.3.3 ▲

The examples of biomes, sub-biomes, and features and their associated depths in Table A22 are provided to emphasise the large differences that exist in the fauna and their life-history characteristics between depth zones and to provide a way to estimate the spatial extent of habitats (refer to the spatial overlap attribute below). For example, the extent of sediment plains on the outer shelf could be roughly estimated and differentiated from sediment plains on the slope.

[8] Hobday, A. J., Smith, A., Webb, H., Daley, R., Wayte, S., Bulman, C., Dowdney, J., Williams, A., Sporcic, M., Dambacher, J., Fuller, M. and Walker, T., 2007. Ecological risk assessment for the effects of fishing: methodology. Report R04/1072 for the Australian Fisheries Management Authority, Canberra.
[9] Williams, A., Dowdney, J., Smith, A.D.M., Hobday, A.J., and Fuller, M., 2011. Evaluating impacts of fishing on benthic habitats: A risk assessment framework applied to Australian fisheries. Fisheries Research 112(3):154-167.

GA7.4 CSA Step 2: Score the consequence attributes ▲

The 2 habitat-productivity attributes' scores are multiplied by 2 to reflect the increased importance of these 2 attributes. The consequence score is then the average of all habitat-productivity and gear-habitat interaction attribute scores.

GA7.4.1 ▲

Biotas have different intrinsic rates of growth, reproduction, and regeneration, which are also variable in different conditions of temperature, nutrients, and productivity (Williams et al., 2010[10]). Habitat depth is an appropriate proxy for regeneration of biota because rates of growth and reproduction will typically be slower in deeper water where temperature and nutrient availability are lower (Hobday et al., 2007). Further, the type of biota may be relevant since some (e.g. corals, crinoids, large sponges) grow at a very slow rate compared to others (e.g. encrusting species).

GA7.4.2.1 ▲

Biotas subject to greater natural disturbances have a greater intrinsic ability to recover from impacts. Common natural disturbances result from wave action and tidal movements, but other factors, such as local currents, storm surge, flooding, temperature fluctuations, and predation, may also be relevant. Habitat depth is considered a suitable proxy for natural disturbance because deeper habitats typically experience fewer or no natural disturbances.

GA7.4.4 ▲

Removability of biota is influenced by the size, height, robustness, flexibility, and structural complexity of the attached biota. Large, erect, inflexible, or delicate biota is more vulnerable to physical damage or removal than small, low, flexible, robust, or deep-burrowing biota. Rugosity refers to the ridged nature of the organism. In general, more rugose (i.e. complex) organisms are more vulnerable to the impacts of fishing. The interactions between a high diversity of biota types and non-standardised fishing gear can make this attribute difficult to score. For example, demersal trawls can have a range of factors influencing removability, such as footrope weight, use of chains, roller or bobbin size, bridle configuration, and door weight. The team should consider the full range of possible interactions.

GA7.4.5 ▲

For example, intermediate-sized rock fragments (6 cm to 3 m) that form attachment sites for sessile fauna can be permanently removed. While soft sediment is less resistant to impact, it is generally more resilient because it accumulates relatively rapidly and is altered by burrowing fauna.

GA7.4.6 ▲

The substratum hardness attribute considers whether or not the seabed will be degraded by contact with fishing gear. For example, hard rocky bottom is intrinsically more resistant to impact.

GA7.4.7 ▲

Substratum ruggedness is scored based on the concept that the access of gear to the habitat is related to the ruggedness of the substratum. For example, large rocks and steep slopes make an area less accessible to mobile gear.

[10] Williams, A., Schlacher, T.A., Rowden, A.A., Althaus, F., Clark, M.R., Bowden, D.A., Stewart, R., Bax, N.J., Consalvey, M. and Kloser, R.J., 2010. 'Seamount megabenthic assemblages fail to recover from trawling impacts'. Marine Ecology 31: 183-199.

GA7.4.8 ▲

For example, fishing impact can be greater on steep slopes because they are more prone to landslide damage.

GA7.5 CSA Step 3: Score the spatial attributes ▲

The spatial score is the geometric mean of the spatial attributes.

GA7.5.1 ▲

The team should consider gear footprint in terms of gear size, weight, and mobility. This attribute measures the level of impact by considering the frequency and intensity of gear disturbance on the habitat. The gear footprint scores are based on the number of encounters needed to have an impact on structural biota in a unit area.

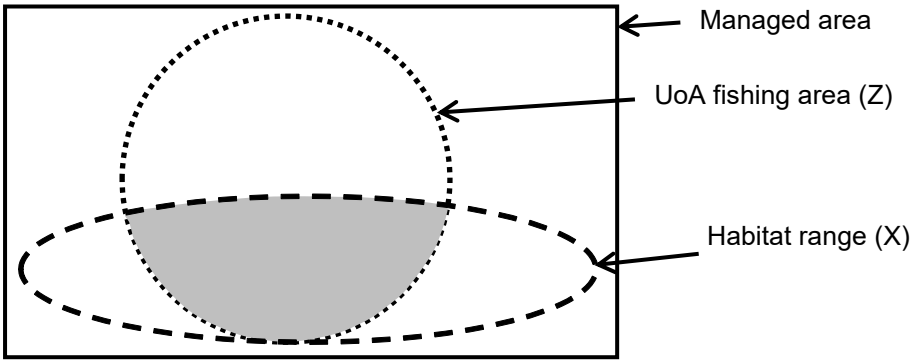
Table GA9: Number of encounters needed to cause impact (modified from Williams et al., 2011)

Gear type	Many encounters needed to cause impact	Some encounters needed to cause impact	Single encounter needed to cause impact
Hand collection	✓		
Handline	✓		
Demersal longline		✓	
Bottom gill net or other entangling net		✓	
Danish seine		✓	
Demersal trawl (including pair, otter twin-rig, and otter multi-rig)			✓
Dredge			✓

GA7.5.4 ▲

The spatial overlap attribute is the overlap of a habitat's range in the "managed area" with the UoA's fishing area. It is calculated as the UoA's fishing area (Z) divided by the habitat's range within the "managed area" (X) (Figure GA4). The team should refer to GA7.3.3 and Table A21 for details on estimating the spatial extent of habitats.

Figure GA4: Visualising the spatial overlap attribute



Spatial overlap (S) = proportion of X overlapped by Z

GA7.5.6 ▲

The encounterability attribute is a measure of how likely the UoA is to encounter the habitat within the "managed area".

Example

A UoA using semi-pelagic gear that rarely affects a benthic habitat would likely have an encounterability score of 0.5 for that habitat. Similarly, a demersal trawl will have low encounterability with a habitat that is confined to heavy reef areas because the trawl cannot operate in such areas. Conversely, a UoA that uses a gear that targets a certain habitat will have high encounterability with that habitat.

GA7.5.4–7 Additional guidance on spatial overlap and encounterability ▲

The team should estimate the spatial overlap and encounterability attributes based on the most recent spatial distribution of fishing by the UoA. The team should modify the assessed fishing area of the UoA according to the gear being used.

For example, if longlines are used in only part of the "managed area" (e.g. due to habitat characteristics that do not allow for longline usage throughout the entire area), the team should assess this part.

GA7.6 CSA Step 4: Determine the CSA score and equivalent MSC score ▲

Calculation of Euclidean distance

For each scoring element (i.e. habitat), the attributes for consequence are scored 1-3 (low, medium, and high). Both of the habitat-productivity attributes' scores are doubled, and then all habitat-productivity and gear-habitat interaction attribute scores are averaged to provide an overall consequence score in the interval. Similarly, the spatial attributes are also scored 1-3 (low, medium, and high) though half scores are possible. The spatial score is derived as a geometric mean of the 3 spatial scores. The consequence and spatial scores then produce a single risk score calculated as the Euclidean distance from the nominal origin [0,0]: $R = \sqrt{(C^2 + S^2)}$;where R is the risk score, C is the consequence score, and S the spatial score.

Conversion of the CSA score

The CSA score is converted to an MSC score using the quadratic equation:

MSC Score = -9.1(CSA)2 + 22.4(CSA) + 86.8

There is a direct quadratic relationship (R2=1) between overall CSA scores and MSC score equivalents. This has been derived setting the highest possible risk score (i.e. all attributes score high risk) as equivalent to an MSC score of 0; setting the lowest possible risk score (i.e. all attributes score low risk) as equivalent to an MSC score of 100; and setting the lower and upper bounds of the medium risk range as equivalent to MSC scores of 60 and 80, respectively.

