

# Monterey Bay Aquarium **Seafood Watch**<sup>®</sup>

Marine Stewardship Council



Benchmarking equivalency results assessed against the  
Seafood Watch Fisheries Criteria

January 2013



# Final Seafood Recommendation

Marine Stewardship Council

Stock	Fishery	Impacts on the Stock Rank (Score)	Impacts on other Species Lowest scoring species Rank*, Subscore, Score	Management Rank Score	Habitat and Ecosystem Rank Score	Overall Recommendation Score
Target Species:FAM	MSC FAM	Green 3.83	Bycatch Species Red, 1.53,1.14	Yellow 3	Yellow 2.45	<b>GOOD ALTERNATIVE 2.38</b>

*Scoring note – scores range from zero to five where zero indicates very poor performance and five indicates the fishing operations have no significant impact.*

## **Summary**

The MSC Fisheries Assessment Methodology (FAM), in cases where all necessary data to assess the state of the target species are available, is equivalent to at least a Seafood Watch “Good Alternative,” with all criteria except impacts on other species scoring yellow or green.

## **Executive Summary**

The benchmarking equivalence assessment was undertaken on the basis of a positive application of a realistic worst-case scenario

- “Positive” – Seafood Watch wants to be able to defer to equivalent certification schemes
- “Realistic” – we are not actively pursuing the theoretical worst case score. It has to represent reality and realistic wild-capture production.
- “Worst-case scenario” – we need to know that the worst-performing fishery capable of being certified to any one standard is equivalent to a minimum of a Seafood Watch “Good alternative” or “Yellow” rank.

The final result of the equivalence assessment for the MSC Fisheries Assessment Methodology (FAM) is a yellow “Good Alternative” recommendation. Seafood Watch does not consider all certified fisheries to be at that level, but the standards could allow a fishery equivalent to a yellow Seafood Watch recommendation to be certified. This means Seafood Watch can defer to the MSC Fisheries Assessment Methodology certification as an assurance that certified products meet at least a yellow “Good Alternative” recommendation.

This result applies only to fisheries which have sufficient data for the target species to be scored under the standard methodology in the FAM; the use of the Risk-Based Framework (RBF) to score target species (under PI 1.1.1) for data-poor fisheries is not assessed here. The RBF and FAM are considered to merit the same scores under Principle 2 (corresponding to SFW Criteria 2 and 4); therefore, the results presented in this paper are applicable to fisheries that were assessed using the RBF for one or more element of Principle 2.

For SFW Criterion 1, the MSC FAM’s requirements that stock be above the limit reference point (LRP), though it may be below the target reference point (TRP), and that harvest controls achieve the objectives of the reference points and allow rebuilding if stock is depleted (meaning below TRP), correspond to SFW “low concern” rankings for stock health and fishing mortality respectively.

Nothing in the MSC FAM standard precludes bycatch of endangered or threatened species, therefore in the worst case the stock status of the lowest scoring bycatch species assessed in Criterion 2 is a “very high concern,” which is applied to endangered or threatened species. While the MSC standard requires that Endangered, Threatened or Protected (ETP) species be managed to be maintained within biologically based limits, the approach for assessing whether fishing mortality is sustainable differs under MSC compared to the SFW approach. Specifically, SFW considers the cumulative impact of all fisheries impacting the species of concern, while MSC considers only the “marginal impact” of the fishery under assessment. As a result, it is possible even for ETP species that the fishery be one contributor to an unsustainable overall fishing rate, with fishing mortality considered a “moderate concern” by SFW. In combination with the “very high concern” for stock status, this results in a red score for Criterion 2. MSC’s requirement that the fishery under assessment not hinder rebuilding or recovery prevents a lower score.

For SFW Criterion 3, while the MSC standard meets or even exceeds SFW requirements for highly effective in some areas, particularly excelling in requirements for stakeholder engagement and scientific research and monitoring, it corresponds to SFW standards for moderately effective, in the worst case, in the key areas of management strategy and implementation and recovery of stocks of concern. This result is driven by the lower standards for management of species assessed under Principle 2 (i.e., the requirement that the goal of management be to maintain species within biologically-based limits rather than at target levels). Principle 2 includes both retained species (assessed under SFW 3.1) and bycatch species (assessed under 3.2). As a result, management is scored as a moderate concern for both retained and bycatch species.

For SFW Criterion 4, the MSC standard does not prevent certification of bottom-tending gear types in rocky habitats; therefore this is the worst case, translating to a SFW score of “high concern” for the impact of the fishing gear on the substrate. Requirements of management of habitat impacts correspond to SFW “moderate mitigation”. In the case where the fishery is catching a species of exceptional importance to the ecosystem, but it is not a low trophic level species (for which MSC has rigorous requirements), the ecosystem-based management requirements under MSC are equivalent to a SFW score of “low concern”, because they require some policies in place to protect ecosystem functioning, but these do not have to meet the goal of allowing the species to fulfill its natural ecological role.

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# **Introduction**

## ***Scope of the analysis and ensuing recommendation***

### **Species**

The assumed scenario can apply to any species, provided there is adequate data for assessment under the standard methodology. The worst-case scenario assumes a species that is of “exceptional importance” to the ecosystem, but is not a low-trophic level species, e.g. a top predator.

### **Geographic coverage**

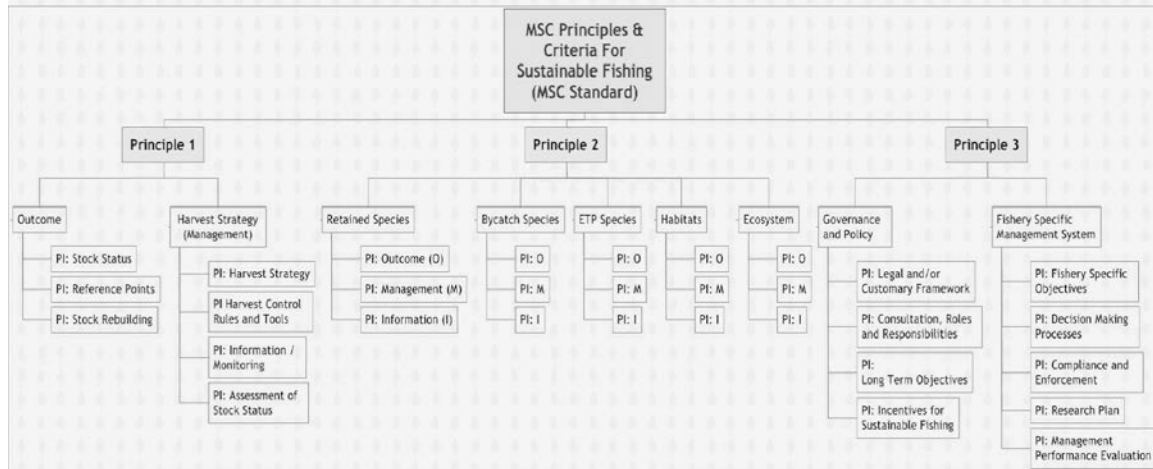
The assumed scenario can apply in any geographic area, but for the worst-case scenario is assumed to occur in a country with minimal fisheries management regulations, such that we do not assume management is in place that goes above and beyond what is specified by the MSC standard.

### **Fishing gears**

The worst-case scenario will be a fishery using mobile bottom-tending gear, such as bottom trawl, as this will result in the lowest score under criterion 4.1. Bottom trawls may also result in high bycatch, including bycatch of endangered or threatened species, resulting in the potential for low scores under criterion 2.

