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Improving efficiency in generating submissions and consistency of outcomes for Marine Stewardship Council (MSC) based assessments

WJ Fletcher, D Gaughan and LM Bellchambers

Government of Western Australia
Department of Fisheries

Fisheries Research Division
Western Australian Fisheries and Marine Research Laboratories
PO Box 20 NORTH BEACH, Western Australia 6920

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Enquiries:
WA Fisheries and Marine Research Laboratories, PO Box 20, North Beach, WA 6920
Tel: +61 8 9203 0111
Email: library@fish.wa.gov.au
Website: www.fish.wa.gov.au
ABN: 55 689 794 771

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Department of Fisheries
3rd floor, The Atrium
168 – 170 St Georges Terrace
PERTH WA 6000
Telephone: (08) 9482 7333
Facsimile: (08) 9482 7389
Website: www.fish.wa.gov.au
ABN: 55 689 794 771

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2013/038 Improving efficiency in generating submissions and consistency of outcomes for Marine Stewardship Council (MSC) based assessments

PRINCIPAL INVESTIGATOR: Dr W J Fletcher

ADDRESS:

Department of Fisheries,

Government of Western Australia

Western Australian Fisheries and Marine Research Laboratories

PO Box 20

North Beach, WA 6920

Telephone: 08 9203 0111 Fax: 08 9203 0199

OBJECTIVES:

1. Increase the efficiency of generating submissions for MSC assessments
2. Minimise the likelihood of unnecessary conditions being imposed during MSC assessments

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1 Non-technical summary

OUTCOMES ACHIEVED TO DATE

This project has developed a Marine Stewardship Council (MSC) submission template specifically designed to address MSC performance indicators and scoring criteria and provides examples of the types of information required to from MSC certified fisheries that scored well against each of the performance indicators. The MSC submission template has been used for the pre-assessment of all the states' fisheries and the full assessment of Exmouth Gulf Prawn Managed Fishery, Shark Bay Prawn Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery and The West Coast Estuarine Managed Fishery (Area 2: Peel-Harvey Estuary) which includes commercial fisheries for blue swimmer crab and sea mullet and the Peel-Harvey Estuary Blue Swimmer Crab Recreational Fishery.

This study has also provided an unique opportunity to develop strategic alliances through the establishment of a MSC Reference Group, with members from a range of countries and institutes undertaking similar MSC process. The group has assisted to generate improvements in the MSC process and consistencies in assessment.

In addition, this study has provided an important insight into how fishery characteristics such as target species, fishing gear and region of the world can influence MSC assessment outcomes and has identified common risk areas for fisheries to consider prior to beginning the certification process.

The prevalence of fishery certification schemes and associated ecolabels has grown over the last ten years with numerous ecolabels now in the marketplace e.g. Friends of the Sea, Naturland, SAI Global Trust (Parkes et al. 2010, Washington and Ababouch 2011, Ward and Phillips 2013). However, one of the most prominent and well regarded, particularly by eNGOs, is the Marine Stewardship Council (MSC) (Gutiérrez et al. 2012, Ponte 2012, Bush et al. 2013, Ward and Phillips 2013) which accounts for greater than 10 % of annual global harvest of wild capture fisheries (MSC 2014b). The MSC certification process involves independent third-party assessments of a fishery based on evaluations made against three broad principles; P1 - assessment of target species, P2 - ecological and environmental impact of the fishery and P3 - governance and management of the fishery. There are currently 7 Australian MSC certified fisheries; Western Australia Rock lobster, Australia Mackerel Icefish, Heard Island and McDonald Islands Toothfish, Lakes and Coorong Fishery, Spencer Gulf King Prawn, Australia Northern Prawn and Macquarie Island Toothfish, with several others in various stages of assessment.

Since 2000, the MSC assessment process has also evolved with the development of a Fisheries Assessment Methodology (FAM) containing performance indicators and explicit sub-criteria to allow a comprehensive and objective review process (Cambridge et al. 2011). However, despite attempts to make the assessment process more objective and equal across fisheries, a lack of understanding of the process and requirements by the fishery client, managers and scientists can lead to inaccurate assessments resulting in onerous conditions.

As a large amount of resources may be required to address a condition these findings have important implications for fisheries entering MSC assessment, particularly small-scale and developing-world fisheries that have limited resources available and therefore need to minimise the risk of receiving a condition.

Experience over the last 13+ years with the ongoing certification of WA rock lobster suggests that a single comprehensive document that is closely aligned with the MSC performance indicators and criteria provides assessors with an accurate and comprehensive understanding of the fishery that reduces the likelihood of gaps in the information available for assessment minimising conditions and ensuring improvement over time (Bellchambers et al. 2014).

The results of this study have provided important information that can be used by prospective fisheries to identify potential risk areas prior to entering the MSC certification process. While each fishery is unique, particular characteristics of a UoC, such as species group, region or fishing method, can significantly affect whether it receives conditions and where these conditions are most likely to occur. By understanding common risk areas based on these factors, fisheries are able to better prepare for certification by focusing resources where they are most needed. In addition, by minimising these risks prior to assessment fisheries can also reduce the likelihood of receiving conditions, which will ultimately reduce both the time and cost of certification.

KEYWORDS: **Marine Stewardship Council, ecolabelling, seafood certification**

2 Acknowledgments

We thank the members of Western Australian Marine Stewardship Council Reference Group for their contributions on the project, particularly for their input during the Perth workshop. We also thank Mr Richard Stoklosa for facilitating and documenting the risk assessment component of the WA MSC Reference Group workshop. Many thanks to the MSC team; Emily Fisher Alastair Harry and Kendra Travaille for their contributions to this project

3 Background

Concern over the sustainable use and management of marine resources has led to a rapid increase in seafood certification schemes and eco-labelling over the last ten years (Parkes et al. 2010, Gale and Haward 2011, Washington and Ababouch 2011, Ponte 2012, Tlusty 2012). Recent reports indicates that ~ 88 % of the total catch of Australian fisheries are from sustainable stocks (FAO 2014, Flood et al. 2014). Of the eight regions (6 States, 1 Territory and the Commonwealth) that comprise Australia's fisheries management jurisdictions, Western Australian (WA) fisheries are responsible for 24 % of the total gross value of Australia's wild capture fisheries (Flood et al. 2014). Western Australia is well regarded internationally in fisheries management with 97 % of WA fisheries assessed as sustainably managed, of the remaining, management responses are in place or proposed to support stock recovery (Kearney 2013, Fletcher and Santoro 2014, Flood et al. 2014).

Despite Australia's positive fisheries management track record a recent survey indicated that while 56 % of respondents believed that Australia's fishing industry's practices around sustainability were ahead of those overseas, only 42 % think that the Australian fishing industry is sustainable (Sparks 2013). While, there are numerous 'what fish to eat' guides i.e. Australia's sustainable seafood guide (http://www.sustainableseafood.org.au) and good fish bad fish (http://goodfishbadfish.com.au) there is clearly still a gap between fisheries management and science and community perceptions, as is the case elsewhere worldwide (Kearney 2013, Maunder and Piner 2015).

In early 2012, the WA State Government announced the allocation of approximately AUS $14 million to third party certification of commercial fisheries (Moore 2012; also see www.wamsc.com.au). The Government was seeking a range of benefits from the certification of the States' fisheries such as; independent, credible and defendable assessments of sustainability in regard to industry practices and government stewardship, secure access to markets, and a reduction in independent requests for stock assessment information from parties such as the Commonwealth Government, large food retailers and non-government organizations (DoF 2012).

Following a review of third party certification programs, Marine Stewardship Council (MSC) was recommended as the preferred third party certification scheme for WA commercial fisheries as it is the most widely recognized and accepted third party fishery sustainability scheme currently available (Gutiérrez et al. 2012, Bush et al. 2013) and it is supported by a number of eNGOs and large retail organisations such as Coles and Woolworths in Australia.

The MSC certification process involves the independent, third-party assessment of a fishery or unit(s) of certification (UoC; defined as a target species in a fishing area by fishing method) against an established standard. The MSC standard is based on three Principles: Principle 1 (P1) — assessment of target stocks; Principle 2 (P2) — ecological and environmental impact of the fishery; and Principle 3 (P3) — governance and management of the fishery. Each Principle consists of a series of performance indicators (PIs) against which the fishery (or UoC) is allocated a score out of 100. If any PI receives a score of less than 60, the fishery automatically fails. A score of 60 – 79 represents a conditional pass, where

additional corrective measures are required in order to meet the criteria. If a condition is placed on the fishery, the fishery must implement an agreed action plan to deliver the required improvements, so that the score can be raised to at least the 80 level, within the five year assessment period. A score of 80 – 100 is an unconditional pass i.e. the fishery is considered to currently meet the MSC criteria. In addition, to scoring above 60 for each of the PIs a fishery (or UoC) must pass each of the three principles individually (i.e. scores cannot be averaged across principles) to successfully obtain MSC certification.

Since 2000, the MSC program has expanded rapidly with 255 fisheries certified worldwide and an additional 121 fisheries in assessment (www.msc.org). Certified fisheries span a large spectrum of global fishing practices, ranging from the 1.2 million tonne Alaskan Pollock fishery operated by sophisticated factory ships to the Ashtamudi Estuary fishery where clams are hand-gathered from dugout canoes. Also certified are small-scale, multi-sector fisheries, such as South Australia's Lakes and Coorong fishery, as well as single vessels and fishing co-operatives (i.e. the American Albacore Fishing Association) that represent only a portion of total catches of a fishery resource.

4 Need

In 2012, the WA Minister of Fisheries announced that the State Government had committed to a four-year program to seek third-party sustainability certification for WA's commercial fisheries. This initiative involves all WA commercial fisheries being put through the pre-assessment stage of the MSC certification process. Funding is also available to support the certification process for those fisheries that choose to move to a full MSC assessment (www.wamsc.com.au). This ambitious project is seen as a mechanism for instilling public confidence in fisheries management, providing a social licence to fish and closing the gap between fisheries science and perceptions of the general public.

Although a wide variety of fisheries have been MSC-certified, a number of concerns have been raised about the certification process and its effectiveness, particularly in regard to the accessibility of the program for small-scale or developing-country fisheries (Pérez-Ramirez et al. 2012). The amount of resources required to achieve and maintain certification means that often large-scale fisheries that have dedicated research programs and formal governance frameworks in place are better positioned to pursue MSC certification than small-scale or developing-world fisheries (OECD 2011, Washington and Ababouch 2011, Gutiérrez et al. 2012, Ponte 2012, Ward and Phillips 2013).

In addition, the consistency with which the standard is applied across the range of fisheries in the certification process has also been questioned (Gilmore 2008, Jacquet et al. 2010, Washington and Ababouch 2011, Ponte 2012). Prior to 2010, fisheries were assessed using a fishery-specific assessment tree, which allowed greater flexibility in assessment but also led to inconsistencies in the scoring of similar fisheries (Gilmore 2008, Ward 2008). This was partly due to different interpretations of the PIs by different assessors (Gilmore 2008, Ward 2008, Jacquet et al. 2010) or the level of involvement of environmental non-governmental organisations (Gilmore 2008, Christian et al. 2013). The implementation of a standard Fisheries Assessment Methodology (FAM) has partly addressed the inconsistencies in assessment by establishing a more comprehensive and objective review process (Cambridge et al. 2011, Martin et al. 2012, Ponte 2012) although it has not completely eradicated the issues.

The MSC assessment process requires a large amount of technical knowledge and information (Washington and Ababouch 2011, Phillips and Ward 2013, Bellchambers et al. 2014) which is largely the responsibility of the fishery client and associated managers and scientists to provide. Therefore, it is crucial that the fishery and associated parties have a sound understanding of the MSC requirements and the potential areas of weakness in the fishery undergoing assessment (Heupel and Auster 2013, Bellchambers et al. 2014). Failure of the fishery to provide sufficient information to address the PIs can lead to delays in the assessment process or result in conditions being placed on the fishery (Heupel and Auster 2013, Ward and Phillips 2013, Bellchambers et al. 2014) both of which can significantly increase the costs associated with both the initial assessment and maintaining certification (Goyert et al. 2010, Pérez-Ramírez et al. 2012, Christian et al. 2013). Given the extent of WA's commitment to the MSC a critical part of the process is to ensure accurate and efficient assessments to minimise conditions and efficiently use public resources.

5 Objectives

5.1 Objective 1: Increase the efficiency of generating submissions for MSC assessments

Experience with WA rock lobster MSC assessments suggests that a single comprehensive document that is closely aligned with the MSC performance indicators and criteria provides assessors with an accurate and comprehensive understanding of the fishery that reduces the likelihood of gaps in the information available for assessment (Bellchambers et al 2014). In addition, this approach highlights to the fishery client areas that may require additional data analysis or documentation prior to assessment, which may in some cases be achieved by revisiting unanalysed historical datasets or unpublished research. A fishery or client is expected to provide all relevant evidence and documentation to the assessment team, as in general, the assessment team are not resourced to conduct their own extensive research or data analysis on the fishery under assessment (Phillips et al. 2003). While the FAM contains performance indicators and explicit criteria by which a fishery will be assessed, there are no specific guidelines regarding the format of supporting documentation to be provided by the client. Therefore, the aim of this objective was to develop a template to collate the information required to ensure accurate assessments and to increase efficiency. In addition, to increase the understanding of the MSC FAM and how it applies to WA fisheries an international MSC reference group was established. The group was established to provide advice and guidance on how to align current WA fisheries management, assessment and monitoring with the MSC standard and provide practical solutions on issues where the two diverged.

5.2 Objective 2: Minimise the likelihood of unnecessary conditions being imposed during MSC assessments

Previous experience indicates that a large amount of resources may be required to address a condition placed on a fishery during MSC assessment. This is particularly important in small-scale and developing-world fisheries that have limited resources available and therefore need to minimise the risk of receiving a condition. Since 2013, MSC has produced a Global Impacts Report that includes a quantitative evaluation of the MSC's effectiveness based on a series of selected performance indicators. Building on the outcomes of the 2014 Global Impacts Report (MSC 2014b) we investigate systematic trends in conditions received by MSC-certified fisheries based on general fishery characteristics with the aim of identifying common areas of risk based on fishery characteristics.. The aim of this study is to provide guidance for prospective fisheries on potential risk areas prior to entering the certification process to allow them to focus (often limited) resources prior to assessment and therefore reduce the likelihood of receiving conditions, ultimately reducing the time and cost of certification.

6 Methods

6.1 Objective 1: Increase the efficiency of generating submissions for MSC assessments

6.1.1 Development of a MSC submission template for fishery clients

A submission template was developed using the performance indicators and scoring criteria from FAM v1.3 (MSC 2013) (see Appendix 4). Examples of MSC certified fisheries that scored well on various PIs have been included to illustrate a range of approaches for addressing the PIs and scoring criteria. All examples were obtained from Public certification results of certified fisheries available on the MSC website (www.msc.org).

6.1.2 Formation of an international MSC reference group

An international MSC reference group was been formed to ensure the outputs of the project are applicable to a wide range of fisheries and that potential implications of FAM 2.0 have been considered. The MSC reference group has representatives from a range of countries (see Appendix 3) including representatives from MSC, FRDC and the conservation sector to encompass the a range of experience and influences from different sectors. The first meeting of the group was be held from 31st March – 4th April 2014 in Perth, WA. There were four objectives for the workshop.

1. To provide advice on the development of templates to assist with the co-ordination of data and information required for MSC assessment
2. To evaluate the consistency between assessments by different CABs for some key areas of concern and identify solutions for improvement where required
3. To develop and assess alternative methods for assessing stock status and setting references points for data limited fisheries using catch and effort data
4. To assess an alternative risk assessment method, including guidelines for scoring that are consistent with MSC's scoring guidepost model

6.2 Objective 2: Minimise the likelihood of unnecessary conditions being imposed during MSC assessments

6.2.1 Collation of data from certified fisheries

Data for all UoCs that were certified by the MSC prior to October 2014 were collated from Public Certification Reports available on the MSC website (www.msc.org). For each UoC, information included the target species, fishing method and location of the fishery, as well as the individual scores awarded for each of the PIs under the three Principles. In order to allow for comparison across UoCs, the dataset was limited to those fisheries assessed or re-assessed using the FAM v1 default assessment tree. Catch and grow / cultivation fisheries and salmon fisheries were excluded from the analyses as these fisheries are assessed against different assessment trees, along with a small number of UoCs with multiple fishing gear types. All data from PI 1.1.3 Stock Rebuilding were also removed, as few fisheries have been assessed as depleted and have therefore received a score for this PI.