GA7.6.3.1 ▲

Examples of information not previously considered within the CSA include gear footprint modifications that lessen the gear's impact by lessening the gear's size, weight, or mobility.

If MSC score adjustments are made, the team should base them on the attributes scored and on how the UoA varies from the scores provided within the scoring tables for each attribute. Examples of these score adjustments are as follows:

Example

The UoA is fishing with a Danish seine that has been modified to be lighter and have less bottom contact. The weight of the gear is relevant to the gear footprint attribute, and the lessened bottom contact could be relevant to the removability of biota, removability of substratum, and/or encounterability attributes; therefore, it is likely appropriate to increase the final MSC score.

A demersal trawl UoA with the addition of rockhoppers will have an increased impact (given the increased ability to access previously untrawlable areas) when compared to trawls without such additions. It would likely be appropriate to adjust the final MSC score downwards since this type of gear has increased impact on the removability of biota and removability of substratum attributes as well as increased spatial overlap and/or encounterability attribute scores.

GA7.7 Setting conditions using the CSA

GA7.7.1 ▲

Since some of the CSA attributes are inherent to the habitat (i.e. consequence attributes), these attributes cannot be changed through Client Action Plans. If attributes have been scored as "high risk" because of a lack of information, these risk scores could be reduced if additional studies were conducted and provided information that indicated a lower risk score.

However, implementation of the Client Action Pan may lead to changes to the the spatial attributes. For example, fishery clients may implement gear modifications that lessen their habitat impacts, fishery clients may change their spatial footprint by avoiding high-risk scoring elements (e.g. corals), and/or fishery clients may make other spatial changes that will result in lower-risk impacts.

The team may test whether the proposed Client Action Plan will have the desired effect at the time of verifying and accepting the Client Action Plan by re-running the CSA. The team should consider whether actions proposed in the Client Action Plan (e.g. alternative gear) could have negative consequences on other scoring elements.

GA8 Conducting a Scale Intensity Consequence Analysis (SICA)

GA8.1 Preparation ▲

The 5 MSC SICA steps are summarised below:

SICA Step 1: Prepare a SICA scoring template for each ecosystem.

SICA Step 2: Score spatial scale of the fishing activity.

SICA Step 3: Score temporal scale of the fishing activity.

SICA Step 4: Score the intensity of the fishing activity.

SICA Step 5: Score the consequence resulting from the scale and intensity of the fishing activity for the most vulnerable subcomponent of the ecosystem.

GA8.4 SICA Step 2: Score spatial scale of fishing activity potentially having an impact on the ecosystem

GA8.4.2 ▲

The scale score is not used to mathematically determine the consequence score. It is used in the process of making judgements about the level of intensity at SICA Step 4. 2 different activities that scored the same for spatial scale might have quite different outcomes for the intensity score.

Example of use of Table A32

If fishing activity (e.g. capture by longline) takes place within 20% of the overall distribution of the ecosystem, then the spatial scale is scored as 3. This needs to be the overlap of the fishing activity of the UoA with the ecosystem distribution.

GA8.5 SICA Step 3: Score temporal scale of fishing activity potentially having an impact on the ecosystem

GA8.5.2 ▲

Examples of scoring temporal scale

If the fishing activity occurs daily, the temporal scale is scored as 6.

If fishing activity occurs once per year, then the temporal scale is scored as 3.

It may be more logical for some activities to consider the aggregate number of days that an activity occurs. For example, if the activity “fishing” was undertaken by 10 boats during the same 150 days of the year, the score is 4. If the same 10 boats each spend 30 non-overlapping days fishing, the temporal scale of the activity is a sum of 300 days, indicating that a score of 6 is appropriate.

If the activity occurs over many days, but only every 10 years, the number of days divided by the number of years in the cycle is used to determine the score. For example, 100 days of an activity every 10 years averages 10 days every year, so a score of 3 is appropriate.

GA8.6 SICA Step 4: Score the intensity of the relevant activity

GA8.6.1 ▲

The team should ensure the intensity score is consistent with the spatial and temporal scores.

Example of scoring intensity:

If spatial and temporal scales are scored as high-risk, the same would be expected when scoring intensity. The overall intensity of fishing activity depends upon the distribution and dynamics of the stock being exploited.

GA8.6.1.2 ▲

The team should ensure the intensity score reflects the frequency and extent of fishing activity.

Examples of intensity scores

Spatial scale score = low, and temporal scale score = low.

Intensity score = low

Justification: The spatial overlap between the fishing activity and the ecosystem distribution is extremely low and the fishing activity occurs very rarely. This combination of scale scores indicates that the intensity of this fishery is negligible.

Spatial scale score = high, and temporal scale score = high.

Intensity score = high

Justification: The fishing activity covers almost half of the spatial distribution of the stock and the fishing activity occurs frequently. This combination of scale scores indicates that the intensity of this fishery is severe.

Spatial scale score = low, and temporal scale score = high.

Intensity score = high

Justification: The spatial overlap between the fishing activity and the stock distribution is extremely low, and the fishing activity occurs frequently. This combination of scale scores indicates that the intensity of this fishery is severe as the fishing activity has frequent impacts on a small part of the stock.

GA8.7 SICA Step 5: Identify the most vulnerable subcomponent of the ecosystem, and score the consequence of the activity on the subcomponent

GA8.7.1 ▲

Subcomponents are indicators of health.

GA8.7.4.1 ▲

If the scale and intensity are scored as medium or high risk, the team should provide additional information to justify a low or medium risk score for consequence.

The team should consider Stakeholder perception in combination with additional qualitative and quantitative information to support the consequence score. Without such information, the team should score consequence as higher risk than the 60 level and fail the UoA.

GA8.8.2.2 ▲

The team may reduce default high risk scores (due to a lack of information) if additional studies revealed the risk level was actually lower. For example, if the SICA results in a consequence score of 80 but additional information is available and presented that justifies raising this score, the team may give a final MSC score of 85.

End of Guidance for Tool A: Risk-Based Framework

Tool B: Evidence Requirements Framework

The intent of the Evidence Requirements Framework is that the information used in fishery conformity assessments is subject to a structured consideration of accuracy as a basis for determining its adequacy for scoring. The Evidence Requirements Framework also seeks to ensure that the team's use of information is clearly documented. ◙

B1 Scope / applicability

B1.1.1 The team shall use the Evidence Requirements Framework to determine the adequacy of information used to inform scoring for the following SIs:

a. Shark finning: PI 1.2.1 SI (e), PI 2.1.2 SI (d), PI 2.2.2 SI (d)

b. Information on UoA impacts: PI 2.1.3 SI (a), PI 2.1.3 SI (b), PI 2.2.3 SI (a), PI 2.3.3 SI (b)

c. Habitats management compliance information : PI 2.3.2 SI (c)

d. Compliance information: PI 3.2.3 SI (c)

B2 Key terms

B2.1.1 The team shall apply the following definitions when using the Evidence Requirements Framework:

a. "Accuracy": The quality of the information ~~itself~~, and how effectively it describes the situation. Accuracy is defined in terms of:

i. "Objectivity": The extent to which information is free from conflict of interest.

ii. "Relevance": The extent to which the information is pertinent to the scoring issue.

iii. "Completeness": The extent to which the information captures all relevant elements and dimensions.

iv. "Consistency": The extent to which different information sources are in agreement.

B3 Consideration of information accuracy

B3.1.1 The team shall consider the available information source(s) applicable to the scoring issue. ◙

B3.1.2 For each information source, the team shall consider:

a. The objectivity, relevance, completeness and consistency of the information. ◙

b. The extent to which potential for bias is understood and mitigated. ◙

B3.1.3 For quantitative information sources, the team shall also consider how methods of data collection account for variability. ◙

B3.1.4 Where the team have concluded that there are no scoring elements in a component, the team shall still consider the accuracy of the information which supports this conclusion.

B4 Determination of information adequacy ◙

B4.1.1 The team shall select the information source(s) that will inform scoring from those considered in B3.

B4.1.2 The team shall determine whether the information selected is collectively adequate to meet each scoring guidepost.

