



# Consultation Report: An analysis of the application of Performance Indicators 2.5.1, 2.5.2 and 2.5.3 in assessments for different fisheries – a report to the MSC

April 2016

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*The views and opinions expressed in this report do not necessarily reflect the official policy or position of the Marine Stewardship Council. This is a working paper, it represents work in progress and is part of ongoing policy development. The language used in draft scoring requirements is intended to be illustrative only, and may undergo considerable refinement in later stages.*

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**An analysis of the application of Performance Indicators 2.5.1, 2.5.2 and 2.5.3 in assessments for different fisheries – a report to the MSC**

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# Project specification

## Background

Principle 2 (P2) of the MSC Fishery Standard covers the range of potential ecosystems elements that may be directly or indirectly impacted on by a fishery. Scored against this Principle, fisheries need to demonstrate that fishing operations allow for the maintenance of the structure, functioning and diversity of the ecosystem in which the fishery operates. To this end, a fishery is scored against five components under P2, namely, primary and secondary species, endangered, threatened or protected species, habitats and ecosystem components. The P2 Ecosystem component (PIs 2.5.1, and 2.5.3) consider the broad ecological community and ecosystem in which the fishery operates and addresses system-wide issues, primarily impacted indirectly by the fishery, including ecosystem structure, trophic relationships and biodiversity. Scoring against these PIs should reflect the indirect impacts of fishing on the ecosystem.

The Ecosystem component is not intended to repeat the status assessment of the other components individually but rather considers the wider system structure and function – although if all these components scored highly it might be expected that the Ecosystem component would also score highly. As a result, the certification requirements allow for aspects of the other P2 components are integrated into this assessment. For example, assessment teams have used the successful implementation of a management strategy for primary species as partial justification for scoring within the SG 60-80 in PI2.5.2. However, scoring higher ( $\geq$ SG 80) in this PI would require broader ecosystem impacts to be accounted for within the management strategy. That said, if the other P2 components score high, it is likely the Ecosystem component will also score high. This has resulted in a perceived ambiguity in the performance criteria associate with the ecosystem component in P2.

To ensure more consistent and robust assessment outcomes and as part of on-going quality assurance work within the MSC Science and Standards department, a review of how the Ecosystem component is assessed through scoring and rationales provided is required.

## Objectives

1. To determine whether “key” ecosystem elements defined within scoring and rationale for the ecosystem PIs 2.5.1, 2.5.2 and 2.5.3, being assessed according to the MSC guidance on key ecosystem elements.
2. To determine whether the rationales of these PIs go above and beyond that considered in other P2 components (as identified through significant differences in P2 PI scoring and rationales).
3. To identify whether the ecosystem PIs have been scored consistently across a representative sample of fisheries.
4. To identify what factors result in an unconditional pass for ecosystem PIs ( $\geq$ SG 80) and those factors that lead to a condition.

## Key Questions:

1. What are the key pieces of information (key elements) used to score the ecosystem PIs?
2. Do they align with the current MSC guidance? (Key ecosystem elements may include trophic structure and function (in particular key prey, predators, and competitors), community composition, productivity pattern (e.g., upwelling or spring bloom, abyssal, etc.), and characteristics of biodiversity)

3. Are these key pieces of information unique to the ecosystem PIs or could they be covered in one of the other P2 components?
4. Has the use of these key elements been consistent?
5. Are there clear patterns in the rationales that lead to a conditional versus unconditional pass?

## **Deliverables**

1. Draft report. Should include, but not limited to:
  - An analysis of scoring across a range of MSC fisheries (10-20% of certified fisheries assessed against v1.3 or later) against the “key” ecosystem elements used in scoring the ecosystem component. Further information is provided on CR guidance on key ecosystem elements.
  - Fisheries selected for analysis should be representative of a range of factors that could affect the scoring or rationale, these may include CABs, regions, species and gears.
2. Final report including the above and incorporating comments from MSC.

## **Note to readers:**

The questions posed by the Objectives are naturally very interlinked, and some issues could be addressed under any or all of the different Objectives. As such, and in an effort to crystalise the issues and focus thinking, the Objectives were rephrased simply and in a hierarchical manner, as follows:

Objective 1: Is MSC guidance on what constitutes a ‘key ecosystem element’ being followed?

Objective 2: Does scoring of the ecosystem elements include consideration of issues and evidence specific to key ecosystem elements?

Objective 3: Have the ecosystem PIs been scored consistently?

Objective 4: This issue was not considered in any detail because the initial review indicated that only one fishery had scored an ecosystem PI below the 80 level. However, an additional question was posed through Objective 2 of “*Why did the ecosystem PIs consistently score highly*”

## Selecting the fisheries to include in the study

To identify the fisheries to study in more detail, the consultant was provided with a copy of the MSC worksheet entitled 'MSC Fisheries Master\_Scoring', dated 29<sup>th</sup> February 2016. The worksheet contained a considerable amount of information, covering the scoring of all Scoring Issues across all Performance Indicators for all MSC fisheries.

In order to refine the list of possible fisheries to include within this study, the worksheet was treated as follows:

- 1) Only fisheries assessed under the default tree v1.3 were selected.
- 2) Only certified fisheries (including first assessments or reassessments) were selected.
- 3) Freshwater fisheries were removed from the selection (i.e, walleye, pike and vendace).
- 4) Only data for PIs 2.1.1 – 2.5.1 were selected.

This treatment reduced the spreadsheet from almost 51,000 rows to just 1,651 rows, and from 1,380 separate report identifiers to just 52 separate report identifiers, some of which included multiple Units of Certification covering different stocks and/or gear types; these reports are listed in Appendix 1.

From the list of 52 fisheries, 25 were selected for review in this study (Appendix 1), with the selected fisheries covering the following criteria:

- Geographically dispersed,
- Targeting pelagic and demersal-living species
- Using different gear types
- Covering the full range of scores awarded for the ecosystem PIs
- Covering the full range of overall Principle 2 scores
- Carried out by different Conformity Assessment Bodies and Principle 2 assessors
- Those of specific interest to the MSC

Selecting the final list of fisheries that were included in the review was a subjective process, however, and a fishery's inclusion should not be taken as an indication that a report was considered to be any better, worse, interesting and/or useful for the study than another that was excluded, as time was limited and not all fisheries could be included.

It is noted that two fisheries scored for Principle 2 by this author were included in the review (15701 Eastern Canada Offshore Scallop, and 16781 OCI Grand Bank yellowtail flounder). An attempt has been made to treat these fisheries in the same objective manner as the other fisheries reviewed.

## Objective 1: To determine whether “key” ecosystem elements defined within scoring and rationale for the ecosystem PIs 2.5.1, 2.5.2 and 2.5.3, are being assessed according to the MSC guidance on key ecosystem elements.

### Method

In order to determine the answer to Objective 1 (Is MSC guidance on what constitutes a ‘key ecosystem element’ being followed?), an initial review of the MSC guidance in the CR v.1.3 (MSC 2013a) and GCR v.1.3 (MSC 2013b) was undertaken; summaries of these texts are included in this report as Appendix 6.

A review of the scoring texts for 19 demersal fisheries and six pelagic fisheries from the complete list of those identified in the initial review of CR v.1.3 fisheries for inclusion in the study was then undertaken, guided by the list of questions below:

- 1) Are key elements defined in Table 4.3 (or equivalent) from the Full Assessment Reporting Template v1.3?
- 2) Are key elements defined in the scoring text for 2.5.1?
- 3) Do the key elements follow MSC guidance on what constitutes a key ecosystem element?
- 4) Is the ecosystem defined in the scoring text for 2.5.1?

### Results

Brief reviews of the 25 different reports that were looked at in detail are provided as Appendix 5 to this report. Summary statistics, using these reviews, are then provided in the table, below.

Question	Yes	Inferred	No	N/A
Are key elements defined in Table 4.3 (or equivalent)	7	-	18	-
Are key elements defined in the scoring text for 2.5.1?	7	11	7	-
Do the key elements follow MSC guidance	17	-	3	5
Is the ecosystem defined in the scoring text for 2.5.1?	11	3	11	-

Essentially, these data show that most reports do not indicate what the key ecosystem elements are in a table detailing the Principle 2 scoring elements (i.e., Table 4.3 in the MSC Full Assessment Reporting Template v1.3, issued 15 January 2013). Even when a table of scoring elements was provided, some did not appear to follow MSC guidance for what constitutes a key ecosystem element; for example:

- 6567 ISF Golden Redfish: Icelandic marine ecosystems
- 10601 Juan Fernandez rock lobster: Removal of lobster
- 16778 Shark bay prawn: Inshore subtropical

Many reports also did not explicitly indicate what the key ecosystem elements were considered to be in the scoring text for PI 2.5.1. In about half of the reports, the key ecosystem elements could be inferred, but in other cases this was not possible. In both cases, though, it is difficult to determine whether MSC guidance is being followed in the scoring, and therefore to determine if the scores given to different fisheries were appropriate.

Examples of text where it was not possible to determine what the key ecosystem elements were that were scored:

- 2511 Norway North Sea and Skagerrak herring: *“Norway maintains extensive ecosystem monitoring and management programmes that review the role of fisheries and target species’ trophic role. A key element of this is the annual assessment, management advice and landing (which have fluctuated by three orders of magnitude in recent decades) for the NSea&SkH fishery. While these variations have been linked to the waxing and waning of other stocks, e.g. NE Arctic cod, there has never been any substantive evidence of irreversible harm.”* (PI 2.5.1 scored 95).
- 14636 Greenland cod, haddock and saithe fishery: *“All these assessments suggest that the Barents Sea Ecosystem is relatively healthy, and that current fishing activities are not disrupting ecosystem structure and function. There has been a decline in seabird populations (as throughout the NE Atlantic), but the reasons for this are unclear (local food shortage; increased predation; historic by catch in drift net and long-line fisheries) and are not attributed to current fishing activity. The high abundance of stocks of key species at different trophic levels (cod/ haddock and capelin) suggests that the fish-related elements of the ecosystem are in good overall shape. Those changes that are taking place are probably related more to climate change.”* (PI 2.5.1 scored 100).

Example of text where the key ecosystem elements that were being scored may be inferred:

- 7594 Prince Edward Island lobster (inferred: foodwebs and trophic structure): *“DFO investigated lobster and predator-prey relationships using samples collected during trawl surveys in LFA 25 and part of LFA 26. Stomach analysis showed that decapods were the principal prey (57% to 84% of prey biomass), with rock crab being the single most important component of the diet (45% to 78%). Lobster represented 8% to 13% of the prey biomass. It has also been observed that the only demersal fish demonstrated to consume large amounts of lobster was the sculpin.”* (PI 2.5.1 scored 100).
- 15693 LFA Latvia eastern Baltic cod (inferred: cod, herring and sprat as dominant members of the upper trophic food web): *“The models of the Baltic food web predict that top predators at the fourth trophic level, including mammals, large fish and cormorants, control the abundance of small fish species at the third trophic level such as perch, sprat, herring and cyprinid fish (HELCOM, 2010). The Baltic Sea upper trophic food web is dominated by cod and two competing planktivorous fish species, herring and sprat (Lindegren et al., 2009). As the cod stock is decreasing herring and sprat abundance is increasing.”* (PI 2.5.1 scored 80).

Possibly more fundamentally, only approximately half of the reports indicated what ecosystem was being considered in scoring PI 2.5.1. This is important because scale and intensity are key determinants of the potential for a fishery to impact ‘the ecosystem’ – a small fishery in a large ecosystem being fundamentally capable of achieving a passing score with very little evidence being presented. However, there is no guidance in the CR v1.3 or the GCR v1.3 on defining the ecosystem.

This issue is considered further under Objective 3, but the absence of a defined ecosystem, and MSC guidance as to how to define the ecosystem, nevertheless again makes it difficult to determine if the scoring for a particular fishery is appropriate.

## Other Comments

It is noted that CB3.17.3<sup>1</sup> and GCB3.19.1<sup>2</sup> together suggest that some fisheries will have no impact upon an ecosystem's key elements. Essentially, while some fisheries obviously have the potential to impact a feature that would be considered crucial to giving the ecosystem its characteristic nature and dynamics (e.g., 12609 Aker Biomarine Antarctic krill), in other cases, it may be difficult to determine that a fishery is impacting upon the key species, habitats, communities or processes that characterise the ecosystem within which the fishery occurs. While it feels inherently likely that such fisheries would be relatively small, this may not always be the case. Nevertheless, if a fishery is not impacting upon key ecosystem elements, then the score should be high and the scoring text could be very short and limited to a description of the key ecosystem elements, and a justification as to why they are not impacted in any significant way by the fishery.

In this regard, it is not clear how a fishery could impact a productivity pattern (e.g., upwelling or spring bloom, etc), a point made in the assessment of 14677 South Arica hake – “*The physical activity of trawling for hake cannot prevent the Benguela current from flowing and providing these ecosystem services.*” As such, there is a question as to the sense of allowing productivity patterns to be identified as key ecosystem elements, when it essentially becomes an opportunity to give high scores with no potential for low scores.

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<sup>1</sup> CB3.17.3 The team should note that “key” ecosystem elements are the features of an ecosystem considered as being most crucial to giving the ecosystem its characteristic nature and dynamics, and are considered relative to the scale and intensity of the fishery. They are features most crucial to maintaining the integrity of its structure and functions and the key determinants of the ecosystem resilience and productivity.

<sup>2</sup> GCB3.19.1 Key ecosystem elements may include trophic structure and function (in particular key prey, predators, and competitors), community composition, productivity pattern (e.g. upwelling or spring bloom, abyssal, etc.), and characteristics of biodiversity.

## Objective 2: To determine whether the rationales of these PIs go above and beyond that considered in other P2 components (as identified through significant differences in P2 PI scoring and rationales).

### Method

In seeking to answer Objective 2 (Does scoring of the ecosystem PIs consider anything beyond that covered by the other PIs?), a review of MSC guidance was initially undertaken to check what evidence types may be used by assessment teams in scoring the ecosystem PIs.

From the review of MSC guidance, it is apparent that assessment teams are provided with options to meet the scoring requirements for the ecosystem PIs without there being any additional information available on ecosystem elements, or without considering ecosystem-specific information, or by expert judgement and by inferring outcomes for ecosystem elements from information on other components (i.e., retained, bycatch or ETP species, and habitats). Specifically:

#### PI 2.5.1:

*“GCB3.17.1 The Ecosystem component does not repeat the status assessment of these elements individually but rather considers the wider system structure and function - although if all these components scored highly it might be expected that the Ecosystem component would also score highly.”*

*“GCB3.17.2 ... Relatively few fisheries would have the information needed to address ecosystem issues quantitatively, and usually they will be assessed using surrogates, analogy, general observations, qualitative assessment and expert judgement.”*

#### PI 2.5.2:

*“CB3.18.2 The team shall note that for SG80 and SG100, partial strategies and strategies respectively may also contain measures designed and implemented to address impacts on components that have been evaluated elsewhere in this framework.*

*CB3.18.2.1 If the measures address specific ecosystem impacts effectively enough to meet the appropriate standard, then it is not necessary to have special “ecosystem measures” to address the same impacts.*

*CB3.18.2.2 It may not be necessary to have a specific “ecosystem strategy” other than that which comprises the individual strategies for the other Components under P1 and P2.”*

Scoring for all 52 CR v.1.3 fisheries was also reviewed, and the scores given for the other Principle 2 outcome, management and information PIs were compared to the scores given for the ecosystem PIs. A review of the scoring texts for the same 25 fisheries identified in the initial review of CR v.1.3 fisheries for inclusion in the study was then undertaken, guided by the list of questions below:

- 1) Are key elements scored using ecosystem-specific information?
- 2) Were scores of 100 awarded for SIs on the basis of ecosystem-specific information?

## Results

In comparison to the scores awarded for the other outcome, management and information PIs in Principle 2, the scoring for the ecosystem PIs appears to be somewhat higher across the 52 fisheries that were assessed against CR v.1.3, as below.