## ***The Marine Stewardship Council Worst Case Scenario***

The Marine Stewardship Council (MSC) methodology is structured into three principles (P1: Stock Status, P2: Environmental Impacts and P3: Management) that are structured into components, which are in turn assessed by different performance indicators (PIs). Performance indicators are scored in steps of 5 from 60 to 100 (scores below 60 would result in certification failure). The scores are combined for each principle with a weighted average such that each component receives the same statistical weight, and each principle score is required to reach  $\geq 80$  for certification. Additionally, scores between 60 and 80 on any PI trigger mandatory conditions designed to improve the score to at least an 80.



**Figure 1: MSC assessment tree structure with principles, components and performance indicators (PIs)**

The MSC standard used when all necessary information is available is called the Fishery Assessment Methodology (FAM). In the case of data deficiency, MSC rates its PIs under the Risk-Based Framework (RBF), dedicated to this situation. In MSC principle 2, a fishery may be assessed using the RBF for any one (or more) of the following PIs: 2.1.1, 2.2.1, 2.3.1, 2.4.1, and 2.5.1. Under Seafood Watch, all other retained and bycatch species are considered under Criterion 2, and the worst possible score under SFW’s Criterion 2.2 (corresponding to PIs 2.1.1/2.2.1/2.3.1) is a “very high concern” (for a species that is endangered or threatened), a ranking that is possible under either the FAM or RBF in Principle 2. Moreover, even under the FAM worst case the fishery can score as poorly as “moderate concern” for Criterion 2.3, corresponding to the case where status is unknown (see Criterion 2 under Analysis, below). A ranking worse than this is not expected in the data-poor situation. Information requirements are somewhat relaxed under 2.1.3, 2.2.3, and 2.3.3 when using the RBF (see MSC Certification Requirements CC3.6.1), but this does not result in differential scoring. Seafood Watch criteria are based on the consideration that the data required for scoring a fishery under the FAM requirements for habitat (2.4.1) and ecosystem (2.5.1) outcomes are generally not available, so our approach in this report assumes an unknown status for these outcome indicators, and scoring for related SFW criteria (4.1, 4.2 and 4.3) are based instead on the management and information requirements. Fisheries scored under the RBF are subject to the same management-related performance indicators as those scored under the FAM. Therefore, there is no need for separate consideration of the RBF under 2.1.1, 2.2.2, 2.3.1, 2.4.1, or 2.5.1.

The case where a fishery uses the RBF for assessing the status of the target stock under PI 1.1.1 is not assessed in this report.

### **SFW criteria and corresponding MSC performance indicators**

The MSC rating for each component is usually structured into an outcome, management and information PI whereas SFW scores the outcomes conditional on the available information, and scores the management in a separate criterion (Criterion 3). There is not a one-to-one

correlation between SFW criteria and MSC PIs, but rather multiple PIs that address each SFW criterion. The SFW criteria, and corresponding MSC PIs, are listed below in Table 1:

SFW Factor	Corresponding MSC PIs			
	P1	P2	P3	
1.1	Inherent Vulnerability			
1.2	Stock Status	1.1.1, 1.1.2, 1.2.3		
1.3	Fishing mortality	1.1.3, 1.2.1, 1.2.2, 1.2.4		
2.1	Inherent Vulnerability			
2.2	Stock Status		2.1.1, 2.1.3, 2.2.1, 2.2.3, 2.3.1, 2.3.3	
2.3	Fishing mortality		2.1.2, 2.1.3, 2.2.2, 2.2.3, 2.3.2, 2.3.3	
2.4	Secondary Factor: Discards and Bait Use			
3.1	Management of Impacts on Retained Stocks			
	Mgmt strategy and implementation (HCRs)	1.2.1, 1.2.2	2.1.1, 2.1.2	
	Recovery of stocks of concern	1.1.3	2.1.1, 2.1.2	
	Scientific research and monitoring	1.2.3, 1.2.4	2.1.3	3.2.4
	Scientific advice	1.2.1, 1.2.2	2.1.2	
	Enforcement			3.2.3
	Track record	1.1.1	2.1.1	(3.2.5)
	Stakeholder inclusion			3.1.2, 3.2.2
3.2	Management of Impacts on Bycatch Species			
	Mgmt strategy and implementation (HCRs)		2.2.1, 2.2.2, 2.3.1, 2.3.2	
	Scientific research and monitoring		2.2.3, 2.3.3	3.2.4
	Scientific advice		2.2.2, 2.3.2	
	Enforcement			3.2.3
4.1	Impact of Fishing Gear on the Substrate		2.4.1	
4.2	Modifying Factor: Mitigation of Fishing Gear Impacts		2.4.2	
4.3	Impacts on the Ecosystem and Food Web		2.5.1, 2.5.2, 2.5.3	

Table 1: Seafood Watch criteria and corresponding MSC performance indicators.



### MSC-specific worst case assumption

There are several cases that reach a score of 80 on each principle level that would score relatively low on the SFW scale, therefore the worst-case scenario is not obvious. Compared to MSC, SFW scores are more strongly driven by outcome indicators relative to management indicators and are much less driven by information related indicators. In addition, due to its decision rules used in addition to averaging (e.g., two red criteria result in an Avoid regardless of numerical average score), SFW is more precautionary in cases where some outcomes are poor and others score very well. One might therefore assume that the worst-case corresponds to a fishery that has the lowest possible scores in the outcome indicators, an intermediate score in the management indicators and the highest score in information indicators to reconcile the 80-principle score requirement. The worst case to rate the MSC Fishery Assessment Methodology (FAM), which assumes that the necessary data are available to assess the criteria, therefore generally assumed such a distribution of outcome, management and information scores (Table 2).

P1	P1 PIs	weight	SG			Meaning
			60	80	100	
stock status	1.1.1 stock status	0.33	60			Min. 70% chance to be above LRP
	1.1.2 RPs	0.33			100	LRPs and TRPs as in SFW
	1.1.3 rebuilding	0.33		80		Rebuilding plan of 1 generation time that has been demonstrated to work
Management of stock status (s.u.a)	1.2.1 harvest strategy	0.25	60			HS expected to achieve objectives, likely works
	1.2.2 HCRs	0.25	60			Generally understood HCRs to reduce F if LRP is approached, in line with HS, some evidence that tools effective
	1.2.3 info & monitoring	0.25			100	Comprehensive range of info, abundance, removals, distributions, fleet, environmental, all being monitored
	1.2.4 assessment	0.25			100	Externally peer reviewed, robustness tested, probabilistic RPs
<b>principle score:</b>			<b>80</b>			

P2	P2 PIs	weight	SG			Meaning
			60	80	100	
retained	2.1.1 outcome	0.33	60			"Within biologically based limits", if outside, measures are in place that are expected to ensure that the recovery of depleted stocks is not hindered
	2.1.2 management	0.33		80		"Partial strategy" that works with some confidence ensuring that stocks are within biologically based limits or that the fishery doesn't hinder recovery of depleted stocks
	2.1.3 info & monitoring	0.33			100	Accurate verifiable info on all retained species and consequences on their status
bycatch	2.2.1 outcome	0.33	60			"Within biologically based limits", if outside, measures are in place that are expected to ensure that the recovery of depleted stocks is not hindered
	2.2.2 management	0.33		80		Partial strategy that works with some confidence ensuring that stocks are within biologically based limits or that the fishery doesn't hinder recovery of depleted stocks
	2.2.3 info & monitoring	0.33			100	Accurate verifiable info on all bycatch species and consequences on their status
ETP	2.3.1 outcome	0.33	60			Fishery effect likely within 'international requirements' for protection of ETP species and unlikely to have known