B4.1.3 The team shall be more precautionary in their determination where there is a lower level of accuracy or a greater reliance on the team's expert judgement.

B4.1.4 The team's determination shall recognise that:

a. A higher level of accuracy is required where there is greater potential for UoA impact.

b. A lower level of accuracy may be adequate where there is a lower potential for UoA impact.

B5 Scoring and rationale

B5.1.1 For the information selected to inform scoring, the team shall document within the scoring rationale:

a. A consideration of accuracy of the collective information.

b. Any triangulation between sources of information.

c. The adequacy of the collective information to meet scoring guideposts.

B5.1.2 The team shall highlight any differences between the information used for different scoring elements.

Guidance for Tool B: Evidence Requirements Framework

The intent of the Evidence Requirements Framework is to be aligned with guidelines in ISO19011 in relation to verification of evidence.

GB1 Scope / applicability

The team may use the Evidence Requirements Framework to inform scoring elsewhere in the standard.

GB3 Consideration of information accuracy

GB3.1.1

Below is a list of potential sources of information relevant for scoring where the Evidence Requirements Framework applies. There may be additional relevant information sources to those listed below.

- Academic research
- Electronic monitoring (e.g., cameras)
- Geospatial positioning (e.g., AIS, VMS)
- Grey literature
- Infringement reports
- Legal reports
- Logbooks
- Management agency reports
- Observer programmes
- On-board inspections
- Port inspections
- Reference fleets
- Research surveys
- Reviews and evaluations
- Risk assessments
- Sales accounting
- Self-reported data
- Stakeholder interviews
- Stock assessments
- Technical expert opinion
- Technical reports

GB3.1.2.a

The example questions below may guide consideration of objectivity, relevance, completeness and consistency.

Objectivity	To what extent is the information independently provided or reviewed?
	To what extent is the information likely to be affected by a conflict of interest?
Relevance	To what extent is the information directly applicable to the UoA or scoring element?
	To what extent is the monitoring programme appropriate for gathering relevant information?
Completeness	To what extent is the information representative of the UoA or scoring element in space and time?
	To what extent is the information up to date?
Consistency	To what extent does the information source agree with other sources?

GB3.1.2.b

Potential for bias may exist in the following areas:

- Observation bias is a deviation from the truth that results during the process of observing and recording information. This can occur due to observer effects, the use of biased estimators, sampling design, data handling protocols or measuring errors.
- Response bias is the tendency for participants to respond inaccurately when providing information, in the sense of overestimating or underestimating a value. This can occur as a result of conflict of interest, the recorder or respondent's competency, questioning method and social or cognitive biases (e.g., confirmation bias, availability bias, etc.).

GB3.1.3

The example questions below may guide consideration of how methods of data collection may account for variability.

Characteristics of the fishing fleet and operations	How is variability in the physical characteristics of the fleet accounted for?
	How is variability in where, when and how the species is caught accounted for?
Ecological and biological characteristics	How is variability in species distribution accounted for?
	How is seasonal variability in productivity accounted for?
Monitoring design	How does the sampling design take into account patterns of clustering in catch events?

The team may report statistics describing precision, such as a coefficient of variation, where these are available.

Tool B: Evidence Requirements Framework

General

General requirements ◙

The team shall use Table B1 to identify when to apply the processes outlined in B1.2 and, if required, B1.3.

Table B1 Application of the Evidence Requirements Framework to the scoring issues.

PI/SI	Application of B1.2 Evaluation of trueness	Application of B1.3 Evaluation of precision
PI 1.2.1 SI (e) PI 2.1.2 SI (d) PI 2.2.2 SI (d)	B1.2 applies if these SIs are scored	Not applicable
PI 2.1.3 SI (a)	B1.2 applies to all scoring elements, including bait species Where there are no scoring elements, B1.2 applies to the UoA	B1.3 applies to all scoring elements, excluding bait species purchased from outside the UoA Where there are no scoring elements, not applicable
PI 2.1.3 SI (b)	B1.2 applies to all scoring elements, including bait species	Not applicable
PI 2.2.3 SI (a)	B1.2 applies to all scoring elements Where there are no scoring elements, B1.2 applies to the UoA	B1.3 applies to all scoring elements Where there are no scoring elements, not applicable
PI 2.3.2 SI (c)	B1.2 applies to the UoA	Not applicable
PI 2.3.3 SI (b)	B1.2 applies to all scoring elements	B1.3 applies to all scoring elements that are a habitat-forming species associated with more sensitive habitats
PI 3.2.3 SI (c)	B1.2 applies to the UoA	Not applicable

The team shall follow B1.4 to determine which scoring guidepost is met for the SI.

Evaluation of information trueness ◙

The team shall apply B1.2.2 – B1.2.4 to determine which of the trueness guideposts (TG) in Table B2 are met.

If there are multiple scoring elements, the team shall determine which guidepost is met for each scoring element.

Table B2 Guideposts for the trueness of information.

TG1	TG2	TG3
There is potential for bias to exist in the information, but its effect on trueness can be **anticipated** and is not considered to be consequential.	There is **limited** potential for bias to exist in the information, but where it might exist, its effect on trueness is **broadly understood** and is not considered to be consequential.	**Most potential sources of bias have been mitigated**, and where bias might exist, its effect on trueness is **well understood** and is not considered to be consequential.

To determine which trueness guidepost is met, the team shall consider and document the information categories listed in Table B3. ◙

The only exceptions to this are:

In scoring PI 2.1.3 for bait species that have been purchased from outside the UoA, the team shall only consider the information on the status of the stock or population.

In scoring PIs 2.1.3 and 2.2.3, where there are no scoring elements in a component, the team shall only consider the information on catches in the UoA.

Table B3 Information to be considered in the evaluation of trueness.

PI/SI	Relevant information	Information categories
PI 1.2.1 SI (e) PI 2.1.2 SI (d) PI 2.2.2 SI (d)	Information needed to determine the implementation of a fins naturally attached (FNA) or non-retention policy ◙	Information to confirm that the UoA has adopted an FNA or non-retention policy Information to confirm that an FNA or non-retention policy is enforced in the UoA
PI 2.1.3 SI (a) PI 2.1.3 SI (b)	Information needed to determine the impact of the UoA on main or minor in-scope species ◙	Information on catches in the UoA Information on the status of the stock or population
PI 2.2.3 SI (a)	Information needed to determine the impact of the UoA on ETP/OOS species and whether the UoA may hinder recovery to favourable conservation status ◙	Information on catches in the UoA Information on the status of the stock or population
PI 2.3.2 SI (c)	Information needed to determine compliance with management regulations and other measures to protect more sensitive habitats ◙	Information to confirm that the UoA has adopted management regulations and other measures to protect more sensitive habitats in the managed area Information to confirm that, within the UoA, the management regulations and other measures to protect more sensitive habitats in the managed area are enforced
PI 2.3.3 SI (b)	Information needed to determine the impact of gear use on habitats, including initial damage and recovery time ◙	Information on the spatial and temporal distribution of fishing effort in the UoA in relation to habitats Information on catches in the UoA of habitat-forming species associated with more sensitive habitats, if applicable

PI/SI	Relevant information	Information categories
		Information on the impact of the gear used in the UoA on habitats
PI 3.2.3 SI (c)	Information needed to determine compliance with management regulations ◙	Information to confirm that management regulations in the UoA are adopted Information to confirm that management regulations in the UoA are enforced

The team shall consider the following criteria to evaluate the trueness of the information available for each information category: ◙

Objectivity

Relevance

Completeness

Consistency

The team shall explain in the scoring rationale how they have considered these criteria.

If there is uncertainty in the impact of the UoA on a scoring element, or regarding compliance with management regulations, the team should be precautionary in its evaluation.

The team shall follow B1.4.2 to report which trueness guidepost is met.

Evaluation of the precision of catch estimates ◙

The team shall apply B1.3.2 – B1.3.4 to determine which of the precision guideposts (PG) in Table B4 are met.

If there are multiple scoring elements, the team shall determine which precision guidepost is met for each scoring element.

Table B4 Guideposts for the precision of catch estimates.