Mean of 52 fisheries	Retained Species	Bycatch Species	ETP Species	Habitats	Ecosystem
Outcome	84.3	85.6	88.5	86.3	90.6
Management	86.6	88.2	86.9	87.8	89.9
Information	86.0	82.2	81.3	86.0	90.2

By calculating the Principle 2 score for all 52 fisheries against PIs 2.1.1 – 2.4.3, only (i.e., without including the ecosystem PIs), it is apparent that none of the 52 fisheries were certified because of high scores awarded for the ecosystem PIs. However, while only 10 fisheries gained by removing the scores for the ecosystem PIs (average Principle 2 score increase = 0.7, range = 0.1 - 1.7) and three fisheries would have scored exactly the same, 39 fisheries lost by removing the ecosystem PIs from the scoring (average Principle 2 decrease = 1.4, range = 0.2 - 3.3). Nevertheless, the generally higher scores awarded for the ecosystem PIs mean that they could be the key factor in fisheries being certified in future.

It is not absolutely clear why PI 2.5.1 should be scored higher than the other Principle 2 outcome PIs. The latitude offered to assessment teams on what might constitute a key ecosystem element may be partly responsible, but the absence of well defined performance thresholds (e.g., in comparison to reference points for retained or bycatch species) and the general need, therefore, for assessment teams to use surrogates, analogy, general observations, qualitative assessment and expert judgement in determining the potential for serious or irreversible harm, appears also likely to be important.

An additional issue that appears to contribute to the high scores given for PI 2.5.1 is that the only distinction between the different SGs is the level of confidence /evidence that assessment teams are able to determine that key ecosystem elements are not being impacted. This is a similar approach to that taken for ETP species (although determining what the relevant ETP species are is subject to much less subjectivity than determining what the key ecosystem elements are), but for the other P2 outcome PIs, there is an additional distinction made at the SG100 level of being required to consider ‘minor’ elements that may be impacted (e.g., minor retained species). This results in assessment teams being required to go in to potentially much greater detail in order to award the highest scores for those PIs.

The scoring for PI 2.5.2 was only slightly higher on average than that of the other management PIs, but again it is not entirely clear why this is the case, particularly when the SIs and SGs for the management PIs across Principle 2 are very similarly phrased. However, as well as not having to consider any ‘minor’ elements, being able to consider “*measures designed and implemented to address impacts on components that have been evaluated elsewhere*” (CB3.18.2) at even the SG100 level allows assessment teams to pick from across the full range of potential management measures available to score, and therefore for any deficiencies to be minimised within the overall package of measures.

Again, not having to consider any ‘minor’ elements may be significant in the higher scores awarded for PI 2.5.3 in comparison to the other P2 information PIs. However, another important reason for the higher scores appears to be the latitude offered to assessment teams to score using surrogates, analogy, general observations, qualitative assessment and expert judgement (GCB3.17.2), in combination with the format of the scoring guideposts. For example, the PI 2.5.3 Sla requirement at SG80 is “*Information is adequate to broadly understand the key elements of the ecosystem.*”, whereas for PI 2.3.3 (ETP species information), the Sla requirements at SG80 is “*Sufficient information is available to allow ... the impact of fishing to be quantitatively estimated.*” Scoring PI 2.5.3 essentially allows for subjective assessment, whereas the other P2 information PIs depend more on data being available.

Brief reviews of the 25 different reports that were looked at in detail are provided as Appendix 5 to this report. Summary statistics, using these reviews, are then provided in the following table.

Question		Yes	Moderate	No	N/A
Are PI 2.5.1 key ecosystem elements scored using ecosystem-specific information		11	10	4	-
Were scores of 100 awarded for SIs on the basis of ecosystem-specific information?	2.5.1, Sla	11	1	3	10
	2.5.2, Sla	6	-	2	17
	2.5.2, S1b	5	-	0	20
	2.5.2, S1c	8	-	5	12
	2.5.2, S1d	5	-	12	8
	2.5.3, S1b	10	-	0	15
	2.5.3, S1c	11	-	1	13
	2.5.3, S1d	12	-	2	11
	2.5.3, S1e	11	-	3	11

### PI 2.5.1

In the context of the findings from Objective 1 (i.e., that key ecosystem objectives are often either not indicated or have to be inferred from the scoring text), scoring texts for PI 2.5.1 for fisheries that were scored 80 typically discussed one or more key ecosystem elements in the context of available information on the outcomes of other Principle 2 components. For example:

- 15694 Cornish hake: “... *it is known that the ecosystem is largely driven by benthic production. There is evidence that the main effects of the set-net fishery on this ecosystem has been to reduce the abundance of large hake, and thus the mean trophic level of the fish community in the area; and in the past to have caused a high mortality of cetaceans (and thus to reduce the abundance of predators in the ecosystem). Recent evidence from the recovery of the hake stock and the much reduced cetacean by catch rate suggests that neither effect has caused serious or irreversible harm to the ecosystem.*” (PI 2.5.1 scored 80).
- 10601 Juan Fernandez rock lobster: “*The fishery lands mature lobster with the females having the opportunity to reproduce at least four times before capture. Indications are that the applied management measures have been successful in restoring the population to former levels. Only the local vessels have access to the resource. The fishery is highly selective. While there is a bait fishery, a significant part of the raw material derives from fish waste and if there is scarcity of a particular resource the fishers may substitute another. There is an extended closed season. There is no evidence of decreased diversity*

*due to the harvest of lobster, e.g. a truncated size composition of the ecological community or changes in the species biodiversity of the ecological community due to the fishery.” (PI 2.5.1 scored 80).*

When PI 2.5.1 was scored above 80, more ecosystem-specific information was typically introduced:

- 6567 ISF Iceland Golden redfish: *“The stock biomass of cod has been increasing and is now larger than observed in the last three decades. This is believed to be the result of a decrease in harvest rate. Cod has been shown to directly affect the biomass of the (offshore) shrimp population (Pandalus borealis). This is currently taken into account in the MRI assessments (using GADGET models) as has the effect of the capelin on cod growth (using regression models).”* (PI 2.5.1 scored 85, but scored 100 for trophic issues element).
- 15703: Olympic Seafood Antarctic krill: *“Hewitt et al. (2004) estimated the annual predator demand for krill in Area 48 as orders of magnitude higher than the current fishery take. Nicoll and Douglass (2012) also agree that removals by the krill fishery have been estimated to be orders of magnitude below the demand from predators and the biomass available to both predators and the fishery. Moreover, according to Murphy et al. (2007), some species also seek alternative breeding options in years when krill are relatively scarce.”* (PI 2.5.1 scored 100).

This was not always the case, however, and some high scores were justified on the basis of outcome indicators and the absence of evidence of impacts on the ecosystem. For example:

- 16778: Shark Bay prawn: *“Major ecosystem impacts from fishing activities in the SBPMF are likely to be due to the removal of the target species, brown tiger and western king prawns, as these species make up the majority of the catch. The fishing mortality rate of prawns in Shark Bay is relatively low compared to the natural seasonal variability of prawn populations as a consequence of environmental conditions, such as water temperature, currents and natural events, e.g., cyclones (Kangas et al. 2006). Retained non-target (‘byproduct’) species are taken in relatively small quantities and generally have large distribution ranges (Kangas et al. 2007).”* (PI 2.5.1 scored 100).
- 16782: Gulf of St. Lawrence Fall Herring: *“The assessment team could not find any concern indicating that the SGSL HF 16 F Gillnet fishery causes any disruption of the key elements underlying ecosystem structure and function especially to a point where there would be a serious threat or irreversible harm. The main impact of the fishery on target, bycatch, and ETP species, and habitat are identified and there is no indication that the fishery perturbed to the ecosystem main structure and function. There is a comprehensive assessment of the target species, and information is available to show the negligible impact on retained, bycatch, and ETP species. There is no indication that the fishery causes serious or irreversible harm to habitats.”* (PI 2.5.1 scored 100).

### PI 2.5.2.

Where a commercially targeted species is identified as a key ecosystem element (e.g., capelin in 6567 ISF Iceland golden redfish; cod in 14608 Poland Eastern Baltic cod), it is noted that a fishery can generate high scores for the ecosystem PIs because of conventional fishery management practices (e.g., undertaking a stock assessment, establishing reference points). Whilst the number of targeted species that could be considered key ecosystem elements may be quite limited, this nevertheless presents fisheries with relatively easy opportunities for high scores.

In any case, as indicated by the previous table, PI 2.5.2 SIc (SG100: “*The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved*”) and SIc (SG100: “*There is evidence that the measures are being implemented successfully*”) appear to present opportunities for high scores without necessarily considering ecosystem-specific information. In fact, these SIs were at times scored on the basis purely of subjective assessment or on the basis of evidence of fishing input controls being implemented which may have very little to do with managing ecosystem-level impacts.

- 12605 Cantabrian Sea anchovy: “*It is the opinion of the managers and the assessment team based on the previous criteria evaluation that the strategy is effective in avoiding serious or irreversible harm to ecosystem structure and function.*” (SIc scored 100).
- 15705 Australia blue grenadier: “*Based on the fact that the fishery has not exceeded its catch limits, verified by 100% observer coverage at sea and unloading observer records, there is good evidence that the strategy is being successfully implemented and the strategy is likely to achieve its objective meeting this element at the SG 100 level.*” (SIc scored 100).
- 15750 Oregon and Washington pink shrimp: “*Oregon State Police enforcement records show very few violations associated with the fishery. The vast majority of fishers willingly work with state biologists and managers to develop and maintain a clean fishery.*” (SIc scored 100).

### PI 2.5.3.:

Evidence from the previous table indicates that scores of 100 for PI 2.5.3 are generally achieved only with the provision of ecosystem-specific information, with three or less scores of 100 being awarded for each SI across the 25 fisheries without using ecosystem-specific information.

SIe appears to provide an opportunity to achieve a score above 80 relatively simply, however, as the SG100 requirement (Information is sufficient to support the development of strategies to manage ecosystem impacts) is very subjective in nature. For example:

- 6544 New Zealand hake: “*There is a growing body of information available on the ecosystem components in which hake occurs and interacts. Linkages between all ecosystem components and the hake fishery cannot be quantified, making the scale of responses to changes in fishing patterns difficult to predict. However, sufficient information is available to support the development of strategies to manage ecosystem impacts. A score of 100 is given.*” (SIe scored 100).
- 13598 Danish and Swedish nephrops: “*The team considers that information is sufficient to support the development of strategies to manage ecosystem impacts. Besides that, sufficient data continue to be collected through various organizations. Data is routinely collected on an ongoing basis to allow for the detection of any change or increase in risk level to the main ecosystem components. ICES Mixed fisheries advice report for the North Sea (2013) (which includes Skagerrak), gives an overview of the stocks of different species and marks a path towards ecosystem management. This advice indicates that sufficient data is collected to support the development of strategies to manage ecosystem impacts.*” (SIe scored 100).

Overall, the impression given from the results is that the assessment teams typically did focus their scoring text for the ecosystem PIs on the key ecosystem elements (however those were defined), and introduced ecosystem-specific information when scoring SIs at 100, rather than

repeating the same information as provided previously when scoring the other Principle 2 PIs. As such, in answer to Objective 2, in general, the rationales for the ecosystem PIs do go above and beyond those of the other P2 components (as identified through significant differences in P2 PI scoring and rationales), in particular when SIs are scored at 100.

However, it is apparent that assessment teams are provided with options to meet the scoring requirements for the ecosystem PIs without there being any additional information available on ecosystem elements, or without considering ecosystem-specific information, or by expert judgement and by inferring outcomes for ecosystem elements from management approaches or information related to other Principle 2 components (i.e., retained, bycatch or ETP species, and habitats). Even at the 100 level, MSC guidance allows for the ecosystem PIs to be scored through only loosely tying management approaches and information to key ecosystem elements (e.g. trophic structures, community structures), and assessment teams do appear to have adopted this approach in some cases.

## Objective 3: To identify whether the ecosystem PIs have been scored consistently across a representative sample of fisheries.

### Method

The initial review of scoring across all 52 fisheries eligible for inclusion in this study (Appendix 3) showed that the average (mean) scores for the ecosystem outcome (90.6), management (89.9) and information (90.2) PIs were all considerably higher than the average (mean) scores for the other Principle 2 outcome (86.2), management (87.4) and information (83.9) PIs. In fact, within the outcome, management and information PIs, the mean scores for the ecosystem PIs were the highest across all of the PIs (Appendix 2). As such, while this Objective was initially focused on what was covered within the scoring of the ecosystem PIs, consideration is also given here to the question “*Why did the ecosystem PIs consistently score highly*”.

### Results

It is apparent that there is a considerable range of detail included in the scoring texts of different MSC fisheries assessment reports. Some reports provide a detailed review of the available evidence in awarding scores (e.g., 6567 ISF Iceland golden redfish, 15750 Oregon and Washington pink shrimp, 16781 OCI Grand Bank yellowtail flounder), but other reports – the majority – are less detailed and stakeholders are required to put greater trust in the assessment team to have scored appropriately, rather than being able to evaluate the evidence separately.

A key aspect of this is that, as noted under Objective 1, the key ecosystem elements under consideration are often not clearly identified in the scoring text, meaning that readers are left without a focus to understand scoring. A clear recommendation from this study is that assessment teams should be reminded of the requirement to identify the P2 scoring elements in Table 4.3 of the assessment report (Table 3 in the Full Assessment Reporting template v2.0).

Nevertheless, the review of fishery assessment reports undertaken for this study indicates that assessment teams have interpreted the available guidance on what comprises a key ecosystem element in different ways, and in some cases may have had difficulty in identifying what the key ecosystem elements were for the fisheries being assessed. The following guidance is provided in the Certification Requirements (v1.3):

*“CB3.17.3 The team should note that “key” ecosystem elements are the features of an ecosystem considered as being most crucial to giving the ecosystem its characteristic nature and dynamics, and are considered relative to the scale and intensity of the fishery. They are features most crucial to maintaining the integrity of its structure and functions and the key determinants of the ecosystem resilience and productivity.”*

It is then only at the very last point for PI 2.5.3 in the Guidance to the Certification Requirements (v1.3) that any examples of key ecosystem elements are provided:

*“GCB3.19.1 Key ecosystem elements may include trophic structure and function (in particular key prey, predators, and competitors), community composition, productivity pattern (e.g. upwelling or spring bloom, abyssal, etc.), and characteristics of biodiversity.”*

However, from this guidance it is apparent that key ecosystem elements could comprise a species, a community, a biological process, or possibly even a physical process. With such an apparently wide variety of potential key elements, there is always likely to be a considerable range in interpretations of key ecosystem elements across different assessment teams and fisheries.

As identified under Objective 1, an additional issue is that the limits of the ecosystem under consideration are often not defined. For some fisheries, the ecosystem may be relatively geographically constrained (e.g., 15693 LFA Latvia Eastern Baltic cod, or 16778 Shark Bay prawn). However, many fisheries exist in areas without obvious geographic or process boundaries. In such cases, the absence of guidance on what might comprise the relevant ecosystem, or even a definition for ‘ecosystem’ in the MSC Vocabulary, leaves this important factor up to the assessment team’s interpretation. In turn, this then makes the identification of the key ecosystem elements subject to interpretation. As such, there can be no expectation that a consistent scoring approach will be taken across different assessments. Therefore, a recommendation is that MSC guidance should be updated to include a definition of ‘ecosystem’, and the instructions in the reporting template should include a requirement to define the ecosystem in which the fishery operates.

At this point it is noted that the guidance under CR v2.0 appears to be very similar as that provided under CR v1.3, and so any recommendations generated under this review appear likely to be applicable to the latest version of the CR, also.

## Other Comments

The text provided in Section 4.4.3 Evaluation techniques (2) of the Full Assessment Reporting Template v2.0 does not exactly reflect the text provided in FCR 7.10.7, in that the FCR text does not include an ‘e.g.’.

- “FCR 7.10.7: “*In Principle 1 or 2, the team shall score PIs comprised of differing scoring elements (species or habitats) that comprise part of a component affected by the UoA.*”
- Full Assessment Reporting Template v2.0, Section 4.4.3 (2): “*The report shall include (using Table 3 below): a) The set of scoring elements (**e.g.** species or habitats) that have been considered in each outcome PI in Principles 1 and 2.*”

Nevertheless, the inclusion of the ‘e.g.’ is important, in indicating to assessment teams that other Principle 2 elements should also be described, including the key ecosystem elements scored under the ecosystem PIs.

## **Objective 4: To identify what factors result in an unconditional pass for ecosystem PIs ( $\geq$ SG 80) and those factors that lead to a condition.**

The initial review of the MSC Fisheries Master\_Scoring' worksheet indicated that all 52 of the V1.3 fishery assessments were scored at 80 or above for PIs 2.5.1 and 2.5.2. Of the 52 fisheries, only the 15694 Cornish hake gillnet fishery was scored below 80 (at 75) for PI 2.5.3, for not meeting Sle:

*“Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).”*

The reason given was that there are data collection limitations, notably on the discarding of spurdog, that prevent an increase in risk level being detected. However, as there is just this one fishery out of the 52 with a condition, this objective was not considered further.