6.2.2 Factors affecting conditions received

In order to determine broad risk areas, the UoCs were grouped based on three factors: target species, fishing method and geographic region (Table 1). Target species were aggregated into nine broad taxonomic groups. Invertebrates were divided into three groups: molluscs (Class: Bivalvia), shrimp (Family: Peneidae) or crab / lobster (Order: Decapoda). The majority of all certified finfish species were from one of five orders; all other species were assigned to an 'other fish' grouping (Table 1). Fishing methods were classified into eight groups based on operation and level of environmental impacts. For example, the 'net' category included various types of static gillnet fisheries but excluded active methods such as trawl or seine netting, which were defined as separate groups. Six global regions were defined based on geographically-discrete locations or by aggregating areas where there were relatively small numbers of certified fisheries into circumglobal regions of common latitudes, e.g. the 'Tropic / sub-tropic' that included the Central Pacific, Atlantic and Indian Oceans. The UoCs were aggregated into the factor groupings with the intention of making the data set as balanced as possible (Table 1).

Statistical analyses of the data were performed using the computing language R (R Core Team 2014, version 3.1.2). The effect of the three discrete factors (species group, fishing method and region) on the composition of conditions received by fisheries within each Principle (P1, P2 and P3) was examined with Permutational Multivariate Analysis of Variance (PERMANOVA; Anderson 2001) using the package vegan (Oksanen 2015). Analyses for each Principle were based on binary scores for each PI, where a '1' represented an individual PI score < 80 (obtained a condition) or '0' a PI score ≥ 80 (unconditional pass). For each Principle, PERMANOVA tests were based on a Euclidean distance matrix of the binary scores and 4999 permutations. All factors in the analysis were considered to be fixed. Due to the unbalanced data set, it was not possible to include any potential interactions between factors in the analysis. Pairwise comparisons of group centroids were conducted using Tukey's HSD tests when results indicated significant ($p \leq 0.05$) differences between groups.

6.2.3 Identifying specific risk areas and mitigation strategies

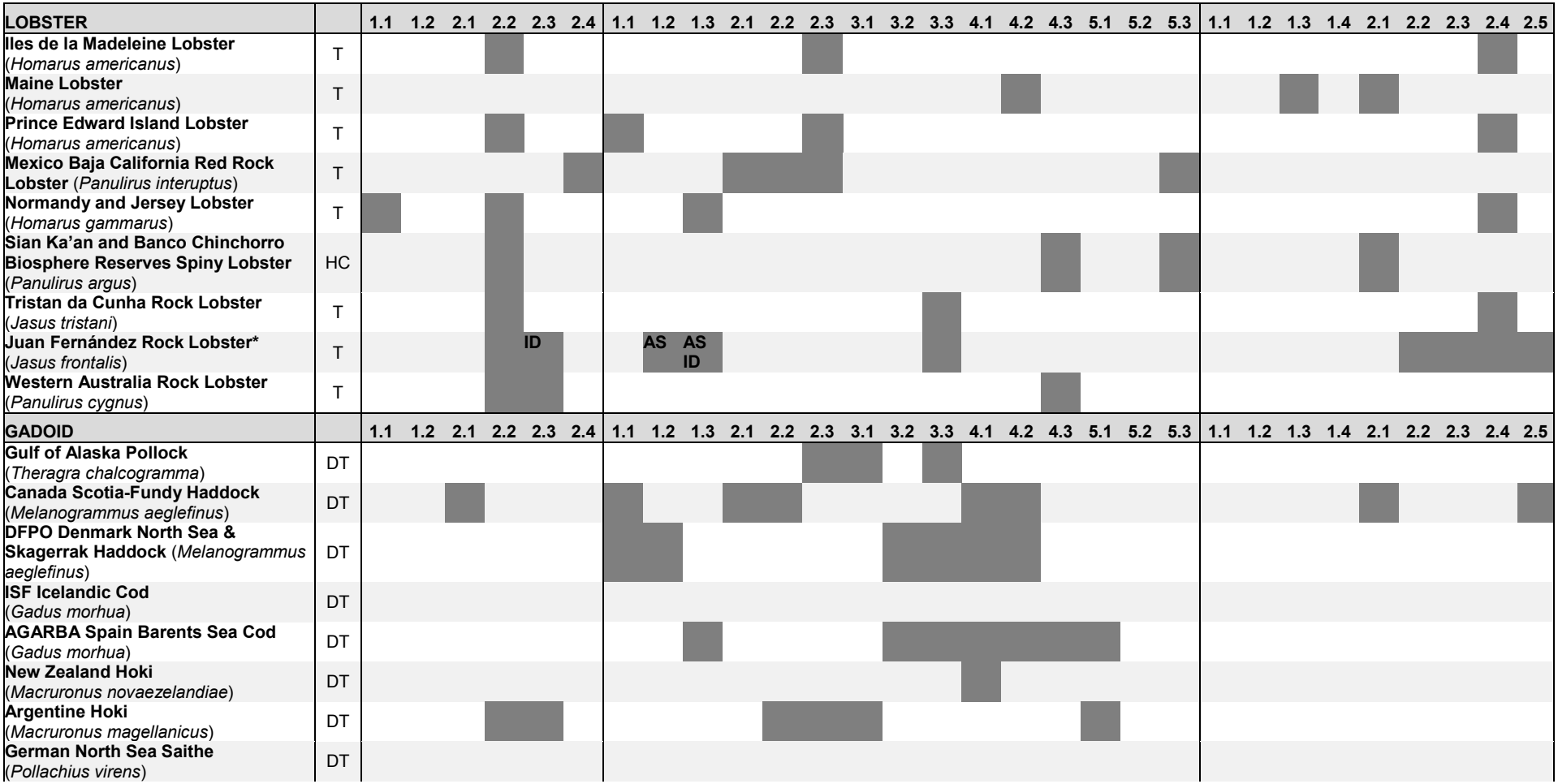
The number and distribution of conditions across the broad components of each Principle was examined at the group level for each factor using the data collated from the MSC website. Specific risk areas at the PI level were then investigated for five commonly-certified types of fisheries: shrimp, lobster, whitefish (Gadiformes), tuna and bivalve molluscs. Representative fisheries/UoCs from each of these five fishery types were also used as case studies in order to identify mitigation strategies that have been used to minimise risk in common areas of weakness. Eight to ten UoCs were selected for each group to represent the range of fishing methods and regions of fisheries certified (Table 2). Due to the unbalanced nature of the dataset, i.e. some groups had more certified fisheries than others, results are presented based on the proportion of conditions received within each group.

Table 1: Factor groups considered in the analyses. Numbers in parentheses represent the number of UoCs within each grouping.

Species	Method	Region
Mollusc (Class: Bivalvia) (22)	Demersal trawl (122)	UK / Europe (84)
Shrimp (Family: Penaeidae) (22)	Pelagic trawl (25)	Arctic (84)
Crab / lobster (Order: Decapoda) (17)	Seine (24)	Tropic / sub-tropic (39)
Small pelagics (Order: Clupeiformes) (22)	Net (23)	NE Pacific (8)
Large pelagics (Order: Perciformes) (23)	Longline (34)	NW Atlantic (41)
Flatfish (Order: Pleuronectiformes) (33)	Hand (collection) and Line (26)	Southern (30)
Scorpionfish (Order: Scorpaeniformes) (18)	Trap / pot (17)	
Whitefish (Order: Gadiformes) (107)	Dredge (15)	
Other fish (22)		

Table 2: Conditions received by selected fisheries across five commonly-certified species groups. Shaded squares indicate that a condition was received. Fishing methods include DT: Demersal Trawl; T: Trap/Pot; HC: Hand Collection; P&L: Pole and Line; T/J: Troll/Jig; S: Seine; D: Dredge. All data was obtained from Public Certification Reports available on the MSC website at www.msc.org.

		Principle 1						Principle 2														Principle 3								
		Outcome		Management				Retained Species			Bycatch			ETP Species			Habitat			Ecosystem			Governance and Policy				Fishery-Specific Management				
	Fishing Method	Stock Status	Reference Points	Harvest Strategy	Harvest Control Rules & Tools	Information& Monitoring	Assessment of Stock Status	Outcome	Management	Information	Outcome	Management	Information	Outcome	Management	Information	Outcome	Management	Information	Outcome	Management	Information	Legal & Customary Framework	Consultation	Long Term Objectives	Incentives	Fishery Specific Objectives	Decision Making Process	Compliance & Enforcement	Research Plan	Management Evaluation
SHRIMP		1.1	1.2	2.1	2.2	2.3	2.4	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	2.5
Australia Northern Prawn (*Penaeus esculentus, P. semisulcatus*)	DT																														
Canada Offshore Striped Shrimp (SFAs 2, 3 & 4) (*Pandalus montagui*)	DT																■	■	■	■	■	■					■			■	
Estonia North East Arctic Cold Water Prawn (*Pandalus borealis*)	DT			■	■														■												
Fogo Island Coop. Soc. Ltd Cold Water Shrimp (*Pandalus borealis*)	DT																■		■												
West Greenland Cold Water Prawn (*Pandalus borealis*)	DT			■	■												■	■	■	■	■	■					■			■	
Oregon Pink Shrimp (*Pandalus jordani*)	DT		■											■		■											■			■	■
Spencer Gulf King Prawn (*Penaeus latisulcatus*)	DT		■													■			■			■		■						■	■
Suriname Atlantic Seabob Shrimp (*Xiphopenaeus kroyeri*)	DT					■					■								■			■						■	■		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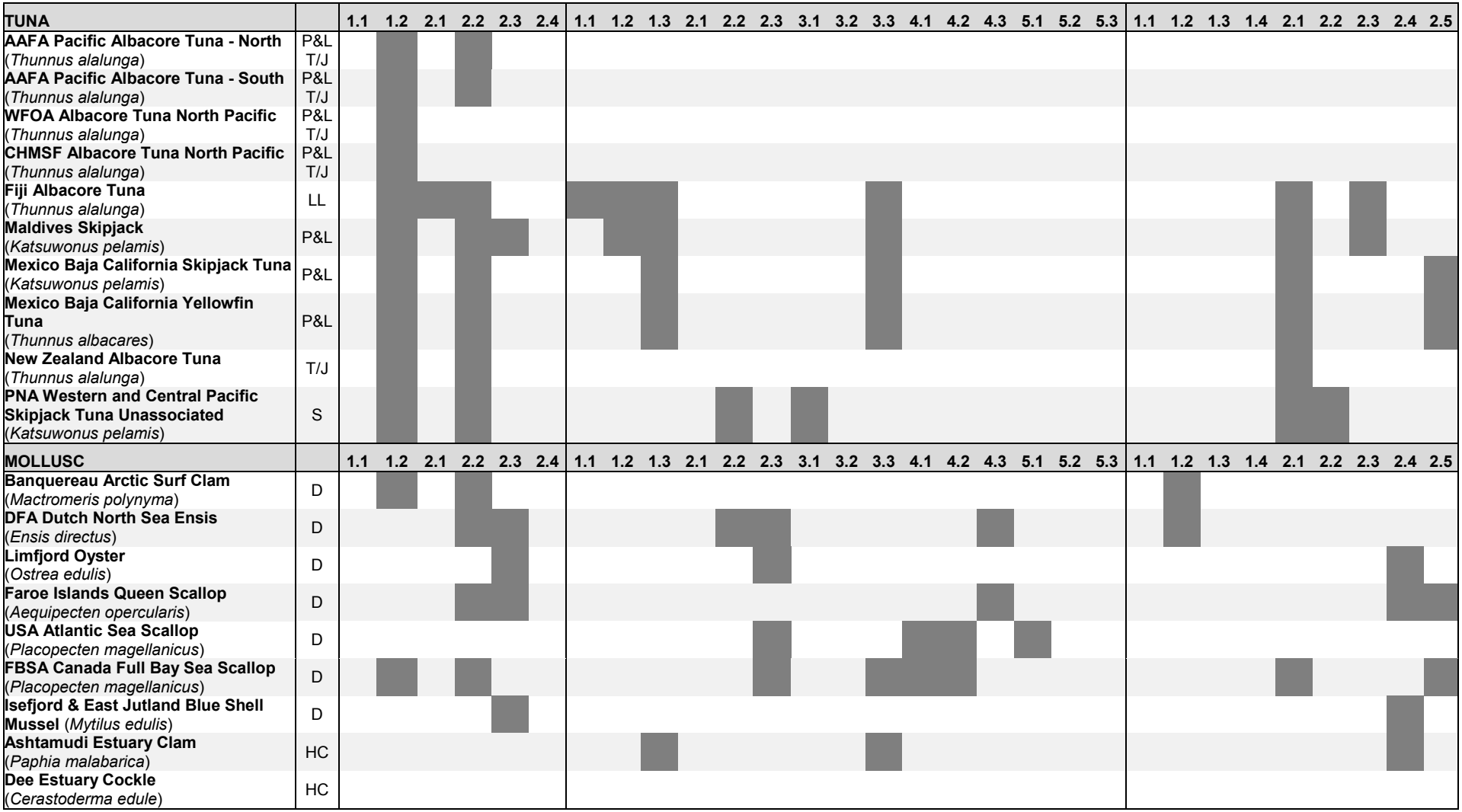
Iles de la Madeleine Lobster (Homarus americanus)
T
Maine Lobster (Homarus americanus)
T
Prince Edward Island Lobster (Homarus americanus)
T
Mexico Baja California Red Rock Lobster (Panulirus interuptus)
T
Normandy and Jersey Lobster (Homarus gammarus)
T
Sian Ka'an and Banco Chinchorro Biosphere Reserves Spiny Lobster (Panulirus argus)
HC
Tristan da Cunha Rock Lobster (Jasus tristani)
T
Juan Fernández Rock Lobster* (Jasus frontalis)
T
ID
AS
AS
ID
Western Australia Rock Lobster (Panulirus cygnus)
T
GADOID
1.1 1.2 2.1 2.2 2.3 2.4 1.1 1.2 1.3 2.1 2.2 2.3 3.1 3.2 3.3 4.1 4.2 4.3 5.1 5.2 5.3 1.1 1.2 1.3 1.4 2.1 2.2 2.3 2.4 2.5
Gulf of Alaska Pollock (Theragra chalcogramma)
DT
Canada Scotia-Fundy Haddock (Melanogrammus aeglefinus)
DT
DFPO Denmark North Sea & Skagerrak Haddock (Melanogrammus aeglefinus)
DT
ISF Icelandic Cod (Gadus morhua)
DT
AGARBA Spain Barents Sea Cod (Gadus morhua)
DT
New Zealand Hoki (Macruronus novaezelandiae)
DT
Argentine Hoki (Macruronus magellanicus)
DT
German North Sea Saithe (Pollachius virens)
DT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AAFA Pacific Albacore Tuna - North (Thunnus alalunga) P&L T/J
AAFA Pacific Albacore Tuna - South (Thunnus alalunga) P&L T/J
WFOA Albacore Tuna North Pacific (Thunnus alalunga) P&L T/J
CHMSF Albacore Tuna North Pacific (Thunnus alalunga) P&L T/J
Fiji Albacore Tuna (Thunnus alalunga) LL
Maldives Skipjack (Katsuwonus pelamis) P&L
Mexico Baja California Skipjack Tuna (Katsuwonus pelamis) P&L
Mexico Baja California Yellowfin Tuna (Thunnus albacares) P&L
New Zealand Albacore Tuna (Thunnus alalunga) T/J
PNA Western and Central Pacific Skipjack Tuna Unassociated (Katsuwonus pelamis) S
MOLLUSC
1.1 1.2 2.1 2.2 2.3 2.4 1.1 1.2 1.3 2.1 2.2 2.3 3.1 3.2 3.3 4.1 4.2 4.3 5.1 5.2 5.3 1.1 1.2 1.3 1.4 2.1 2.2 2.3 2.4 2.5
Banquereau Arctic Surf Clam (Mactromeris polynyma) D
DFA Dutch North Sea Ensis (Ensis directus) D
Limfjord Oyster (Ostrea edulis) D
Faroe Islands Queen Scallop (Aequipecten opercularis) D
USA Atlantic Sea Scallop (Placopecten magellanicus) D
FBSA Canada Full Bay Sea Scallop (Placopecten magellanicus) D
Isefjord & East Jutland Blue Shell Mussel (Mytilus edulis) D
Ashtamudi Estuary Clam (Paphia malabarica) HC
Dee Estuary Cockle (Cerastoderma edule) HC

7 Results and discussion

7.1 Objective 1: Increase the efficiency of generating submissions for MSC assessments

7.1.1 Development of a MSC submission template for fishery clients

A generic MSC submission template has been developed (Appendix 4). The template is specifically designed to address each of the 31 performance indicators and provides examples of the types of information required to address the performance indicators from certified fisheries. The template has been used for all WA pre-assessments and full assessments. To align with the Department's Ecosystem Based Fisheries Management (EBFM) framework and existing legislative reporting requirements, pre-assessments for the States commercial fisheries were conducted in five bioregions (i.e. North Coast, Gascoyne, West Coast, South Coast and State-wide). Pre-assessments for four bioregions have been completed, with state-wide expected to be completed by late 2015. In addition, Exmouth Gulf Prawn Managed Fishery, Shark Bay Prawn Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery and The West Coast Estuarine Managed Fishery (Area 2: Peel-Harvey Estuary; which includes commercial fisheries for blue swimmer crab and sea mullet and the Peel-Harvey Estuary Blue Swimmer Crab Recreational Fishery are all in full assessment. Taking the number of WA fisheries, including the WA rock lobster fishery, either MSC certified or in assessment to six.