					'unacceptable' impacts	
	2.3.2 management	0.33		80	Strategy highly likely achieves 'international requirements' for protection with some basis for confidence	
	2.3.3 info & monitoring	0.33			100	Accurate verifiable info on all ETP species and consequences on their status
<b>habitat</b>	2.4.1 outcome	0.33	60		<40% probability that irreversible harm is caused	
	2.4.2 management	0.33		80	Partial strategy' that likely works to achieve habitat SG80 outcome (<30% probability that irreversible harm is caused)	
	2.4.3 info & monitoring	0.33			100	Distribution of habitat types known, impact of gear has been quantified
<b>ecosystem</b>	2.5.1 outcome	0.33	60		The fishery unlikely disrupt key elements of ecosystem functioning that would lead to irreversible harm	
	2.5.2 management	0.33		80	Strategy that likely works is in place taking into account all available information to reach SG80 ecosystem outcome	
	2.5.3 info & monitoring	0.33			100	Interaction of fishery with ecosystem elements has been investigated in detail and the main function of these elements in the system is understood
<b>principle score:</b>			<b>80</b>			

<b>P3</b>	<b>P2 PIs</b>	<b>weight</b>	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>	<b>Meaning</b>
<b>governance</b>	3.1.1 legal framework	0.25			100	Management system in line with national & int law, includes dispute resolution
	3.1.2 consultation	0.25	60			Management includes consultation with main stakeholders. Organization of the fishery well understood
	3.1.3 long-term objectives	0.25		80		Precautionary approach is at least implicit in the long-term management goals
	3.1.4 incentives	0.25		80		Economic & social incentives for sustainability, no subsidies leading to unsustainability
<b>system</b>	3.2.1 system objectives	0.20	60			Management's objectives set to achieve the MSC Principles 1 & 2: to avoid overfished status/overfishing occurring, and to avoid ecosystem impacts.
	3.2.2 decision making	0.20			100	Managers respond to the different challenges represented by the fishery with measures which are deemed to achieve MSC Principles 1 & 2
	3.2.3 enforcement	0.20	60			There is monitoring & surveillance in place to enforce above said measures
	3.2.4 research plan	0.20			100	Research plan in place, results available to "interested parties"
	3.2.5 evaluation	0.20		80		Management system subject to review, either internal or external
<b>principle score:</b>			<b>80</b>			

**Table 2: Worst case assumption to rate the MSC FAM. Breakdown of principles, components and PIs with assumed worst case SG-levels to meet the certification requirement of a weighted average of score 80 in each principle, and result in a minimal SFW score. A summary narrative meaning of the PI condition is also given.**

The assumed worst case was constructed by the argument of the most important impact of PIs on the SFW assessment, but was not strictly evaluated if it represents the global worst case. It is nevertheless assumed as the worst case until another assumption can be shown to score worse on SFW. It has to be noted, however, that the SG-levels often have little effect on the SFW scale, because the areas where MSC tends to score most poorly are where the issues addressed are different between the methodologies. The SG-level within a PI typically indicates the certainty to assess the scoring issues but not a change in the scoring issue itself. Additionally, we have informally considered a few alternative worst-case

scenarios (including the scenario where all PIs within one area, e.g. ETP species PIs 2.3.1, 2.3.2 and 2.3.3 or habitat PIs 2.5.1, 2.5.2 and 2.5.3, are set at 60 with other scores raised to compensate) and found they scored equivalent or better than the scenario presented here. It can therefore be assumed that the assumed worst case, at least in its result and conclusion, likely corresponds to the global worst case.

## **Analysis**

### **Benchmarking principles**

The benchmarking equivalence assessment was undertaken on the basis of a positive application of a realistic worst-case scenario

- “Positive” – Seafood Watch wants to be able to defer to equivalent certification schemes
- “Realistic” – we are not actively pursuing the theoretical worst case score. It has to represent reality.
- “Worst-case scenario” – we need to know that the worst fishery capable of being certified is equivalent to a minimum of a Seafood Watch “good alternative” or yellow rank.

### **Benchmarking assumptions**

A number of assumptions were made to enable an equivalence assessment to be made either in the face of differing language or units etc, or in the case of missing information or gaps in the standards. The assumptions enable consistency across all the standards being assessed. Specific assumptions have been noted where relevant in the individual criteria sections below, but the following were applied to all standards:

- The assumed attributes for a worst-case scenario have to be consistent for the hypothetical fishery in order to be realistic. For instance, the assessment cannot assume a bottom trawl fishery to evaluate one criterion but a purse seine to evaluate another.
- To evaluate the worst-case scenario, if the definition of a criterion in the standard is more general and there is freedom for interpretation, but SFW defines the criterion more narrowly, the interpretation of the standard criterion is chosen so that it would meet the standard criterion but not the requirement in the SFW criterion.
- In cases where there equal freedom for interpretation within both the SFW criteria and the other standard, it is assumed that a similar interpretive lens is used (e.g., as if the two criteria were evaluated by the same assessor).
- Due to the prevalent case of missing or incomplete information to evaluate fisheries criteria in practice, the assessment includes for each standard a case where all necessary information to assess the criteria is assumed available and, separately, a case where it is assumed not available.

### **Scoring guide**

- All scores result in a zero to five final score for the criterion and the overall final rank. A zero score indicates poor performance, while a score of five indicates high performance.

- The full Seafood Watch Fisheries Criteria that the following scores relate to are available on our website at [www.seafoodwatch.org](http://www.seafoodwatch.org).

## **Criterion 1: Stock for which you want a recommendation**

### **Guiding principles**

- The stock is healthy and abundant. Abundance, size, sex, age and genetic structure should be maintained at levels that do not impair the long-term productivity of the stock or fulfillment of its role in the ecosystem and food web.
- Fishing mortality does not threaten populations or impede the ecological role of any marine life. Fishing mortality should be appropriate given current abundance and inherent resilience to fishing while accounting for scientific uncertainty, management uncertainty, and non-fishery impacts such as habitat degradation.

### **Summary of scores for Marine Stewardship Council**

<b>Stock</b>	<b>Fishery</b>	<b>Inherent Vulnerability</b>	<b>Stock Status</b>	<b>Fishing Mortality</b>	<b>Criterion 1</b>
		Rank	Rank (Score)	Rank (Score)	Rank Score
Target Species:FAM	MSC FAM	High	Low Concern (4)	Low Concern (3.67)	<b>Green 3.83</b>

For SFW Criterion 1, the MSC FAM’s requirements that stock be above the limit reference point (LRP), though it may be below the target reference point (TRP), and that harvest controls achieve the objectives of the reference points and allow rebuilding if stock is depleted (meaning below TRP), correspond to SFW “low concern” rankings for stock health and fishing mortality respectively.

### **Justification of Ranking**

#### **Factor 1.1 Inherent Vulnerability: High**

#### Relevant PIs and Scoring under Assumed Worst Case:

None

#### Key relevant information:

“Inherent vulnerability” (SFW) or “productivity” (MSC) is not explicitly addressed in the FAM because it is assumed that stock assessments would correctly account for it. There is no requirement on vulnerability, provided that it is reconcilable with stock status requirements

(below). The worst case was assumed to be a species under assessment of high vulnerability.