However, consideration of the question *“Why did the ecosystem PIs consistently score highly”* is given under the discussion on Objective 2, above.

## Discussion and Recommendations:

Recommendations from this report fall under two themes.

### Theme 1: Develop the ecosystem PIs

The first theme is intended to provide suggestions for how to improve the consistency of scoring for the ecosystem PIs between assessment reports, and to help stakeholders determine that fisheries are scored appropriately.

- 1) Assessment teams should be reminded of the requirement to identify the P2 scoring elements in Table 4.3 of the assessment report (Table 3 in the Full Assessment Reporting template v2.0). A check of compliance with this requirement could be part of the standard review process undertaken by MSC staff at the PCDR consultation stage.
- 2) Guidance could be provided for PI 2.5.3 SIa SG60 (*“Information is adequate to identify the key elements of the ecosystem”*) to the effect that assessment teams need to actually identify the key ecosystem elements in the scoring text in order to meet the SG60 requirement.
- 3) There is almost no practical difference between the requirements of PI 2.5.3 SIb, SIc and SId, and two of these SIs could almost certainly be removed without limiting the range of information that assessment teams would be required or able to present in order to score. In addition, PI 2.5.3 SIc and SId focus on information on Components (i.e., target, retained, bycatch and ETP species, and habitats), which confuses the approach to scoring the ecosystem PIs.
- 4) Productivity patterns (e.g., upwelling or spring bloom, etc) should not be considered key ecosystem elements in the context of a fisheries assessment, as there is no feasible way for a fishery to disrupt these major processes to a point where there would be serious or irreversible harm. As such, any assessment team that identifies a productivity pattern as a key ecosystem element is effectively guaranteeing their fishery a scoring boost.
- 5) MSC guidance should be updated to include a definition of ‘ecosystem’, and the instructions in the reporting template should include a requirement to identify the ecosystem in which the fishery operates.
- 6) A default list of potential ecosystem elements should be provided, with assessment teams required to indicate which ones were ‘key’ ecosystem elements for the fisheries under assessment. Fisheries could then score 80 if no ecosystem elements were considered to be ‘key’ or key ones were not impacted in any significant way, but all would need to be considered to meet the SG100 level. This would also encourage assessment teams to provide a more rounded picture of the ecosystem in which the fishery operates than is necessarily the case at present.

## **Theme 2: Remove the ecosystem PIs**

The second theme focuses on the more radical idea that because the ecosystem PIs are almost never scored below 80 (as shown below, only PI 2.5.3 was scored below 80, but then only on a single occasion for 15694 Cornish hake gillnet), they provide no added value to the assessment process. Essentially, the ecosystem PIs could be discarded from the assessment process, and there would be no apparent loss to the MSC in terms of rewarding good practice and encouraging improvement in fishery performance.

Scores <80 for 52 CRv1.3 fisheries	Retained Species	Bycatch Species	ETP Species	Habitats	Ecosystem
Outcome	5	2	6	9	0
Management	7	2	3	5	0
Information	3	11	10	5	1

There would, however, be a considerable gain for assessment teams (and clients, presumably) in terms of reducing the time burden for producing assessment reports. As such, the single recommendation for the second theme is:

- 1) Remove the ecosystem PIs from the assessment tree.

Although, of course, there are no data presented here on whether some fisheries have failed assessments because of the ecosystem PIs being scored down, this outcome would seem unlikely, given that the ecosystem PIs are generally scored higher in the 52 fisheries considered here, and because assessment teams can use expert judgement in scoring the ecosystem PIs, rather than being dependent on the availability of data.

In the case that the ecosystem PIs were removed from a future assessment tree, an additional SI could be included in the outcome PIs of the target, primary, secondary and ETP species, scored at SG100 only, to account for their ecosystem roles. This could be mirrored by minor changes to the management SIs. For example:

- Example Outcome SI (SG100, only): *“There is evidence that the UoA is highly unlikely to affect the ecosystem role of the secondary species to a point where there would be serious or irreversible harm.”*
- Example Management SI (SG100, only): *“There is a strategy in place for the UoA for managing main and minor secondary species, including with respect to their role in the ecosystem.”*

There would be no need to add to or change the information PIs, as they already include a requirement at SG100 that “Information is adequate to support a strategy”. However, a guidance note could be added to indicate that, at SG100, the strategy would need to account for the component’s role in the ecosystem.

In the event that this approach was taken, there would also not be a particular need to include an ecosystem aspect to the existing habitat PIs, as the introduction through CR v.2.0 of the VME requirements already accounts for the ecosystem role of habitats to some extent.

## **Comments from other experienced MSC practitioners**

In order to gain further insight and determine the validity of any recommendations, a number of experienced MSC practitioners were contacted in the final stages of the project. They were asked to comment on the findings, and to provide alternative ideas if neither the Theme 1 nor Theme 2 approaches seemed appropriate. Responses were received from six of the people contacted, and these are provided in near complete form as Appendix 4 (noting that the responses have been edited slightly where necessary to remove personal information that may allow respondents to be identified).

In general, the respondents felt that the ecosystem PIs are challenging to score and that improvements could be made to promote greater consistency between assessments. However, some respondents indicated they would prefer to retain the ecosystem PIs, while some felt that they could be removed from the assessment.

The key arguments in favour of retaining the ecosystem PIs were that greater understanding of ecosystem function is now being generated globally and that the MSC was right to encourage this developmental process, whilst it might also make it difficult for some fisheries to meet the MSC requirement of an overall  $\geq 80$  score for P2 if the ecosystem PIs were removed.

The key arguments in favour of removing the ecosystem PIs were that they are scored inconsistently, and can simply be a repository for any information on the fishery that didn't fit in to the other PIs. A number of the respondents also agreed that the ecosystem PIs are very time consuming to score.

Finally, it is noted that a number of the respondents expressed an interest in participating in any further work to develop the ecosystem PIs or change the scoring approach, either through engaging in discussions or participating in workshops.

## Appendix 1: CR v.1.3 fisheries that were eligible for study

Key:

= Pelagic fisheries that were selected for further study;  = Demersal fisheries that were selected for further study.

Report ID	Report Name	SpeciesName	gear
2485	Samherji Norwegian & Icelandic herring trawl and seine <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/isf-norwegian-and-icelandic-herring-trawl-and-seine/assessment-downloads-1/20140529_PCR_HER360.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/isf-norwegian-and-icelandic-herring-trawl-and-seine/assessment-downloads-1/20140529_PCR_HER360.pdf</a>	Herring ( <i>Clupea harengus</i> )	Midwater trawls - not specified
2511	Norway North Sea and Skagerrak herring <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/norway-north-sea-and-skagerrak-herring/re-assessment-downloads-1/20140703_PCR_HER89.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/norway-north-sea-and-skagerrak-herring/re-assessment-downloads-1/20140703_PCR_HER89.pdf</a>	Herring ( <i>Clupea harengus</i> )	Pelagic trawl
2512	Norway spring spawning herring <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/norway-spring-spawning-herring/re-assessment-downloads-1/20140703_PCR_HER91.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/norway-spring-spawning-herring/re-assessment-downloads-1/20140703_PCR_HER91.pdf</a>	Herring ( <i>Clupea harengus</i> )	Pelagic trawl
2567	Northern Ireland Pelagic Sustainability Group (NIPSG) Irish Sea herring <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/northern-ireland-pelagic-sustainability-group-%28nipsdg%29-irish-sea-herring/assessment-downloads-1/20140801_PCR_HER406.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/northern-ireland-pelagic-sustainability-group-%28nipsdg%29-irish-sea-herring/assessment-downloads-1/20140801_PCR_HER406.pdf</a>	Herring ( <i>Clupea harengus</i> )	Pelagic trawl
6544	New Zealand EEZ hake trawl <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/new-zealand-hake-trawl-fishery/assessment-downloads-1/20140910_PCR_HAK075.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/new-zealand-hake-trawl-fishery/assessment-downloads-1/20140910_PCR_HAK075.pdf</a>	Hake (southern) ( <i>Merluccius australis</i> )	Demersal trawl
6553	New Zealand EEZ ling trawl and longline <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/new-zealand-ling-trawl-and-longline-fishery/assessment-downloads-1/20141009_PCR_LIN076.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/new-zealand-ling-trawl-and-longline-fishery/assessment-downloads-1/20141009_PCR_LIN076.pdf</a>	Pink cusk-eel ( <i>Genypterus blacodes</i> )	Demersal trawl
6556	South Georgia Patagonian toothfish longline <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/south-atlantic-indian-ocean/south-georgia-patagonian-toothfish-longline/2ndreassessment-documentation/20140915_PCR_TOO111.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/south-atlantic-indian-ocean/south-georgia-patagonian-toothfish-longline/2ndreassessment-documentation/20140915_PCR_TOO111.pdf</a>	Patagonian toothfish ( <i>Dissostichus eleginoides</i> )	Set longlines
6557	ISF Iceland saithe <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/isf-saithe-ling/assessment-downloads-1/20140910_PCR_SAI405.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/isf-saithe-ling/assessment-downloads-1/20140910_PCR_SAI405.pdf</a>	Saithe ( <i>Pollachius virens</i> )	Bottom trawls - not specified
6567	ISF Iceland golden redfish <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/isf-iceland-golden-redfish/assessment-downloads-folder/20141008_PCR_v2_RED404.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/isf-iceland-golden-redfish/assessment-downloads-folder/20141008_PCR_v2_RED404.pdf</a>	Golden redfish ( <i>Sebastes marinus</i> / <i>Sebastes norvegicus</i> )	Bottom trawls - not specified
6586	Ashtamudi Estuary short-necked clam <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/indian-ocean/ashtamudi-estuary-short-necked-clam-fishery/assessment-downloads-1/20141028_PCR_CLA409.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/indian-ocean/ashtamudi-estuary-short-necked-clam-fishery/assessment-downloads-1/20141028_PCR_CLA409.pdf</a>	Clam (short neck) ( <i>Paphia malabarica</i> )	Hand dredges, Hand gathered

6596	Companhia de Pescarias do Algarve rope grown Mediterranean mussel <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/companhia-de-">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/companhia-de-</a>	Mediterranean mussel ( <i>Mytilus galloprovincialis</i> )	Miscellaneous gear
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	<a href="#">pescarias-do-algarve-s-a-portugal-atlantic-s-e-algarve-coast-rope-grown-mussel/copy2_of_assessment-downloads-folder/20141112_PCR_MUS427.pdf</a>		
7594	Prince Edward Island lobster trap <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/prince-edward-island-lobster-trap/assessment-downloads-1/20141106_PCR_LOB415.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/prince-edward-island-lobster-trap/assessment-downloads-1/20141106_PCR_LOB415.pdf</a>	Lobster (American) ( <i>Homarus americanus</i> )	Traps - pots
7610	Pacific hake mid-water trawl <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/pacific-hake-mid-water-trawl/Reassessment-downloads/20141124_PCR_HAK095.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/pacific-hake-mid-water-trawl/Reassessment-downloads/20141124_PCR_HAK095.pdf</a>	North Pacific hake ( <i>Merluccius productus</i> )	Midwater trawls - not specified
8600	Icelandic Gillnet lumpfish <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/icelandic-gillnet-lumpfish/assessment-downloads-1/20141222_PCR_LUM339.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/icelandic-gillnet-lumpfish/assessment-downloads-1/20141222_PCR_LUM339.pdf</a>	Lumpfish (=Lumpsucker) ( <i>Cyclopterus lumpus</i> )	Gillnets
10597	Gaspésie lobster Trap fishery <a href="http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/gaspesie-lobster-trap/assessment-downloads-folder/20150311_PCR_LOB455.pdf">http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/gaspesie-lobster-trap/assessment-downloads-folder/20150311_PCR_LOB455.pdf</a>	Lobster (American) ( <i>Homarus americanus</i> )	Traps - pots
10601	Juan Fernández Rock lobster <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/juan-fernandez-rock-lobster/assessment-downloads-folder/20150105_PCR_LOB420.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/juan-fernandez-rock-lobster/assessment-downloads-folder/20150105_PCR_LOB420.pdf</a>	Lobster (Juan Fernandez rock) ( <i>Jasus frontalis</i> )	Traps - pots
12605	Cantabrian Sea purse seine anchovy fishery <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/cantabrian-sea-purse-seine-anchovy/assessment-downloads-1/20150324_PCR_ANC466.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/cantabrian-sea-purse-seine-anchovy/assessment-downloads-1/20150324_PCR_ANC466.pdf</a>	Anchovy ( <i>Engraulis encrasicolus</i> )	Seine nets (purse)
12609	Aker Biomarine Antarctic krill <a href="http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/southern-ocean/aker-biomarine-antarctic-krill/reassessment-downloads-folder/20150116_PCR_v2_KRI001.pdf">http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/southern-ocean/aker-biomarine-antarctic-krill/reassessment-downloads-folder/20150116_PCR_v2_KRI001.pdf</a>	Antarctic krill ( <i>Euphausia superba</i> )	Pelagic trawl
13598	Danish and Swedish nephrops (Swedish UoC 1) <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/danish-and-swedish-nephrops/assessment-downloads-1/20150127_PCR_SWEDISH_NEP407.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/danish-and-swedish-nephrops/assessment-downloads-1/20150127_PCR_SWEDISH_NEP407.pdf</a>	Norway lobster ( <i>Nephrops norvegicus</i> )	Demersal trawl, Traps - pots
13599	Danish and Swedish nephrops (Danish UoCs 7-8) <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/danish-and-swedish-nephrops/assessment-downloads-1/20150127_PCR_DANISH_NEP407.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/danish-and-swedish-nephrops/assessment-downloads-1/20150127_PCR_DANISH_NEP407.pdf</a>	Norway lobster ( <i>Nephrops norvegicus</i> )	Demersal trawl
13601	Vilsund Blue a/s Limjord mussel & cockle dredge <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/denmark-blue-shell-mussel-and-cockle-dredge/reassessment-downloads/20150106_PCR_MUS035.PDF">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/denmark-blue-shell-mussel-and-cockle-dredge/reassessment-downloads/20150106_PCR_MUS035.PDF</a>	Blue mussel ( <i>Mytilus edulis</i> ), Cockle ( <i>Cerastoderma edule</i> )	Boat dredges
14608	Poland Eastern Baltic cod <a href="http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/poland-eastern-baltic-cod/assessment-downloads-1/20150120_PCR_COD419.pdf">http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/poland-eastern-baltic-cod/assessment-downloads-1/20150120_PCR_COD419.pdf</a>	Atlantic cod ( <i>Gadus morhua</i> )	Bottom trawls -not specified
14636	Greenland cod, haddock and saithe trawl fishery <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/greenland-cod-haddock-and-saithe-trawl/assessment-downloads-1/20150505_PCR_COD412.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/greenland-cod-haddock-and-saithe-trawl/assessment-downloads-1/20150505_PCR_COD412.pdf</a>	Atlantic cod ( <i>Gadus morhua</i> ), Haddock ( <i>Melanogrammus aeglefinus</i> ), Pollock ( <i>Pollachius virens</i> )	Demersal trawl
14677	South Africa hake trawl <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/south-atlantic-indian-ocean/south-africa-hake-trawl-fishery/south-african-hake-second-reassessment-documents/20150526_PCR_HAK108.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/south-atlantic-indian-ocean/south-africa-hake-trawl-fishery/south-african-hake-second-reassessment-documents/20150526_PCR_HAK108.pdf</a>	Hake (cape) ( <i>Merluccius capensis</i> , <i>M.paradox.</i> )	Demersal trawl