The template was refined based on the input of the international reference group (see section 7.2.1 for feedback from reference group). However, the template will require further refinement in 2015 when the new MSC FAM becomes operational.

7.1.2 Formation of a MSC reference group

The international MSC reference group met on 31st March – 4th April 2014 in Perth, WA. The group had four primary tasks which are discussed below;

1. To provide advice on the development of templates to assist with the co-ordination of data and information required for MSC assessment

The Third Party Certification (TPC) project in WA involves all of the state's commercial fisheries, ~45 fisheries, undergoing MSC pre-assessment. Therefore, a MSC submission template was developed to;

- ensure that documentation required for assessment is prepared and presented in a structured manner,
- provide explanations and examples of how to address the MSC performance indicators and scoring criteria,
- align MSC language, particular language used in performance indicators and scoring criteria, with language that used by the clients.

The reference group suggested some general improvements for the template i.e. making it more user friendly so it could be given to industry to use for MSC assessments. Overall the group was impressed with the template and thought it functioned well however, they

concluded that extension of the template to other users would only be useful for full assessments. The reference group suggested that the template was far more comprehensive than what was generally provided for pre-assessment and therefore requires a level of resources that most fisheries were unwilling to invest at the pre-assessment stage. DoF pursued the MSC submission templates because;

(i) the Department was directed to do so by government
(ii) rigorous pre-assessments would ultimately benefit full assessments,
(iii) the view was that accurate pre-assessments require as much information as possible.

The outcomes of this component of the workshop were that DoF will;

(i) continue to use the templates in WA as they have been a useful tool for preparing and presenting documentation in both pre-assessment and full assessment

(ii) share the template with other jurisdictions on request

(iii) provide further guidance and describe in what context the templates are to be used
(iv) update the template to incorporate changes to the FAM under FAM 2.0

2. To evaluate the consistency between assessments by different CABs for some key areas of concern and identify solutions for improvement where required

The group had a general discussion about the difficulties of comparing assessments by different CABs, as members of assessment teams may change according to the assessment being undertaken. The group suggested focusing on other factors such as fishery type, gear type, or region of the world to determine the influence of these factors on certification. The outcomes of this research are presented in Objective 2 *Minimise the likelihood of unnecessary conditions being imposed during MSC assessments.*

3. To develop and assess alternative methods for assessing stock status and setting references points for data limited fisheries using catch and effort data

It is generally agreed that fisheries should be operating with biomass at or above B_{msy}. The issue for many of the world's fisheries is that (1) there is no estimate of biomass of the exploited stock, and (2) the way in which the stock responds to reduced density is unknown. This is a significant impost on small data limited fisheries where acquiring the data required to develop biomass based reference points may require a large expenditure of resources in relation to the value and risk posed by the fishery (Flood et al. 2014). However, the inability in many situations to determine B_{msy} until after it has been exceeded has led to concern regarding using yield as a basis for managing fisheries (Carruthers et al. 2012). However, other measures can be used to manage fisheries without the need for an explicit understanding of B_{msy}. Catch and catch rate can be used to set reference points to manage a fishery against the principle of maintaining biomass above B_{msy}. The use of these types of measures has had variable success (e.g. Polacheck 2006, Restrepo et al. 1998) depending on the fishery. However, given the poor history of managing to B_{msy} there is a reluctance to adopt this approach in many regions of the world. With increasing limits on public funds to improve the knowledge of actual biomass levels there is renewed interest in using catch or

catch rate data as the basis for managing to B_{msy}, particularly in fisheries that have effective management systems. Nonetheless, despite the intent to effectively manage data poor fisheries (including those with mandatory catch and effort reporting) there remains a challenge to determine reference points (targets, thresholds, limits) for fisheries that do not have sufficient data to estimate stock size. This has been attempted for some fisheries in USA, NZ and Australia. Importantly, the use of catch and catch data as a basis for setting reference levels must be integrated into a responsive and adaptive management system (Dowling et al. 2008, Berkson et al. 2011).

In WA aquatic resources are managed using a risk-based, regional Ecosystem Based Fisheries Management (EBFM) framework (Fletcher et al. 2010). EBFM explicitly considers all ecological resources and community values within a bioregion, with the level of resources (research, management and compliance) allocated according to risk (Fletcher 2015). The range of quantitative methods used by DoF to monitor and assess stock status are divided into five broad categories, ranging from assessments based on commercial catch data (Level 1) to fully integrated models (Level 5) (Wise et al. 2007, DoF 2011).

The MSC standard requires that the status of target species are assessed in relation to biomass based reference points i.e. B_{msy} and B_{lim}. As the majority of small, data limited fisheries in WA are managed using risk assessment and level 1 (catch data) or level 2 (CPUE data) this has caused a number of issues in pre-assessment. The group had a general discussion regarding the use of catch and CPUE as proxies for B_{msy} and noted that FAM 2.0 (MSC 2014) allows the use of proxies for B_{msy}. However, the group also noted that a stable catch or catch rate in a managed fishery does not provide evidence of a healthy stock. The outcome of this component of the workshop was that while the new FAM 2.0 allows the use of proxies for B_{msy} that DoF needs to continue to develop and assess alternative methods for assessing stock status and setting references points for data limited fisheries using catch and effort data. In data limited fisheries DoF needs to particularly focus on clearly documenting a well-managed fishery at a low catch levels and clearly illustrate the link of the proxies used to for B_{msy}. For those fisheries going to full assessment research to collect additional information such as length frequencies may be required prior to MSC assessment or be prepared to assess the fishery using a risk based approach.

4. To assess an alternative risk assessment method, including guidelines for scoring that are consistent with MSC's scoring guidepost model

The workshop included two days of discussion and advice on risk assessments conducted as part of the review of MSC certification process. In particular, the group considered an alternative risk assessment method, including guidelines for scoring that are consistent with the MSC. The risk assessment presentations and case studies identified strengths and weaknesses of the methods and to recommendations for improvements to the MSC certification process.

The risk assessment component of the workshop included presentations from Richard Stoklosa (facilitator of risk assessment component of the workshop) on MSC risk-based framework and Dr Rick Fletcher (DoF) on qualitative risk assessment in Ecosystem Based Fisheries Management (EBFM) (Fletcher 2015).

The facilitator presented introductory remarks on ecological risk assessment for fisheries certification, referring to the MSC Risk-Based Framework (RBF) assessment methodology (MSC 2014c, Hobday et al. 2007), the international standard for risk management (AS/NZS ISO 31000:2009) and examples of conceptual models and alternative risk assessment methods from recently completed assessments (Stoklosa 2013a, 2013b).

Notable aspects of the presentation were:

- An overview of the international standard for risk management (AS/NZS ISO 13000:2009), and how it relates to various assessment methodologies.
- Reviewing the criteria that triggers the use of the MSC RBF, and an example of how scoring guideposts are applied in assessments (MSC 2014c).
- Insight into the development of the MSC RBF (Hobday et al. 2007).

The presentation illustrated the importance of management responses to threats in a hierarchical risk assessment methodology (progressively more rigorous risk analysis as required). Management actions to control or reduce risk are always an alternative to more stringent and highly structured risk analysis management response to risk may be appropriate in lieu of further time and resource-consuming risk analysis, or a lack of data to proceed with more rigorous risk analysis.

In addition to the discussion of standards and methodologies, some technical objectives for risk assessment were offered for consideration (after Hayes 2003):

- Clear endpoints and well-defined boundaries that are sufficiently relevant from a policy perspective, but simple enough to minimise uncertainty.
- Rigorous inductive (and deductive) assessment techniques, particularly for hazard (threat) identification, involving a team of subject matter experts.
- Hierarchical or tiered structure to allow increasingly accurate risk estimates as more information becomes available, or to implement precautionary management measures if appropriate or necessary.
- Make predictions that can be scientifically tested.
- Include a good analysis of uncertainty and demonstrate robustness of solutions.
- Consider fisheries management policy implications and decision-making needs.

It was recognised that fit-for-purpose risk assessment methods must be selected to achieve these objectives. It has been recognised that the development of assessment tools is an ongoing process for EBFM (Smith et al. 2007), including consideration of social and economic objectives, ecological modelling and management strategy evaluation.

DoF presented qualitative risk assessment in EBFM (Fletcher 2015), which has been adopted as Departmental policy to inform management and allocate resources in a consistent manner. Adopting the terminology and approach in the international risk management standard (AS/NZS ISO 31000:2009), the presentation focused on using the consequence and likelihood method to assess risk. The qualitative method is supported by definitions of categories of consequence for a wide range of ecological assets and social and economic objectives. Consequence tables have been developed for the ecological components that are

part of MSC certification (e.g. target species, retained species, bycatch, ETPs, habitats and ecosystems).

Consequence levels are selected for the various ecological threats of fishing, using an expert-based process, and all available data and evidence is considered in assessing the consequence of fishing interactions with ecological components. The likelihood of the described consequence is then estimated along with the uncertainty. Management arrangements are also considered when scoring consequence and likelihood with effective management arrangements lowering the risk. Consequence levels are defined in terms of biological or productivity parameters that are important to fisheries sustainability. For example, consequences to target species are expressed with regard to the biomass yield:

Consequence level	Target species biomass criteria
Low (Level 1)	$B >> B_{msy}$
Moderate (Level 2)	$B > B_{msy}$
Major (Level 3)	$B_{lim} < B < B_{msy}$
Extreme (Level 4)	$B < B_{lim}$

Where: B is the current biomass of the target species
B_{msy} is maximum sustainable yield,
B_{lim} is the limit for spawning stock biomass

The consequence-likelihood approach estimates risk using a matrix of consequence and likelihood on each axis—with more severe consequences and higher likelihood leading to higher risk. However, the outputs of the risk assessment are not just the scores generated from a consequence-likelihood matrix, but rather the supporting description of the interactions being assessed, the existing management controls, uncertainty in the likelihood of consequences occurring, and possible improvements to reduce risk for management consideration. It is also common to report on the 'residual risk level', which would be expected if suggested management actions were adopted.

This approach has the advantage of considering and documenting all fishing interactions, so that possible management responses to reduce risk can be considered and implemented. This type of approach is characteristic of other risk assessment standards which explicitly require the consideration of risk reduction strategies for threats on the higher end of the risk scale.

For DoF, an example of the practical difficulty of the MSC RBF methodology is justifying that few fishers, using limited gear, operating in a small spatial area has low susceptibility.

The consequence-likelihood approach can include all of the information considered in both the scale, intensity, consequence analysis (SICA) and productivity-susceptibility analysis (PSA) of the MSC RBF. However, the consequence-likelihood approach—when undertaken

by subject matter experts—enables the additional consideration of all information, lines of evidence, and existing management measures to produce a more robust and accurate assessment outcomes. The consideration of additional management strategies to reduce risk informs decision makers of improvements that can be achieved in management, and may assist to identify sensible conditions of certification.

The important conclusion of the presentation was that the Department seeks to use its qualitative approach based on AS/NZS ISO 31000 to explicitly address a wider range of technical information and management responses to identified risks. It was acknowledged that the DoF approach (Fletcher 2015) is an example of a fit-for-purpose alternative which can improve the MSC fisheries certification process.

The reference group noted that the DoF approach is appropriate for assessing the ecological risks of fishing activities. However, there remains a question of how to link the outcomes of likelihood-consequence risk assessments with MSC scoring guideposts. This will require exposure of the DoF approach to CABs and calibration of assessment criteria.

Fishery management attributes in the MSC RBF may lead to a case of double scoring in the assessment methodology. Scoring of a management outcome can be frustrated by the scoring of a management process elsewhere in the methodology. There is an argument to incorporate management settings directly in risk assessment, which the DoF approach aims to do.

Examples of MSC RBF scoring issues

An issue was identified with low-productivity of target species always scoring '3', regardless of management measures to reduce risk—resulting in an artificially 'high' level of risk. This issue derives from the PSA methodology to be very precautionary when estimating risk scores.

Two specific examples were briefly discussed to highlight issues with the RBF scoring methodology:

- In a Swedish freshwater lake, 40 fishers target Pike Perch but with low areal overlap as fishing occurs in limited areas. Selectivity scores should also be moderated low post release mortality (verified by tagging) due to good fish handling practices. As a result, the SICA scored <80 due to unrealistically severe consequence scores. However, the PSA scores indicated a pass (>80).
- Indian Ocean Skipjack was assessed as having very high productivity (two years before Indian Ocean Tuna Commission stock assessment). The SICA score was in the 60's, but the PSA scored 90's.

These examples point to the limitations of the RBF in certain circumstances, and the potential disparity between the SICA screening-level risk scores compared to the PSA risk scores.

Case studies

Reference group members presented case studies for discussion and analysis to gain an understanding of risk assessment methods and approaches used in fisheries assessment around the world.

Case studies included:

- Blue swimmer crab in the Peel Harvey, WA, particularly with respect to seasonal changes in the abundance of the target species and estimates of recreational fishing.
- Using PSA to determine fishing mortality for pike perch stock in a large Swedish lake, particularly with regard to scoring intensity and encounterability;
- Indian Ocean skipjack tuna, to illustrate the difficulty of obtaining global stock assessment data and agreement on control rules from multiple jurisdictions when RBF P1 scores otherwise fail assessment;

The case studies considered the MSC RBF results from SICA and PSA methods, and used the PSA scoring tool (Microsoft Excel spreadsheet) as a live exercise during the case study discussions. Scoring issues and interpretation of scores were the main issues considered by the group.

Peel-Harvey Estuary—Blue swimmer crab

At the time of the workshop the blue swimmer crab fishery was being considered for MSC assessment as part of the WA MSC process. The fishery has both a commercial and recreational component operating in the same estuary. The key issue for certification is the recreational catch, with a need to undertake a 'selectivity analysis' of the proportion of commercial and recreational catches to determine the overall impact on the target species.

PSA results for this fishery show productivity scores of '1' (high productivity); and susceptibility scores of 2.3 for the commercial component and 1.9 for the recreational component. A catch-weighted average score was proposed for assessment purposes, resulting in a PSA score of 2.3, which translates to an MSC score of 90 ('low' risk).

It was observed that a tendency to score all of the productivity attributes '1' and all of the susceptibility attributes '3' is possible, without regard for the specific circumstances of commercial and recreational fishing activities. This observation applied to all PSA assessments.

Susceptibility attributes were considered in detail by the reference group for this fishery, to improve understanding of how they are applied in a single estuary. The attribute of areal overlap of fishing activity was debated. One suggested approach is to consider the horizontal and vertical probabilities of encountering fishing gear, the probability of being trapped, and the probability of mortality—resulting in a conditional probability expression of susceptibility.

The reference group advised that the co-client approach for MSC certification is likely to be appropriate, and would set an important precedent for fisheries elsewhere. With PSA scores leading to an MSC score of >80, the RBF may be the preferred approach for subsequent assessments pending an understanding of how harvest control rules and reference points are accounted for under the RBF.

Swedish lake—pike perch

The small-scale pike perch fishery in Sweden was the world's first freshwater fishery to become MSC certified in 2006. The certification is for a large single water reserve (Lake Hjälmaren) targeted by 30-40 fishermen.