PG1	PG2	PG3
A catch monitoring system is in place that is able to collect and provide catch information	The catch monitoring system in place is expected to account for the main sources of random error that may affect the precision of catch estimates	The catch monitoring system in place enables a census of catches using independent observation

The team shall determine that PG1 is met if a catch monitoring system is in place that facilitates: ◙

The estimation of catches; and

Reporting of catch information to management authorities; and

Independent verification of catches.

The team shall determine that PG2 is met if the catch monitoring system:

Is expected to account for the main sources of random error that may affect the precision of catch estimates; and

Has in place independent observation of catches. ◙

To determine if B1.3.3.a is met, the team shall consider the following criteria: ◙

Fishing operations: The extent to which characteristics of a fishing fleet and its operations influence variability in catch estimates.

Ecological characteristics of any scoring elements: The extent to which ecological and biological characteristics of a species influence variability in catch estimates.

Monitoring design: The extent to which the method of observation influences variability in catch estimates.

The team shall explain in the scoring rationale how they have considered these criteria.

In scoring PI 2.2.3 SI (a), to determine if B1.3.3.b is met, if the UoA is managed by a Regional Fisheries Management Organisation (RFMO) and operates on the high seas, the team shall determine whether the catch monitoring system includes independent observation of at least 30% of fishing events per year. ◙

The team may recognise a lower level of independent observation as being adequate to meet B1.3.3.2 when it is: ◙

Designed to achieve a specified level of precision in catch estimates for the ETP/OOS species scoring element; and

Representative of the UoA's fishing operations; and

Implemented by the RFMO as a binding measure; and

Supported by analysis that is publicly available.

The team shall determine that PG3 is met if the catch monitoring system enables a census of catches using independent observation. ◙

The team shall follow B1.4.2 to report which of the precision guideposts is met.

Scoring and rationale

The team shall use Table B5 to determine which scoring guidepost (SG) is met for the scoring issue, based on the outcome of B1.2 and, if applicable, B1.3. ◙

If there are multiple scoring elements, the team shall determine which scoring guidepost is met for each scoring element.

Table B5 Determination of the scoring guidepost

PI/SI	SG60	SG80	SG100
PI 1.2.1 SI (e) PI 2.1.2 SI (d) PI 2.2.2 SI (d)	TG3 is met	Not applicable	Not applicable
PI 2.1.3 SI (a)	TG1 and PG1 (if applicable) are met	TG2 and PG2 (if applicable) are met	TG3 and PG3 (if applicable) are met
PI 2.1.3 SI (b)	Not applicable	Not applicable	TG2 is met
PI 2.2.3 SI (a)	TG1 and PG1 (if applicable) are met	TG2 and PG2 (if applicable) are met	TG3 and PG3 (if applicable) are met
PI 2.3.2 SI (c)	TG1 is met	TG2 is met	TG3 is met

PI/SI	SG60	SG80	SG100
PI 2.3.3 SI (b)	TG1 (and PG1, if applicable) is met	TG2 (and PG1, if applicable) is met	TG3 (and PG1, if applicable) is met
PI 3.2.3 SI (c)	TG1 is met	TG2 is met	TG3 is met

The team shall provide a rationale for its determination in the scoring table. ◙

The team shall identify which trueness guidepost in Table B2 is met and provide a rationale for why it is met.

If B1.3 has been applied, the team shall identify which precision guidepost in Table B4 is met and provide a rationale for why it is met.

If there are multiple scoring elements, the team should explain any differences in the trueness or precision guideposts that are met.

End of Tool B: Evidence Requirements Framework

Guidance for Tool B: Evidence Requirements Framework

GB1 General

GB1.1 General requirements ▲

The Evidence Requirements Framework (ERF) is a method to help determine the accuracy of information used in a fishery assessment. It provides a structured approach for the appraisal of information and is explicit on how the team should reach and report their judgement on its accuracy.

The ERF is focused on the evaluation of fisheries' information systems, including how information is collected, reported, handled and analysed. In taking a systematic view, there is recognition that different monitoring approaches and technologies may achieve a similar result in terms of the accuracy of information collected.

Box GB1: Terminology used in the Evidence Requirements Framework

The terms 'accuracy', 'trueness' and 'precision' used in the framework are adapted from the definitions used in ISO 5725, which relates to the application of statistical methods.

Accuracy refers to the closeness of information to the truth and can be described in terms of trueness and precision.

Trueness is a description of the effect of systematic error on information, and is the converse of bias. Systematic error causes an observation to be different from the truth in a way that is consistent or predictable.

Precision refers to the reproducibility of an estimate and is a description of the effect of random errors. Random error causes an estimate to be different from the true value in a way that is unpredictable.

For most information considered in an MSC fishery assessment, its accuracy will be determined exclusively by its trueness. This is the case for qualitative information, such as information on compliance with management measures.

For many types of quantitative information, its accuracy is affected by trueness and precision. In the ERF, the consideration of precision in addition to trueness is only required for catch estimates.

For certain information, the team is required to consider only its trueness, even where precision may also be a factor in understanding its accuracy. This is due to the practical challenges in investigating precision in certain circumstances. This is the case for information regarding the impact of the UoA on minor in-scope species and less sensitive habitats.

Table B1 sets out which scoring issues require consideration of both trueness and precision, and which only require the team to consider trueness.

GB1.2 Evaluation of information trueness ▲

The evaluation of trueness is intended to identify the possibility for bias in the information and to consider the extent to which it may affect information trueness. This follows the logic that if we understand the potential for bias in the information, and the likely strength of its effect, we can make an inference on trueness. The lower the potential for bias, the higher the expected level of trueness.

The team should focus on how the information used in the assessment came into being and consider if there is potential for it to be biased. For instance, depending on the information, the team should reach a judgement on whether there is potential for bias to be produced in how it was collected or produced, how it has been handled, and how and by whom it was provided to the team. If bias is likely or known to exist in the information, the team should ascertain whether its effect is understood or can be anticipated, and reach a conclusion whether it is consequential to the trueness of information.

All three of the trueness guideposts require that there is no consequential effect of bias on the trueness of information. The team should not determine TG1 as being met if the presence of bias in the information is likely or known to exist, but the strength of its effect is not known or cannot be anticipated. If the team determines there is no or negligible potential for bias in the information, it should interpret this to mean there is no consequential effect of bias on the trueness of information.

There are several types of bias that may be relevant for the team to consider, for example:

- Observation bias is a deviation from the truth that results during the process of observing and recording information. This can occur due to observer effects, the use of biased estimators, sampling design, data handling protocols or measuring errors.
- Response bias is the tendency for participants to respond inaccurately when providing information, in the sense of overestimating or underestimating a value. This can occur as a result of conflict of interest, the recorder or respondent's competency, questioning method and social or cognitive biases.
- Confirmation bias is the tendency to use information in a way that confirms a prior belief. This can occur as a result of selecting or favouring certain information, ignoring contrary information or biased interpretation.

GB1.2.2 Relevant information ▲

Each scoring issue is associated with a collection of information that is relevant for the team to consider when scoring. For example, to undertake an assessment of the UoA's impact on a species, the team should review information on the UoA's catches, as well as information that describes the status of the stock.

To foster consistency between assessments, the team is required as per B1.2.2 to evaluate the same basic collection of information for each scoring issue. The team should group relevant information into categories and pair these categories with the different scoring issues. Using this approach, Table B3 identifies, for each scoring issue, a core collection of information to be considered by the team when undertaking the evaluation of information trueness. In addition to these categories, the team may also consider and document additional information as part of their evaluation if it is relevant to the scoring issue.

See Table GB1 for examples of commonly available information sources and where these may be applicable to different information categories.

Table GB1 Examples of the information sources relevant to the information categories.