14681	SZLC, HNSFC & CFA Cook Islands EEZ south Pacific albacore longline <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/cook-islands-tuna/assessment-downloads-folder/2719R07A_Public_Certification_Report.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/cook-islands-tuna/assessment-downloads-folder/2719R07A_Public_Certification_Report.pdf</a>	Albacore tuna ( <i>Thunnus alalunga</i> )	Longlines - not specified
14683	Bay of Fundy, Scotian Shelf and Southern Gulf of St. Lawrence lobster Trap <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/bay-of-fundy-scotian-shelf-and-southern-gulf-of-st-lawrence-lobster-trap/assessment-downloads-1/20150526_PCR_LOB428.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/bay-of-fundy-scotian-shelf-and-southern-gulf-of-st-lawrence-lobster-trap/assessment-downloads-1/20150526_PCR_LOB428.pdf</a>	Lobster (American) ( <i>Homarus americanus</i> )	Traps - pots
15691	Western Baltic spring spawning herring <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/western-baltic-spring-spawning-herring/assessment-downloads-1/20150420_PCR_HER128.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/western-baltic-spring-spawning-herring/assessment-downloads-1/20150420_PCR_HER128.pdf</a>	Herring ( <i>Clupea harengus</i> )	Pelagic trawl
15692	FROM Nord North Sea and Eastern Channel pelagic trawl herring <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/from-nord-north-sea-and-eastern-channel-pelagic-trawl-herring/assessment-downloads-1/20150422_PCR_HER459.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/from-nord-north-sea-and-eastern-channel-pelagic-trawl-herring/assessment-downloads-1/20150422_PCR_HER459.pdf</a>	Herring ( <i>Clupea harengus</i> )	Pelagic trawl
15693	LFA Latvia trawl eastern Baltic cod <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/lfa-latvia-trawl-eastern-baltic-cod/assessment-downloads-1/20150709_PCR_COD413.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/lfa-latvia-trawl-eastern-baltic-cod/assessment-downloads-1/20150709_PCR_COD413.pdf</a>	Atlantic cod ( <i>Gadus morhua</i> )	Bottom trawls -not specified
15694	Cornish hake gill net <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/cornish-hake-gill-net/assessment-downloads-1/20150520_PCR_HAK194.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/cornish-hake-gill-net/assessment-downloads-1/20150520_PCR_HAK194.pdf</a>	Hake (European) ( <i>Merluccius merluccius</i> )	Gillnets
15696	DPPO and DFPO North Sea herring <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/dppo-and-dfpo-north-sea-herring/reassessment-downloads-folder/20150714_PCR_HER34.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/dppo-and-dfpo-north-sea-herring/reassessment-downloads-folder/20150714_PCR_HER34.pdf</a>	Herring ( <i>Clupea harengus</i> )	Pelagic trawl, Purse seine nets
15697	Eastern Canada offshore lobster <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/Eastern-Canada-offshore-lobster/re-assessment-downloads/20150630_PCR_LOB39.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/Eastern-Canada-offshore-lobster/re-assessment-downloads/20150630_PCR_LOB39.pdf</a>	American lobster ( <i>Homarus americanus</i> )	Traps - not specified
15698	Alaska Pacific cod - Bering Sea and Aleutian Islands <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/bering-sea-and-aleutian-islands-pacific-cod/reassessment-downloads-folder/20150618_PCR_COD014.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/bering-sea-and-aleutian-islands-pacific-cod/reassessment-downloads-folder/20150618_PCR_COD014.pdf</a>	Pacific cod ( <i>Gadus macrocephalus</i> )	Demersal trawl
15699	Alaska Pacific cod - Gulf of Alaska <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/gulf-of-alaska-pacific-cod/reassessment-downloads-folder/20150618_PCR_COD050.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/gulf-of-alaska-pacific-cod/reassessment-downloads-folder/20150618_PCR_COD050.pdf</a>	Pacific cod ( <i>Gadus macrocephalus</i> )	Demersal trawl
15700	Canada Pacific halibut (British Columbia) <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/Canada-Pacific-halibut-bc/reassessment-downloads-1/20150630_PCR_HAL26.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/Canada-Pacific-halibut-bc/reassessment-downloads-1/20150630_PCR_HAL26.pdf</a>	Pacific halibut ( <i>Hippoglossus stenolepis</i> )	Longlines - not specified
15701	Eastern Canada offshore scallop <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/Eastern-Canada-offshore-scallop/re-assessment-downloads/20150630_PCR_SCA040.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/Eastern-Canada-offshore-scallop/re-assessment-downloads/20150630_PCR_SCA040.pdf</a>	American sea scallop ( <i>Placopecten magellanicus</i> )	Boat dredges
15702	Canada Highly Migratory Species Foundation (CHMSF) British Columbia Albacore Tuna North Pacific <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/CHMSF-British-Columbia-North-Pacific-Albacore-Tuna/reassessment-downloads-folder/MSF_CHMSF_Albacore_tuna_fishery_PCR_June2015.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/CHMSF-British-Columbia-North-Pacific-Albacore-Tuna/reassessment-downloads-folder/MSF_CHMSF_Albacore_tuna_fishery_PCR_June2015.pdf</a>	Albacore tuna ( <i>Thunnus alalunga</i> )	Trolling lines

15703	Olympic Seafood Antarctic krill <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/southern-ocean/rimfrost-antarctic-krill/assessment-downloads-1/20150820_PCR_KRI481.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/southern-ocean/rimfrost-antarctic-krill/assessment-downloads-1/20150820_PCR_KRI481.pdf</a>	Antarctic krill ( <i>Euphausia superba</i> )	Pelagic trawl
15705	Australia blue grenadier <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/australia-blue-grenadier/assessment-downloads-1/20150825_pcr_hok338">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/australia-blue-grenadier/assessment-downloads-1/20150825_pcr_hok338</a>	Blue grenadier ( <i>Macruronus novaezelandiae</i> )	Demersal trawl, Midwater trawls - not specified
15740	Norway North East Arctic haddock <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/Norway-north-east-arctic-offshore-haddock/re-assessment-downloads/20151008_PCR_HAD87.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/Norway-north-east-arctic-offshore-haddock/re-assessment-downloads/20151008_PCR_HAD87.pdf</a>	Haddock ( <i>Melanogrammus aeglefinus</i> )	Demersal trawl
15742	Norway North East Arctic cod <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/Norway-north-east-arctic-offshore-cod/reassessment-downloads/20151008_PCR_COD086.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/Norway-north-east-arctic-offshore-cod/reassessment-downloads/20151008_PCR_COD086.pdf</a>	Atlantic cod ( <i>Gadus morhua</i> )	Demersal trawl
15745	Greenland lumpfish <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/arctic-ocean/greenland-lumpfish/assessment-downloads-folder/20150813_PCR_v2_LUM451.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/arctic-ocean/greenland-lumpfish/assessment-downloads-folder/20150813_PCR_v2_LUM451.pdf</a>	Lumpfish(=Lumpsucker) ( <i>Cyclopterus lumpus</i> )	Gillnets
15750	Oregon and Washington pink shrimp <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/oregon-and-washington-pink-shrimp/reassessment-downloads-1/20130214_PCR_SHR94.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/oregon-and-washington-pink-shrimp/reassessment-downloads-1/20130214_PCR_SHR94.pdf</a>	Ocean shrimp ( <i>Pandalus jordani</i> )	Otter trawls -not specified
15751	Sweden Skagerrak, Kattegat and the Norwegian Deep cold-water prawn <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/sweden-skagerrak-and-the-norwegian-deep-cold-water-prawn/assessment-downloads-folder/20151015_PCR_PRA426_1.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/sweden-skagerrak-and-the-norwegian-deep-cold-water-prawn/assessment-downloads-folder/20151015_PCR_PRA426_1.pdf</a>	Prawn (northern) ( <i>Pandalus borealis</i> )	Bottom trawls - shrimp trawl
16748	Exmouth Gulf Prawns <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/indian-ocean/exmouth_gulf_prawn/assessment-downloads-1/20151021_PCR_PRA472.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/indian-ocean/exmouth_gulf_prawn/assessment-downloads-1/20151021_PCR_PRA472.pdf</a>	Prawn (brown tiger) ( <i>Penaeus esculentus</i> ), Prawn(western king) ( <i>Penaeus latisulcatus</i> )	Bottom trawls - otter
16751	Walker Seafood Australian Albacore and Yellowfin tuna, swordfish and mahi mahi Longline <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/walker-seafood-australia-albacore-yellowfin-tuna-and-swordfish/assessment-downloads-1/2050827_WalkerSeafood_PCR_Report.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/walker-seafood-australia-albacore-yellowfin-tuna-and-swordfish/assessment-downloads-1/2050827_WalkerSeafood_PCR_Report.pdf</a>	Albacore tuna ( <i>Thunnus alalunga</i> ), Swordfish( <i>Xiphias gladius</i> ), Yellowfin tuna ( <i>Thunnus albacares</i> )	Longlines - not specified
16778	Shark Bay prawn <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/indian-ocean/shark_bay_prawn/assessment-downloads-1/20151022_PCR_PRA477.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/indian-ocean/shark_bay_prawn/assessment-downloads-1/20151022_PCR_PRA477.pdf</a>	Prawn (brown tiger) ( <i>Penaeus esculentus</i> ), Prawn(western king) ( <i>Penaeus latisulcatus</i> )	Bottom trawls - otter
16779	Alaska flatfish - Bering Sea and Aleutian Islands <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/bering-sea-and-aleutian-islands-flatfish/reassessment-downloads-folder/20151029_PCR_FLA13.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/bering-sea-and-aleutian-islands-flatfish/reassessment-downloads-folder/20151029_PCR_FLA13.pdf</a>	Alaska plaice ( <i>Pleuronectes quadrituberculat.</i> ), Arrowtooth flounder ( <i>Atheresthes stomias</i> ), Flathead sole ( <i>Hippoglossoides elassodon</i> ), Kamchatka flounder ( <i>Atheresthes evermanni</i> ), Northern rock sole ( <i>Lepidopsetta polyxystra</i> ), Yellowfin sole ( <i>Limanda aspera</i> )	Pelagic trawl
16780	Alaska flatfish - Gulf of Alaska <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/gulf-of-alaska-flatfish/reassessment-downloads-folder/20151028_PCR_FLA049.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/pacific/gulf-of-alaska-flatfish/reassessment-downloads-folder/20151028_PCR_FLA049.pdf</a>	Arrowtooth flounder ( <i>Atheresthes stomias</i> ), Flathead sole ( <i>Hippoglossoides elassodon</i> ), Rex sole ( <i>Glyptocephalus zachirus</i> ), Rock sole ( <i>Lepidopsetta bilineata</i> ), Sole (Northern rock) ( <i>Lepidopsetta polyxystra</i> )	Pelagic trawl

16781	OCI Grand Bank yellowtail flounder trawl <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/OCI-grand-bank-yellowtail-flounder/re-assessment-downloads-1/20151027_PCR_FLO092.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/OCI-grand-bank-yellowtail-flounder/re-assessment-downloads-1/20151027_PCR_FLO092.pdf</a>	Yellowtail flounder ( <i>Limanda ferruginea</i> )	Demersal trawl
16782	Gulf of St Lawrence fall herring gillnet fishery <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/Gulf-of-St-Lawrence-Fall-herring-gillnet/assessment-downloads-1/20151105_PCR_HER479.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/Gulf-of-St-Lawrence-Fall-herring-gillnet/assessment-downloads-1/20151105_PCR_HER479.pdf</a>	Herring ( <i>Clupea harengus</i> )	Gillnets
16783	SPSG, DPPO, PFA, SPFPO & KFO Atlanto-Scandian purse seine and pelagic trawl herring <a href="https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/spsg-dppo-pfa-spfpo-kfo-atlanto-scandian-purse-seine-pelagic-trawl-herring/assessment-downloads-folder/20151222_PCRreport_HER45.pdf">https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/spsg-dppo-pfa-spfpo-kfo-atlanto-scandian-purse-seine-pelagic-trawl-herring/assessment-downloads-folder/20151222_PCRreport_HER45.pdf</a>	Herring ( <i>Clupea harengus</i> )	Pelagic trawl, Seine nets (purse)

## Appendix 2: Principle 2 scores for CR v1.3 fisheries that were eligible for review.

Key:

= Pelagic fisheries that were selected for further study;  = Demersal fisheries that were selected for further study.

Report ID	Report Name	Gear	P2 Lead	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3	P2 Score
2485	Samherji Norwegian & Icelandic herring trawl and seine	Midwater trawl	NP	90	75	85	100	90	85	85	85	80	100	95	95	85	85	85	88.0
2511	Norway North Sea and Skagerrak herring	Pelagic trawl	SL	90	90	85	100	100	95	100	95	85	95	100	90	95	100	100	94.7
2512	Norway spring spawning herring	Pelagic trawl	SL	100	100	100	100	100	95	100	95	85	95	100	90	95	100	100	97.0
2567	Northern Ireland Pelagic Sustainability Group Irish Sea herring	Pelagic trawl	NP	100	100	90	100	90	80	80	80	80	100	90	95	80	90	80	89.0
6544	New Zealand EEZ hake trawl (Challenger QMA – HAK 7)	Demersal trawl	GP	80	85	85	80	80	85	95	85	80	80	80	80	80	90	85	83.3
6553	New Zealand EEZ ling trawl and longline (LIN 5)	Demersal trawl	GP	80	85	90	80	80	90	95	85	80	80	80	80	80	90	95	84.7
6556	South Georgia Patagonian toothfish longline	Set longlines	Jim	80	85	90	80	95	90	100	100	100	80	90	80	100	100	100	91.3
6557	ISF Iceland saithe	Bottom trawl	SS	75	75	85	100	100	85	80	80	85	60	90	85	100	100	100	86.7
6567	ISF Iceland golden redfish	Bottom trawl	SS	75	75	85	100	100	85	80	80	85	75	75	85	85	100	100	85.7
6586	Ashtamudi Estuary short-necked clam	Hand dredge	Jim	100	80	70	100	80	80	100	80	65	100	80	80	100	85	80	85.3
6596	Companhia de Pescarias do Algarve rope grown Mediterranean mussel	Rope	BK	N/A	N/A	N/A	N/A	N/A	N/A	100	85	80	80	90	80	80	90	85	85.6
7594	Prince Edward Island lobster trap	Trap	GC	60	60	90	100	80	70	100	95	80	80	95	90	100	100	80	85.3
7610	Pacific hake mid-water trawl (Canada)	Midwater trawl	MP	80	95	75	80	100	70	100	90	100	100	100	100	90	100	90	91.3
8600	Icelandic Gillnet lumpfish	Gillnet	SS	80	85	85	80	75	65	95	80	85	100	90	80	100	95	90	85.7
10597	Gaspésie lobster Trap fishery	Trap	GC	60	60	90	80	90	80	100	95	80	80	95	90	100	100	80	85.3
10601	Juan Fernández Rock lobster (Island Alexander)	Trap	PA	80	65	75	100	80	80	90	85	65	80	80	80	80	80	80	80.0
12605	Cantabrian Sea purse seine anchovy fishery	Purse seine	LB	80	85	90	90	95	75	90	85	70	100	95	90	100	90	90	88.3
12609	Aker Biomarine Antarctic krill	Pelagic trawl	LR	80	80	90	100	100	100	95	100	95	100	100	85	100	80	90	93.0
13598	Danish and Swedish nephrops (Swedish UoC 1)	Demersal Trawl	LR	90	95	95	80	90	85	80	90	80	70	75	85	80	80	100	85.0
13599	Danish and Swedish nephrops (Danish UoCs 7-8)	Demersal Trawl	LR	80	80	80	80	80	85	80	90	80	70	75	85	80	80	100	81.7
13601	Vilsund Blue a/s Limjord mussel & cockle dredge (mussel)	Dredge	Jim	80	80	80	80	80	80	100	95	85	100	100	90	90	90	90	88.0
14608	Poland Eastern Baltic cod	Bottom Trawl	MC	80	85	80	100	80	90	80	80	75	75	80	85	100	95	95	85.3
14636	Greenland cod, haddock and saithe trawl fishery	Demersal trawl	Paw	85	95	90	80	95	80	85	85	80	80	80	75	100	90	95	86.3
14677	South Africa hake trawl	Demersal trawl	Jim	80	95	85	80	80	85	80	85	70	80	70	85	100	90	95	84.0
14681	SZLC, HNSFC & CFA Cook Islands EEZ south Pacific albacore	Pelagic	CS	80	80	80	80	80	80	75	75	75	100	80	95	80	80	85	81.7