The susceptibility score of the PSA has difficulty reflecting fishing mortality of the target species, due to low post-capture mortality. Susceptibility scores based on encounterability can be overestimated due to interpretation of areal and vertical overlap in a lake environment.

The experience gained from this assessment was to use the SICA process to determine how fishing activity is capturing fish then use this information to inform the susceptibility scores of the PSA. It was necessary to interpret the susceptibility attributes (areal overlap, vertical overlap, selectivity and post-capture mortality) in terms of the specific circumstances of activities undertaken by a relatively small number of fishermen.

Indian Ocean—skipjack tuna

Skipjack tuna is a highly migratory stock managed on a regional scale by the Indian Ocean Tuna Commission (IOTC). Nearly all tuna fishing nations in the region are parties to the IOTC management arrangements. The fishery was proceeding through full MSC assessment at the time of the workshop, with the final report released in March 2015—achieving MSC certification with conditions.

The reference group noted that the scoring regime of the RBF initially pointed to failure for certification under Principle 1 (sustainable fish stocks), and that an IOTC stock assessment was undertaken to achieve a 'pass'. Certification conditions include requirements for ongoing stock assessment. The IOTC's progress on these conditions is likely to be influenced by the MSC's standing with participating governments.

7.2 Objective 2: Minimise the likelihood of unnecessary conditions being imposed during MSC assessments

7.2.1 Results

7.2.1.1 Trends in data from certified fisheries

A total of 286 UoCs from 181 fisheries were included in the analyses. The number of conditions received by these UoCs ranged from zero to 11, with the majority of UoCs receiving three conditions. The number and distribution of conditions received across the three broad MSC Principles was highly variable between fishery groups (Figure 1a). For example, within some species groups such as crab/lobster and large pelagics, almost all certified UoCs received P1 conditions, while only one P1 condition was received for all 18 scorpionfish UoCs sampled. Specific fishing methods also received a high number of P2 conditions, particularly demersal trawl and longline fisheries. Regionally, fisheries from the Arctic had a low proportion of UoCs with P1 and P3 conditions compared to UK / European fisheries and NW Atlantic fisheries which had a high proportion of UoCs with P1 and P3 conditions, respectively.

7.2.1.2 Influence of factors on nature of the conditions received

Species group had a significant effect on the composition of conditions received by UoCs in P1 (df 8, F = 7.97, $p = 0.001$), P2 (df 8; F = 13.64, $p = 0.001$) and P3 (df 8, F = 9.46, $p = 0.001$). Whitefish, molluscs and small pelagic finfish primarily received conditions in the Management component of P1 (P1.2), while conditions for large pelagic finfish, small pelagic finfish, crab/lobster and other fish were split between the Management and Outcome components. Only one P1 condition was received for all scorpionfish UoCs sampled, within the Outcome component of P1 (P1.1) on Stock Status (PI 1.1.1; Figure 1b).

The overall distribution of conditions within P2 varied between groups (Figure 1b); however, there was no significant difference in the composition of P2 conditions for the majority of groups, except for small pelagics which was significantly different than both flatfish and shrimp. Finfish and crab / lobster fisheries received the majority of conditions on the Retained Species, Bycatch and ETP Species components (P2.1, P2.2 and P2.3, respectively), while the majority of P2 conditions for shrimp and molluscs fisheries were within the Habitat and, to a lesser extent, Ecosystem components (P2.4 and P2.5, respectively).

The majority of species groups received conditions related to the Fishery-Specific Management System component of P3 (P3.2; Figure 1b), although whitefish also received a high proportion of conditions in Governance and Policy (P3.1). Over half of the flatfish UoCs received a P3 condition on Incentives of Sustainable Fishing (PI 3.1.4), with no other P3 conditions received for this species group. No scorpionfish UoCs received a P3 condition.

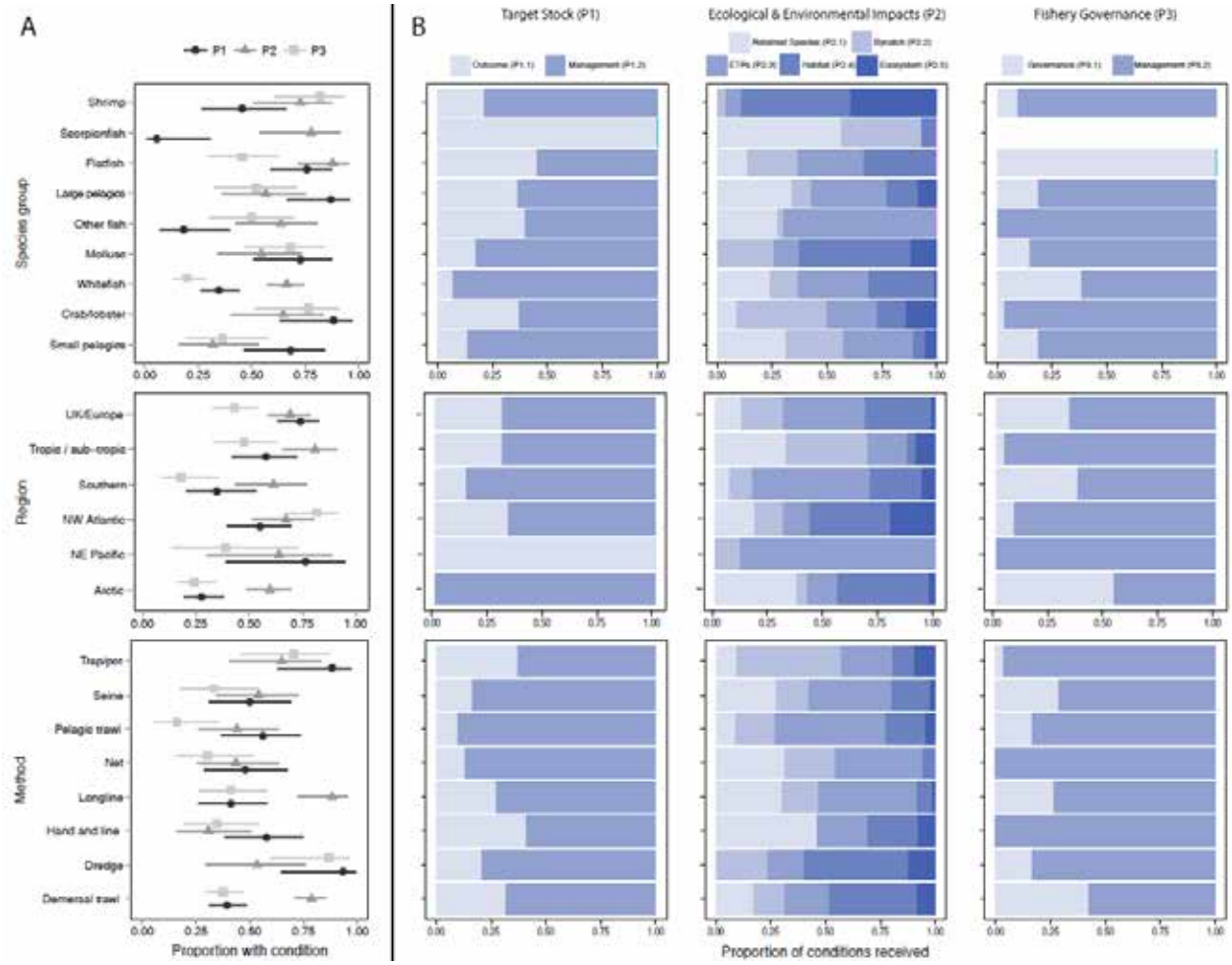

Figure 1: (a) Proportion (± 95 % CI) of UoCs within each factor group that received a condition for each of the three MSC Principles (i.e. P1, P2 and P3) and (b) distribution of conditions received by UoCs within each group across the broad components of each Principle.

Region had a significant effect on the composition of conditions received by UoCs in P1 (df 5, F = 3.02, p = 0.01), P2 (df 5, F = 0.37, p = 0.001) and P3 (df 5, F = 12.53, p = 0.001). Most of the P1 conditions were within the Management component (P1.2), with all the Arctic region P1 conditions occurring within this area (Figure 1b). In contrast, all P1 conditions in the NE Pacific region were received in the Outcome component (P1.1; Figure 1b), with conditions ranging across three PIs within this component.

Fisheries from the UK / Europe, Southern and NE Pacific regions all had a high proportion of conditions within the ETP species component of P2 (P2.3), while fisheries from the Tropic / Sub-tropics received a high proportion of conditions within the Retained and Bycatch species components (P2.1 and 2.2 respectively). NW Atlantic and Arctic fisheries also had a high proportion of Habitat conditions (P2.4).

The distribution of conditions in P3 on UoCs classified by region varied more than groupings based on species group or fishing method (Figure 1b), with a difference between the

composition of conditions in the NW Atlantic compared to the Arctic, Southern, UK / Europe and Tropic/sub-tropic regions. The majority of P3 conditions received in the Tropic / sub-tropic and NW Atlantic regions related to the Fishery-Specific Management System component (P3.2). Both of these regions had a high proportion of conditions in Fishery Specific Objectives (PI 3.2.1) and Research Plan (PI 3.2.4), although NW Atlantic region also had a high proportion in Management Performance Evaluation (PI 3.2.5). In contrast, the UK / Europe, Southern and Arctic regions all had conditions throughout both P3 components. The NE Pacific region only received conditions in the Fishery-Specific Management System component (P3.2; Figure 1b).

Fishing method had a significant effect on the composition of P2 conditions received by UoCs (df 7, F = 11.26, $p = 0.001$). Similar to species group, the distribution of conditions throughout P2 was highly variable between fishing methods (Figure 1b), with differences identified between demersal fishing methods, such as demersal trawl, and more pelagic or generally low-impact methods, such as pelagic trawl and hand and line. Demersal trawl and dredge fisheries received the majority of conditions in the Habitat and Ecosystem components (P2.4 and P2.5, respectively), while conditions in most other method types related to Retained and ETP Species (P2.1 and P2.3 respectively). The trap / pot fisheries also received a high proportion of conditions on Bycatch (P2.2; Figure 1b).

7.2.1.3 Specific risk areas for commonly certified fisheries

Specific risk areas within each component were investigated for five commonly-certified types of fisheries: shrimp, lobster, whitefish, tuna and molluscs.

All certified shrimp UoCs (n = 22) received at least one condition. The majority of conditions in P1 related to Harvest Control Rules and Tools (PI 1.2.2; 27 % of UoCs). Within P2, conditions were focused on Habitat and Ecosystem components, particularly Habitat Information (PI 2.4.3; 50 %). However, 36 % of UoCs also received conditions on Habitat Outcome and Management (PIs 2.4.1 and 2.4.2 respectively) and Ecosystem Management and Information (PIs 2.5.2 and 2.5.3 respectively). Within P3, 73 % of UoCs received a condition on Research Plan (PI 3.2.4; Figure 2).

Eight lobster UoCs were included in the analyses with all UoCs receiving at least three conditions. Within P1, 75% of UoCs received a condition on Harvest Control Rules and Tools (PI 1.2.2). Within P2, the majority of conditions related to Information PIs, particularly for Retained Species (PI 2.1.3), Bycatch (PI 2.2.3), Habitat (PI 2.4.3) and Ecosystem (PI 2.5.3), with 25 % of UoCs receiving conditions in each of these areas. Similar to shrimp, the majority of P3 conditions related to the Research Plan (PI 3.2.4; 50 %) and Fishery-Specific Objectives (PI 3.2.1; Figure 2).

Twenty-five of the 107 certified whitefish UoCs did not receive a condition. Of the remaining UoCs, there were few conditions in P1, with the highest proportion of UoCs receiving a condition on Harvest Strategy (PI 1.2.1; 10 %), Harvest Control Rules and Tools (PI 1.2.2; 10 %) and Information and Monitoring (PI 1.2.3; 16 %). The majority of P2 conditions related to Outcome PIs, particularly for Habitat (PI 2.4.1; 36 %) and Retained Species (PI 2.1.1; 24 %). Compared to the other fishery types examined, whitefish also received a high number of conditions in relation to ETP Species (PIs 2.3.1, 21 %; 2.3.2, 15 %; 2.3.3, 17 %). Within P3, the

highest proportion of UoCs received conditions on Consultation, Roles and Responsibilities (PI 3.1.2, 10 %) and Management Performance and Evaluation (PI 3.2.5; 13 %; Figure 2).

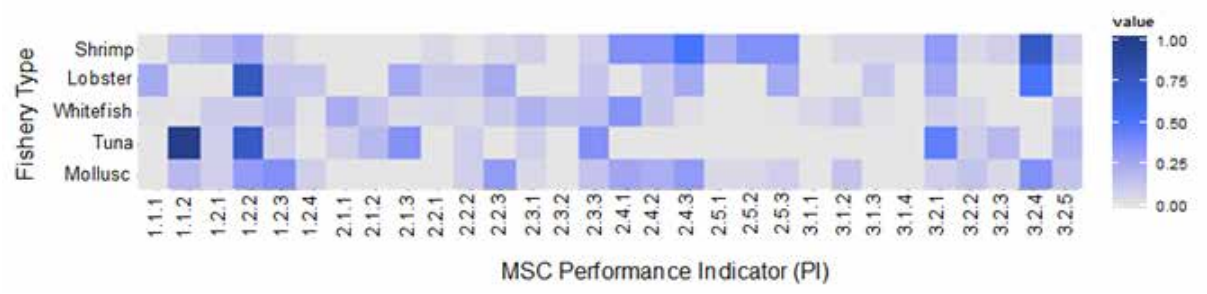

Figure 2: Proportion of total UoCs in each of the five commonly-certified fishery groups (shrimp, n = 22; lobster, n = 8; whitefish, n = 107; tuna, n = 11; mollusc, n = 22) that received a condition at each Performance Indicator (PI)

Eleven tuna UoCs were included in the analyses, with each UoC receiving at least one condition. There was a distinct distribution of conditions, with a number of PIs not receiving a single condition, e.g. Stock Status (PI 1.1.1), all Habitat and Ecosystem PIs (2.4.1 – 2.5.3), all Governance and Policy PIs (3.1.1 – 3.1.4) and Research Plan (PI 3.2.4). In contrast, there were a number of PIs where a high proportion of the UoCs received a condition including Reference Points (PI 1.1.2; 100 %), Harvest Control Rules and Tools (PI 1.2.2; 73 %), Retained and ETP Species Information (PIs 2.1.3 and 2.3.3, respectively; 36 % each) and Fishery-Specific Objectives (PI 3.2.1; 45 %; Figure 2).

Ninety-one per cent of the mollusc UoCs (n = 22) received a condition. The majority of conditions related to Harvest Control Rules and Tools (PI 1.2.2; 33 %) and Information and Monitoring (PI 1.2.3; 36 %). Within P2, the majority of conditions related to Habitat, with the highest proportion of UoCs receiving a condition on Habitat Outcome (PI 2.4.1; 32 %), Management (PI 2.4.2; 23 %) and Information (PI 2.4.3; 32 %). Of the UoCs that received conditions in this component, 65 % received multiple conditions e.g. conditions on both Habitat Outcome and Management. Thirty-two per cent of UoCs also received a condition on Bycatch Information (PI 2.2.3). The highest proportion of conditions in P3 was received on Research Plan (PI 3.2.4; 36 %; Figure 2).

7.2.2 Discussion

7.2.2.1 Trends in data from certified fisheries

The results of this study have provided important information that can be used by prospective fisheries to identify potential risk areas prior to entering the MSC certification process. While each fishery is unique, particular characteristics of a UoC, such as species group, region or fishing method, can significantly affect whether it receives conditions and where these conditions are most likely to occur. By understanding common risk areas based on these factors, fisheries are able to better prepare for certification by focusing resources where they are most needed. In addition, by minimising these risks prior to assessment fisheries can also reduce the likelihood of receiving conditions, which will ultimately reduce both the time and cost of certification.

Species group and geographic region had a significant impact on the distribution of conditions across all three MSC Principles, while fishing method only had a significant effect for P2. These results are consistent with the nature of the three Principles, with P1 focused on assessing the sustainability of the target species, P2 related to ecosystem impacts from fishing, which generally vary by gear type, and P3 used to assess the governance and management systems in place, with common strategies used for similar species and regional frameworks applied in many areas.

7.2.2.2 Principle 1

A high proportion of species such as crab / lobster, large pelagic finfish and flatfish and fisheries operating in the UK / Europe and NE Pacific regions received P1 conditions relative to other groups. The majority of these conditions related to the Management component of P1 (P1.2). Although some fisheries still received conditions related to Outcome (P1.1), these results indicate that the majority of fisheries entering the MSC certification process have target species stocks that are currently maintained within sustainable levels.