	Information source									
Information category	Logbooks and self-reporting	On-board observers	Electronic monitoring	Vessel position monitoring	On-board inspections and port sampling	Landing and sales accounting	Enforcement reports and legal findings	Research studies and fishing trials	Reference fleets	Interviews and qualitative techniques
Information on catch in the UoA	•	•	•		•	•		•	•	•
Information on fishing effort in the UoA	•	•	•	•	•			•		•

~~Information on enforcement in the UoA with respect to monitoring compliance~~		~~•~~	~~•~~	~~•~~			~~•~~			~~•~~
~~Information on the status of the stock or population~~	~~Sources include several of those listed above but originating from all activities that contribute to fishing mortality of the stock or population, not only the UoA~~									

~~Guidance to Table B3 Information needed to determine the implementation of an FNA or non-retention policy ▲~~

~~In scoring the shark finning SIs, the team should evaluate the information that is needed to confirm that an FNA or non-retention policy has been adopted in the UoA. As part of this, the team should consider if there is clear documentation regarding the policy and the extent to which the details of the policy are accessible to, and understood by, fishers in the UoA. The team should also consider any third-party opinion regarding the perceived legitimacy of the policy by fishers in the UoA, such as from interviews with the enforcement agency.~~

~~The team should also evaluate any information needed to confirm that the FNA or non-retention policy is enforced. This should include consideration of the method and extent of the monitoring of compliance of the policy in the UoA. There should be explicit consideration of the appropriateness of the monitoring method for detecting any contraventions of the policy. For instance, the team may consider whether compliance monitoring is able to directly observe interactions with sharks during the catch operation, during processing on-board or during transhipment.~~

~~Guidance to Table B3 Information needed to determine the impact of the UoA on in-scope main or minor species ▲~~

~~PI 2.1.3 SI (a) and (b) are concerned with the quality of information available to assess the impact of the UoA on the in-scope main and minor species, with respect to status. This includes understanding the quality of information that describes how the UoA interacts with the species, such as through catches, and the quality of information on the species' stock or population status, such as its abundance.~~

~~The team should interpret "information on catches in the UoA" as information that is relevant in understanding the direct effects of a UoA in the fishing area, including both retained and discarded catches.~~

~~It is noted that information on unobserved mortalities associated with the UoA is often unavailable. The team should not consider information on unobserved mortalities as part of its evaluation.~~

~~The team should interpret the "information on a species' stock or population status" as referring to an estimate of stock status, population size or another metric of population status.~~

~~It is noted that the information used to generate estimates of stock or population status may come from a range of sources beyond the UoA, including other fisheries, independent research programmes or expert working groups.~~

~~When evaluating the trueness of information about stock or population status the team should limit its evaluation to the nominated considerations, i.e. the extent to which the estimate of stock or population is likely to be affected by a conflict of interest, is directly applicable to the scoring element and provides an up-to-date description of the scoring element.~~

~~The team should not evaluate assessment methodologies, models or information used to produce stock or population estimates.~~

~~If scoring a bait species that has been purchased from outside the UoA, there is no direct effect from the UoA and the team should only consider "information on the status of the stock or population".~~

Guidance to Table B3 Information needed to determine the impact of the UoA on ETP/OOS species ▲

In scoring PI 2.2.3 SI (a), the team should refer to the guidance provided above for in-scope species with respect to the evaluation of information on catches in the UoA, and "information on the status of the stock or population".

For ETP/OOS species, the team should interpret the term "catches" to mean all direct effects of the UoA. This includes information on all fatal interactions with the species, whether associated with the gear or another aspect of the fishing operation. For example, mortalities of seabirds as a result of collision with the vessel, as well as those caught in the fishing gear. To achieve this, the team may need to consider the adequacy of monitoring protocols for collecting information on the UoA's range of direct effects on a scoring element.

Guidance to Table B3 Information needed to determine compliance with management regulations and other measures to protect more sensitive habitats ▲

The guidance provided above in relation the shark finning SIs is also relevant to scoring PI 2.3.2 SI (c), but with respect to the adoption and enforcement of management regulations and other measures to protect more sensitive habitats.

Note that PI 2.3.2 SI (c) considers information on compliance, rather than levels of compliance.

Guidance to Table B3 Information needed to determine the impact of gear use on habitats ▲

In scoring PI 2.3.3 SI (b), the team should evaluate information relating to the impact of the UoA's fishing gear on habitats within the managed area. This includes information on the spatial and temporal distribution of the UoA's fishing activity relative to the distribution of habitats. For habitat-forming species associated with more sensitive habitats, the team should also consider information on catches of these species in the UoA. The team should also consider information regarding the impact of the UoA's fishing gear on all impacted habitats, including both initial impact and recovery time.

Guidance to Table B3 Information needed to determine compliance with management regulations ▲

The guidance provided above in relation the shark finning SIs is also relevant to scoring PI 3.2.3 SI (c), but with respect to the adoption and enforcement of management regulations.

GB1.2.3 Trueness criteria ▲

The criteria and considerations outlined in Table GB2 are intended to facilitate a systematic evaluation of information by the team that is consistent across fishery assessments. The team should not conduct a detailed (quantitative) analysis. Instead, the team should consider the strengths and weaknesses of the information available.

The team should use the example questions provided for each criterion in Table GB2 as guidance on how to interrogate the information against the criteria.

In some circumstances, some of the criteria may not be relevant to the information being evaluated. Where this is the case, the team should state in the scoring rationale why a criterion has not been evaluated to show that this criterion has been considered.

Table GB2 Criteria and considerations teams should use to structure their evaluation of information trueness.

Criteria	Example questions to consider the criteria
Objectivity To what extent is the information free from conflict of interest	To what extent is the information independent from the UoA?
	To what extent is the veracity of the information likely to be affected by a conflict of interest?
Relevance To what extent is the information pertinent or connected to the matter in hand	To what extent is the information directly applicable to the UoA or scoring element?
	To what extent is the monitoring program appropriate for gathering relevant information?
Completeness To what extent does the information capture all relevant elements and dimensions	To what extent is the information representative of the UoA or scoring element in space and time?
	To what extent does the information provide an up-to-date description of the UoA or scoring element?
Consistency To what extent are different information sources in agreement	To what extent is the information accordant with itself or other comparable sources?

For each scoring issue, the team should reach a determination on the trueness of the information as a whole, rather than for each category of information in isolation. For example, in scoring PI 2.1.3 SI (a), the team should reach an overall judgement on whether the available information provides a true understanding of the impact of the UoA on in-scope main species. This may be informed by the objectivity, relevance, completeness or consistency of different pieces of information, but the team should determine how well, on balance, the collection of information reflects the truth. See the worked examples in Box GB2 and Box GB3 for illustrations of this approach.

Assessing the objectivity of information

In assessing the objectivity of information, the team should consider the extent to which the information is independent from the UoA, and the extent to which the veracity of information is likely to be affected by a conflict of interest. The first of these considerations is focused on the existence of a potential conflict of interest arising from how the information has been collected or produced, while the second considers the extent to which the effects of a known or potential conflict of interest are mitigated.

In this context, the team should interpret "independent from the UoA" to mean there is no possibility that the commercial interests of the fishery directly prejudice the collection or provision of truthful information. Where this benchmark is not met, and a potential conflict of interest is known or expected, the team should consider how the influence of that conflict on the trueness of information is mitigated.

The team may need to consider the objectivity of information that has been collected through a programme of independent observation. The team should interpret the term "independent observation" to mean an objective method of observing catches and other direct effects, on an ongoing basis, that is expected to produce information with a high level of trueness.

Examples of independent observation include the use of on-board observers and electronic monitoring systems. The team should interpret the term "observer" to mean a third-party specialist deployed as part of a monitoring program, usually by a government or contractor.

When evaluating the independence of information collected through independent observation, the team should consider:

- The institutional arrangements of the observer or electronic monitoring programme. For example, is there a system in place for good record keeping and information security, and is there any unmitigated conflict of interest (e.g. financial benefit) that may influence the trueness of information.
- The management of the scheme, such as how it is funded, how personnel are recruited, the data submission and reporting protocols used, and the quality assurance measures in place.
- How data is collected at sea to assure its independence, including the training, equipment and reference material provided to observers, the design of data collection protocols and how the integrity of data is protected.

Using these considerations, the team should reach a conclusion on the ability of the independent observer scheme to provide truthful information. The team should be cognisant of all arrangements for data assurance in place in the programme. For example, when considering observation schemes that are funded by the fishing industry, the team should consider the adequacy of any mechanisms or processes that are in place to ensure the independence and integrity of the data collected. The team should be precautionary in their judgement where there is uncertainty in how potential conflicts of interest are managed.

Box GB2: Worked example of the evaluation of information trueness.

Worked example

This example illustrates the process of applying the Evidence Requirements Framework in assessing PI 2.1.2 SI (d) for a fictitious fishery. This involves an evaluation of information trueness.