14683	Bay of Fundy, Scotian Shelf and Southern Gulf of St. Lawrence lobster Trap (UoC 2)	Trap	GC	70	70	85	80	80	75	85	85	80	80	95	90	100	100	80	83.7	
15691	Western Baltic spring spawning herring	Pelagic trawl	Jim	80	80	90	80	80	80	90	80	90	90	90	85	80	90	90	85.0	
15692	FROM Nord North Sea and Eastern Channel herring	Pelagic trawl	CS	80	80	80	80	90	80	80	80	80	90	80	95	90	80	85	83.3	
15693	LFA Latvia trawl eastern Baltic cod	Bottom trawl	LB	80	80	90	80	90	85	95	90	80	75	80	85	80	80	95	84.3	
15694	Cornish hake gill net	Gill net	Jim	85	90	90	70	80	75	90	70	80	90	90	80	80	90	75	82.3	
15696	DPPO and DFPO North Sea herring	Pelagic trawl + purse seine	CS	80	80	80	80	90	80	80	80	80	90	90	95	90	80	85	84.0	
15697	Eastern Canada offshore lobster	Trap	RBS	80	90	90	80	80	95	85	95	80	100	80	80	100	80	95	87.3	
15698	Alaska Pacific cod - Bering Sea and Aleutian Islands	Demersal trawl	DB	95	95	80	80	95	80	90	100	90	80	95	80	100	100	95	90.3	
15699	Alaska Pacific cod - Gulf of Alaska	Demersal trawl	DB	95	95	80	80	95	80	95	95	95	80	95	80	100	95	95	90.3	
15700	Canada Pacific halibut (British Columbia)	Longline	SM	95	95	95	80	85	90	90	75	85	80	95	85	80	90	90	87.3	
15701	Eastern Canada offshore scallop	Dredge	RBS	100	100	100	80	100	80	90	85	80	80	80	90	80	90	95	88.7	
15702	Canada Highly Migratory Species Foundation (CHMSF) British Columbia Albacore Tuna North Pacific	Trolling	GC	100	100	85	100	100	80	100	85	80	100	100	100	100	100	100	95.3	
15703	Olympic Seafood Antarctic krill	Pelagic trawl	LR	100	100	100	100	100	100	100	100	95	100	100	85	100	80	90	96.7	
15705	Australia blue grenadier	Demersal and midwater trawl	SD	80	90	80	80	100	85	85	95	80	80	90	75	80	90	85	85.0	
15740	Norway North East Arctic haddock	Demersal trawl	SL	80	95	85	90	85	85	75	85	80	70	85	90	95	85	95	85.3	
15742	Norway North East Arctic cod	Demersal trawl	SL	80	95	85	90	85	85	75	85	80	70	85	90	95	85	95	85.3	
15745	Greenland lumpfish	Gillnet	SL	85	95	85	65	75	65	100	90	80	90	90	80	100	95	95	86.0	
15750	Oregon and Washington pink shrimp	Otter trawl	MP	100	100	100	80	100	95	70	85	75	80	95	85	100	90	90	89.7	
15751	Sweden Skagerrak, Kattegat and the Norwegian Deep cold-water prawn	Shrimp trawl	JA	80	95	85	80	80	75	80	80	80	75	75	75	80	80	85	80.3	
16748	Exmouth Gulf Prawns	Bottom otter trawl	RB/KM	90	90	80	80	100	75	75	80	65	100	80	75	100	90	85	84.3	
16751	Walker Seafood Australian Albacore and Yellowfin tuna, swordfish and mahi mahi Longline	Pelagic longline	KC	80	80	80	100	80	80	75	90	75	100	80	100	80	90	100	86.0	
16778	Shark Bay prawn	Bottom otter trawl	RB/KM	90	90	80	80	95	75	90	80	65	100	80	75	100	90	85	85.0	
16779	Alaska flatfish - Bering Sea and Aleutian Islands	Demersal trawl	DB	90	85	80	80	80	80	95	100	95	80	95	80	80	100	95	87.7	
16780	Alaska flatfish - Gulf of Alaska	Demersal trawl	DB	90	90	80	80	90	80	95	90	95	100	95	80	80	100	100	89.7	
16781	OCI Grand Bank yellowtail flounder trawl	Demersal trawl	RBS	80	100	95	80	80	80	90	90	80	80	85	90	80	80	85	85.0	
16782	Gulf of St Lawrence fall herring gillnet fishery	Gillnet	IM	90	85	90	80	80	75	80	85	80	80	85	85	100	80	80	83.7	
16783	SPSG, DPPO, PFA, SPFPO & KFO Atlanto-Scandian purse seine and pelagic trawl herring	Pelagic trawl + purse seine	CS	80	80	85	80	85	80	80	80	80	90	90	95	80	80	80	83.0	
Average PI Scores					84.3	86.6	86.0	85.6	88.2	82.2	88.5	86.9	81.3	86.3	87.8	86.0	90.6	89.9	90.2	86.7

## Appendix 3: Analysis of scores provided by different Principle 2 lead experts

Initial	P2 Lead	Number of Fisheries	Mean of Other P2 Outcome PIs	Mean of Other P2 Management PIs	Mean of Other P2 Information PIs	Mean PI 2.5.1	Mean PI 2.5.2	Mean PI 2.5.3
BK	Bert Keus	1	N/A	N/A	N/A	80	90	85
CS	Chrissie Sieben	4	82.8	82.5	83.8	85	80	83.8
DB	Don Bowen	4	87.8	93.1	83.4	90	98.8	96.3
GC	Geraldine Criquet	4	85.9	86.6	84.1	100	100	85
GP	Graham Pilling	2	83.8	82.5	83.8	80	90	90
IM	Ivan Mateo	1	82.5	83.8	82.5	100	80	80
JA	Julian Addison	1	78.8	82.5	78.8	80	80	85
Jim	Jim Andrews	6	87.3	84.8	82.7	91.7	90.8	88.3
KC	Kat Collinson	1	88.8	82.5	83.8	80	90	100
LB	Lisa Borges	2	86.3	87.5	83.1	90	85	92.5
LR	Lucia Revenga	4	87.8	90.9	89.7	90	81.3	93.8
MC	Massimiliano Cardinale	1	83.8	81.3	82.5	100	95	95
MP	Mark Pedersen	2	86.3	95.6	87.5	95	95	90
NP	Nick Pfeiffer	2	94.4	88.1	86.3	82.5	87.5	82.5
PA	Patricio Arana	1	87.5	77.5	75	80	80	80
Paw	Mike Pawson	1	82.5	88.8	81.3	100	90	95
RB/K M	Richard Banks / Kevin McLoughlin	2	88.1	86.9	73.8	100	90	85
RBS	Rob Blyth-Skyrme	3	85.4	88.8	86.7	86.7	83.3	91.7
SD	Sabine Daume	1	81.3	93.8	80	80	90	85
SL	Stephen Lockwood	5	87.5	91.5	85.8	96	93	97
SM	Siân Morgan	1	86.3	87.5	88.8	80	90	90
SS	Sigmar Steingrímsson	3	83.3	83.8	82.9	95	98.3	96.7
Average scores for all CR1.3 fisheries			86.2	87.4	83.9	90.6	89.9	90.2

## Appendix 4: Input received from other experienced MSC practitioners

### Original e-mail to respondents

Hello All,

I'm doing work for the MSC, looking at the way the ecosystem PIs (2.5.1, 2.5.2, 2.5.3) have been scored under v1.3, and seeing if there is anything that can be done to improve the process. I have a few ideas of things the MSC could do to take things forward in this regard, but I wanted to run them by you to see what you thought (noting that the MSC has given me their blessing for this).

Before I give you my thoughts, though, I should quickly lay out some findings.

- There are 52 separate reports in the MSC system of fisheries that have been assessed or reassessed against CR v1.3
- None of the 52 fisheries was scored at less than 80 for PI 2.5.1 (and 26 of 52 were scored 95 or 100).
- None of the 52 fisheries was scored at less than 80 for PI 2.5.2 (and 17 of 52 were scored 95 or 100).
- Only 1 of the 52 fisheries scored PI 2.5.3 at less than 80 (and 23 of 52 were scored 95 or 100).
- The average scores for the ecosystem PIs were all higher than the average scores for any of the other P2 outcome, management or information PIs.

It is noticeable that there is a great deal of latitude offered to assessment teams in both identifying what the 'key ecosystem elements' are, and then in scoring the PIs with "surrogates, analogy, general observations, qualitative assessment and expert judgement" (GCB3.17.2). So, maybe it should not be a surprise that, essentially, no conditions are ever placed on the ecosystem PIs.

But, in my experience, scoring the ecosystem PIs is somewhat tortuous, and I am keen to provide some recommendations as to how to improve things. I have two general themes that I'm considering advocating – the first is to improve upon the system, and the second is to revise the system.

#### Improve upon the system.

In order to improve the consistency and hopefully reduce the burden somewhat, I'm considering suggesting the following.

- 1) That teams should be required to state what the ecosystem is and what the key ecosystem elements are (I feel the latter is a requirement anyway under Table 4.3, but most assessments don't include this information explicitly).
- 2) Get rid of two of SIs b, c and/or d from PI 2.5.3, as by my thinking and on the basis of the level of information that is usually available, there is very little practical difference between them.
- 3) Provide a default, limited list of potential ecosystem elements – fisheries could score 80 for 2.5.1 and 2.5.2 if no ecosystem elements were considered to be 'key' or key ones were not impacted in any significant way, but all would need to be considered to meet the SG100 level

### Revise the system.

To my thinking, the lack of any conditions (bar 1) on the ecosystem PIs indicates that they provide no added value to the assessment process. As such, I think they could be scrapped with no apparent loss to the MSC in terms of rewarding good practice and encouraging improvement in fishery performance. Of course, my data don't show if fisheries have failed assessment because of the ecosystem PIs being scored down, but the higher average scores for the ecosystem PIs in the fisheries that were certified (and the latitude available to score them) suggests this hasn't happened.

To soften the blow to stakeholders of scrapping the ecosystem PIs, I am considering suggesting that some consideration of ecosystem issues could be introduced elsewhere. Essentially, an additional SI could be included in the outcome PIs of the target, primary, secondary and ETP species, scored at SG100 only, to account for their ecosystem roles. This could be mirrored by a minor change to Sla of the management PIs. For example:

- New Outcome SI (SG100, only): *“There is evidence that the UoA is highly unlikely to affect the ecosystem role of the secondary species to a point where there would be serious or irreversible harm.”*
- Revised Management Sla (SG100, only): *“There is a strategy in place for the UoA for managing main and minor secondary species, including with respect to their role in the ecosystem.”*

So, as experienced MSC people, what do you think – would you suggest revising the approach, or would you advocate simply scrapping the ecosystem PIs (and include ecosystem consideration elsewhere)? Or, am I on the wrong track and you think things are either absolutely fine as is, or something completely different should be one?

### Response 1(a)

Interesting questions. As we are not supposed to score the same issues multiple times, I assume ecosystem effects will be largely the effect of removing biomass (target and non-target) from the system. Key LTL spp will be dealt with in P1, but would the combined target and non-target be considered again under PI 2.5? Probably, but if you pass P1 then 2.5 will be a doddle, I guess.

Before thinking about this in detail, though, I wonder what would be the effect on average P2 scores if the 2.5 PIs were removed, and the effect if 2.5 PIs were transmuted into SG100 SIs as you suggest? I.e. are we risking removing the thing where fisheries do well because they do well? I also recall various 'ecosystem' conditions pre v1.3 which were closed before reassessment – is our window wide enough?

### Follow-up to original e-mail to repondents

I did calculate the effect on the overall P2 score of removing the ecosystem PIs. None of the 52 would have failed, but only 10 fisheries gained by removing the scores for the ecosystem PIs (average P2 score increase = 0.7, range = 0.1 - 1.7) three fisheries would have scored exactly the same, and 39 fisheries would have lost (average P2 score decrease = 1.4, range = 0.2 - 3.3). So, the general effect is mixed, but more fisheries lost than gained.

I haven't worked out how I would have scored the fisheries if the MSC scrapped the ecosystem PIs but adopted ecosystem SIs elsewhere. I take your point on the relatively narrow focus (i.e., v1.3 fisheries only).

### Response 2

In my experience there is a huge inconsistency as to what is assessed so your suggestions under “Improve 1 and 3” I think are critical. Each time the MSC has introduced new assessment criteria there has been a change in the Ecosystem component and I still don’t think it is clearly defined - there is certainly leeway for different interpretations

My first assessment we called it environment (habitat and ecosystem were combined) and the criteria was "The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes". The client was truly pinged and spent [a lot of money] on work on trophic relationships. In the 1st reassessment they were again pinged and this time were forced to do ERA, come up with agreed objectives and then implement them - most could not realistically be achieved in the life of the certificate. [This] shows that there has now been a move to a more “softer” approach to ecosystem - your analysis

The ecosystem is such a huge topic and covers such a wide variety of issues (too broad). We need to think about what exactly it is we are wanting to assess that isn’t assessed in the other P2s. (A skype brainstorm would be good) That may then give you the answer as to whether or not it should be removed as a separate component.

My gut feeling is not to drop “ecosystem” but to improve it as you suggest.

### **Response 3**

I see the ecosystem PIs in this way: it’s like an MSC certification with P1, 2 and 3 but with an extra P4, where the combined effect of P1, 2 and 3 need to be scored and passed for the certification to be granted. I understand that if the "parts" are ok, it does not necessarily mean that the "whole" is ok. However, can we really analyse it and score it? I think your analysis shows that at the moment we can’t.

So to me it sounds more logical to scrap the ecosystem PIs and include the missing aspects in the other P2 PIs, but I do realise that this might be easier said than done. Ecosystem PIs seem to be a repetition of all the other PIs scored and I guess that your analyses of the assessment results reflect this. I might be missing aspects to it but the understanding I have is that even if there is an issue not addressed in the previous PIs, it is most likely very hard to identify it and score it. So, if deleting is not an option at the end, then concrete guidelines need to be given, and I agree with your suggestion of at least identifying the ecosystem elements.

On a smaller note, I think the adding of specific P1 scoring for low trophic level species already took some of the aspects of ecosystem PIs to P1. the same logic could possibly be applied to P2.

### **Response 1(b)**

OK, my further thoughts as follows:

1. There is a future in which we can expect a lot of fisheries to have functioning balanced ecosystem models (North Sea, Alaska, Antarctic krill etc are well on the way). I think there is a role for an ecosystem PI. At the moment we are mostly making informed guesses, but eventually science/information will catch up and this will become more relevant. On this basis, and given that having a PI requires people to think directly about this, I would keep the Ecosystem PIs.
2. Then we need to ensure that the ecosystem PI is worded so as to follow widespread adoption of such modelling etc (i.e. not like v2 where habitat info is 18 months behind the standard and a database to evaluate bycatch spp. PIs is x months behind) but also allows for general application. We are mostly there with current wording I think

3. Some teams have called this ‘trophic function’ and perhaps that is what we need to be dealing with here. The current wording covers most of this, but 2.5.3 c then goes off on all other components and confuses the situation. If we are losing a SI – this is the one for me!
4. RBF must only be SICA for some time to come. Heaven forefend some kind of CSA!
5. So I think we need to decide what this PI is actually about (ref SA3.16.1), and then word it accordingly.

## **Response 4**

I agree that the ecosystem PIs are some of the most difficult to score despite (because of?) the flexibility given to the assessment teams in their interpretation. There seem to be two approaches – either use 2.5 to evaluate any issues that have not arisen previously in P2 or concentrate primarily on ecosystem models and trophic relationships.

In some ways I am not surprised that your analysis shows that almost all fisheries score at least 80 given the flexibility provided to assessment teams in justifying their scores. I do wonder sometimes whether the positioning of the ecosystem PIs at the end of P2 may have something to do with the narrow range of scoring. Having ground through retained/bycatch, ETP and habitat issues, by the time you reach ecosystems, particularly 2.5.3, enthusiasm has started to wane amongst assessment teams, peer reviewers, and even stakeholders responding to the PCDR. Tightening up the wording of the scoring issues might help to ward off that lack of enthusiasm.

Whilst it might seem simpler to delete 2.5 and include some of the issues within the other P2 categories, I agree with [Response 1] that the development of ecosystem models in many regions highlights that this is an area of growing importance, and on balance I think that 2.5 should be retained with revised, more explicit scoring issues. This does of course run the risk of increasing the number of fisheries which get conditions on ecosystem with the consequent difficulties of meeting those conditions (ref. [Response 2] comment). So we would need to make sure that 2.5 retains those things that fisheries tend to do well and which currently helps fisheries to score highly against the ecosystem PIs.

## **Response 5**

I agree with the comments made to date.