Within the five fishery types examined, P1 conditions were most frequently received on Reference Points (PI 1.1.2), which was largely driven by tuna UoCs, and Harvest Control Rules and Tools (PI 1.2.2). Similarly, 42 % of all MSC certified fisheries have conditions that relate to effective harvest control rules (MSC 2014b). This suggests that while fisheries entering certification have a system designed to reduce exploitation once the stock has deviated from the reference points, well defined, explicit and fully implemented harvest strategy control rules are not in place (MSC 2014b). This is partly due to the fact that while there are internationally accepted approaches to sustainable fisheries management, there are no international equivalents for harvest control rules and precautionary reference points (McIlgorm 2013, Agnew et al. 2014, Sloan et al. 2014) meaning they are often the most poorly defined component of management strategies (Agnew et al. 2014). Although several countries have national approaches or guidelines, e.g. New Zealand and Australia, approaches often vary between jurisdictions (Flood et al. 2014, Sissenwine et al. 2014, Smith et al. 2014). In Australia, fisheries that have implemented harvest strategies tend to be higher value fisheries with a history of quantitative stock assessments and strong governance (Smith et al. 2014). Small-scale and data-poor fisheries have substantial challenges to implementing harvest strategies due to the cost of data collection, monitoring and reporting required for formal stock assessments (Sissenwine et al. 2014, Smith et al. 2014). In many cases, as least in Australia, these types of fisheries have used a weight of evidence or risk based approach to stock assessment (for examples see Woodhams et al. 2012, Flood et al. 2014).

Seventy-five per cent of lobster fisheries received a condition on Harvest Control Rules and Tools (PI 1.2.2). The only lobster fisheries to not receive a condition on this PI were the Maine Lobster Trap and Mexico Baja California Red Rock Lobster Fisheries. The Mexico Baja California Red Rock Lobster Fishery has a well-developed harvest strategy that is reviewed on an annual basis in order to produce the Annual Harvesting Program (SCS 2011) which contains the strategy for each of the ten cooperatives of the UoC. Harvest control rules are applied by each cooperative based on the results of the last fishing season to maintain the biomass above the B_{MSY}. The market price of lobster is also monitored during the fishing season to control the

fishing effort and close the season if economic gains are low. At the time of assessment the biomass of lobster for the previous five seasons had remained above B_{msy}; therefore, the fishery scored 90/100 on PI 1.2.2 (SCS 2011). In contrast, the Sian Ka'an and Banco Chinchorro Biosphere Reserves spiny lobster fishery is a small-scale fishery with a strong local management system based on traditional knowledge however, the fishery does not have a formal harvest strategy or control rules relative to target and limit reference levels (MRAG 2012). While the fishing cooperatives have control mechanisms to regulate fishing effort, which have previously been effective in maintaining the stocks, there was a concern that the fishery may be driven by market demand rather than sustainability. With no formal rules to reduce fishing effort when stock levels (or catches) decline below a threshold the fishery scored 75/100 on PI 1.2.2 and received a condition to implement formal harvest control rules (MRAG 2012). Similarly, the WA Rock Lobster fishery also has a condition relating to harvest control rules, as until recently the fishery did not have a formal harvest strategy with well-defined and explicit harvest control rules. This illustrates that regardless of the economic value, long history of quantitative stock assessment and robust governance, a formalised harvest strategy and appropriate control rules are an essential component of minimising P1 conditions.

7.2.2.3 Principle 2

The majority of fisheries certified by the MSC have received at least one P2 condition, and P2 PIs are responsible for the most conditions and related action plans (MSC 2014b). All three factors considered in this study had a significant impact on the distribution of P2 conditions received by a fishery, however, the effect was strongest for fishing method. The highly variable distribution of conditions throughout P2 for each fishing method is likely to reflect differences in the nature of fishing methods. For example, fishing gear that regularly contacts the seafloor such as demersal trawl and dredge had a high proportion of conditions within the Habitat component (P2.4), while pelagic fishing methods such as longlines or seine netting had a high proportion of conditions related to impacts on other species (P2.1 – 2.3).

The majority of P2 conditions in the commonly-certified fisheries examined related to Outcome and Information PIs within the above components. Martin et al. (2012) found that for P2 conditions on information, an increase in knowledge can be sufficient to increase certainty that a fishery is not causing negative impacts. In many fisheries, data on retained species, bycatch and ETP species may be collected as part of ongoing research or monitoring programs but is not formally analysed or reported (Bellchambers et al. 2014). The failure to provide these data to assessors may result in unnecessary conditions that do not accurately reflect the actual risks in the fishery (Bellchambers et al. 2014) particularly for pelagic fisheries that generally have a higher proportion of conditions in these areas. Even for fisheries using gear that is typically considered to have a low ecosystem impact, e.g. trap fisheries, a failure to provide assessors with sufficient evidence to address P2 criteria can result in costly conditions (Bellchambers et al. 2014). Thus, an essential step in preparing for MSC certification is to analyse and present all available data.

Most P2 conditions were placed on demersal trawl fisheries for prawns and whitefish. Interestingly, while both groups received a similar number of P2 conditions, the conditions were on different PIs. The majority of P2 conditions placed on each group were related to

Habitat, but shrimp fisheries scored lowest on Habitat Information (PI 2.4.3), while conditions on the whitefish fisheries related mainly to Habitat Outcome (PI 2.4.1) and the measures in place to minimise risk (Habitat Management, PI 2.4.2). Action plans for the selected shrimp fisheries suggest that knowledge of the types and distribution of habitats within the fishery area and data on the spatial extent of trawling to allow impacts to be measured over time are required to meet the MSC criteria. As shrimp trawlers typically operate over soft sediments such as sand and mud using lighter trawl gear (Kaiser et al. 2002) it is possible for fisheries that lack detailed fishery-specific data to avoid conditions on Habitat by referring to studies conducted on gear impacts in similar fisheries to demonstrate that they are unlikely to have a substantial impact on the seabed (IMM 2011, FCI 2011). The use of this information can be further strengthened by having management measures such as spatial closures in place to limit the extent of impact, as is the case in the Suriname Seabob Shrimp Fishery (FCI 2011).

As demersal trawling for whitefish is often undertaken using heavy gear designed to cope with more vulnerable, hard-bottom habitats (Ingólfsson and Jørgensen 2006) it is essential for these fisheries to provide empirical evidence that the fishery is not causing serious or irreversible harm to sensitive habitats or to demonstrate that management strategies have been implemented and are effective in reducing risk (IMM 2012a, FCI 2013). For example, actions plans for the AGARBA Spain Barents Sea Cod Fishery on PIs 2.4.1 and 2.4.2 prescribe that a Code of Conduct be developed for recording interactions with sensitive seabed types (i.e. corals and sponges) and set out actions when these habitats are encountered (FCI 2013).

It should be noted that P2 has changed substantially in the new MSC Fisheries Standards (v 2.0; MSC 2014c) particularly in relation to Retained Species and Bycatch (P2.1 and 2.2) however, the points raised above remain relevant. In fact, for many fisheries, the new standard will require additional information to meet PIs, with increased emphasis being placed on demonstrating that P2 species are above the point of recruitment impairment.

7.2.2.4 Principle 3

A high proportion of both whitefish and shrimp fisheries and fisheries in the NW Atlantic received a P3 condition, with significant differences identified in the distribution of conditions between species groups and fishery regions. Of the fisheries examined in this study, few had P3 conditions on PIs relating to Governance and Policy (PIs 3.1.1 – 3.1.4). Similarly, 94 % of MSC certified fisheries have effective governance and policy (MSC 2014b) suggesting that fisheries entering the MSC process already have strong management and governance in place (Gutiérrez et al. 2012). Instead, the majority of P3 conditions were on the PIs relating to the Fishery-Specific Management System, specifically Fishery-Specific Objectives (PI 3.2.1), Decision-Making Processes (PI 3.2.2) and Research Plan (PI 3.2.4).

Of the selected fisheries examined in this paper, every species group had at least one UoC that received a condition on Fishery-Specific Objectives (PI 3.2.1). However, approximately half of the tuna fisheries received a condition on this PI, despite receiving a low number of other P3 conditions. This may be related to the regional-level management in these fisheries, as tuna stocks generally straddle jurisdictions international agreement on their management is required. At the international level, tuna commissions have clear, well-defined fishery management objectives developed by Regional Fisheries Management Organisations

(RFMOs) and specified in their respective conventions (e.g. IATTC 2010, WCPFC 2000, IOTC 1993). However, for many tuna fisheries explicit, well-defined short and long-term objectives at the national or fishery-level are lacking. For example, the New Zealand Albacore Tuna Troll Fishery is managed under the Western Central Pacific Fisheries Commission (WCPFC) while the New Zealand government (through the Ministry of Fisheries; MFish), is responsible for managing the fishery in the New Zealand EEZ. At the time of MSC assessment, there were no fishery-specific management objectives in place, as albacore in New Zealand was not managed under the Quota Management System (QMS). Prior to and during the MSC assessment process, MFish had been working with stakeholders to develop a total allowable catch (TAC) for albacore in New Zealand (Moody Marine 2011). However, as these objectives were not explicitly incorporated into the management system at the time of assessment, the fishery received a condition on this PI. Since MSC certification, the *National Fisheries Plan for Highly Migratory Species* (MFish 2010a) has been implemented, along with the *Albacore Operational Management Plan 2010 – 2015* (MFish 2010b). This operational plan includes well-defined and measurable short- and long-term objectives, which have been separated as "use outcome" and "environment outcome" and are consistent with achieving the outcomes expressed by P1 and P2. Therefore, at the first surveillance audit, this condition was closed and the PI rescored to 100 (IMM 2012b).

A high proportion of all shrimp, lobster and mollusc UoCs (73 %, 50 % and 36 %, respectively) received a condition on Research Plan (PI 3.2.4). Conversely, across all UoCs 100 % of whitefish and 96 % of tuna fisheries passed this PI unconditionally. Almost all of the selected fisheries examined in this paper undertake research and monitoring related to a range of P1 and P2 issues however, many of these fisheries lack a single, cohesive, fishery-specific research plan. In some fisheries this may be due to the fact that multiple jurisdictions are responsible for managing and monitoring a single resource, e.g. the Normandy and Jersey Lobster Fishery, or multiple agencies undertaking various aspects of research related to a specific fishery or resource in an *ad hoc* fashion. For example, in the Suriname Atlantic Seabob Shrimp Fishery, the need for a research plan for the fishery was identified by the Shrimp and Groundfish Resource Working Group (SGWG) in 2009. While a number of research projects had already been conducted, further research requirements were identified during the development of the harvest control rules and fishery management plan and a formal research plan was implemented in 2010 (FCI 2011). The research plan includes areas directly related to the management of the seabob resource and associated the ecosystem, as well as other management issues, such as monitoring systems for illegal, unregulated and unreported fishing for compliance purposes (FCI 2011).

It should be noted that this PI has been removed from the new MSC standards (v.2.0; MSC 2014c); however, the need for strategic research is still referenced within both P1 and P2 Information PIs. While the lack of an explicit research plan may not result in a condition on any of these PIs, a fishery-specific research plan is still useful in order to improving scoring against these PIs and thus, increase the average score across the Principle which may offset lower scores received on other PIs.

8 Benefits and Adoption

This project has developed a MSC submission template which has assisted with the pre-assessment of ~ 47 of the states' fisheries including the full assessment of Exmouth Gulf Prawn Managed Fishery, Shark Bay Prawn Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery and The West Coast Estuarine Managed Fishery (Area 2: Peel-Harvey Estuary; which includes commercial fisheries for blue swimmer crab and sea mullet) and the Peel-Harvey Estuary Blue Swimmer Crab Recreational Fishery are all in full assessment. Taking the number of WA fisheries, including the WA rock lobster fishery, either MSC certified or in assessment to six.

A key benefit of this research is an increased understanding of the MSC FAM by DoF including the performance indicators and scoring criteria. In addition, the project has improved the knowledge of strategies to reduce the risk of receiving conditions in a range of different fisheries, ensuring efficient allocation of resources to high risk areas prior to MSC full assessment with has assisted in minimising conditions in fisheries undergoing MSC full assessment.

An additional outcome of this project has been the strategic alliances built by the establishment of an international MSC reference group to provide advice and guidance on the MSC process which ensures WA is consulted on new initiatives and changes to the MSC FAM.

9 Further Development

The MSC submission template developed during this project was designed to address the performance indicators and scoring criteria of FAM v1.3 (MSC 2012). With the revised FAM v2.0 (MSC 2014c) applying to fisheries entering assessment from April 2015 the template will need to be updated to reflect the changes in the new standard.

This project established a MSC reference group to provide advice and guidance on aligning WA fisheries with the MSC standard. The group highlighted a number of issues for DoF to pursue including to;

- provide further guidance and describe the context in which the MSC submission templates are to be used
- further develop and assess alternative methods for assessing stock status and setting references points for data limited fisheries using catch and effort data
- link the outputs of DoF risk assessments (i.e. likelihood-consequence risk assessments) with MSC scoring guideposts and conduct a calibration with assessment criteria
- Continue to progress the consistency in assessment study by incorporating new factors and progress to publication

10 Planned Outcomes

This project has developed MSC submission template specifically designed to address MSC performance indicators and scoring criteria and provides examples of the types of information required to address the performance indicators and scoring criteria from MSC certified fisheries. The template has been used for all WA pre-assessments and full assessments. In addition, this study has provided an important insight into how fishery characteristics such as target species, fishing gear and region of the world can influence MSC assessment outcomes and has identified common risk areas for fisheries to consider prior to beginning the certification process. Further investigation of these systematic trends for specific types of fisheries will help to inform both fisheries research and management.

A key benefit of the research is an improved understanding of the MSC FAM; how it applies to WA fisheries and how to better align WA fisheries assessment, monitoring and management to address the MSC FAM to ensure more accurate and consistent assessments.

The project results have been communicated in a number of peer reviewed journal articles, at industry and Certification Advisory Panel (CAP) meetings and have formed an integral part of the WA MSC process.

11 Conclusion

11.1 Objective 1: Increase the efficiency of generating submissions for MSC assessments

A generic MSC submission template has been developed. The template addresses the 31 performance indicators (PI) of FAM v1.3 and provides examples of the types of information required to address the PIs from certified fisheries. The template has been used for all WA pre-assessments and full assessments until end April 2015. The template was refined based on the input of the international MSC reference group but will require updating to align with the FAM v2.0 (MSC 2014c) for any assessments from May 2015.

In addition, the reference group provided advice and guidance on the aligning WA fisheries with the performance indicators and scoring criteria in the MSC FAM. The group also provided advice on how to develop proxies for B_{msy} in data limited fisheries that rely on catch or CPUE as mechanisms of determining stock status and mechanisms to incorporate the DoF risk assessment approach into MSC assessments rather than reverting to using the RBF.

11.2 Objective 2: Minimise the likelihood of unnecessary conditions being imposed during MSC assessments

The majority of P1 conditions are on Reference Points (PI 1.1.2) or Harvest Control Rules and Tools (PI 1.2.2). In order to avoid conditions in these areas, fisheries need to develop reference points and associated harvest control rules to ensure that the exploitation rate is reduced as the limit reference points are reached. Harvest control rules must be well defined, explicit and formally documented so that market drivers or other factors cannot potentially reduce stock to below the point where recruitment would be impaired.

Of the fisheries examined in this study, the majority of the P2 conditions were on PIs relating to Outcome and Information. As most P2 conditions are placed on demersal trawl fisheries for shrimp and whitefish, it is particularly important to review the P2 components of these fisheries prior to assessment. Resources need to be focused on addressing Habitat and Ecosystem PIs by providing the spatial distribution of habitats and fishing effort over time in conjunction with management measures such as spatial and temporal closures. To minimise P2 conditions on pelagic fisheries, resources need to be focused on Information PIs of Retained, Bycatch and ETP Species. For example, in the case of Bycatch, fisheries need to provide information on bycatch species (including quantities landed or discarded), reporting (e.g. logbooks, observer programs or targeted research) and management measures, such as spatial and temporal closures, bycatch reduction devices or gear restrictions.