A species of shark caught by a fictitious UoA is assessed as an in-scope species under Principle 2. The client has indicated to the team that it operates an FNA policy, in the form of a mandatory code of conduct, on all of its vessels. In this scenario, the team is required as per Table B3 to evaluate the trueness of the information confirming the implementation of the client's FNA policy, including its adoption and enforcement in the UoA. For example, the team may consider evidence for the existence of policy documents, adoption of policy on board vessels, and the existence of enforcement activities that are appropriate for detecting and deterring instances of shark finning.

The team are required to undertake an evaluation against the trueness criteria, the details of which should be included in the background section of the report.

Objectivity. An FNA policy document exists, taking the form of a mandatory code of conduct for all vessels within the UoA. The client asserts there is widespread understanding and acceptance of the policy across the UoA's fleet. The policy is enforced as part of wider enforcement activities using video-based electronic monitoring. The electronic monitoring programme is operated and managed by a third-party company, which has in place suitable arrangements regarding data integrity and quality assurance. Video analysts are required to report all instances of shark fining, and are provided with appropriate training to do this.

Relevance. The FNA policy has been written specifically for the UoA and is appropriate to its operations. On-board monitoring is appropriate for detecting shark finning events, with cameras positioned to cover the main areas where interactions with sharks may occur.

Completeness. The FNA policy applies to all vessels in the UoA. All vessels are fitted with electronic monitoring cameras. There is a protocol to review 30% of the video footage from a trip, increasing to 100% if a shark is detected in any of the hauls.

Consistency. Information provided by enforcement officials and stakeholders corroborate the information provided by the client regarding the existence of an FNA policy and its widespread adoption on board vessels in the UoA.

The team are required to produce a summary to be included in the scoring rationale, and to confirm which scoring guidepost is met.

Information regarding adoption of the FNA policy across the UoA's fleet comes primarily from the client, which raises the possibility of response bias. However, interviews with enforcement officials corroborate the client assertion of widespread acceptance of the FNA policy amongst captains and crew. TG3 is met on the basis that there is very little potential for bias in the information, and therefore no consequential effect of bi as on the trueness of information. SG60 is met.

GB1.3 Evaluation of the precision of catch estimates ▲

The purpose of the evaluation of precision is to examine how the catch monitoring system works to reduce random error. The team should interpret the term "catch monitoring system" to mean any approach that allows for the systematic collecting and reporting of catch information (e.g. records of retained and discarded catches) and the estimation of catches on an ongoing basis. The team should not measure the precision of catch estimates directly, e.g. a coefficient of variation, although they may choose to report this where it is known.

The team should consider that mandatory or voluntary monitoring schemes, or a combination of the two, may achieve the requirements. Mandatory schemes include those that are required to be implemented in the UoA by a management agency. Voluntary schemes are those that augment or exceed mandatory requirements by allowing for a higher level or greater functionality of monitoring. These may be bespoke to a UoA, e.g. to allow for the achievement of certain MSC requirements. The team should confirm that a voluntary scheme is not in contravention with relevant management regulations.

Definition for catch estimates

The term 'catch estimate' refers to an estimate of the total quantity of a species caught in a fishery during a specified time period, including both retained and discarded catches. It is a statistical estimate based on a calculation using data from a sample of catches.

For ETP/OOS species, the team should interpret "catch estimate" to mean an estimate of all direct effects of the UoA. This should include an estimate of all fatal interactions with the species, whether associated with the gear or another aspect of the fishing operation.

The team should confirm that catch estimates that are expressed in either weight or number of individuals.

Accounting for the main sources of random error

The focus of this requirement is on how the UoA's catch monitoring system is designed to reduce the effect of random error on the precision of catch estimates. This follows statistical theory whereby the more that random error is reduced by the characteristics of the monitoring system, the higher the precision of catch estimates that are produced. The team should consider both the physical (e.g. sampling design, observation methods) and statistical (e.g. statistical procedures, estimators) aspects of the catch monitoring system.

The main sources of random error that may affect the precision of catch estimates are identified in Table GB3, along with consideration for how these may be accounted for by the catch monitoring system. The team should consider other sources of random error that may exist in the UoA, as appropriate.

Table GB3 Main sources of random error that may affect the precision of catch estimates.

Sources of random error	Dimensions	Mitigation
Heterogeneity in physical characteristics of the fleet (including gear)	fleet	To what extent does the sampling frame, sampling design and/or statistical procedure cover all major characteristics of the fleet?

Sources of random error	Dimensions	Mitigation
Heterogeneity in where and when fish are caught	time, space	To what extent does the sampling design and/or statistical design take into account seasonality and spatial distribution of fishing effort?
Dynamics in stock distribution or catchability	time, space, species	To what extent does the sampling design and/or statistical procedure take into account productivity schedule (e.g. spawning and recruitment seasons) and spatial distribution of the stock?
Extent of statistical independence in catch observations	time, space, fleet, trip, haul	To what extent does the sampling design take into account patterns of clustering in fishing operations?

GB1.3.2 ▲

Independent verification of catches

The team should interpret the term "independent verification" of catches to mean verification of the trueness of catch data on an ongoing basis by a competent third-party using an appropriate methodology. This may include verification of the amount of catch recorded, its composition or its origin. Examples of independent verification of catch data include at-sea inspections, dockside monitoring, or triangulation with vessel monitoring data. It is not the intent that all catch data is independently verified on a continual basis.

GB1.3.3.b ▲

Considering the requirement for independent observation of catches

The team should refer to the definition for "independent observation" provided in the section on assessing the objectivity of information in GB1.2.3.

The team should note that there is no threshold level of coverage of independent observation needed to achieve this requirement unless B1.3.3.3 applies.

GB1.3.3.1 ▲

The criteria and considerations outlined in Table GB4 are intended to facilitate a systematic evaluation of information by the team that is consistent across fishery assessments.

The team should use the questions provided for each criterion in Table GB4 as guidance on how to interrogate the information against the criteria.

The team may choose whether to answer these questions directly, consider them more generally, or to ignore them if they are not relevant in the specific fishery context. The team may also ask and answer further questions if they are relevant to evaluating the precision of information.

Table GB4 Criteria used to structure the evaluation used to determine if PG2 is met.

Criteria	Consideration
Fishing operations The extent to which characteristics of a fishing fleet and its operations influence variability in catch estimates	To what extent is variability in the physical characteristics of the fleet accounted for by the catch monitoring system?
	To what extent is variability in where, when and how the species is caught accounted for by the catch monitoring system?

Criteria	Consideration
Ecological characteristics The extent to which ecological and biological characteristics of a species influence variability in catch estimates	To what extent is variability in species distribution accounted for by the catch monitoring system?
	To what extent is variability in productivity dynamics accounted for by the catch monitoring system?
Monitoring design The extent to which the method of observation influences variability in catch estimates	To what extent are observations of catch statistically distinct from each other?

GB1.3.3.3 Scoring PI 2.2.3 SI (a) ▲

The intent of this requirement is to ensure an additional layer of assurance for the precision of catch estimates for ETP/OOS species in certain fisheries. Species in this group are likely to have low rates of interaction, which would be expected to drive high levels of variability in catches. Catch monitoring systems would typically struggle to account for this variability without having high catch sampling rates.

The team should interpret UoAs to which this requirement applies as those for which an RFMO has primary jurisdiction for management of the P1 stock, including data collection and reporting obligations, and that operate partly or fully on the high seas.

The team should interpret the requirement for "independent observation of at least 30% of fishing events per year" as the percentage of total UoA fishing events in a year for which catch data have been collected using a method of independent observation. The team may accept an average coverage percentage across years.

The team should interpret the term "fishing event" to mean a haul, set or other unit of capture that is appropriate in the context of the UoA.

Electronic monitoring: coverage vs review rates

When considering the use of electronic monitoring, the team should consider both coverage rate and review rate, amongst other factors. For instance, a fleet may have cameras installed on 100% of vessels, but only 10% of the footage from a vessel is sampled for review. There may be a protocol in place that increases the baseline review rate to >10% if certain triggers are met.

In cases such as this, the team should use its judgement to determine if the MSC's intent is likely to be met with respect to improving precision of catch estimates for ETP/OOS species. The team should consider the dynamics of the interaction with the species (e.g. area, seasonality); the details of the footage review protocols, including their relevance to the ETP/OOS species; maximum potential review rates; and evidence that higher rates of review have been triggered in the past.