**Factor 1.2 Stock status: Low Concern (4)**

Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
1.1.1 stock status	60	min. 70% chance to be above LRP
1.1.2 RPs	100	LRPs and TRPs as in SFW
1.2.4 assessment	100	externally peer reviewed, robustness tested, probabilistic RPs

Key Relevant Information

To pass certification, in the worst case scenario, the stock may be “depleted” in the MSC sense (i.e. below target reference point, see glossary) but is required to have a probability or certainty of 70% that it is above the LRP  $B_{lim}$  below which recruitment would be impaired. This corresponds to the SFW condition for “low concern”, "above the limit reference point but might be below the target reference point". If default reference points are used, both methodologies (SFW and MSC) account for vulnerability (SFW) or the productivity (MSC) of the stock in determining the RP levels in a comparable way (though MSC leaves the classification of productivity to the assessor under FAM, only under RBF is a definition and classification of productivity given). Since SG60 is assumed under PI 1.1.1, the information available is constrained to be sufficient for appropriate RPs (PI1.1.2) and the assessment would be of sufficient quality to meet SFW requirements (see also PI1.2.4).

**Factor 1.3 Fishing mortality: Low Concern (3.67)**

Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
1.1.3 rebuilding	80	rebuilding plan of 1 generation time that has been demonstrated to work
1.2.1 harvest strategy	60	HS expected to achieve objectives, likely works
1.2.2 HCRs	60	Generally understood HCRs to reduce F if LRP is approached, in line with HS, some evidence that tools effective
1.2.3 info & monitoring	100	comprehensive range of info, abundance, removals, distributions, fleet, environmental, all being monitored

Key relevant information:

The internationally defined and acknowledged term of “fishing mortality rate”  $F$  is not explicitly addressed in the entire MSC methodology but fishing mortality rate might be assumed to be the essential part in the evaluation of "harvesting strategy" in PI1.2.1. MSC

requires the Harvest Control Rules (HCR) to reduce  $F$  if LRPs are achieved, referring to LRPs of biomass (i.e. to  $B_{lim}$ , not to  $F$ ). Under MSC, the "harvesting strategy" should achieve objectives reflected in the RPs. The harvest strategy "to meet the management objectives reflected in the RPs" should be interpreted as adjusting  $F$  such that in the long term (in iteration at equilibrium, see CB2.4.3, 'robust simulation testing') the stock biomass can be expected at  $B_{MSY}$ , and to reach this objective,  $F$  could consequently be expected to be at or below  $F_{MSY}$ . The worst case assumption implies that stock biomass is somewhere between the limit reference point (LRP) and the target reference point (TRP, see factor 1.2 above) and is thus "depleted" (meaning below the target reference point  $B_{MSY}$ , see glossary). In PI 1.1.3 it is required that "depleted" stocks (i.e. stocks below  $B_{MSY}$ ) are rebuilt with a recovery plan. The "rebuilding" was interpreted here as bringing the stock back to  $B_{MSY}$ , and this could only be achieved by reducing  $F$  accordingly.  $F$  would consequently have to be below  $F_{MSY}$ . In the worst case the PIs 1.1.1, 1.1.3, 1.2.1 and 1.2.2 which most impact the SFW factors would be at low levels, whereas the indicators on information and accuracy of assessment would be at high levels to reach a score of 80 in P1 (though there could be substantial uncertainty in the assessment). The language of "harvest strategy is expected to achieve objectives reflected in the reference points" and having "sound rebuilding strategies in place" can be compared with the SFW language of "it is probable that fishing mortality rate is at or below a sustainable level (e.g.  $F_{MSY}$ ) that will allow the stock to maintain its productivity or to recover (if depleted)". The fishery is assumed a substantial contributor to mortality in its cumulative effect, therefore this scores 3.67 ("low concern") in SFW.

## **Criterion 2: Impacts on other retained and bycatch stocks**

### **Guiding principles**

- The fishery minimizes bycatch. Seafood Watch® defines bycatch as all fisheries-related mortality or injury other than the retained catch. Examples include discards, endangered or threatened species catch, pre-catch mortality and ghost fishing. All discards, including those released alive, are considered bycatch unless there is valid scientific evidence of high post-release survival and there is no documented evidence of negative impacts at the population level.
- Fishing mortality does not threaten populations or impede the ecological role of any marine life. Fishing mortality should be appropriate given each impacted species' abundance and productivity, accounting for scientific uncertainty, management uncertainty and non-fishery impacts such as habitat degradation.

### **Summary of Scores for Marine Stewardship Council**

<b>Stock</b>	<b>Inherent Resilience</b>	<b>Stock Status</b>	<b>Fishing Mortality</b>	<b>Subscore</b>	<b>Score</b> (subscore*discard modifier)	<b>Rank</b> (based on subscore)
	Rank	Rank (Score)	Rank (Score)			

Bycatch Species	Low	Very High Concern (1)	Moderate Concern (2.33)	1.53	1.14	Red
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The summary table and text in this section contains a score and justification only for the lowest scoring species. Nothing in the MSC standard precludes bycatch of endangered or threatened species, therefore in the worst case the stock status of the lowest scoring bycatch species assessed in Criterion 2 is a “very high concern,” which is applied to endangered or threatened species. While the MSC standard requires that Endangered, Threatened or Protected (ETP) species be managed to be maintained within biologically based limits, the approach for assessing whether fishing mortality is sustainable differs under MSC compared to the SFW approach. Specifically, SFW considers the cumulative impact of all fisheries impacting the species of concern, while MSC considers only the “marginal impact” of the fishery under assessment. As a result, it is possible even for ETP species that the fishery be one contributor to an unsustainable overall fishing rate, with fishing mortality considered a “moderate concern” by SFW. In combination with the “very high concern” for stock status, this results in a red score for Criterion 2. MSC’s requirement that the fishery under assessment not hinder rebuilding or recovery prevents a lower score.

### Justification of Ranking

#### Factor 2.1 Inherent Vulnerability: High

##### Relevant PIs and Scoring under Assumed Worst Case

None

##### Key Relevant Information:

As for the stock under assessment, the “inherent vulnerability” (SFW) or “productivity” (MSC) of retained and by-caught species is not explicitly addressed under the FAM (but is under the RBF). As opposed to the stock under assessment, there is no requirement on vulnerability or productivity in context of defining the RPs to determine stock status. The worst case was assumed to be any by-caught species of high vulnerability.

#### Factor 2.2 Stock status: Very High Concern (1)

##### Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
2.1.1 outcome	60	"within biologically based limits", if outside, measures are in place that are expected to ensure that the recovery of depleted stocks is not hindered
2.1.3 info & monitoring	100	accurate verifiable info on all retained species and consequences on their status
2.2.1 outcome	60	"within biologically based limits", if outside, measures are in place that are expected to ensure that the recovery of depleted stocks is not hindered
2.2.3 info &	100	accurate verifiable info on all bycatch species and consequences on

monitoring		their status
2.3.1 outcome	60	fishery effect likely within 'international requirements' for protection of ETP species and unlikely to have known 'unacceptable' impacts
2.3.3 info & monitoring	100	accurate verifiable info on all ETP species and consequences on their status

Key Relevant Information:

There is nothing in the MSC standard to preclude bycatch of endangered or threatened species, provided the impact is constrained appropriately (which is considered by SFW in a separate criterion, 2.3). Therefore the worst case for bycatch species is a status of “very high concern” (score of 1).