For what it’s worth, my feeling is that a lot could be achieved by making it clear what the ecosystem PI is meant to be about (and equally that it is not meant to be about). This, of course, would need to be done in a way that is more pragmatic than the habitats PIs in CR v2.0 which as [Response 1] notes are rather too ambitious.

My feeling is that most P2 authors have lost the will to live by the time they get to 2.5.1 so it either becomes a dustbin for stuff that didn’t fit in elsewhere, or something to skate over quickly before mailing the text off to the rest of the team. If it was clearer what should and should not be considered here, then I think that would only help.

## **Response 6**

I did a quick check back at the guidance MSC have given on the Ecosystem PIs and SIs. Not much has changed since 2008. The guidance text may have been reformatted or split between certification requirements and guidance but, in combination, near enough says the same thing, from FAM V1 through to v1.3...and v2.0.

In my first FAM assessment in 2008 we read the guidance multiple times and came up with something that we hoped would meet the MSC expectations, a combination of lumping issues that weren't covered under the other P2 PIs, but we had information on, including anything on ecosystem models and trophic relationships. Apparently the approach worked and, from there on, I believe all the assessments I've been involved with have taken a similar approach.

Instinctively, I'd be keen to reduce the P2 burden and see these PIs go if they add no value to the process. However, their value and reason why they are there, and in their present form, may be more political than anything. Did you have opportunity to discuss with anyone at MSC about the process / thinking behind their development and implementation? Given their turn-over of staff, it's possible no one remains from those times...but sometimes it's worth finding out where these things came from and what the expectation was.

Ultimately, I'm in favour of pragmatism and having clearer guidance and wording of the SIs.

## Appendix 5: Summary of scoring approach to ecosystem PIs for selected fisheries

2485: Samherji Norweian and Icelandic herring (Midwater trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	90	75	85	100	90	85	85	85	80	100	95	95	85	85	85

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No** – information was provided on scoring elements for retained species and habitats, only (P.63).
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being trophic structure.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Yes – the Southern Norwegian Sea and the Icelandic Marine ecosystems.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Moderate – predator-prey issues were discussed but scoring was based on component outcomes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **No (SId)**; PI 2.5.3: **No (SId), Yes (Sle).**

### PI 2.5.1

Key ecosystem elements were not identified specifically, but the key ‘interaction’ between the fishery and the ecosystem was described in the text as “*the removal of the target species, which serves as a prey species for a wide range of fish, birds and mammals.*”, which is consistent with trophic structure being a key ecosystem element. The impact of the fishery in this regard is stated as being constantly reviewed by multi-species virtual population analysis, but it is not clear why a partial score of 85 was awarded (rather than a higher or lower score).

### PI 2.5.2

The text for SIa notes that “*there is a shortage of well-defined P2 objectives principally those that might better capture the role of herring in the ecosystem*”, but a range of regulatory measures that are considered to aim to limit the adverse effects of fishing on the marine ecosystem are described (e.g., technical measures, limited entry, ITQs, reporting mechanisms). It is not stated that these comprise a partial strategy, but this is indicated by the score of 80 for SIa. Texts for the other SIs also lack clear scoring statements, but an overall score of 85 appears to be based on ecosystem considerations being implicit rather than explicit (SIb), and outcome status for components (SIc and d), with SId meeting the SG100 requirements.

### PI 2.5.3

Scoring for SIa is focused on understanding of components rather than elements. The majority of the text for SIb indicates that where it is stated “*The main potential impacts is the depletion of prey species*”, the authors intended to mean ‘The main potential impact is the depletion of herring as a prey species’. In any case, it is reported that no comprehensive study of food web structure has been undertaken, but a score of 85 is justified on the basis that main impacts of the fisheries are understood and consequences can be inferred (SId), and because information continues to be collected that could support development of ecosystem strategies (Sle).

2511: Norway North Sea and Skagerrak herring (Pelagic trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	90	90	85	100	100	95	100	95	85	95	100	90	95	100	100

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No – information was provided on scoring elements for retained species, only (P.63).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **No.**
- Do the key ecosystem elements follow MSC guidance? **N/A.**
- Is the ecosystem identified in the scoring text for 2.5.1? **No.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **No – trophic interactions were mentioned but scoring was based on an absence of evidence of impact.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **No** PI 2.5.2: **Yes (SIa, SIb, SIc), No (SId);** PI 2.5.3: **Yes (SIb, SIc, SId, SIe).**

**PI 2.5.1**

Neither key ecosystem elements nor the ecosystem were identified in the scoring text. A score approaching 100 appears to have been awarded on the strength of the absence of evidence of irreversible harm to the ecosystem, and on the basis that an ecosystem approach to management is required by law – “*The Marine Resources Act makes it an explicit requirement that an ecosystem approach is taken to all aspects of marine resource management and this provides the statutory framework for the regional seas’ management plans. It is highly unlikely therefore that the fishery will disrupt ecosystem structure or function. Nevertheless, such conclusions are drawn by inference rather than substantiated facts, hence the reduced score.*” It is not entirely clear why a score of 95 was awarded (rather than a score of 90, for example) and the text in fact justifies a score of 80, only.

**PI 2.5.2**

The basis for awarding the 100 score is the Norwegian Marine Resources Act, a high level document requiring the ecosystem approach to resource management and exploitation, from which flow the suite of regional seas management plans that are intended to ‘monitor and safeguard the status of the marine environment and the resources it supports’. There is also an objective to develop a Norwegian ecosystem model. Specific measures are listed in SIb as including “*Measures include the MAREANO mapping programme that monitors, inter alia, anthropogenic interactions with the seabed and informs appropriate management decisions, e.g. coral closed areas. There are fishery biological and technical conservation measures for safeguarding stocks and managing fisheries and the interactions with other animals.*” SId is scored on the basis of outcome status for components.

**PI 2.5.3**

The scoring text indicates that ecosystem modelling efforts are ongoing, with long-established research programmes being in place. The main predator-prey interactions have been investigated, such that the impacts of the fishery and consequences for the ecosystem can be inferred. A score of 100 is justified.

**6544: New Zealand hake (Challenger QMA – HAK 7) (demersal trawl)**

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	85	85	80	80	85	95	85	80	80	80	80	80	90	85

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No – information was provided on scoring elements for retained, bycatch, ETP species and habitats, only (P.59).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being community composition and trophic structure.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Inferred as being the sub-Antarctic region and Chatham Rise.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Moderate – elements were discussed but scoring based on other components.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **N/A**; PI 2.5.2: **No (SIa)**, **No (SIc)**; PI 2.5.3: **No (SIe)**.

**PI 2.5.1**

Key ecosystem elements were not identified specifically in the scoring text. The discussion did note that there was no evidence of a loss of community constituents or of ecosystem function or of species, over time, but it was also noted that the mean trophic level of the commercial and survey catches is declining and that “*change is ongoing; the ecosystem has not stabilised at an alternative state.*” This PI appears to have been scored 80 on the basis that the target stock is being managed well above  $B_{MSY}$ , and on the basis that energy transfer between components is likely to be efficient.

**PI 2.5.2**

The text notes that no measures in place relate specifically to ecosystem function, but the score of 100 for SIa is justified on the basis that the quota and non-quota species management measures, as well as habitat protection measures, together form a plan. Text for SIc highlights that the scoring is based on consideration of management of individual ecosystem components rather than of functions.

**PI 2.5.3**

The text points to the existence of stomach content studies and some ecosystem modelling for some areas around New Zealand. A score of 100 for SIb is based on interactions being inferred from stock assessments and catch trends, whilst it is noted that models have not been used to investigate the impact of fishing on the ecosystem.

656Z: ISF Iceland Golden redfish (bottom trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	75	75	85	100	100	85	80	80	85	75	75	85	85	100	100

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No – the scoring element for P2 Ecosystem was identified only as ‘Icelandic marine ecosystem’ (P.78).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Yes**
- Do the key ecosystem elements follow MSC guidance? **Yes**
- Is the ecosystem identified in the scoring text for 2.5.1? **Yes – Icelandic marine ecosystems.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Yes**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **Yes (all SIs)**; PI 2.5.3: **Yes (all SIs)**.

**PI 2.5.1**

Key ecosystem elements were identified specifically in the scoring text for the PI as:

- trophic issues (depletion of top predators or key prey species, trophic cascades)
- ecosystem structure (size composition, species composition, biodiversity)
- genetic issues (loss of genetic diversity, genetic changes in demographic rates)

The scoring text highlights the evidence available to understand the three key elements identified. For trophic issues, evidence is presented from ‘extensive studies on the feeding ecology or demersal fish species’ (with a focus on capelin and cod as key prey and predator species), as well as from ecosystem studies. For ecosystem structure, evidence was mainly inferred from stock assessments and habitat data. Text for the genetic issues was missing from the bottom of P.187 of the document. A score of 85 was awarded on the basis of trophic issues scoring 100 and the other two elements scoring 80.

**PI 2.5.2**

The text for SIa indicates that there are few measures in place relating specifically to ecosystem function, but the score of 100 for SIa is justified on the basis of the operation of the quota system to manage capelin and cod as key prey and predator species, and the existence of closures to protect juvenile and/or spawning fish and vulnerable habitats (which are reported to be the most diverse areas in the Icelandic marine ecosystem). Together with a strategic plan to preserve biodiversity in Icelandic waters, these measures are considered to constitute an ecosystem management plan. Text for SIc highlights that the scoring is based on consideration of management of targeted fish species and vulnerable habitats; birds and mammals are mentioned with respect to efforts to increase observer awareness, only.

**PI 2.5.3**

Various multi-species models of the Icelandic ecosystem are identified in the text. SIb indicates that key elements of the ecosystem are considered to be “key predators, prey and vulnerable habitats.” High scores are justified on the basis of assessments of status of these key elements, an understanding of their role in the ecosystem, and from the use of the models to evaluate interactions between fisheries and ‘key elements’ (although the references provided are dated and their titles do not indicate a relationship to the fishery). Information on the interactions is reportedly taken in to account in management

7594: Prince Edward Island lobster (trap).

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	60	60	90	100	80	70	100	95	80	80	95	90	100	100	80

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No**, but a description of the Gulf of St. Lawrence ecosystem was provided at the start of the introductory section covering the ecosystem (P.80), together with a review of the role of lobster in the southern Gulf of St. Lawrence food web (P.84).
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being foodwebs and trophic structure.**
- Do the key ecosystem elements follow MSC guidance? **Yes**
- Is the ecosystem identified in the scoring text for 2.5.1? **No.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **No.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **No**; PI 2.5.2: **Yes (Slb)**; **No (other SlS)**; PI 2.5.3: **N/A.**

**PI 2.5.1**

Evidence on the role of lobster in the food chain was discussed in the text, and a general statement made on the availability of information on the effects of fishing on marine ecosystems, but little or no data specific to the PEI fishery. Scoring at 100 was based on the absence of evidence for impacts on ecosystem components rather than on evidence of no impacts on ecosystem elements.

**PI 2.5.2**

The text for Sla points to overarching Canadian policies and the Sustainable Fisheries Framework as providing the basis for management of the fishery. Together with the introduction of a (very small) MPA in the PEI area, and measures that appear designed to manage lobster populations (e.g. licence limits, trap limits, berried female ban), these measures are considered to constitute an ecosystem management plan. The evidence to support a score of 100 for SId (evidence of implementation) appears to be the introduction of the Bassin Head MPA, only.

**PI 2.5.3**

A good description of the Gulf of St. Lawrence ecosystem is provided, but the scoring text, justifying a score of 80 for PI 2.5.3. is focused on knowledge of the status of ecosystem components. For example, Slb states: *“Main impacts of the fishery on target, retained, bycatch and ETP species, and habitat are identified. There is a comprehensive assessment of the target species. The distribution of fishing effort is known. Rock crab landings of lobster fishermen are recorded and integrated in the rock crab stock assessment. Regarding the ETP species catch, a mandatory SARA logbook must be completed...”*

7610: Pacific hake (midwater trawl, Canada).

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	95	75	80	100	70	100	90	100	100	100	100	90	100	90

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No – the scoring element for P2 Ecosystem was identified only as ‘California Current’ (P.102).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being community composition and trophic structure.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Yes – the California Current ecosystem.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Yes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **Yes (all SIs, although no detail)**; PI 2.5.3: **Yes (SIb, SIc, although no detail).**

**PI 2.5.1**

Key ecosystem elements were not identified specifically in the scoring text. The discussion pointed to two US studies of the California Current Ecosystem that indicated limited direct effects on target and bycatch species, and few indirect effects through predator-prey links to other parts of the food web. A NMFS review further indicated that the groundfish fishery was not likely to adversely modify designated critical habitat for ETP species. An absence of any Canada-specific studies meant that a partial score of 90 was given.

**PI 2.5.2**

The text for SIa points to the Integrated Fisheries Management Plan (IFMP) as being a plan to address ecosystem effects from the fishery, so scoring 100. There is no detail in the scoring text on the specific approaches, but the introductory text points to a focus on setting objectives for various aspects of ecosystem structure and function, such as productivity, key species and sensitive habitats.

**PI 2.5.3**

The Canadian fishery is scored up on the basis of the US studies that provide information on structure and function of the California Current ecosystem (although very little if any detail is included in the scoring text), but is considered to meet only the SG80 level for SIs d and e because there is limited Canada-specific information available.

10601: Juan Fernandez rock lobster (Trap)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	65	75	100	80	80	90	85	65	80	80	80	80	80	80

N.B. The page formatting of the report is poorly controlled, such that text is missing off the sides of some pages.

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **Yes, but identified only as 'removal of lobster' (P.55).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being community structure or species composition.**
- Do the key ecosystem elements follow MSC guidance? **No.**
- Is the ecosystem identified in the scoring text for 2.5.1? **No.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Moderate – scoring referred to some elements (e.g. changes in species diversity) but scoring appears to be based on lobster stock status only.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **N/A**; PI 2.5.2: **N/A**; PI 2.5.3: **N/A**.

**PI 2.5.1**

No key ecosystem elements were identified in the scoring text, but the absence of evidence of impacts on community structure was mentioned. Scoring was based on the status of the lobster stock only, except for the Islas Desventuradas UoC which was unusually scored 100 on the basis of there being a limited level of effort.

**PI 2.5.2**

The fishery was considered to meet 80 on the basis that neither measures nor a partial strategy were considered necessary.

**PI 2.5.3**

A 'wide variety of data from assessments and academic research' were reported to be available on the ecosystem components off the three island groups comprising the UoCs, but no references are provided, and no details are provided in the justifications for the 80 scores awarded. It is noted in the scoring text for Sle that "*The lack of specific information on the impact of the fishery on the ecosystem means the fishery does not meet SG100 Sle*"

12605: Cantabrian Sea anchovy (Purse seine)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	85	90	90	95	75	90	85	70	100	95	90	100	90	90

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No – no table of P1 and P2 scoring elements is included in the report.**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Yes.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Yes – the Bay of Biscay ecosystem.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Yes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **No (SIc, SIId)**; PI 2.5.3: **Yes (SIc, SIId).**

### PI 2.5.1

The ‘keystone species’ were identified as phytoplanktonic and zooplanktonic (which appears likely to mean ‘phytoplankton and zooplankton’), although anchovy is also noted as being “*the preferential prey to several high level trophic predators such as tuna and seabirds, and may control their abundance*”. The score of 100 was justified on the basis that modelling appears to have been undertaken showing that the system is bottom-up controlled, with small pelagic species including anchovy being the dominant lower trophic level species, and because the anchovy stock was healthy.

### PI 2.5.2

The text for SIa points to the use of various fishery management measures being in place (e.g., TACs, discard limits, closed areas, minimum landing sizes, etc.) that together comprise a partial strategy to restrain impacts that would affect ecosystem structure and function. A score of 90 overall was justified on the basis that the measures are considered likely to work (SIc) and had been implemented (SIe).

### PI 2.5.3

The text indicates that two studies of the Bay of Biscay system have been undertaken using models, so meeting the SG100 requirements that main interactions can be inferred and have been investigated (SIb), and that impacts are identified and the main functions are understood (SIc). The absence recent data on top predators within the system, and levels of bycatch, were considered to be the key reason why the fishery did not meet the SG100 level for SIs d and e.