GB1.3.3.4 Allowance for alternative levels of independent observation ▲

The team should interpret the phrase "a lower level of independent observation" to mean a lower annual sampling rate using a method of independent observation, e.g. independent observation of 15% of fishing events per year.

The intent of this alternative requirement is to recognise where an RFMO has explicitly considered the precision of catch estimates for an ETP/OOS species and designed an appropriate monitoring scheme accordingly. The team should report the target level of precision that is intended to be achieved by the monitoring scheme in the scoring rationale.

~~The team should also confirm that the monitoring requirements are binding, and that the UoA is implementing the monitoring requirements even if there is not full adoption in the wider fishery. The level of precision that is intended to be achieved by the monitoring scheme should be supported analytically, and the team should confirm that the details of the analysis are available publicly.~~

~~GB1.3.4 ▲~~

~~To meet this guidepost (PG3), the team should confirm that the UoA's catch monitoring system enables a census of catches using a method of independent observation. The team should interpret the term "census" to mean the observation of all catch events, such that total catch can be known from the data rather than being estimated from a sample. This could include where there is electronic monitoring of all catch events but where only a portion of that footage is routinely reviewed, but there are protocols in place to increase review rates to 100% if certain triggers are met. As per GB1.3.3.3 guidance on "electronic monitoring: coverage vs review rates", where the review rate is less than 100% the team should use its judgement to determine whether the information collected and protocols in place enable a census of catches.~~

~~The team may allow some tolerance on the observation of all catch events in a given period, recognising that even the best designed systems may be unable to avoid temporary outages. The team should use its judgment to determine if the system no longer routinely enables a census of catches.~~

~~GB1.4 Scoring and rationale~~

~~GB1.4.1 ▲~~

~~If the combination of a trueness guidepost and a precision guidepost are needed to meet a scoring guidepost, the team should limit the scoring level to that of the lower guidepost. For example, if TG3 is the highest guidepost met with respect to trueness, and PG2 is the highest guidepost met with respect to precision, SG80 is met.~~

~~For some SIs, not all trueness or precision guideposts apply. This is indicated by the highest guidepost included in Table B5. For example, if scoring PI 2.3.3 SI (b), all of the trueness guideposts can be attained, but, for applicable scoring elements, PG1 is the highest precision guideposts that can be attained.~~

~~GB1.4.2 ▲~~

~~The team should provide a summary of their evaluation of the accuracy of information, reflecting on the trueness of information and, where required, the precision of catch estimates. If there are multiple scoring elements, the team may choose to provide a general summary of information and its accuracy, and highlight any differences between scoring elements.~~

~~The team should provide full details of the evaluation of information trueness and, if applied, an evaluation of catch estimate precision in the background section of the report.~~

~~Box GB3: Worked example of the evaluation of information trueness and the evaluation of catch estimate precision~~

~~Worked example~~

~~This example illustrates the process of applying the Evidence Requirements Framework in assessing PI 2.2.3 SI (a) for a fictitious gillnet fishery. This includes an evaluation of information trueness and an evaluation of catch estimate precision.~~

~~Description of the scenario~~

Three ETP/OOS species have been identified as bycatch in the UoA; common guillemot, Atlantic puffin and long tailed duck. Information on bycatch of all three species is collected through electronic monitoring with video, which is installed on some vessels in the UoA. Logbooks are also used on all vessels to record catch and effort information, including seabird bycatch. Total bycatch of the three seabird species is estimated using the electronic monitoring data, scaled up to the level of the UoA using information on fishing effort from logbooks. Populations of all three seabird species are monitored by a regional environment agency. Abundance estimates are based primarily on data from seabird nesting counts undertaken by various research organisations, and bycatch data from the UoA and several other fisheries that operate in the region.

Evaluation of information trueness criteria

The team are required to undertake an evaluation against the trueness criteria, the details of which should be included in the background section of the report.

Objectivity. Electronic monitoring with video is used to identify and quantify all bycatch in the UoA, including seabirds. Catch data (including seabird bycatch) are generated from the footage by the monitoring provider and submitted directly to the management agency. The electronic monitoring programme is paid for by the fishing industry, including contributions from the UoA, but managed by a third-party contractor. Interviews with the monitoring provider and review of relevant document show that there several measures in place to avoid a conflict of interest, including appropriate training, reporting protocols and data quality assurance. Interviews also confirm that the monitoring provider has no financial interest in the fishery, other than the service it provides. Logbooks are also used to record catch and effort data for all vessels. These are verified by the management agency through a programme of at-sea and dockside inspections, and comparison with fishing location data collected from electronic monitoring.

Relevance. Catch data from both electronic monitoring and logbooks is directly relevant to the UoA. Both data sources are available for all three seabird species. Identification is done at the species level. An independent study shows that identification and counts are achieved with a high level of accuracy for Atlantic puffin and long tailed duck, but common guillemot has a significant misidentification rate, meaning counts are likely underestimated. This likely underestimation has not been explored to understand, for example, if it is consistent through time or varies by trip or season. The information base for the management of seabird populations includes comprehensive productivity information from annual breeding surveys and relevant information on direct fishing-related mortality from all fisheries in the.

Completeness. Electronic monitoring cameras are fitted on 35% of the UoA vessels, averaging 30% coverage of annual fishing effort over the past 3 years. The vessels participating in the electronic monitoring scheme were chosen based on a random sampling protocol that was designed to provide a representative sample of the fleet. For these vessels, all hauls on all trips are recorded, and all footage is reviewed. Almost all fatal interactions with seabirds occur as a result of entanglement in the net, which is captured in the monitoring footage. Logbooks are completed for all trips in all parts of the fishing area.

Consistency. There is reasonable correspondence between logbook and electronic monitoring data in term of fishing effort, although the management agency notes a tendency for underreporting of bycatch of some seabird species in logbooks. Details of the electronic monitoring programme, including details of the sampling design and data assurance mechanisms, are corroborated by management officials.

The team are required to produce a summary to be included in the scoring rationale.

There is an appropriately designed monitoring system in place for the three seabird species that ensures limited potential for bias to exist in catch information, including seabird bycatch data. It is noted that while there is some underreporting of seabird bycatch in logbooks, these data are not used to estimate seabird bycatch in the UoA, or used to estimate seabird populations more widely. Information on fishing effort, which is used to estimate fishery-level catch (including seabird bycatch), is verified by the management agency and considered to be reliable.TG2 is met for Atlantic puffin and long tailed duck. However, some possible areas of bias are not fully explored, including the possibility for observer bias arising in those vessels fitted with electronic monitoring equipment. TG3 is not met.

For common guillemot, there is possibility for observation bias in catch information due to misidentification in video footage. A study has identified a significant measuring error, although its effect on the catch estimates for this species have not been investigated in detail. However, it is possible to anticipate its approximate effect on underestimating guillemot bycatch estimates. TG1 is met for common guillemot.

Evaluation of catch estimate precision

The team should consider each of the precision guideposts in turn, with details of their evaluation included in either the scoring rationale or background section of the report, as appropriate.

PG1

There is a suitable catch monitoring system in place that provides catch information for all three seabird species. Catch data, including on seabird bycatch, are collected primarily using electronic monitoring using video. Catch data are derived from the footage by the monitoring provider and submitted directly to the management agency. The management agency estimates total seabird bycatch using the bycatch data derived from electronic monitoring, scaled up to the fishery level based on total fishing effort from verified logbooks.

PG2

The team are required to undertake an evaluation against the precision criteria.

Fishing operations. Electronic monitoring cameras are fitted on 35% of the UoA vessels, averaging 30% coverage of annual fishing effort over the past 3 years. The vessels participating in the electronic monitoring scheme were chosen based on a random sampling protocol that was designed to provide a representative sample of the fleet. For these vessels, all hauls on all trips are recorded, and all footage is reviewed. It is noted that while most monitored vessels operate in eastern areas, this reflects where the majority of fishing effort is concentrated.