**Factor 2.3 Fishing mortality: Moderate Concern (2.33)**

Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
2.1.2 management	80	"partial strategy" that works with some confidence ensuring that stocks are within biologically based limits or that the fishery doesn't hinder recovery of depleted stocks
2.1.3 info & monitoring	100	accurate verifiable info on all retained species and consequences on their status
2.2.2 management	80	partial strategy that works with some confidence ensuring that stocks are within biologically based limits or that the fishery doesn't hinder recovery of depleted stocks
2.2.3 info & monitoring	100	accurate verifiable info on all bycatch species and consequences on their status
2.3.2 management	80	strategy highly likely achieves 'international requirements' for protection with some basis for confidence
2.3.3 info & monitoring	100	accurate verifiable info on all ETP species and consequences on their status

Key Relevant Information:

The relevant PIs are 2.3.1 (outcome), 2.3.2 (management), and 2.3.3 (information) for the worst case of ETP bycatch. At the 60 level, 2.3.1 requires that the known effects of the fishery are likely to be within limits of national and international requirements, and are unlikely to create unacceptable impacts. In some cases there may be no or very minimal international or national requirements for protection and rebuilding, so the first clause is irrelevant in the worst case. The second clause is interpreted as requiring that the known direct effects of the fishery are unlikely to hinder recovery or rebuilding of ETP species/stocks. In the assumed worst case, the information performance indicator (2.3.3) is scored at 100, which requires that “Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species”. Thus all known effects of the fishery can be assumed to encompass all the fishery’s effects, and therefore the fishery is unlikely to hinder recovery or rebuilding.



Seafood Watch considers the sustainability of cumulative fishing pressure affecting a bycatch species, rather than considering only the sustainability of the fishery under assessment in isolation. If the MSC standard used the same approach, the worst case scenario outlined above would be considered consistent with SFW “low concern”. However, the MSC FAM states that the assessment is based on the “marginal contribution” of the fishery under consideration, which can be examined by analysing what the fishery’s impact would be in isolation if mortality from all other fisheries was zero. Therefore, overall the fishing mortality experienced by the ETP species may be unsustainable, and the fishery’s contribution to that mortality may not be negligible, or may be unknown. (The case where the fishery’s contribution to overall mortality is unknown is possible even given the high score for the information performance indicator, because the total mortality experienced by the ETP species may be unknown. For example, it may be evident that cumulative mortality is too high based on ongoing declines in the population, and the mortality caused by the fishery under assessment may be well known and sustainable in isolation. But if total cumulative fishing mortality on the population as well as the maximum sustainable level of mortality is unknown, it cannot be determined whether the fishery under assessment would be considered a “substantial contributor” by SFW standards). However, the standard also requires that, in any case, the fishery does not hinder recovery or rebuilding (GCB 3.2.5, p. 76). This is consistent, at worst, with the SFW scoring of “moderate concern”; that is, in the worst case, overall overfishing is occurring and “Fishery contribution to mortality is unknown, stock/population is depleted, and management effectiveness is unknown or effective.” To score worse than this, either the fishery must be a known “substantial contributor” which implies that its contribution to mortality would “hinder recovery”, or there must be no effective management in place (which is precluded by PI 2.3.2, which even at SG60 requires that there be measures in place that are expected to ensure that the fishery does not hinder recovery, and which are considered likely to work).

**Factor 2.4 Overall discard rate : “>100%” (0.75)**

Relevant PIs and Scoring under Assumed Worst Case

None

Key relevant information:

While MSC encourages the minimization of discards, it doesn't set any quantitative threshold requirement. The MSC states that the impact of the fishery should be appropriate for the "ecosystem carrying capacity". As long it is considered appropriate for the ecosystem's carrying capacity, the discard-landing ratio could take any possible value and would not impede certification.

## **Criterion 3: Management effectiveness**

### **Guiding principle**

- The fishery is managed to sustain the long-term productivity of all impacted species. Management should be appropriate for the inherent vulnerability of affected marine life and should incorporate data sufficient to assess the affected species and manage fishing mortality to ensure little risk of depletion. Measures should be implemented and enforced to ensure that fishery mortality does not threaten the long-term productivity or ecological role of any species in the future.

**Summary of Scores for Marine Stewardship Council**

<b>Fishery</b>	<b>Management: Retained Species</b>	<b>Management: Non-retained species</b>	<b>Criterion 3</b>
	Rank (Score)	Rank (Score)	Rank Score
MSC FAM	Moderate Concern (3)	Moderate Concern (3)	<b>Yellow 3</b>

For SFW Criterion 3, while the MSC standard meets or even exceeds SFW requirements for highly effective in some areas, particularly excelling in requirements for stakeholder engagement and scientific research and monitoring, it corresponds to SFW standards for moderately effective, in the worst case, in the key areas of management strategy and implementation and recovery of stocks of concern. This result is driven by the lower standards for management of species assessed under Principle 2 (i.e., the requirement that the goal of management be to maintain species within biologically-based limits rather than at target levels). Principle 2 includes both retained species (assessed under SFW 3.1) and bycatch species (assessed under 3.2). As a result, management is scored as moderate for both retained and bycatch species.

**Justification of Ranking**

**Factor 3.1 Management of fishing impacts on retained species: Moderate Concern (3)**

<b>Fishery</b>	<b>Critical?</b>	<b>Mgmt strategy and implement.</b>	<b>Recovery of stocks of concern</b>	<b>Scientific research and monitoring</b>	<b>Scientific advice</b>	<b>Enforce.</b>	<b>Track record</b>	<b>Stakeholder inclusion</b>
MSC FAM	No	Moderately Effective	Moderately Effective	Highly Effective	Moderately Effective	Highly Effective	Moderately Effective	Highly Effective

Key relevant information:

SFW Criterion 3.1 addresses the harvest rule and management strategy for all managed species, including those assessed under Criterion 1 as well as any “other retained species”. As a result, both Principles 1 and 2 of the MSC standard could apply, as the managed species considered under 3.1 could encompass both the species covered by the unit of certification (addressed in

P1) and any other retained species (addressed in P2). In general, the standard is lower for the other retained species covered in P2, so this drives the worst case scenario. Management of retained species scores as a “moderate concern” overall due to moderately effective requirements for management strategy and implementation, recovery of stocks of concern, scientific advice, track record, and highly effective requirements for research and monitoring, enforcement and stakeholder engagement.

Detailed rationale:

*Management Strategy and Implementation: Moderately Effective*  
Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
1.2.1 harvest strategy	60	HS expected to achieve objectives, likely works
1.2.2 HCRs	60	Generally understood HCRs to reduce F if LRP is approached, in line with HS, some evidence that tools effective
2.1.1 outcome	60	"within biologically based limits", if outside, measures are in place that are expected to ensure that the recovery of depleted stocks is not hindered
2.1.2 management	80	"partial strategy" that works with some confidence ensuring that stocks are within biologically based limits or that the fishery doesn't hinder recovery of depleted stocks

For Principle 1 species, under 1.2.2, to pass MSC SG60 there must be harvest control rules (HCRs) in place that are generally understood and these HCRs act to reduce exploitation rates as limit reference points (LRPs) are reached (with some evidence that these HCRs are effective and appropriate). This corresponds with a SFW ranking of highly effective, “Fishery has highly appropriate strategy and goals, and there is evidence (scientific or other rigorous source) that the strategy is being implemented successfully”. However, for Principle 2 species, requirements are focused on maintaining species at “biologically based limits” (beyond which serious or irreversible harm may occur) (see PI 2.1.1, 2.1.2). This represents a lower bar than that used in both P1 of the MSC and the SFW criteria; for example, under SFW, appropriate management is considered use of reference points “with the goal of maintaining stock biomass at or above the point where yield is maximized”, i.e. MSY. This corresponds to a SFW moderately effective, “some effective management is in place, but there is a need for increased precaution” for species assessed under P2; thus the worst case ranking for management strategy and implementation is moderately effective.