The majority of P3 conditions received are associated with the Fishery-Specific Management System, particularly Fishery Specific Objectives and Research Plan (PIs 3.2.1 and 3.2.4, respectively). These PIs are often addressed through the development of a fishery or resource-specific harvest strategy or management plan that incorporates both target species stocks and ecosystem considerations. Despite the removal of Research Plan (PI 3.2.4) from

the new standard fisheries will still be required to demonstrate strategic research planning for both P1 and P2 Information PIs.

This study has provided an important insight into how fishery characteristics can influence MSC assessment outcomes and has identified common risk areas for fisheries to consider prior to beginning the certification process.

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13 Appendices

Appendix 1: Intellectual Property

There is no identifiable intellectual property arising from this report

Appendix 2: Project staff

Dr Warrick Fletcher	Principal Investigator	DoF#
Dr Dan Gaughan	Supervising Scientist	DoF#
Dr Lynda Bellchambers	Principal Research Scientist	DoF#
Dr Emily Fisher	Research Scientist	DoF*
Dr Alastair Harry	Research Scientist	DoF#
Ms Kendra Travaille	Research Scientist	DoF#

*Staff employed for parts of the project under FRDC funding

#In-kind staff contributions by DoF

Appendix 3: Members of International Reference Group

Dr Daniel Gaughan – Department of Fisheries WA

Dr Lynda Bellchambers – Department of Fisheries WA

Dr Yorgos Stratoudakis – Portuguese Institute of Sea and Atmosphere, Lisbon, Portugal

Mr Aaron Irving – Deepwater Group, Wellington, New Zealand

Mr Peter Trott –World Wildlife Fund (WWF), Tasmania, Australia

Ms Amanda Stern-Pirlot – At-Sea Processors Association, Seattle, Washington, USA

Dr Andrew Hough – Association of Sustainable Fisheries, UK

Ms Megan Atcheson – Marine Stewardship Council, London, UK

Guy Leyland – Western Australian Fisheries Advisory Council, Perth, Australia

Mr Tom Pickerell[1] – Project Inshore, UK

Dr Deon Durholtz[1] – Department of Agriculture Fisheries and Forestry- South Africa)

Mr Crispian Ashby[2]– Fisheries Research and Development Corporation (FRDC)

[1]did not attend Perth workshop but were provided with background material and the opportunity to comment

[2]could not attend, Dr Patrick Hone attend day 1 of workshop on behalf of FRDC

Appendix 4: MSC submission template for fishery clients

Marine Stewardship Council Assessment Documentation:

[Fishery Name]

Date

Authors

Executive Summary

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1 Background to MSC Initiative

In March 2012, the (then) Western Australian (WA) Minister of Fisheries announced that the State Government had committed to a four-year program to seek third-party sustainability certification for WA's commercial fisheries. This initiative will involve all WA commercial fisheries being put through the pre-assessment stage of the Marine Stewardship Council's (MSC) certification process. Funding is also available to support the certification process for those fisheries that choose to move to a full MSC assessment.

This document provides a cumulative description of the [fishery name] for assessment against the MSC Principles and Criteria for Sustainable Fishing. There [are/is] [number] unit(s) of certification (UoC) included in this document for assessment, as follows:

UoC 1: [Fishery Name]

Species: [Common name (*Species name*)]

Geographical Area: [Area]

Method of Capture: [Fishing Method]

2 Aquatic Environment

[Summary of aquatic environment in which the fishery occurs]

3 Species and Stock Description

3.1 [P1 Species Common Name]

3.1.1 Taxonomy and Distribution

3.1.2 Stock Structure

3.1.3 Life History

3.1.3.1 Movements

3.1.3.2 Reproduction

3.1.3.3 Size-Fecundity Relationships

3.1.3.4 Factors Affecting Recruitment of Juveniles

3.1.3.5 Weight-Length Relationships

3.1.3.6 Age and Growth

3.1.3.7 Diet

3.1.3.8 Natural Mortality

3.1.3.9 Parasites and Diseases

3.2 Fishery Information

3.2.1 Fishery Development

3.2.2 Current Fishing Activities

3.2.3 Fishing Methods and Gear

3.2.4 Management Arrangements

3.2.4.1 Governance

The [fishery name] is managed by the Department under the following legislation:

- *Fish Resources Management Act*[1] (FMRA; to be replaced by Aquatic Resources Management Bill [ARMB] once enacted);
- *Fish Resources Management Regulations 1995* (FRMR);
- FRMA Part 6 — *[Title of Management Plan]*; and
- FRMA Section 43 Orders — *[Titles of relevant Orders]*;

Fishers must also comply with the requirements of:

- The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Western Australian Marine Act 1982*; and
- Western Australian *Wildlife Conservation Act 1950*.

3.2.4.1.1 Management Measures

[Add description of management measures in place under each of the above legislation, including other management e.g. marine parks]

3.2.5 Catch and Effort

[Add catch and effort history information]

3.3 External Influences

External influences include other activities and factors that occur within the PHE that may or may not impact on the productivity and sustainability of fisheries resources and their ecosystems. The main external influences included here are [add each listed below].

[1] Note the FRMA will be replaced by *Aquatic Resources Management Bill* (AMRB) once enacted.

3.3.1 Catch from Other Fisheries

3.3.1.1 Commercial Fisheries

3.3.1.2 Recreational Fisheries

3.3.1.3 Customary Fisheries

3.3.2 Environmental Factors

3.3.3 Market Influences

3.3.4 Other Activities

3.3.5 Introduced Marine Species

MSC Principle 1

4 Stock Status

4.1 [P1 Species common name]

4.1.1 Current Stock Status (MSC 1.1.1)

[Provide a description of the current stock status (see Box 1 for an example).]

Is it **likely**, **highly likely**, or there is a **high degree of certainty** that the status of the stock above the point where recruitment would be impaired?

Is the stock at, or fluctuating around, the target reference point?

Refer to relevant information for determining relevant time periods for judging fluctuations (i.e. the biology of the species, history of fishing pressure and management system).

Box 1. Stock Status description for the CSHMAC Celtic Herring

CSHMAC Celtic Sea Herring Stock Status (Southall et al. 2012); Score: 100
Spawning stock biomass is well above the precautionary (limit) reference point described as having "a low probability of low recruitment". It is at its highest level since the 1960s. Further, the estimated fishing mortality is well below the F_{MSY}, at the lowest level since the start of assessment data in 1958. There is thus a **high degree of certainty** that the Celtic herring stock is above the point where recruitment would be impaired.
The spawning stock biomass has been above the limit reference point, and well within the target region, for the past four years. The stock is projected to continue to increase over the next few years, keeping it above the MSY with a **high degree of certainty**.

4.1.2 Stock Rebuilding (MSC 1.1.3)

Only include if the stock has been depleted (i.e. has dropped towards the point at which recruitment would be impaired).

[Provide evidence that the stock is successfully rebuilding within a specified timeframe.]

4.1.2.1 Strategy Design

[Describe stock rebuilding strategy in place.

Is the rebuilding strategy successfully rebuilding the stock?

Will the rebuilding of the stock be complete within the **specified timeframe**?]

4.1.2.2 Timeframes

[What rebuilding timeframe is in place?

Describe how the specified rebuilding timeframe relates to the **Generation Time** of the species (i.e. the average age of sexual maturity).]

Scoring is based around the specified length of the timeframe. Thus, to obtain a score of:

- 60: The timeframe should be the shorter of 30 years or 3 generation times;
- 80: The timeframe should be the shorter of 20 years or 2 generation times; or
- 100: The shortest practicable timeframe does not exceed 1 generation time.

When the length of 3 generation times of the species is < 5 years, the rebuilding timeframe should be up to 5 years.

4.1.2.3 Evaluation

[Describe the monitoring that is undertaken to demonstrate that the rebuilding strategy is successful.]

> How do you know the strategy will be effective and rebuild the stock within the specified timeframe?

To meet the requirement of evidence of rebuilding in cases where the stock is only in early stages of recovery, a demonstration is required to show that it is **highly likely** that the strategy will be successful in recovering the stock. This demonstration should be:

- Through robust simulation testing; or
- Providing evidence that the measures taken have successfully recovered a different stock in the past.

5 Stock Assessment (MSC Criteria 1.2.4)

5.1 Species 1

5.1.1 Assessment Description

[Describe the **Stock Assessment** methods employed for assessing the target stock (see Box 2)].

When a stock is comprised of multiple sub-stocks or a stock complex, the level of assessment necessary for individual stocks should reflect their ecological importance (MSC 2013b).

Box 2. Stock Assessment Description for the SFSAG Haddock

SFSAG Haddock Stock Assessment Description (Moody Marine Ltd. 2010); Score: 100
An assessment of the North Sea and Skagerrak haddock stock is undertaken annually by the ICES assessment working group. It employs the Extended Survivors' Analysis (XSA) version of a Virtual Population Analysis (VPA). The data used in the assessment are derived from (i) total reported landings, (ii) sampling for weight, length, age, (iii) observer recorded discards, (iv) fishing effort data from logbooks, CPUE or LPUE, (v) research vessel survey indices and (vi) data on natural mortality (M) from multi-species analyses.

5.1.2 Appropriateness of Assessment

[Describe how the Stock Assessment approach is appropriate for the stock and for the harvest control rule.]

> Does the Stock Assessment take into account the major features relevant to the biology of the species and the nature of the fishery?

5.1.3 Assessment Approach

[Describe how the Stock Assessment is evaluating stock status relative to reference points in the harvest strategy.]

5.1.4 Uncertainty in the Assessment

[Identify the major sources of **Uncertainty** and describe how the Stock Assessment takes this into account.]

> Is the evaluation of stock status relative to reference points undertaken in a probabilistic way?

Common sources of uncertainty identified in MSC certified fisheries include:

- Data collection;
- Illegal, Unreported and Unregulated (IUU) catches;
- Ageing errors and growth estimates;
- Estimates of natural mortality;
- Recruitment variability; and / or
- Model structure uncertainty (MSC 2013b).

5.1.5 Evaluation of Assessment

Has the assessment been tested and is it considered to be robust?

Have alternative hypotheses and assessment approaches been explored?

5.1.6 Peer Review of Assessment

Has the assessment undergone peer review (internal and external)?

Examples may include reviews by:

- Scientific Advisory Groups and Committees
- Expert Reviews and Workshops
- Publications in peer-reviewed journals

6 Harvest Strategy

6.1 Framework (MSC Criteria 1.2.1)

A Harvest Strategy (decision rule framework) provides a set of transparent and verifiable measures against which one can assess and report on the performance of the fishery and demonstrate its sustainability. The 'harvest strategy' encompasses the performance measures (limit, threshold and target reference points), the data collection and analyses for determining these, the justifications for adopting the levels at which the reference points are set, and the control rules (or management measures) that will be applied to ensure the overall management system is responsive to the performance measures.

[Provide a brief summary of the Harvest Strategy framework.]

For example, this may include a Table outlining the fishery performance measures, reference points and harvest control rules, see example in Box 3. More detailed information about the different elements of the harvest strategy should be presented under the relevant sub-heading below.

Box 3. Examples of elements of Harvest Strategies of MSC-certified fisheries

Performance Measures/Indicators	Reference Points	Harvest Control Rules
• Abundance/biomass • Fishing mortality • Multiple indicators (often based around catch, CPUE and age/length/sex compositions, recruitment etc.)	• Target • Threshold • Limit	• If the Performance Indicator is fluctuating around the Target level, no management action is required • If the Performance Indicator has breached the Threshold level, a review is undertaken to investigate the potential causes of the breach. If the breach is considered to be due to low stock levels, some management action is necessary (e.g. reduction in fishing effort or TAC) • If the Performance Indicator has breached the Limit level, immediate management action is necessary (e.g. substantial reduction in fishing effort or TAC, or fishery closure)

6.1.1 Design

[Describe the Harvest Strategy design.]

Is the Harvest Strategy **expected** to achieve management objectives?

Is the Harvest Strategy responsive to the state of the stock?

Do elements of the Harvest Strategy **work together** to achieve objectives, or is the strategy **designed** to achieve objectives?

6.1.2 Evaluation

[Discuss how you know the Harvest Strategy will work.]

To obtain a score of:

- 60: Describe how the Harvest Strategy is **likely** to work, based on prior experience or plausible argument;
- 80: Provide evidence that the Harvest Strategy is achieving its objectives, based on some sort of structural, logical argument and analysis; or
- 100: Demonstrate that the Harvest Strategy has been fully **evaluated** and shown to be achieving its objectives (i.e. maintaining stock at target levels).

The term "evaluated" refers to testing that the Harvest Strategy is robust to uncertainty that is appropriate to the scale and intensity of the fishery (MSC 2013b), which is typically undertaken using the Harvest (or Management) Strategy Evaluation approach (see e.g. Punt et al. 2005).

6.1.3 Monitoring

[Describe the monitoring that is being undertaken to collect the information required to evaluate the performance of the Harvest Strategy.]

6.1.4 Review

Is the Harvest Strategy periodically reviewed and improved as necessary?

6.1.5 Shark Finning

Only include if the target species is a shark.

[Provide evidence that **shark finning** is not taking place in the fishery (i.e. removing any of the fins, or the tail, of a shark and discarding the remainder of the shark while at sea).]

6.2 Reference Points (MSC Criteria 1.1.2)

6.2.1 Appropriateness of Reference Points

[Describe reference points in place and explain how they are appropriate for the stock.]

Reference points may take many forms and be either generic (based on justifiable or reasonable practice appropriate for the type of species), or estimated for the stock (see Box 4 below for examples).

6.2.2 Level of Target Reference Point

[Describe the **Target reference point**.]

Is this Target Reference Point such that the stock is maintained at, or above, a level consistent with B_{MSY} (or some measure or surrogate with similar intent or outcome)?

The term 'consistent with B_{MSY}' is defined as being close to or at B_{MSY} or some other measure or surrogate with similar intent or outcome, which maintains a high productivity and is at a level well above the point at which recruitment would be impaired (MSC 2013b).

As for the Limit Reference Point, a higher score for the target reference point requires that relevant precautionary issues are accounted for when setting this point.

Box 4. Examples of target and limit reference points

Reference points	Fishery example
• B_{MSY}	For the Maine Lobster Trap Fishery (Bannister et al. 2013), the target abundance is determined by the high end of the statistical distribution in a reference period (1982-2003), which is considered to be consistent with B_{MSY}.
• F_{MSY}	The management plan of Northeast Arctic Haddock Fisheries is being adjusted to maintain F at a F_{MSY}, which corresponds to equilibrium stock size of maximum productivity (MEP 2012).
• B_{LIM}/F_{LIM}	In the Northeast Arctic Cod Fisheries, limit reference points are set following the precautionary approach defined by ICES (MEP 2012). A spawning stock biomass reference point is derived from a stock-recruitment relationship and the corresponding F-based reference point is calculated through simulation. Both safeguard against natural variability and uncertainty in assessment and thus a score of 90 was obtained for PI 1.1.2. The limit reference point for Suriname Seabob Shrimp is set at 60% of B_{MSY}, which is higher than the general limit reference point for avoiding recruitment failure (50% B_{MSY}) (Southall et al. 2011)
• Catch/CPUE	For the Gulf of Lawrence Shrimp Fishery, CPUE data from research provide and average annual CPUE (an index of relative abundance) with 95% CIs (TAVEL 2008). The 95% CIs are used as reference points when comparing indices of a reference period (1995-2005) with indices of subsequent years. In the Lakes and Coorong Fishery in South Australia, upper and lower limit reference points for each target species are derived from historical values of catch and CPUE, thus accommodating for inter-annual variability in these indicators (SCS 2008). However, as there was no demonstration that reference points are well-selected or precautionary, a score of 85 for PI 1.1.2 was assigned for three of the four target species. A lower score of 79 was given to Goolwa cockles, as the reference points for this species are based on data from a historical period in which catches increased significantly. Thus a condition was placed on this fishery to provide an evaluation of whether the limits are appropriately precautionary.

6.2.3 Level of Threshold Reference Point

[Describe the Threshold reference point.]

6.2.4 Level of the Limit Reference Point

[Describe the **Limit reference point**.]

> Is the Limit reference point set above the level at which there is an appreciable risk of impairing reproductive capacity of the stock?

To obtain a score of 100, the Limit Reference Point should consider **relevant precautionary issues** (e.g. environmental variability and the ecological role of the stock, see also Section 7.2.3.1).

6.2.4.1 Key Low Trophic Level Species

Only include if the target species is considered a key Low Trophic Level (LTL) species. These species typically belong in Box 5, but may also be distinguished by various other biological and ecological characteristics. To identify if the target species is a LTL species, see MSC Certification Requirements (MSC 2013a).