### 12609: Aker Biomarine Antarctic krill (Pelagic trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	80	90	100	100	100	95	100	95	100	100	85	100	80	90

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No – no table of P1 and P2 scoring elements is included in the report.**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being krill as a key prey species.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Inferred as being Area 48.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Yes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **N/A**; PI 2.5.3: **Yes (SIc, SIId).**

#### PI 2.5.1

The key ecosystem element was not identified specifically, but the majority of the scoring text was focused on the issue of krill as a key prey species. The critical scoring point appears to be that fishery take of krill was estimated by two studies to be ‘orders of magnitude’ below the estimated predatory demand, so meeting the SG100 requirement. Retained, bycatch and ETP catches in the fishery were essentially considered to be negligible.

#### PI 2.5.2

The scoring text for this PI points to the introduction of subarea catch limits as comprising a partial strategy, which justifies a score of 80 overall.

#### PI 2.5.3

The text indicates that a wide range of modelling approaches have been used to investigate the functioning of the Antarctic ecosystem, so meeting the SG100 requirements for SIs c and d. Many of the studies appear to have been focused on krill, but a key failing, preventing the fishery from achieving a higher score, was considered to be the limited understanding of the impact of climate change on krill populations. It is not clear that this future-casting issue is captured in SIb (“*Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated.*”), but this was scored down at 80 along with SIe because of concerns over the impact of climate change.

### 13598: Danish and Swedish nephrops – Swedish UoC 1 (Demersal trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	90	95	95	80	90	85	80	90	80	70	75	85	80	80	100

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No – no table of P1 and P2 scoring elements is included in the report.**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Yes.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **No.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Yes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **N/A**; PI 2.5.2: **N/A**; PI 2.5.3: **Yes (SIb, SIc, SId), No (SIe).**

#### PI 2.5.1

Key ecosystem elements were identified at the end of the scoring text as biodiversity, community structure and productivity. The discussion did not identify the extent of the ecosystem in which the fishery operates, however, and apparently highlighted low predator abundance as a positive indicator for scoring.

#### PI 2.5.2

The text for SIa points to the use of selective gears and various management measures or plans that are implemented in the fishery area, such as the cod recovery plan and Natura 2000. The ICES Advisory Committee on Ecosystems is mentioned as helping to coordinate the provision of research and advice on marine ecosystems. A score of 80 was justified throughout on the basis of non-specific approaches.

#### PI 2.5.3

A range of information sources on ecosystem elements was provided, including studies on trophic structure and community composition, as well as an Ecopath model for the North Sea and an ICES mixed fisheries advice report that provide the basis for ecosystem management. A score of 100 was given.

14608: Poland Eastern Baltic cod (Bottom trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	85	80	100	80	90	80	80	75	75	80	85	100	95	95

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No – no table of P1 and P2 scoring elements is included in the report.**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Yes.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Yes – Baltic Sea.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Yes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **Yes (Sla, Slc, Sld)**; PI 2.5.3: **Yes (Slb, Slc, Sld)**.

**PI 2.5.1**

The text provides a discussion on trophic structure and the relative impact of cod fishing on the Baltic food web, and finally infers that the key ecosystem element is cod as a predator. A score of 100 is justified because the report states *“the only theoretically serious or irreversible harm to the key elements of ecosystem structure and function is through the overfishing of the Eastern Baltic cod stock itself”*, before highlighting that the stock is currently above B<sub>TRIGGER</sub>.

**PI 2.5.2**

The text points to the overfishing of Baltic cod as being the only route through which serious or irreversible harm may result, so the scoring for SIs b, c and d is focused exclusively on stock management, with additional reference to European Directives addressing marine environmental status and management (e.g., the Marine Strategy Framework Directive and the Habitats Directive) in the text of Sla. Sla is scored 100 although it is stated only that a partial strategy is in place.

**PI 2.5.3**

The text for Sla states *“Key elements include the trophic structure of the Baltic Sea ecosystem such as key prey, predators and competitors; community composition, productivity patterns and characteristics of biodiversity”*, which appears to contradict text for PIs 2.5.1 and 2.5.2 that only cod is a key element. Nevertheless, the scoring text of the other SIs indicates that a number of ecosystem models have been developed for the Baltic, and that studies have used these models to evaluate the interactions between Baltic fisheries, the environment and the food web. A score of 100 is justified.

14636: Greenland cod, haddock and saithe fishery (Demersal trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	85	95	90	80	95	80	85	85	80	80	80	75	100	90	95

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? No, but ecosystem characteristics are described at the start of the P2 introduction (P.23).
- Are key ecosystem elements identified in the scoring text for 2.5.1? No.
- Do the key ecosystem elements follow MSC guidance? N/A.
- Is the ecosystem identified in the scoring text for 2.5.1? Yes – Barents Sea ecosystem.
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? Moderate – scoring referred to evidence on trophic structure, but mainly related to abundance of fish species, only.
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: Yes; PI 2.5.2: Yes (Sla), No (Sld); PI 2.5.3: Yes (Sld, Sle), No (Sic).

### PI 2.5.1

Key ecosystem elements were not identified, with the scoring text reporting against ecosystem structure and function only. Fish-related elements of the ecosystem were given particular attention, seabirds were mentioned, but habitats were not mentioned. A score of 100 was awarded.

### PI 2.5.2

The text for Sla indicates that there are various measures in place that together justify a score of 100 for Sla, including TACs and a discard ban, the existence of closures to protect juvenile fish and vulnerable habitats in Norwegian waters. There is also an ecosystem-based management plan in place for the Barents-Sea Lofoten area, and various other projects and programmes in place to monitor the ecosystem. Note that Slb was (incorrectly) scored 'Partial', but it seems that this was not taken into account in scoring overall.

### PI 2.5.3

The text indicates that a number of ecosystem models have been developed for the Barents Sea, and that indicators and model parameters are monitored on a regular basis, such that impacts and interactions can be determined, with some having been investigated. It was apparently considered that the fishery did not meet the SG100 for Slb on the basis that relationships between the fishery and benthic and seabird populations were less well understood.

### 14677: South African hake (Demersal trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	95	85	80	80	85	80	85	70	80	70	85	100	90	95

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **Yes – identified as ‘trophic interactions’ (P. 117).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being the Benguela current and trophic interactions.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Yes.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Yes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **Yes (SIc)**, **Yes (SIId – hake stock management and status)**; PI 2.5.3: **Yes (SIb, SIc, SIId).**

#### PI 2.5.1

Key ecosystem elements were not identified, and the key characteristic of the ecosystem was defined as the ‘Benguela current’. It was also stated that “*The physical activity of trawling for hake cannot prevent the Benguela current from flowing and providing these ecosystem services.*”, although what ecosystem services are provided is not specified. An investigation of the effects of hake fishing on the trophic structure has been carried out, showing ‘that effects would be ‘corrected’ within a period of 10-20 years. Together, these are considered to provide evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function, so justifying a score of 100.

#### PI 2.5.2

The text for SIa points to the use of measures specific to the maintenance of the hake stock biomass as being a partial strategy to ensure that ecosystem effect are appropriately managed (noted as being a ‘happy coincidence’ rather than being deliberately intended), but an overall score of 90 is given on the basis that the management strategy for hake is considered likely to work and is being implemented.

#### PI 2.5.3

The text indicates that the Benguela ecosystem has been modelled and there is good understanding of the key elements. Although these are not identified specifically, the text focuses on ecosystem modelling as evidence that the main impact from the fishery would be a reduction in hake biomass leading to changes in the abundance of prey species and species that compete with the prey species for food. Only SIe was scored down, because the partial strategy focuses only on maintaining hake biomass rather than ecosystem impacts.

15693: LFA Latvia eastern Baltic cod (Midwater and bottom trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	80	90	80	90	85	95	90	80	75	80	85	80	80	95

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No**.
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being cod, herring and sprat as dominant members of the upper trophic food web.**
- Do the key ecosystem elements follow MSC guidance? **Yes**.
- Is the ecosystem identified in the scoring text for 2.5.1? **Yes – the Baltic.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Moderate – trophic structure is discussed but there is no link to outcome status.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **N/A**; PI 2.5.2: **N/A**; PI 2.5.3: **Yes (SIb, SIc), No (SIId).**

### PI 2.5.1

Key ecosystem elements were not specifically identified, but the text refers to ecosystem models for the Baltic and provides a discussion on trophic structure. Relative levels of impacts on components are mentioned, but there is no link to actual outcome status, i.e., to the potential for the ecosystem to be disrupted by the fishery. The score of 80 is justified on the basis that a peer reviewer apparently commented that a score of 100 was not appropriate (given that the report also states “*As the cod stock is decreasing herring and sprat abundance is increasing*”). Note the 80 score contrasts with the PI 2.5.1 score of 100 for Poland eastern Baltic cod.

### PI 2.5.2

Scoring for this PI is based on management that restrains the impacts of the fishery on ecosystem components. It is considered that together these represent a partial strategy, so meeting SG80 overall.

### PI 2.5.3

The text indicates that a number of ecosystem models have been developed for the Baltic Sea, with main interactions between the fishery and ecosystem elements having been investigated. Only SIe was scored down, because information is not considered adequate to allow for the development of a full strategy, although no details are provided.

15694: Cornish hake (Gill net)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	85	90	90	70	80	75	90	70	80	90	90	80	80	90	75

NB – this fishery was included specifically because it is the only v1.3 fishery with a score of less than 80 for any of the three ecosystem PIs.

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No, but ecosystem characteristics are described at the start of the P2 introduction (P.37).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **No.**
- Do the key ecosystem elements follow MSC guidance? **N/A.**
- Is the ecosystem identified in the scoring text for 2.5.1? **No.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Moderate – the text refers to trophic levels but scoring focuses on the status of components.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **N/A**; PI 2.5.2: **No (SIc, SId)**; PI 2.5.3: **N/A.**

**PI 2.5.1**

Key ecosystem elements were not specifically identified, and the commentary for this PI notes that the overall effect on ecosystems of fisheries in the Celtic Sea have not been assessed. It is stated that the ecosystem is driven by benthic production and that the set-net fishery has reduced the trophic level of the fish community through reducing the abundance of large hake. Evidence for scoring is based on the status of the hake stock and a reduction in the cetacean bycatch. It is noted that a score of 80 is given even though wording of the scoring comments mirrors the SG100 wording.

**PI 2.5.2**

Scoring comments indicate that somewhat broad, EU level management objectives and measures linked to fishing pressure, the protection of habitats and species, and the avoidance of disruption to ecosystem processes, were together considered to constitute a partial strategy. A score of 90 was given on the basis that while only a partial strategy is in place, the measures were considered likely to work (SIc) and were being implemented (SId).

**PI 2.5.3**

The text confirms that no modelling of the Celtic Sea ecosystem has been undertaken, and scoring is focused on inferring impacts from the status of ecosystem components. A score of 75 was provided because of concerns over SIc, which requires sufficient data to be collected to detect any increase in risk level. The resulting condition was focussed on spurdog, and on collecting bycatch data to allow for an increase in risk level to be detected.

### 15701: Eastern Canada Offshore scallop (Dredge)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	100	100	100	80	100	80	90	85	80	80	80	90	80	90	95

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **Yes (P.85).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Yes.**
- Do the key ecosystem elements follow MSC guidance? **Yes, although key ecosystem elements (scallop as a dominant component of the biota and prey species; gravel and cobble habitats and associated epibenthic species that act as structuring habitat), as well as some ecosystem components (yellowtail flounder and wolffish) are listed.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Yes – the Eastern Canada Offshore Scallop Ecosystem.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Yes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **N/A**; PI 2.5.2: **No (Slc, Sld)**; PI 2.5.3: **Yes (Slb, Sld, Sle).**

#### PI 2.5.1

Key ecosystem elements were identified, but a score of 80 was justified on the basis of evidence of the status of some components (e.g. scallop and yellowtail flounder stocks, habitats) as well as on their role in the ecosystem. A score of 80 was justified in part on the basis of the area covered by the fishery annually in comparison to the area covered by the offshore banks.

#### PI 2.5.2

Scoring comments indicate that a score of 90 was given on the basis that the measures in place are focused on the management of components rather than on consideration of ecosystem elements specifically, but that in combination they are a partial strategy. These measures were considered likely to work (Slc) and there was evidence that they were being implemented (Sld), however, so justifying a score of 90 overall.

#### PI 2.5.3

Slc is focused rather more on components than would be ideal, but the text of the PI indicates that an ecosystem model of the fishery area exists, that the main functions of the target, retained, bycatch and ETP species as predators and prey in the ecosystem are known, and the role and importance of gravel habitats for shelter and survival of some groundfish is known. The fishery did not score 100 overall because the assessment team couldn't determine that the main functions of these components were 'understood' (i.e., Slc).

15703: Olympic Seafood Antarctic krill (Pelagic trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	100	100	100	100	100	100	100	100	95	100	100	85	100	80	90

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No (P.61)**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being krill as a key prey species.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Inferred as being Area 48.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Yes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **N/A**; PI 2.5.3: **Yes (Slc, Sld).**

**PI 2.5.1**

The scoring text very closely mirrors that of the Aker Biomarine fishery, and the score is the same.

**PI 2.5.2**

The scoring text very closely mirrors that of the Aker Biomarine fishery, and the score is the same.

**PI 2.5.3**

The scoring text very closely mirrors that of the Aker Biomarine fishery (although the text on the need for information related to future climate change impact is toned down, and the suggestion of introducing closed areas as reference areas is not included), and the score is the same.

### 15705: Australia blue grenadier (Demersal trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	90	80	80	100	85	85	95	80	80	90	75	80	90	85

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **Yes, but identified only as “Interaction of fishery with ecosystem structure and function” (P.41).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being mesopelagic fish and squid species within the foodweb.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem defined in the scoring text for 2.5.1? **No.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Moderate – there is some discussion of elements (e.g., foodwebs) but the scoring was based on management approach and absence of evidence of adverse impacts.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **N/A**; PI 2.5.2: **No (Slc, Sld)**; PI 2.5.3: **Yes (Sle).**

#### PI 2.5.1

Key ecosystem elements were not identified directly, but the scoring text includes a description of some of the characteristics of the ecosystem (e.g., that is largely bottom-up forced and that mesopelagics play a key role). A score of 80 is justified on the basis that a large marine reserve network is established, and because there is no evidence of impacts in the 14 year history of the fishery.

#### PI 2.5.2

Scoring comments indicate that a score of 90 was given on the basis that the measures in place are focused on the management of components rather than on consideration of ecosystem elements. Together, though, the measures are considered to comprise a partial strategy. The scores of 100 for Slc and Sld are based solely on the fishery not having exceeded catch limits.

#### PI 2.5.3

The scoring of this PI was focused on information on key species rather than key elements, although the text indicates that there is good information on key elements. Somewhat strangely, given that PI 2.5.1 was scored as a partial strategy, only, Sle was scored 100, with the justification that “*strategiesto manage ecosystem impacts have been developed that are supported by sufficient information*”.

15742: Norway North East Arctic cod (Demersal trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	95	85	90	85	85	75	85	80	70	85	90	95	85	95

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No (P.95-97).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Inferred as being capelin within the foodweb.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Yes – North East Arctic ecosystem.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Moderate – there is mention of the existence of ecosystem models and some discussion of ecosystem interactions, but scoring is based on component status and absence of evidence of adverse impacts.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **Yes (SId)**; PI 2.5.3: **Yes (SIb, SId, SIe).**

**PI 2.5.1**

Key ecosystem elements were not identified, but the scoring text indicates that work is undertaken annually through ICES to review the status of the North East Arctic ecosystem, and to understand trophic interactions. The score was justified on the basis of the status of components and on the absence of evidence of impacts. The final sentence mirrors the SG80 text rather than the SG100 text, but a partial score of 95 was awarded because “*there are still some habitats that are vulnerable*”.

**PI 2.5.2**

The scoring text indicates that there is a good variety of information being collected, and some focus is placed on the protection of important habitat and spawning or nursery ground. The management approach appears to be focused primarily on maintaining stock status (e.g., “*with the exception of fish-stock management plans, there is no explicit requirement that action will be taken within any of the national plans or international conventions*”). The fishery overall scored 85 on the basis that SId (there is evidence that the measures are being implemented successfully) was scored at 100.

**PI 2.5.3**

The scoring text indicates that there is good understanding of food web dynamics in the Barents Sea, particularly regarding cod, haddock and saithe and their prey, which is sufficient to parameterise ecosystem models and underpins regional seas ecosystem management plans. None of the text states specifically which ecosystem elements were considered in scoring, however, and there is some indication that knowledge of the effect of fishing on target stocks was the key factor leading to the high score of 95 (e.g., SIb – “*Thus, not only can the consequences of main interactions be inferred, many of them have been identified and quantified – most obviously the effect of fishing on fish stocks*”).