*Recovery of stocks of concern: Moderately Effective*  
Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
1.1.3 rebuilding	80	rebuilding plan of 1 generation time that has been demonstrated to work
2.1.1 outcome	60	"within biologically based limits", if outside, measures are in place that are expected to ensure that the recovery of depleted stocks is

		not hindered
2.1.2 management	80	"partial strategy" that works with some confidence ensuring that stocks are within biologically based limits or that the fishery doesn't hinder recovery of depleted stocks

Rebuilding of stocks of concern is considered in MSC PIs 1.1.3, 2.1.1 and 2.1.2. As was the case for management strategy and implementation, the worst case occurs for species assessed under P2, in which case measures just must be “expected to result in fishery not causing the retained species to be outside biologically based limits” (2.1.1). This does not fully meet the SFW highly effective standard that “management has a rebuilding or recovery strategy in place with a high likelihood of success in an appropriate timeframe, and best management practices are in use to minimize mortality of these species to the greatest extent possible, and harvest control rules are in place that will allow for rebuilding”. This standard is not met because mortality need not be minimized to the greatest extent possible, only to the point where biologically based limits are not exceeded. However, in combination with PI 2.1.2, which requires some evidence and confidence that rebuilding strategies will be successful, it does imply that “management has a rebuilding or recovery strategy in place whose eventual success is probable, or best management practices to minimize mortality of “stocks of concern” are in use where needed and are believed to be effective,” as required for a ranking of moderately effective.

*Scientific Research and Monitoring: Highly Effective*  
Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
1.2.3 info & monitoring	100	comprehensive range of info, abundance, removals, distributions, fleet, environmental, all being monitored
1.2.4 assessment	100	externally peer reviewed, robustness tested, probabilistic RPs
2.1.3 info & monitoring	100	accurate verifiable info on all retained species and consequences on their status
3.2.4 research plan	100	Research plan in place, results available to "interested parties"

The assumed worst case scenario modeled here assigns a score of SG100 to most of the PIs that relate to scientific research and monitoring, including 1.2.3, 1.2.4, 2.1.3 and 3.2.4 (this is done to allow scoring at the SG 60 level for outcome metrics while meeting the requirement that scores average to 80). Taken together, these PIs require that: all information required by the HCRs is monitored with high frequency and a high degree of certainty, and there is a good understanding of uncertainties (1.2.3); assessments take into account species biology and uncertainties, are tested and found to be robust, and are subject to peer review (1.2.4); accurate information on all retained species is collected regularly with a high degree of certainty and is adequate to assess impacts on those species (2.1.3); and research is adequate to support management efforts (3.2.4). These standards meet (and in fact exceed) the SFW highly effective requirement that “the management process uses an independent and up-to-

date scientific stock assessment or analysis, or other appropriate method that seeks knowledge related to stock status, and this assessment is conducted regularly and is complete and robust”.

*Scientific Advice: Moderately Effective*

Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
1.2.1 harvest strategy	60	HS expected to achieve objectives, likely works
1.2.2 HCRs	60	Generally understood HCRs to reduce F if LRP is approached, in line with HS, some evidence that tools effective
2.1.2 management	80	"partial strategy" that works with some confidence ensuring that stocks are within biologically based limits or that the fishery doesn't hinder recovery of depleted stocks

Although scientific advice is not explicitly addressed, it is implicit in strategies that are in place (found in MSC: 1.2.1, 1.2.2, 2.1.2), that are expected to maintain species at biologically based limits or to ensure the fishery does not hinder recovery or rebuilding strategies. The worst-case scenario considered here has 1.2.1 and 1.2.2 scored at SG60 (requiring that the harvest strategy is expected to achieve management objectives and is likely to work, and that the HCR is implemented appropriately and effectively) and 2.1.2 at SG80 (requiring that there is an objective basis for confidence that the partial strategy to maintain species at biologically based limits will work). If scientific advice were regularly disregarded, the harvest strategy would not be expected to achieve management objectives (if HS was set disregarding advice) or would not be likely to work. For P2, if scientific advice were disregarded, there could not be an objective basis for confidence that the strategy would work. However lacking a specific PI addressing adherence to scientific advice, the standard does not unequivocally meet the SFW highly effective requirement that management nearly always follow scientific advice.

*Enforcement: Highly Effective*

Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
3.2.3 enforcement	60	there is monitoring & surveillance in place to enforce above said measures

Based on PI 3.2.3, monitoring control and surveillance mechanisms exist, are implemented and there is a reasonable expectation that they are effective, which aligns with SFW highly effective at SG 60: “Regulations and agreed voluntary arrangements are regularly enforced and independently verified, including VMS, logbook reports, dockside monitoring and other similar measures appropriate to the fishery”.

*Track Record: Moderately Effective*

Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
1.1.1 stock status	60	min. 70% chance to be above LRP

2.1.1 outcome	60	"within biologically based limits", if outside, measures are in place that are expected to ensure that the recovery of depleted stocks is not hindered
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Although track record is not explicitly addressed, it is implicit in the likelihood/certainty/confidence of management measures (HS, HCR and enforcement) that demonstrably work at the SG 60 or above, as well as the outcome-based requirements under P1 and P2. If management measures resulted in stock declines and did not allow stocks to recover, the stocks would not meet requirements under PI 1.1.1 (for species under assessment) and PI 2.1.1 (for other species). There may be some uncertainty in the track record, however, given that this is not specifically addressed, particularly for species covered under P2. This aligns with SFW moderately effective.

*Stakeholder inclusion: Highly Effective*

Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
3.1.2 consultation	60	Management includes consultation with main stakeholders. Organization of the fishery well understood
3.2.2 decision making	100	managers respond to the different challenges represented by the fishery with measures which are deemed to achieve MSC Principles 1 & 2

SG 60 on 3.1.2 requires that the management system include consultation processes, and SG 100 on 3.2.2 ensures that decision-making processes respond to all issues identified in a timely and transparent manner. Together, this aligns with SFW ‘highly effective’ as a worst-case scenario for the management system, as it ensures that “the management process is transparent and includes stakeholder input”.

**Factor 3.2 Management of fishing impacts on bycatch species: Moderate Concern (3)**

Fishery	All Species Retained?	Critical?	Mgmt strategy and implement.	Scientific research and monitoring	Scientific advice	Enforce.
MSC FAM	No	No	Moderately Effective	Highly Effective	Moderately Effective	Highly Effective

Key relevant information:

Performance indicators relevant to management of bycatch species are found in Principles 2 and 3. Because Principle 2 species are managed to a lower standard than both MSC Principle 1 species and SFW (requiring only that the goal be to maintain species within “biologically based limits”), the management strategy and implementation is considered equivalent to a SFW moderately effective in the worst case, resulting in a score of moderate concern for 3.2 overall.

Detailed rationale:

*Management Strategy and Implementation: Moderately effective*

Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
2.2.1 outcome	60	"within biologically based limits", if outside, measures are in place that are expected to ensure that the recovery of depleted stocks is not hindered
2.2.2 management	80	partial strategy that works with some confidence ensuring that stocks are within biologically based limits or that the fishery doesn't hinder recovery of depleted stocks
2.3.1 outcome	60	fishery effect likely within 'international requirements' for protection of ETP species and unlikely to have known 'unacceptable' impacts
2.3.2 management	80	strategy highly likely achieves 'international requirements' for protection with some basis for confidence

MSC's PIs 2.2.1 and 2.2.2 address management of bycatch species, and 2.3.1 and 2.3.2 address ETP species management. Like the PIs addressing other retained species under P2 (2.1.1 and 2.1.2), these PIs are focused on maintaining species within "biologically based limits", or in the case of ETP species, avoiding "unacceptable impacts". This ensures that there is some appropriate strategy in place as required to meet SFW moderately effective, but does not ensure that impacts on the bycatch species are minimized and that strategies are highly effective and precautionary, as required for SFW highly effective.