Ecological characteristics. Atlantic puffin and common guillemot are known to have a relatively uniform distribution across the fishing area in both space and time. As such, the monitoring programme is able to detect bycatch of these species effectively, in space and time, at current coverage levels. Long tailed duck is migratory, occurring in large numbers in western parts of the fishing area in the winter months. For this species, variability in catches is unlikely to be well accounted for at the current level of monitoring, due to the limited spatial and temporal overlap with monitored fishing effort (resulting in a relatively small sample size) and the clustered nature of encounters with the species (resulting in high variability between hauls). The monitoring programme cannot be adjusted in the short-term by providing additional coverage for detecting long tailed duck interactions to better account for these issues.

Monitoring design. Data have the potential to clustered by vessel or trip, due to how they are collected. There is no attempt to account for clustered data when total seabird bycatch is estimated. However, because fishing operations are considered to be similar across the monitored fleet (such as gear specification, setting time, distance from shore etc.), the team considered that any autocorrelation in the data is unlikely to have a strong effect on the precision of seabird bycatch estimates.

PG3

The coverage of electronic monitoring used in the catch monitoring system does not enable a census of catches from the UoA.

The team are required to produce a summary to be included in the scoring rationale.

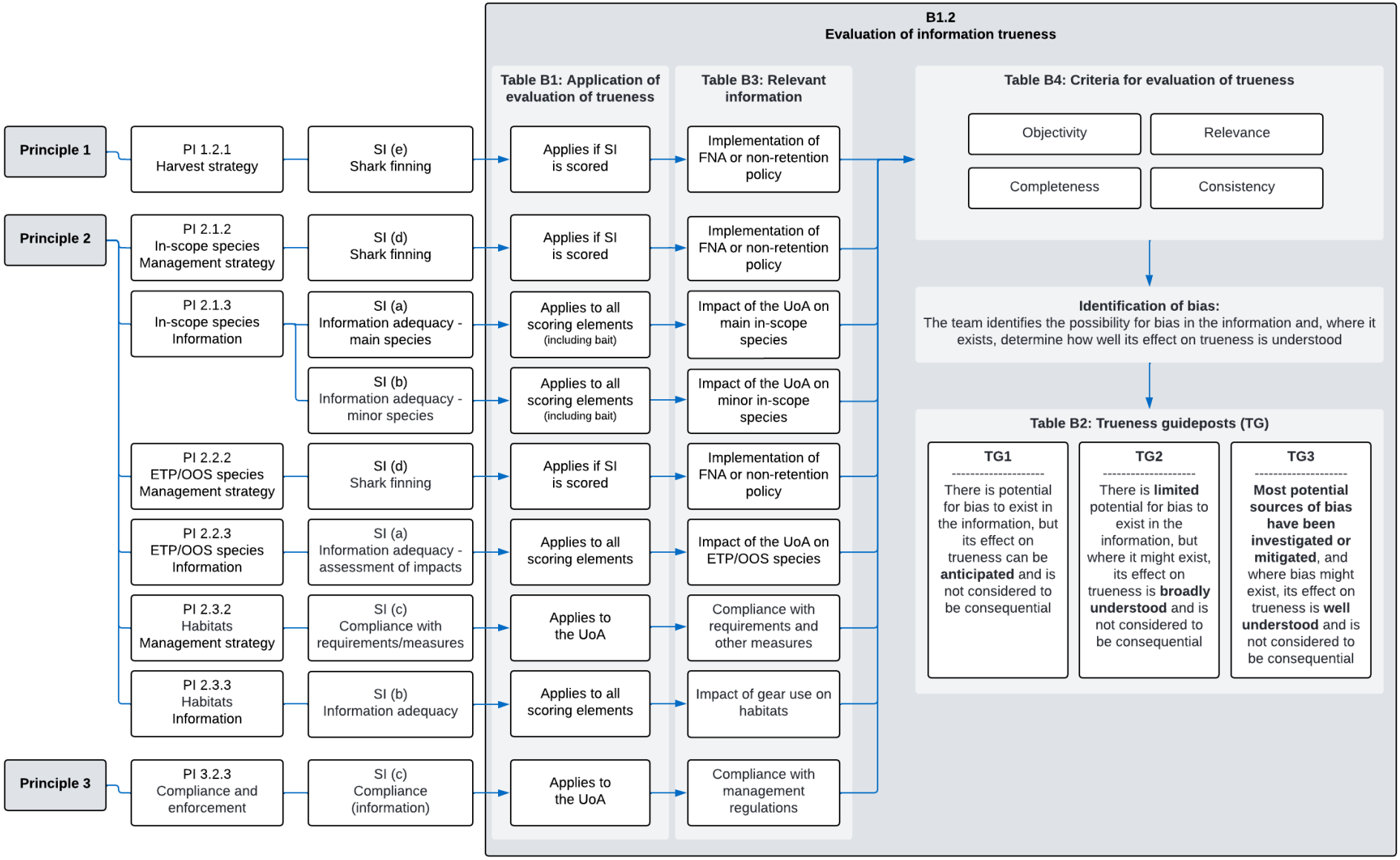
There is a suitable catch monitoring system in place that provides independent information on incidental catches of all three seabird species, meeting PG1. For Atlantic puffin and common guillemot, this system is expected to account for the main sources of variability that may affect the precision of catch estimates, meeting PG2. However, for long tailed duck PG2 is not met, as variability in its spatial and temporal distribution is not well accounted for, resulting in a relatively small sample size and high variability between hauls. The catch monitoring system does not enable a census of catches, so PG3 is not met for any of the species.

Scoring guideposts

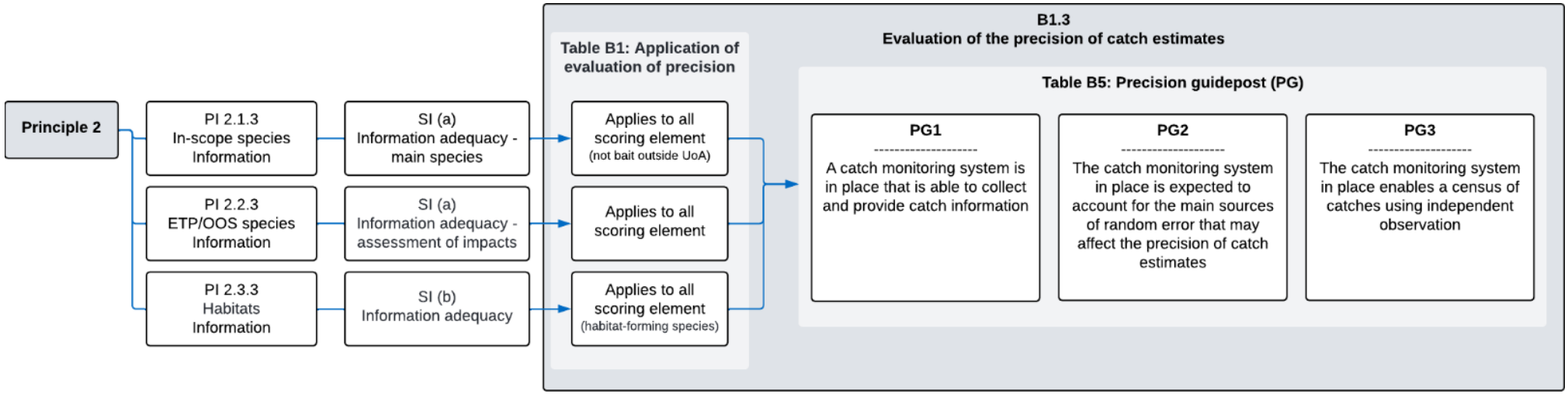
~~*In addition to the evaluation summaries for trueness and precision, which identify which trueness and precision guideposts are met and why, the team should identify and explain which scoring guidepost is met for each of the scoring elements.*~~

~~Information to estimate the impact of the UoA on Atlantic puffin, and whether the UoA may be a threat to its recovery, has a high degree of trueness (meeting TG2) and precision (meeting PG2). SG80 is met. Bycatch estimates for common guillemot are likely to be precise (meeting PG2), but they underestimate the true level of mortalities caused by the UoA (TG1 is met). SG60 is met. There is a suitable catch monitoring system in place for long tailed duck (meeting TG2), but catch estimates are unlikely to have a high degree of precision (meeting PG1). SG60 is met.~~

~~**Figure GB1: Guide to the application of the evaluation of trueness to applicable scoring issues.**~~



~~**Figure GB2: Guide to the application of the evaluation of precision to applicable scoring issues.**~~



End of Guidance to Tool B: Evidence Requirements Framework