15750: Oregon and Washington pink shrimp (Otter trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	100	100	100	80	100	95	70	85	75	80	95	85	100	90	90

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No (P.45-48).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Yes.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **No (but is defined as the California Current Ecosystem in PI 2.5.3).**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Yes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **Yes (SIc), No (SIId)**. PI 2.5.3: **Yes (SIb, SIe).**

### PI 2.5.1

Key ecosystem elements were identified as trophic relationships and benthic community structure. The text justified a score of 100 on the basis of knowledge that pink shrimp typically comprise a small percentage (<10%) of the food taken by predatory fish species occupying the same areas as the shrimp fishery, the area fished and the recovery times of fished habitats, and (for genetic impacts) the low levels of bycatch.

### PI 2.5.2

The scoring text indicates that the various measures in place (protection of essential fish habitat, use of bycatch reduction devices, introduction of rockfish conservation areas, etc.) comprise a partial strategy, with a focus on managing the impact of fishing on target species or other components. The score of 90 is justified on the basis of the measures being likely to work (SIc) and because there is evidence that they are being implemented (SIId).

### PI 2.5.3

The scoring text states that a well-developed model of the California Current ecosystem exists, with physical and biological characteristics, including main food webs, parameterised such that there is broad understanding of the key elements of the ecosystem. The key ecosystem elements identified in PI 2.5.1 aren't addressed in all scoring issues (e.g., trophic relationships and biodiversity in SIb), but in general the text focuses on the evidence available to understand the fishery's impact on ecosystem elements rather than components.

15751: Sweden Skaggerak, Kattegat and Norwegian Deep cold-water prawn (Shrimp trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	95	85	80	80	75	80	80	80	75	75	75	80	80	85

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No**.
- Are key ecosystem elements identified in the scoring text for 2.5.1? **No**, but “*Two potential impacts of the fishery on the ecosystem that have not been covered previously under the assessment of P1 and P2 performance indicators*” were identified.
- Do the key ecosystem elements follow MSC guidance? **N/A**.
- Is the ecosystem identified in the scoring text for 2.5.1? **No**.
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Moderate – ecosystem relationships were discussed but scoring was based on component outcomes**.
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **N/A**; PI 2.5.2: **N/A**; PI 2.5.3: **No (Sle)**.

### PI 2.5.1

Key ecosystem elements were identified as trophic relationships and benthic community structure. The text interestingly justified a score of 80 partly on the basis that shrimp is an important prey item, and while the biomass was low, there had also been a recent decline in the predator fish biomass, thus the shrimp fishery was considered to be highly unlikely to disrupt ecological relationships within the ecosystem. Scoring for the benthic community structure element was also based on inference.

### PI 2.5.2

The scoring text indicates that the various measures in place (establishment of Natura 2000 sites, implementation of catch quotas, use of selective gears etc.) comprise a partial strategy, with a focus on managing the impact of fishing on target species or other components. A score of 80 is justified throughout on the basis of these measures comprising an overall partial strategy.

### PI 2.5.3

The text for SIa concentrates solely on the Skagerrak ecosystem, and key elements are defined as including the trophic structure, with the scoring apparently based on the information available from ICES stock assessment reports indicating stock status. Scoring text for the other SIs is not very detailed but indicates that there is a least one ecopath model of the North Sea that is considered relevant. The overall score of 85 was based on Sle being scored at 100 because the team considered that information is sufficient to support the development of strategies.

### 16778: Shark Bay prawn (Bottom otter trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	90	90	80	80	95	75	90	80	65	100	80	75	100	90	85

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **Yes, although the ecosystem element was listed as 'Inshore subtropical' (P.172).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **No, but the text includes a discussion around prawns as a prey species.**
- Do the key ecosystem elements follow MSC guidance? **No.**
- Is the ecosystem identified in the scoring text for 2.5.1? **No.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **Moderate – key elements were not defined but scoring was based on the results of studies indicating that shrimp trawling at current levels does not affect overall biodiversity and community structure.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **Yes**; PI 2.5.2: **Yes (SIc)**, **No (SIId)**; PI 2.5.3: **Yes (SIc)**.

#### PI 2.5.1

The text for this PI indicates that the most likely source of ecosystem impact is the removal of the target prawn species because “*these species make up the majority of the majority of the catch*”, although the text also focuses on the results of two studies, including one from Shark Bay, that looked at the impact of prawn fishing on overall biodiversity and community structure and found no effect from the fishery. This provides justification for a score of 100.

#### PI 2.5.2

The scoring text indicates that there is a specific ecosystem management objective for the fishery, with various measures in place (input controls, plus spatial and temporal closures, the use of VMS, mandatory use of bycatch reduction devices, etc.), together comprising a partial strategy towards that objective. The 90 score is based on SIc and d being scored at 100.

#### PI 2.5.3

The text for SIa is unusually focused on the information collected that allows an increase in risk to ecosystem components to be detected. Text for the other SIc indicates that there is evidence that the fishery does not affect overall biodiversity, but the scoring justifications are generally based on evidence of the status of components rather than elements. The overall score of 85 was based on SIc being scored at 100 because of an existing risk assessment of ecosystem impacts from the fishery.

16779: Alaska Flatfish – Bering Sea and Aleutian Islands (Demersal trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	90	85	80	80	80	80	95	100	95	80	95	80	80	100	95

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **Yes, although the ecosystem elements were listed as ‘Bering Sea’ and ‘Aleutian Islands’ (P.95).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **No, but ‘corals’ listed in PI 2.5.2.**
- Do the key ecosystem elements follow MSC guidance? **No.**
- Is the ecosystem identified in the scoring text for 2.5.1? **No.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **No – the text is focused is component outcomes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **N/A**; PI 2.5.2: **Yes (Sla, Slb, Slc), No (Sld)**; PI 2.5.3: **Yes (Slc, Sld, Sle).**

### PI 2.5.1

The brief text for this PI doesn’t indicate the key ecosystem elements or the ecosystem, and focuses on the fishery impacts on retained, bycatch and ETP species as components. Habitats are not mentioned, but ‘ecosystem analyses’ have apparently been undertaken, and a score of 80 was awarded.

### PI 2.5.2

Scoring comments identify that management measures in place under fishery management plans take into account key elements of the ecosystem (noted to be “the corals”), including through prohibitions on the catch of highly value species and restrictions on bottom contact in sensitive habitat. The FMP is considered to be based on well-understood functional relationships, referencing extensive research on structure and functioning of both ecosystems.

### PI 2.5.3

The text indicates that there are quantitative models of both the Bering Sea and the Aleutian Islands, justifying a score of 95 overall, but Slb (Main interactions can be inferred and have been investigated) was scored down from 100 on the basis that the long-term ecosystem effects from trawling have not been empirically determined in the Bering Sea and Aleutian Islands. Sle (information is sufficient to support the development of strategies) was scored at 100 on the strength of a comprehensive survey programme undertaken to monitor abundance and key element of the systems.

16781: OCI Grand Bank yellowtail flounder (Demersal trawl)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	80	100	95	80	80	80	90	90	80	80	85	90	80	80	85

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **Yes (P.62).**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **Yes.**
- Do the key ecosystem elements follow MSC guidance? **Yes.**
- Is the ecosystem identified in the scoring text for 2.5.1? **Yes – the yellowtail flounder fishery ecosystem.**
- Are key elements scored using ecosystem-specific information? **Yes.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **N/A**; PI 2.5.2: **N/A**; PI 2.5.3: **Yes (Sle).**

### PI 2.5.1

Key ecosystem elements are listed as the trophic structure of the benthic system on the Grand Bank and the structure and function of sandy habitats and associated species that act as structuring habitat. Ecosystem modelling work has been undertaken that showed, amongst other things, that the groundfish exploitation rate from the Grand Bank has been below their fisheries production potential; this was considered to provide evidence that the fishery was highly unlikely to disrupt the trophic structure. Other evidence on trawling impacts on benthic habitats and communities and subsequent recovery was also discussed, but the proximity of potential VME features to the fishing area prevented the fishery from scoring above 80 for that element. A score of 80 overall was given but a partial score of 90 could have been awarded.

### PI 2.5.2

Scoring comments indicate that a score of 80 was given on the basis that the measures in place are focused on the management of components rather than on consideration of ecosystem elements specifically, but that in combination they are a partial strategy so precluding a higher score for any of the SIs.

### PI 2.5.3

As with the assessment of the Eastern Canada Offshore Scallop Fishery (undertaken by the same assessor), SIa in the OCI Grand Bank yellowtail flounder assessment is focused rather more on component outcomes than would be ideal, but the text of the PI indicates that trophic interactions on the Grand Bank have been investigated and the fisheries production potential established, while the main functions of the target, retained, bycatch and ETP species as predators and prey in the ecosystem are known, as is the role and importance of sandy habitats and associated epibenthic structuring species. A score of 85 was awarded because SIe (information is sufficient to support the development of strategies) was scored at 100.

16782: Gulf of St. Lawrence Fall Herring (Gillnet)

PI	2.1.1	2.1.2	2.1.3	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	2.5.1	2.5.2	2.5.3
Score	90	85	90	80	80	75	80	85	80	80	85	85	100	80	80

- Are key ecosystem elements identified in Table 4.3 (or equivalent)? **No – no table of P1 and P2 scoring elements is included in the report.**
- Are key ecosystem elements identified in the scoring text for 2.5.1? **No.**
- Do the key ecosystem elements follow MSC guidance? **N/A.**
- Is the ecosystem identified in the scoring text for 2.5.1? **No, but is inferred as being the Gulf of St. Lawrence in PI 2.5.3.**
- Are key elements in PI 2.5.1 scored using ecosystem-specific information? **No.**
- Is ecosystem-specific information used to justify scores >80? PI 2.5.1: **No**; PI 2.5.2: **N/A**; PI 2.5.3: **N/A.**

**PI 2.5.1**

Neither key ecosystem elements nor the ecosystem are identified. The scoring text for this PI is largely made up of repeats the text of the SI and some of the MSC scoring guidance, and is scored 100 on the basis of outcome status for components, and the absence of evidence indicating that the fishery causes any disruption of the key elements underlying ecosystem structure and function.

**PI 2.5.2**

The scoring text for SIa indicates that there are no ecosystem-specific measures in place, and the fishery is scored 80 overall for this PI on the basis of restrictions on the number of fishermen, the size of the gillnets and the fishing season. It is noted that the final sentence only justifies a score of 60, as it is said that these fishery-specific restrictions are “*only management measures*” (i.e., rather than being a ‘partial strategy’).

**PI 2.5.3**

The text indicates that modelling of the Southern Gulf ecosystem has been undertaken, and a simple description of the basic trophic links between different functional groups is provided in SIa. A score of 80 overall was primarily justified on the basis of the availability of the model data and the assessment of the herring stock. Higher scores were apparently not awarded in part because of a lack of independent data.

## Appendix 6: CR and GCR text describing the approach to scoring PIs

### 2.5.1 – 2.5.3

#### PI 2.5.1

##### CR v1.3 (MSC 2013a)

CB3.17.1 The team shall score the other components of the assessment (i.e. target species, retained species, bycatch species, ETP species and habitats) separately to this PI, which considers the wider ecosystem structure and function.■

CB3.17.2 The team should interpret serious or irreversible harm in relation to the capacity of the ecosystem to deliver ecosystem services.■

CB3.17.3 The team should note that “key” ecosystem elements are the features of an ecosystem considered as being most crucial to giving the ecosystem its characteristic nature and dynamics, and are considered relative to the scale and intensity of the fishery. They are features most crucial to maintaining the integrity of its structure and functions and the key determinants of the ecosystem resilience and productivity.

CB3.17.4 The team shall interpret the terms “unlikely”, “highly unlikely” and “evidence for” in SG60, SG80 and SG100 as in Table CB18. CB3.17.5 The team should make sure that:

- CB3.17.5.1 Where the team uses qualitative analysis and/or expert judgements in scoring a fishery at the 60 and 80 SGs this should be approximately equivalent to the quantitative probability interpretation given in Table CB18.
- The justification for equivalence shall be provided.
  - A range of informed viewpoints or alternative hypotheses may be used to make qualitative judgements about the probability interpretation of the SG.
  - The team may consider using the SICA to assess this PI as a means of obtaining the range of viewpoints and constructing the probability interpretation of the SG.

##### GCR v1.3 (MSC 2013b)

The Ecosystem component considers the broad ecological community and ecosystem in which the fishery operates.

PI 2.5.1 requires that “the fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.”

GCB3.17.2 confirms that such harm may reflect “depletion of top predators and trophic cascade through lower trophic levels caused by depletion of key prey species in ‘wasp-waist’ food webs. Assessments of the risks of “serious or irreversible harm” to the ecosystem in PI 2.5.1 may be made in reference to the maximum levels of impacts allowed under CB2.3.18 b. While PI 1.1.2 scores the setting of TRPs and the theoretical evidence that they will achieve the allowed impact levels, PI 2.5.1 scores the evidence that such levels are being achieved in practice.

GCB3.17.1 The Ecosystem component does not repeat the status assessment of these elements individually but rather considers the wider system structure and function - although if all these components scored highly it might be expected that the Ecosystem component would also score highly. The Ecosystem component addresses system-wide issues, primarily impacted indirectly by the fishery, including ecosystem structure, trophic relationships and biodiversity.

GCB3.17.2 Serious or irreversible harm in relation to the capacity of the ecosystem to deliver ecosystem services could include:

- trophic cascade (i.e. significantly increased abundance, and especially decreased diversity, of species low in the food web) caused by depletion of predators and especially ‘keystone’ predators;
- depletion of top predators and trophic cascade through lower trophic levels caused by depletion of key prey species in ‘wasp-waist’ food webs;
- severely truncated size composition of the ecological community (e.g. greatly elevated intercept and steepened gradient in the community size spectrum) to the extent that recovery would be very slow due to the increased predation of intermediate- sized predators;
- gross changes in the species biodiversity of the ecological community (e.g. loss of species, major changes in species evenness and dominance) caused by direct or indirect effects of fishing (e.g., discarding which provides food for scavenging species);
- change in genetic diversity of species caused by selective fishing and resulting in genetically determined change in demographic parameters (e.g. growth, reproductive output).

Relatively few fisheries would have the information needed to address ecosystem issues quantitatively, and usually they will be assessed using surrogates, analogy, general observations, qualitative assessment and expert judgement. Harm to ecosystem structure is normally inferred from impacts on populations, species and functional groups, which can often be measured directly. Harm to ecosystem functions is normally inferred from impacts on ecosystem processes and properties such as trophic relationships, community resilience etc. and often have to be inferred from conceptual or analytical models or analyses.

## PI 2.5.2

### CR v1.3 (MSC 2013a)

CB3.18.1 The team shall note that the measures required by SG60 may exist primarily to manage the impact on target species or other components, but have the capacity to achieve ecosystem outcomes. ■

CB3.18.2 The team shall note that for SG80 and SG100, partial strategies and strategies respectively may also contain measures designed and implemented to address impacts on components that have been evaluated elsewhere in this framework.

CB3.18.2.1 If the measures address specific ecosystem impacts effectively enough to meet the appropriate standard, then it is not necessary to have special “ecosystem measures” to address the same impacts.

CB3.18.2.2 It may not be necessary to have a specific “ecosystem strategy” other than that which comprises the individual strategies for the other Components under P1 and P2.

CB3.18.2.3 If there are ecosystem impacts that may not be addressed effectively by existing measures, it may be necessary to add new measures or strengthen existing ones to address those impacts.

### GCR v1.3 (MSC 2013b)

CB3.18.1 See the guidance on ‘measures’ provided in the General Guidance section GCR2.1, GCR2.2

## PI 2.5.3

### CR v1.3 (MSC 2013a)

CB3.19.1 A team shall, in the second scoring issue of this PI, ■

CB3.19.1.1 Require some information of “the main impacts of the fishery on these key ecosystem elements” at the SG80 level.

CB3.19.1.2 Focus on the “main interactions between the fishery and these ecosystem elements” at the SG100 level. At this level:

- a. Fisheries should be capable of adapting management to environmental changes as well as managing the effect of the fishery on the ecosystem.
- b. Monitoring the effects of environmental change on the natural productivity of fisheries should be considered best practice and should include recognition of the increasing importance of climate change.

### GCR v1.3 (MSC 2013b)