*Scientific Research and Monitoring: Highly effective*

Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
2.2.3 info & monitoring	100	accurate verifiable info on all bycatch species and consequences on their status
2.3.3 info & monitoring	100	accurate verifiable info on all ETP species and consequences on their status
3.2.4 research plan	100	Research plan in place, results available to "interested parties"

PIs 2.2.3 and 2.3.3 require that "accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP/bycatch/retained species" and that this information is "adequate to support comprehensive strategy for management." These factors are scored at the SG 100 level and set a very high standard that meets SFW highly effective, which requires that data collection and analysis are "sufficient to determine that goals are being met". In addition, PI 3.2.4 requires scientific research plans in place.

*Scientific Advice: Moderately effective*

#### Relevant PIs and Scoring under Assumed Worst Case

<b>PI</b>	<b>Score</b>	<b>Summary</b>
2.2.2 management	80	partial strategy that works with some confidence ensuring that stocks are within biologically based limits or that the fishery doesn't hinder recovery of depleted stocks
2.3.2 management	80	strategy highly likely achieves 'international requirements' for protection with some basis for confidence

As in 3.1, scientific advice is not explicitly considered (precluding a score of “highly effective”) but can be considered implicit in the requirements for strategies that work with some confidence to maintain populations within biologically based limits. This is scored at the moderately effective level.

*Enforcement: Highly effective*

#### Relevant PIs and Scoring under Assumed Worst Case

<b>PI</b>	<b>Score</b>	<b>Summary</b>
3.2.3 enforcement	60	there is monitoring & surveillance in place to enforce above said measures

Scored as in 3.1 (see above).



## **Criterion 4: Impacts on the habitat and ecosystem**

### **Guiding principles**

- The fishery is conducted such that impacts on the seafloor are minimized and the ecological and functional roles of seafloor habitats are maintained.
- Fishing activities should not seriously reduce ecosystem services provided by any fished species or result in harmful changes such as trophic cascades, phase shifts or reduction of genetic diversity.

### **Summary of Scores for Marine Stewardship Council**

<b>Fishery</b>	<b>Gear type and substrate</b>	<b>Mitigation of gear impacts</b>	<b>EBFM</b>	<b>Criterion 4</b>
	Rank (Score)	Rank (Score)	Rank (Score)	Rank Score
MSC FAM	High Concern (1)	Moderate mitigation (0.5)	Low Concern (4)	Yellow 2.45

For SFW Criterion 4, the MSC standard does not prevent certification of bottom-tending gear types in rocky habitats; therefore this is the worst case, translating to a SFW score of “high concern” for the impact of the fishing gear on the substrate. Requirements of management of habitat impacts correspond to SFW “moderate mitigation”. In the case where the fishery is catching a species of exceptional importance to the ecosystem, but it is not a low trophic level species (for which MSC has rigorous requirements), the ecosystem-based management requirements under MSC are equivalent to a SFW score of “low concern”, because they require some policies in place to protect ecosystem functioning, but these do not have to meet the goal of allowing the species to fulfill its natural ecological role.

### **Justification**

#### **Factor 4.1 Impact of the fishing gear on the substrate: High Concern (1)**

##### Relevant PIs and Scoring under Assumed Worst Case

<b>PI</b>	<b>Score</b>	<b>Summary</b>
2.4.1 outcome	60	<40% probability that irreversible harm is caused

##### Key relevant information:

While SFW defines risk categories based on the gear and the habitat with which the gear interacts, MSC uses a terminology referring to the “probability of causing irreversible harm” (required to be <40%). How to determine the “probability” of irreversible harm is not clear, despite considerable guidance on what constitutes serious or irreversible harm. For

instance a trawl or dredge on gravel, cobble or boulder would score “high concern” in the SFW methodology but MSC might consider that the “probability” of causing “irreversible harm” is not sufficient (<40%) to impede certification. Where SFW is restricted to scores based on the gear and habitat interaction, the MSC assessor must interpret the impact of gear on habitat, and the likelihood of irreversible harm. The information to reliably determine the “probability of causing irreversible harm” is in practice unlikely ever readily available.

**Factor 4.2 Modifying factor: Mitigation of fishing gear impacts: Moderate mitigation (0.25)**

Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
2.4.2 management	80	partial strategy that likely works to achieve habitat SG80 outcome (<30% probability that irreversible harm is caused)

Key relevant information:

MSC PI2.4.2 at SG 80 requires that “there is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above [where the probability of serious or irreversible harm is <30%]. There is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved. There is some evidence that the partial strategy is being implemented successfully.” This exceeds SFW “minimal mitigation” which requires that “modifications or measures anticipated to be effective are being tested or developed” (because for the MSC case, these measures must already be in place). The MSC requirement is similar to SFW’s moderate mitigation, which calls for current implementation of effort reduction, habitat protection, gear modification, or “other measures... that are reasonably expected to be effective”, where “effective” is described as “a) goal is sufficient to maintain the structure and function of affected ecosystems in the long-term, and b) there is scientific evidence that they are meeting these goals.” It is not clear in practice how to determine a probability of irreversible harm; however, the MSC is currently (2013) addressing this issue as part of the Fishery Standard Review. At the date of publication, recommendations (although not yet finalized) include revisions to the habitat requirements that will incorporate a new Productivity-Susceptibility Analysis approach for assessing benthic impacts (see <http://improvements.msc.org/database/benthic-impacts>). It is believed that this improvement will clarify the goal of the measures that would need to be in place to achieve SG80 for PI 2.4.2. Further, despite some freedom of interpretation under both standards, we assume a similar interpretive lens applied to the MSC as to SFW (see “Benchmarking Assumptions”), such that the goals of reaching <30% probability of irreversible harm (MSC) and of maintaining long-term ecosystem structure and function (SFW) are considered equivalent, and both standards require a reasonable expectation of success in meeting those goals. Therefore, this factor is scored as “moderate mitigation.”

### Factor 4.3 Ecosystem and Food Web Considerations: Low Concern (4)

#### Relevant PIs and Scoring under Assumed Worst Case

PI	Score	Summary
2.5.1 outcome	60	the fishery unlikely to disrupt key elements of ecosystem functioning that would lead to irreversible harm
2.5.2 management	80	strategy that likely works is in place taking into account all available information to reach SG80 ecosystem outcome
2.5.3 info & monitoring	100	interaction of fishery with ecosystem elements has been investigated in detail and the main function of these elements in the system is understood

#### Key relevant information:

SFW requirements under 4.3 pertain to policies to protect ecosystem functioning (which are evaluated most stringently in cases where “exceptional species” are caught), the use of FADs, and the use of hatcheries. Hatcheries (primarily used extensively in salmonid fisheries) and FADs (used in fishing for tuna and other pelagics with purse seine gear) are both considered irrelevant to the worst-case scenario, which is based on a bottom trawl fishery, because neither salmonids nor tuna and other pelagics are fished with bottom trawl gear and FADs are not used with bottom trawls. Therefore this criterion is scored on the basis of MSC PIs pertaining to protecting ecosystem function, which include PIs 2.5.1, 2.5.2 and 2.5.3. Taken together, as scored in the assumed worst case scenario, these PIs require that there is a good understanding of interactions between the fishery and ecosystem (PI 2.5.3 at SG100), that the fishery is unlikely to disrupt the ecosystem to the point of serious or irreversible harm (PI 2.5.1 at SG60), and that there is a partial strategy, expected to restrain impacts on the ecosystem to achieve an outcome of SG80 for PI 2.5.1 (see below), likely to work, and with evidence of successful implementation (PI 2.5.2 at SG80).