[Describe how the target and limit reference points are set at precautionary levels to allow for ecosystem needs.]

Box 5. Types of species defined as "key LTL stocks" (Source: MSC 2013a)

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

6.3 Harvest Control Rules and Tools (MSC Criteria 1.2.2)

6.3.1 Design and Application

[Provide a detailed description of the **Harvest Control Rule** in place for the target species of the fishery.]

> What management actions will be taken at different stock levels relative to the specified reference points?
>
> Is the harvest control rules consistent with the harvest strategy and acts to reduce the exploitation rate the limit reference point is approached?

To satisfy the SG100 requirement, additional precaution should be built into the harvest control rule to ensure the target stock is maintained well above the limit reference point.

It may be valuable to provide a flowchart outlining the design and application of the harvest control rules (see example in Figure 7.1).

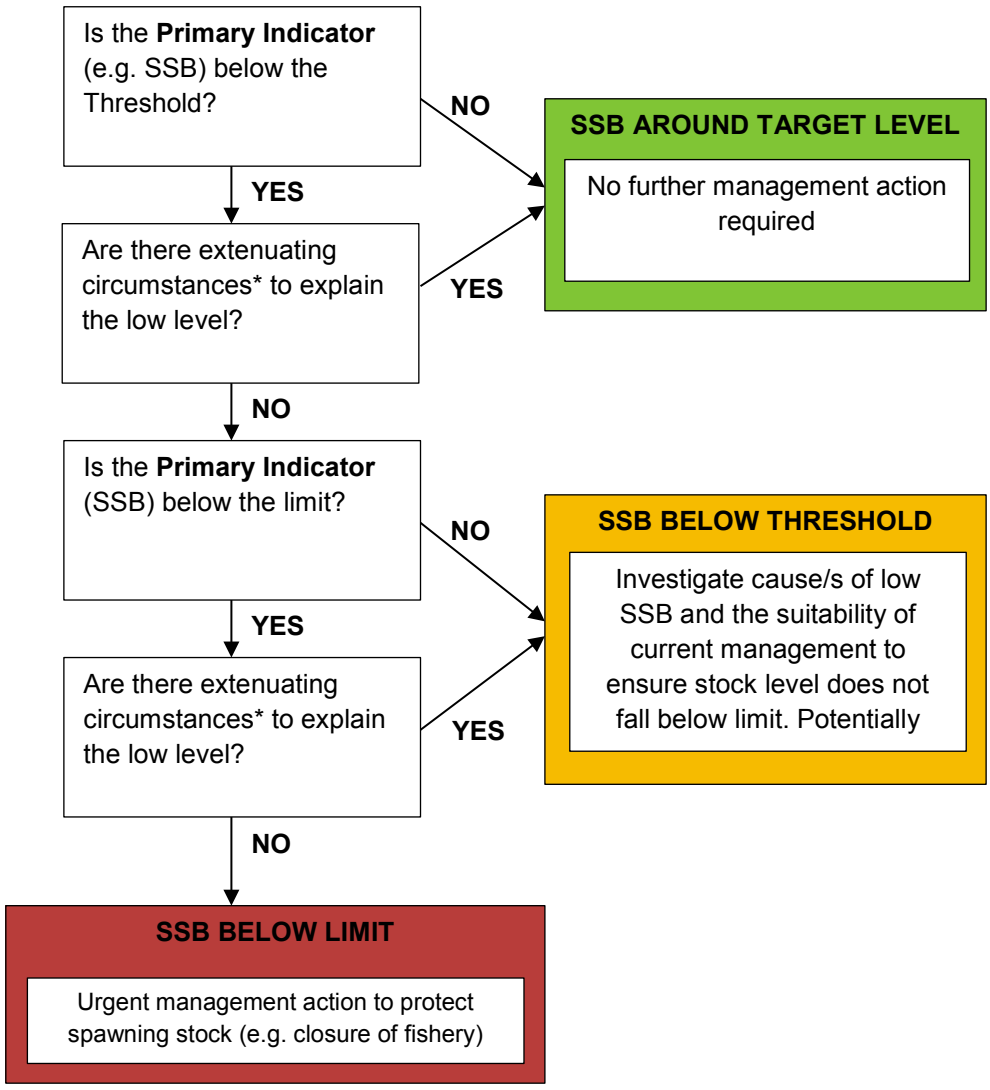


Figure 7.1. Example flowchart of the Harvest Control Rules for the target species of the fishery.

6.3.2 Accounting for Uncertainty

[Describe how the **selection** or **design** of the Harvest Control Rules takes into account uncertainties.]

6.3.3 Evaluation

[Provide evidence that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.]

6.4 Information and Monitoring (MSC Criteria 1.2.3)

6.4.1 Range of Information

[Provide a summary of the quantity and quality of (fishery-dependent and fishery-independent) information collected to support the Stock Assessment and Harvest Strategy for the target species (for examples, see Box 6).]

How often is this collected, and how long has this been collected?

How is this information validated?

Box 6. Examples of Information/Monitoring to support the harvest strategy

Information/Monitoring:
• Stock structure (genetics) • Fleet composition • Logbook data (catch and effort) • Unload/processor returns • Vessel Monitoring System (VMS) data • Biological information (e.g. on growth and reproduction) • Stock abundance/biomass surveys • Age/Length-structure monitoring

6.4.2 Monitoring

6.4.2.1 Commercial Catch and Effort

[Describe how removals and fishing effort are monitored.]

What is monitored (e.g. catches and different measures of effort)?

How is this monitored (e.g. by logbooks, observers)?

How often is this data collected (e.g. daily, monthly)?

Where does recorded information go (i.e. to DoF research)?

How it this information validated (including external validation, i.e. processor unloads)? What is the level of accuracy and coverage?

6.4.2.2 Catch from Other Sectors

[Describe how recreational, charter and/or indigenous catches are monitored.]

Is there likely to be any illegal catches of the target species?

6.4.2.3 Other Monitoring

[Describe any other sources of information, apart from catch and effort records, that are used to support the harvest strategy.]

6.4.3 Comprehensiveness of Information

[Is there good information on all removals from the stock (i.e. from other commercial fisheries or fishing sectors)?]

MSC Principle 2

7 Retained Species (MSC Criteria 2.1)

7.1 Overview

What non-target species are retained by the **fishery** (i.e. all **species** retained by the fishery that are NOT covered in P1)?

What information is available on the catches of these **species** (historical and current)?

> If possible, provide a table of **retained species** catches for fishery (historical and current).

What is the stock status for each of these **species**/groups?

If you have limited information on retained species, can you identify what are the '**main**' **retained species**?

> What is the stock status of each **species** (even if it is uncertain)?

7.2 Management Strategy

Describe the management arrangements, control rules and **tools** in place to maintain retained species within **biologically-based limits** or ensure the fishery **does not hinder** their recovery/rebuilding. See examples in Box 7 below.

> How do you know the management system is working or is **likely** to work (e.g. plausible argument, objective basis, testing)?
>
> How do you know the **measures** / **strategy** are being **implemented successfully** (e.g. high compliance with management **measures**)?
>
> How do you know that the **strategy** is **achieving its objective**?[2]
>
> How do you know that no **shark finning** is occurring in the fishery?[3]

If there are no **retained species** in the fishery, how do you intend to ensure this remains the case?

[2] Only applicable if you have a 'strategy' with a specific objective.
[3] Only applicable if one of your retained species is a shark or shark by-product

Box 7. Retained Species Management System Level Examples

Measures

General (all fishing methods):

- Limited entry
- Vessel size restrictions
- Effort limits
- Improvement to design and use of fishing gear
- Bans on discards[4]
- Spatial and/or temporal measures (e.g. closures, effort limits, etc.)
- Species restrictions
- Limits and/or quota on catches
- Minimum/ maximum size limits
- Catch reporting (e.g. logbooks, observer programs, etc.)
- Incentives for fishers to comply with measures to manage bycatch and reduce discards
- Reporting of catches
- Observer programs
- Risk assessment of byproduct species

Additional Gear-Specific Measures:

Dredge

- Gear size/ weight limits
- Bars or grids across dredge mouth
- Mesh or belly ring size restrictions
- Water depth restrictions
- Washing/ dipping to remove non-target/ undersize species
- 'Move-on' provisions

Trawl

- Use of Bycatch Reduction Devices (e.g. grids)
- Hopper sorting systems
- Net restrictions (e.g. mesh size, net size)
- 'Move-on' provisions

Net

- Selective targeting measures
- Net restrictions (e.g. mesh size, net size)
- Set time restrictions
- Deployment methodology
- Discrete fishing locations

Pot/Trap

- Trap type/ shape restrictions
- Limits on the total number of traps deployed at a time
- Trap mesh size limits
- Escape gaps/ 'Open' traps
- Bait usage

Line and Hook

- Deployment/ retrieval of gear methods
- Limits on number of hooks and/or length of longlines
- Hook selectivity (e.g. use of circle hooks)
- 'Move-on' provisions
- Selective targeting of identified target-species schools

Hand Collection

- Harvest selectivity
- Species restrictions
- Size restrictions

Partial Strategy

Coordination of Measures, into general strategy based on an:

[4] Providing retained catch cannot be released alive and it utilised in a manner that is consistent with the FAO Code of Conduct for Responsible Fisheries

- Understanding of how they work together to achieve outcome and
- An awareness of need to change measures if found to be ineffective
- Does not have to be byproduct-specific

Strategy

Byproduct-Specific Strategy including (but not limited to):

- Monitoring of byproduct catch levels;
- Reference Points and stock assessments for key byproduct species;
- Mitigation measures to minimise byproduct catches; and
- Mechanisms for change in light of unacceptable impacts.

7.3 Information and Monitoring

What information is available on the amount of non-target species retained by the fishery? This information should include both **observed** and **unobserved mortality** arising from fishing in the fishery.

How is this information collected? See examples in Box 4 below.

How is this information used to evaluate the **measures** / **strategy** in place to manage these **species**?

How often is this information collected / monitored?

Box 8. Examples of Information Collection Methods

Information collection methods:	
• Observer programs • Interviews with fishers • Research programs • Electronic monitoring • Other technologies, such as cameras • Logbooks	• Inspection of fishing vessels and gear prior to commencement of fishing operations • Processor unload records • Co-management and community-based management

If there are no **retained species** in the fishery, what monitoring is in place to ensure that no impact occurs in the future?

7.4 Bait

Describe the bait used in the fishery (if any), including:

What species are used?

How much of each species is used (per trip and combined for the entire season / year)? See bait usage example below.

Where is the bait sourced from / what fishery does the bait come from?

Is that fishery recognised as managed or nationally / internationally certified sustainable?

Describe any research that has been on the impact of bait addition to the **ecosystem** in this fishery.

Box 9. Bait Usage Example

Year	Total Days Fished	Effort (traplifts x 1000)	Catch (kg)	Bait Type	Days Fished with each Bait Type	Amount of Bait used per Day (kg)	Total Bait Used (kg)	Conversion Rate
2008	122	35.8	29078	Mixed Fish	81	86	6994	0.2
				Herring/Pilchard	41	70	2847	0.1
2009	150	45.0	19403	Mixed Fish	100	86	8600	0.4
				Herring/Pilchard	50	70	3500	0.2
2010	107	32.1	27015	Mixed Fish	71	86	6134	0.2
				Herring/Pilchard	36	70	2497	0.1
2011	57	16.2	14558	Mixed Fish	38	86	3268	0.2
				Scaly Mackerel	19	70	1330	0.1
2012	27	8.1	5518	Mixed Fish	18	86	1548	0.3
				Scaly Mackerel	9	70	630	0.1

8 Bycatch (MSC Criteria 2.2)

8.1 Overview

What species are captured and are not retained by the fishery (i.e. **bycatch species**, not including any **ETP species** which are assessed separately)?

Include any impacts of ghost fishing or other unobserved mortality.

Provide a list of all **bycatch species** captured by the fishery (and discard rates), if possible.

If you have limited information on bycatch, can you identify what the '**main**' **bycatch species** are?

What is the stock status of each of the '**main**' species (even if it is uncertain)?

8.2 Management Strategy

Describe the **measures** / **strategy** in place to maintain bycatch species within **biologically-based limits** or ensure the fishery **does not hinder** their recovery/rebuilding. See examples in Box 10 below.

Even if the status of the species is very uncertain, what **measures** or practices are in place that makes it **unlikely** that the fishery could seriously deplete the population or hinder recovery?

How do you know the **measures** / **strategy** are working or are **likely** to work (e.g. plausible argument, objective basis, testing)?

How do you know the **measures** / **strategy** are being **implemented successfully** (i.e. high compliance with management **measures**)?

How do you know that the **strategy** is **achieving its objective**?

Box 10. Bycatch Species Management System Level Examples

Measures

General (all fishing methods):

- Limited entry
- Vessel size restrictions
- Effort limits
- Improvement to design and use of fishing gear
- Species restrictions
- Min/Max size limits
- Limits and/or quota on catches
- Minimum/ maximum size limits
- Bans on discards[5]
- Catch reporting (e.g. logbooks, observer programs, etc.)
- Incentives for fishers to comply with measures to manage bycatch and reduce discards
- Spatial and/or temporal measures (e.g. closures, effort limits, etc.)
- Reporting of discards
- Observer programs
- Risk assessment of bycatch species

Additional Gear-Specific Measures:

Dredge

- Gear size/ weight limits
- Bars or grids across dredge mouth
- Mesh or belly ring size restrictions
- Water depth restrictions
- Washing/ dipping to remove non-target/ undersize species
- 'Move-on' provisions

Trawl

- Use of Bycatch Reduction Devices (e.g. grids)
- Hopper sorting systems
- Net restrictions (e.g. mesh size, net size)
- 'Move-on' provisions

Net

- Selective targeting measures
- Net restrictions (e.g. mesh size, net size)
- Set time restrictions
- Deployment methodology
- Discrete fishing locations

Pot/Trap

- Trap type/ shape restrictions
- Limits on the total number of traps deployed at a time
- Trap mesh size limits
- Escape gaps/ 'Open' traps
- 'Ghost panels' to limit ghost fishing

Line and Hook

- Deployment/ retrieval of gear methods
- Limits on number of hooks and/or length of longlines
- Hook selectivity (e.g. use of circle hooks)
- 'Move-on' provisions
- Selective targeting of identified target-species schools

Hand Collection

- Harvest selectivity

Partial Strategy

Coordination of Measures, into general strategy based on an:

[5] Providing retained catch cannot be released alive and it utilised in a manner that is consistent with the FAO Code of Conduct for Responsible Fisheries

- Understanding of how they work together to achieve outcome and
- An awareness of need to change measures if found to be ineffective
- Does not have to be bycatch-specific

Strategy

Bycatch-Specific Strategy including (but not limited to):

- Monitoring of bycatch catch and discard levels;
- Understanding of level of uncertainty in bycatch levels;
- Mitigation measures to minimise bycatch catches or discard levels; and
- Mechanisms for change in light of unacceptable impacts.

8.3 Information and Monitoring

What information is available on the amount of **bycatch** discarded by the fishery? This information should include both **observed** and **unobserved mortality** arising from fishing in the fishery under assessment.

> How is this information collected? See information collection examples provided in Box 4 above.
>
> How is this information used to evaluate the **measures** / **strategy** in place to manage these species?
>
> How often is this information collected / monitored?

9 Endangered, Threatened and Protected (ETP) Species (MSC Criteria 2.3)

9.1 Overview

For MSC assessment purposes, **ETP species** include species listed under CITES Appendix 1, unless it can be shown that the particular stock of the CITES-listed species impacted by the fishery under assessment is not endangered, and Species recognised by national legislation and / or binding international agreements to which the jurisdictions controlling the fishery under assessment are party.

What **ETP species** are found within the fishery boundaries (regardless of whether they interact with the fishery)?

> Provide a brief description of each species, including distribution, population size, life history and any protection or rebuilding requirements in place.

What **ETP species** has the fishery reported interactions with, including direct capture, contact with gear, boat strikes, etc.?

> Provide a table of all known **ETP species** interactions with the fishery (historical and current, with mortality if known).
>
> Based on these interactions, is the fishery considered to have any **unacceptable impacts** or significant detrimental **direct** (e.g. capture / mortality) or **indirect effects** (e.g. non-capture interactions, such as boat strikes, which do not result in mortality) on **ETP species**?