In the worst case, the fishery is targeting a species of exceptional importance to the ecosystem. The MSC has very rigorous requirements for fisheries catching key low trophic level species, which would be considered an exceptional species according to SFW; however, it is possible that the fishery is catching an exceptional species that is not a key low trophic level species, but the harvest of which still may have serious ecosystem consequences (for example, a top predator, e.g. sharks). In this case, for a ranking of “very low concern”, SFW requires that the HCR “protects enough biomass to allow these exceptional species to fulfill their ecological role,” which is not fully assured by the corresponding MSC requirement under 2.5.2 that the impact on the ecosystem is constrained sufficiently to reach the outcome performance level of SG80, i.e. “highly unlikely” to create ecosystem impacts that result in “serious or irreversible harm.” (Fulfilling its ecological role is defined by SFW as the natural trophic role of a species/population, a higher requirement than avoiding irreversible harm). However, PI 2.5.2 does meet the SFW requirements for “low concern,” i.e. that “policies are in place to protect ecosystem functioning.”

# Overall Recommendation

Final Score = geometric mean of the four Scores (Criterion 1, Criterion 2, Criterion 3, Criterion 4).

The overall recommendation is determined as follows:

- **Best Choice** = Final Score between 3.2 and 5, **and** no Red Criteria, **and** no Critical scores
- **Good Alternative** = Final score between 2.2 and 3.199, **and** Management is not Red, **and** no more than one Red Criterion other than Management, **and** no Critical scores
- **Avoid** = Final Score between 0 and 2.199, **or** Management is Red, **or** two or more Red Criteria, **or** one or more Critical scores.

## Marine Stewardship Council

Stock	Fishery	Impacts on the Stock	Impacts on other Species	Management	Habitat and Ecosystem	Overall
		Rank (Score)	Lowest scoring species Rank*, Subscore, Score	Rank Score	Rank Score	Recommendation Score
Target Species:FAM	MSC FAM	Green 3.83	Bycatch Species Red, 1.53,1.14	Yellow 3	Yellow 2.45	<b>GOOD ALTERNATIVE 2.38</b>

## Glossary

The different standards use different definitions of the same terms, mainly in context with the technical details of defining stock status. Differences in the usage of terms are listed between MSC and SFW (Table 4). The other standards either do not use these technical terms or do not define them explicitly.

<b>Term</b>	<b>MSC</b>	<b>SFW</b>
<b>Limit reference point <math>B_{lim}</math></b>	“Biologically based limits”; “recruitment overfishing”	Limit reference point below which reproduction is unsafe / impaired
<b>Depleted</b>	Below the population biomass target reference point $B_{MSY}$	Below population biomass limit reference point $B_{lim}$ (below which reproduction is unsafe / impaired)
<b>Overfished</b>	Below biomass limit reference point $B_{lim}$ (below which reproduction is unsafe / impaired)	Below biomass limit reference point $B_{lim}$ (below which reproduction is unsafe / impaired)
<b>Overfishing (occurring)</b>	Not clearly defined. “overfishing” is mentioned in the context of depletion, which would in the MSC-sense refer to $B_{MSY}$ and thus $F_{MSY}$ , but also in the context of recruitment overfishing, which would refer to $B_{lim}$ or $F_{lim}$ .	Fished at a rate above the target reference point for fishing mortality rate $F_{MSY}$
<b>RPs based on assumed pristine / unfished biomass <math>B_0</math></b>	“Generic reference points”	Default reference points

**Table 4: Different interpretations of same term used by MSC and SFW**

## **About Seafood Watch®**

Monterey Bay Aquarium's Seafood Watch® program evaluates the ecological sustainability of wild-caught and farmed seafood commonly found in the United States marketplace. Seafood Watch® defines sustainable seafood as originating from sources, whether wild-caught or farmed, which can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems. Seafood Watch® makes its science-based recommendations available to the public in the form of regional pocket guides that can be downloaded from [www.seafoodwatch.org](http://www.seafoodwatch.org). The program's goals are to raise awareness of important ocean conservation issues and empower seafood consumers and businesses to make choices for healthy oceans.

Each sustainability recommendation on the regional pocket guides is supported by a Seafood Report. Each report synthesizes and analyzes the most current ecological, fisheries and ecosystem science on a species, then evaluates this information against the program's conservation ethic to arrive at a recommendation of "Best Choices", "Good Alternatives" or "Avoid". The detailed evaluation methodology is available upon request. In producing the Seafood Reports, Seafood Watch® seeks out research published in academic, peer-reviewed journals whenever possible. Other sources of information include government technical publications, fishery management plans and supporting documents, and other scientific reviews of ecological sustainability. Seafood Watch® Research Analysts also communicate regularly with ecologists, fisheries and aquaculture scientists, and members of industry and conservation organizations when evaluating fisheries and aquaculture practices. Capture fisheries and aquaculture practices are highly dynamic; as the scientific information on each species changes, Seafood Watch®'s sustainability recommendations and the underlying Seafood Reports will be updated to reflect these changes.

Parties interested in capture fisheries, aquaculture practices and the sustainability of ocean ecosystems are welcome to use Seafood Reports in any way they find useful. For more information about Seafood Watch® and Seafood Reports, please contact the Seafood Watch® program at Monterey Bay Aquarium by calling 1-877-229-9990.

### **Disclaimer**

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## Guiding Principles

Seafood Watch™ defines sustainable seafood as originating from sources, whether fished<sup>1</sup> or farmed, that can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems.

The following **guiding principles** illustrate the qualities that capture fisheries must possess to be considered sustainable by the Seafood Watch program:

- *Stocks are healthy and abundant.*
- *Fishing mortality does not threaten populations or impede the ecological role of any marine life.*
- *The fishery minimizes bycatch.*
- *The fishery is managed to sustain long-term productivity of all impacted species.*
- *The fishery is conducted such that impacts on the seafloor are minimized and the ecological and functional roles of seafloor habitats are maintained.*
- *Fishing activities should not seriously reduce ecosystem services provided by any fished species or result in harmful changes such as trophic cascades, phase shifts, or reduction of genetic diversity.*

Based on these guiding principles, Seafood Watch has developed a set of four sustainability **criteria** to evaluate capture fisheries for the purpose of developing a seafood recommendation for consumers and businesses. These criteria are:

1. Impacts on the species/stock for which you want a recommendation
2. Impacts on other species
3. Effectiveness of management
4. Habitat and ecosystem impacts

Each criterion includes:

- Factors to evaluate and rank
- Evaluation guidelines to synthesize these factors and to produce a numerical score
- A resulting numerical score and **rank** for that criterion

Once a score and rank has been assigned to each criterion, an overall seafood recommendation is developed on additional evaluation guidelines. Criteria ranks and the overall recommendation are color-coded to correspond to the categories on the Seafood Watch pocket guide:

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<sup>1</sup> “Fish” is used throughout this document to refer to finfish, shellfish and other invertebrates.

**Best Choices/Green:** Are well managed and caught or farmed in environmentally friendly ways.

**Good Alternatives/Yellow:** Buy, but be aware there are concerns with how they're caught or farmed.

**Avoid/Red:** Take a pass on these. These items are overfished or caught or farmed in ways that harm other marine life or the environment.