Are the effects of the fishery on each of these species within national / international limits for the protection of the species?

9.2 Management Strategy

Describe the **measures** / **strategy** in place to manage the fishery's impact on and minimise mortality of **ETP species**. See examples in Box 11 below.

How does the **measures** / **strategy** compare to the national / international requirements for the protection / rebuilding of these species?

How do you know the **measures** / **strategy** are working or are **likely** to work (e.g. plausible argument, objective basis, testing)?

How do you know the **measures** / **strategy** are being **implemented successfully** (i.e. high compliance with management **measures**)?

How do you know that the **strategy** is **achieving its objective**?

* If there are **no requirements of protection and rebuilding** under national ETP legislation or international agreements, also describe:

- The **measures** / **strategy** in place to ensure the fishery **does not hinder** the recovery of **ETP species**;
- How you know these **measures** are working or are **likely** to work; and
- What **evidence** is available to demonstrate the **strategy** is being **implemented successfully** and changes are occurring.

Box 11. ETP Species Management System Level Examples

Measures

General (all fishing methods):

- Limited entry
- Vessel size restrictions
- Effort limits
- Improvement to design and use of fishing gear
- Target species catch limits to ensure adequate food source remains for ETP species
- Spatial and/or temporal closures and restrictions
- Limits and/or quota on the number of interactions
- Handling and release protocols
- ETP population monitoring
- Incentives for fishers to comply with measures to reduce ETP interactions
- Reporting of interactions
- Observer programs
- Risk assessment of ETP species

Additional Gear-Specific Measures:

Trawl

- Use of Bycatch Reduction Devices (e.g. Turtle Exclusion Devices / grids)
- Net restrictions (e.g. mesh size, net size)

Net

- Net restrictions (e.g. mesh size, net size)
- Depth restrictions
- Minimum spacing distances between nets

Pot/Trap

- Pot design (shape and size)
- Minimum mesh size and escape gaps
- ETP exclusion devices (e.g. Sea Lion Exclusion Devices [SLEDs])
- Use of longline configuration
- Weighted buoy lines
- Breakaway links on vertical lines

Line and Hook

- Use of barbless hooks or circle hooks
- Longer leader lengths than buoy drop lengths
- Prohibition on use of wire trace

Hand Collection

- Harvest selectivity

Strategy

ETP Species-Specific Policy including (but not limited to):

- Quantitative monitoring of interaction and mortality rates;
- Mitigation measures to minimise interaction rates / mortality; and
- Mechanisms for change in light of unacceptable impacts.

Comprehensive Strategy

ETP Species-Specific Strategy (as above) that is:

- Made up of linked:
  - Quantitative monitoring,
  - Analyses, and
  - Management Measures and Responses
- And has been tested.

9.3 Information and Monitoring

What information is available on the amount of **ETP species** interactions with the **fishery**?

How is this information collected? See Information Collection Examples in Box 4 above.

How is this information used to **evaluate** the **measures** / **strategy** in place to manage these species?

How often is this information collected / monitored?

10 Habitats (MSC Criteria 2.4)

10.1 Overview

What information is available on the **habitat** types within the fishing area and broader region (e.g. broad- or fine-scale habitat mapping, general habitat distributions, etc.)?

- Include **habitat** maps and / or descriptions
- For benthic **habitats**, consider (1) substratum (sediment type, e.g. sandy bottom), (2) geomorphology (seafloor topography, e.g. rocky reef) and (3) biota (dominant flora / fauna groups, e.g. kelp forest; MSC 2013b)

Where do fishing activities take place in relation to the different **habitat** types?

Is there any indication of any **serious** negative impacts from fishing on the **habitat**, including:

- Habitat loss;
- Extinction of habitat types;
- Depletion of key habitat forming species or associated species to the extent they are at a high risk of extinction; and / or
- Significant alteration of habitat cover/mosaic that causes major changes to the structure or diversity of the associated species assemblages (MSC 2013b)?

10.2 Management Strategy

Describe the **measures** / **strategy** in place to limit or minimise the impact of the **fishery** on **habitat structure and function**. See examples in Box 12 below.

How do you know the **measures** / **strategy** are working or are **likely to work** (e.g. plausible argument, information about the **fishery** / **habitat**s, testing)?

How do you know the **measures** / **strategy** are being **implemented successfully** (i.e. high compliance with management **measures**)?

How do you know that the **strategy** is **achieving its objective**?

Box 12. Habitat Management System Level Examples

Measures

General (all fishing methods):

- Limited entry
- Vessel size restrictions
- Effort limits
- Improvement to design and use of fishing gear
- Spatial and/or temporal closures and restrictions
- Incentives for fishers to comply with measures to reduce sensitive habitat interactions
- Avoidance of sensitive habitat areas
- 'Move on' rule for high catches of sensitive habitat components (e.g. sponges, corals)
- Reporting of fishing location / intensity (e.g. 'footprint')
- Observer programs
- Risk assessment of habitat types

Additional Gear-Specific Measures:

Dredge

- Gear size/ weight limits
- Limits on amount and/or size of benthic habitat components (e.g. rocks) to be landed
- Rotational areas open to dredging activities
- Targeted fishing activities in areas of high target species density
- Limits on exploratory dredging

Trawl

- Use of lightweight gear and/or rubber discs along the ground rope
- Use of semi-pelagic doors/trawls
- Limits on exploratory trawling

Net

- Depth restrictions
- Discrete fishing areas
- Deployment and retrieval methods to minimise bottom contact

Pot/Trap

- Pot size restrictions
- Deployment and retrieval methods to minimise bottom contact

Line and Hook

- Maximum fishing depths (pelagic fishing activities)

Hand Collection

- Harvest selectivity

Partial Strategy

Coordination of Measures, into general strategy based on an:

- Understanding of how they work together to achieve outcome and
- An awareness of need to change measures if found to be ineffective

Strategy
Habitat-Specific Strategy including (but not limited to): • Monitoring of habitat interaction levels; • Mitigation measures to minimise habitat impacts; and • Mechanisms for change in light of unacceptable impacts.

10.3 Information and Monitoring

What information is available on the impacts of gear use on **habitat** types?

What information is available on the spatial extent of interaction and the location and timing of the use of fishing gear? See information Collection Example in Box 4 above.

How often is this information collected / monitored?

Is there any other **habitat** monitoring in place?

11 Ecosystem (MSC Criteria 2.5)

11.1 Overview

The **ecosystem** component does not repeat the status assessment of previous components (retained species, bycatch, ETP species and habitats) but addresses system-wide issues, primarily impacted *indirectly* by the fishery, including ecosystem structure, trophic relationships and biodiversity.

Describe the **ecosystem**(s) in which the **fishery** operates.

Describe the **'key' ecosystem elements** (i.e. features most crucial to maintaining the integrity of the **ecosystem's structure and function** and the key determinants of the ecosystem resilience and productivity)?

Is there any indication of **serious or irreversible harm** from fishing activities, such as:

- Trophic cascade caused by depletion of predators, especially 'keystone' predators;
- Depletion of top predators and trophic cascade through lower trophic levels caused by depletion of key prey species in 'wasp-waste' food webs;
- Severely truncated size composition of the ecological community to the extent that recovery would be very slow due to the increased predation of intermediate-sized predators;
- Gross changes in the species diversity of the ecological community; or
- Change in the genetic diversity of species caused by selective fishing and resulting in genetically-determined change in demographic parameters (e.g. growth, reproductive output; MSC 2013b)?

11.2 Management Strategy

Describe the **measures** / **strategy** in place to address or restrain impacts of the fishery on **key elements** of the **ecosystem**. See examples in Box 13 below.

How do you know the **measures** / **strategy** are working or are **likely to work**?

How do you know the **measures** / **strategy** are being **implemented successfully** (e.g. high compliance with management **measures**)?

Can the **measures** / **strategy** be adapted to environmental changes?

Box 13. Ecosystem Management System Level Examples

Measures

General (all fishing methods):

- Limited entry
- Vessel size restrictions
- Effort limits
- Target species harvest strategy and control rules
- Limits and/or quota on byproduct/ bycatch catches
- Improvement to design and use of fishing gear
- Spatial and/or temporal closures and restrictions
- Bans on discards[6]
- Avoidance of sensitive habitat areas
- Incentives for fishers to comply with measures to reduce sensitive habitat interactions
- 'Move on' rule for high catches of sensitive habitat components (e.g. sponges, corals)
- Catch reporting
- Reporting of fishing location / intensity (e.g. 'footprint')
- Observer programs
- Ecological Risk Assessments
- Modelling of ecosystem and fishery interactions

Additional Gear-Specific Measures:

Dredge

- Targeted fishing activities in areas of high target species density
- Bars or grids across dredge mouth
- Mesh or belly ring size restrictions
- Water depth restrictions
- Washing/ dipping to remove non-target/ undersize species
- 'Move-on' provisions
- Limits on amount

Trawl

- Use of Bycatch Reduction Devices (e.g. grids)
- Hopper sorting systems
- Net restrictions (e.g. mesh size, net size)
- 'Move-on' provisions
- Use of lightweight gear and/or rubber discs along the ground rope
- Use of semi-pelagic doors/trawls
- Limits on exploratory

Net

- Selective targeting measures
- Net restrictions (e.g. mesh size, net size)
- Set time restrictions
- Depth restrictions
- Discrete fishing locations
- Minimum spacing distances between nets
- Deployment and retrieval methods

Pot/Trap

- Trap type/ shape/size restrictions
- Limits on the total number of traps deployed at a time
- Trap mesh size limits
- Escape gaps/ 'Open' traps
- Bait usage
- ETP exclusion devices (e.g. Sea Lion Exclusion Devices [SLEDs])
- Use of longline configuration

Line and Hook

- Maximum fishing depths (pelagic fishing activities)
- Deployment/ retrieval of gear methods
- Limits on number of hooks and/or length of longlines
- Hook selectivity (e.g. use of circle hooks)
- Longer leader lengths than buoy drop lengths
- Prohibition on use of

Hand Collection

- Species restrictions
- Size restrictions
- Harvest selectivity

[6] Providing retained catch cannot be released alive and it utilised in a manner that is consistent with the FAO Code of Conduct for Responsible Fisheries

	and/or size of benthic habitat components (e.g. rocks) to be landed • Rotational areas open to dredging activities • Limits on exploratory dredging	trawling	• Weighted buoy lines • Breakaway links on vertical lines • Deployment and retrieval methods	wire trace • 'Move-on' provisions • Selective targeting of identified target-species schools
Partial Strategy				
Coordination of Measures, into general strategy based on an: • Understanding of how they work together to achieve outcome and • An awareness of need to change measures if found to be ineffective				
Strategy				
Full Ecosystem Strategy including (but not limited to): • Monitoring of ecosystem impacts (e.g. catch levels (target, byproduct, bycatch); ETP species interactions rates; habitat impacts) • Reference Points and stock assessments for key species; • Understanding of key ecosystem threats (fishing and non-fishing); • Mitigation measures to minimise fishery-based ecosystem impacts; and • Mechanisms for change in light of unacceptable impacts.				

11.3 Information and Monitoring

How are **ecosystem** impacts monitored and what information is available? See examples in Box 4 above.

- Along with any **quantitative** information available, include surrogates, analogies, general observations, **qualitative** assessments or expert judgements that can be used to provide information on ecosystem issues (MSC 2013b).
    - Harm to **ecosystem structure** can be inferred from impacts on populations, species and functional groups and is often measured *directly*.
    - Harm to **ecosystem functions** can be inferred from impacts on resilience, etc., and often have to be *inferred* from conceptual or analytical models or analyses.

What are the main impacts of the fishery on the **key ecosystem elements**?

Have any of these impacts / interactions been investigated?

How often is information on the impact of fishing activities on the ecosystem collected / monitored?

MSC Principle 3

12 Governance and Policy

Governance and policy captures the broad, high-level context of the **fishery management system** within which the **fishery** under assessment is found. This section includes:

- The legal and / or customary **framework** that overarches the **fishery**;
- Consultation processes and policies;
- The articulation of roles and responsibilities of people and organisations within the overarching **management system**; and
- Other overarching policies supporting fisheries management.

12.1 Legal and/or Customary Framework (MSC 3.1.1)

Demonstrate that most of the essential features and elements needed to deliver sustainable fisheries are present in a coherent, logical set of practices or procedures or within a coherent, logical supporting 'rule-making' structure.

What essential features and elements are present in the **fishery**? See examples in Box 14 below.

Box 14. Essential Management Features (MSC 2013b)

Essential Management Features	
• Establishing when and where people can fish; • Who can fish; • How they can fish; • What they can catch; • How much they can catch; • Who they talk to about 'rules' for fishing;	• How they might gather relevant information and decide what to do with it; • How they know that people are abiding by whatever 'rules' are made; and • How they catch, sanction or penalise wrongdoers.

Are these features combined within a legal **framework**? What is this **framework**?

Does the **framework** focus on long-term or short-term managements?

How does the **framework** manage risk and uncertainty?

Is the **framework** transparent and open to scrutiny, review and adaptation as new information becomes available?

Is the **framework** compatible with local, national and/or international laws or standards?

For informal and traditional management systems, evidence of the extent to which this scoring issue is met could be through accepted norms; commonly held values; beliefs; and / or agreed rules across the fishing communities of which the **fishery** is part (MSC 2013b).

12.1.1 Cooperation with Other Parties

Describe the **framework** in place (e.g. bilateral / multilateral agreements) for **cooperation** with other parties (national and international; see Box 15).

For fisheries that are not subject to international **cooperation** for management of the stock, this means:

- The existence of national laws, agreements and policies governing the actions of all the authorities and actors involved in managing the **fishery** and
- A level of **cooperation** (see Box 15) between national entities (e.g. regional and national management, state and federal management, indigenous and other groups) on national management issues (as appropriate for the context, size, scale or intensity of the fishery; MSC 2013b).

For fisheries that are subject to international **cooperation** for management of the stock (e.g. **shared stocks**, **straddling stocks**, **highly migratory species [HMS]** or **discrete high-seas stocks**), this means:

- National and international laws, arrangements, agreements and policies governing the actions of the authorities and actors involved in managing the **fishery**; and
- A level of international **cooperation** (see Box 15) with other territories, sub-regional or regional fisheries management organisations under the obligations of UNCLOS[1] Articles 63(2), 64, 118, 119 and UNFSA[2] Articles 8 and 10 (MSC 2013b).

Box 15. Definition of cooperation and general examples of the level of cooperation needed to achieve Scoring Guidelines 60, 80 and 100 for MSC PI 3.1.1

Measuring Cooperation
Cooperation shall at least deliver to the intent of UNSFA 10, relating to: 1. Collection, sharing and dissemination of scientific data; 2. Scientific assessment of stock status; 3. Development of management advice; and 4. Agreement and delivery of management actions consistent with sustainable management advice and on management and control.

[1] http://www.un.org/depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm

[2] http://www.un.org/depts/los/convention_agreements/texts/fish_stocks_agreement/CONF164_37.htm

Level: SG60	SG80	SG100
Generation of scientific advice, not its implementation	Organised and effective cooperation with other parties	Binding procedures governing cooperation with other parties
Framework for cooperation with other parties Flag state should be participating with a relevant RFMO at least as a cooperating non-contracting party or cooperating non-member	Flag state will be participating with a relevant RFMO or other arrangement as a member, or if membership is prohibited for political reasons, as a cooperating non-contracting party or cooperating non-member	Flag state will be participating with a relevant RFMO or other arrangement as a member, or if membership is prohibited for political reasons, as a cooperating non-contracting party or cooperating non-member
Example:		
Ability for parties to coordinate scientific advice to respective management agencies	Establishment of appropriate cooperative mechanisms for effective monitoring, control, surveillance and enforcement	Agreement and compliance with conservation and management measures to ensure long-term sustainability of straddling fish stocks

12.1.2 Resolution of Disputes

What dispute resolution mechanisms are used in the **fishery**?

Provide information on these mechanisms and evaluate the effectiveness of these mechanisms. See Box 16 for an example. Information provided can include:

- Information on the proportion of **stakeholders** that are aware of the existence of dispute resolution arrangements;
- The history and examples of how disputes have been dealt with in the past; and /or
- The presence / absence of any unresolved disputes (MSC 2013b).

Box 16. Fishery example of dispute mechanisms (formal and informal)

Oregon Pink Shrimp Fishery (IMM 2013) **Score: 100**	

Informal mechanisms:	• Ongoing processes of communication and consultation between the fishery management staff and industry, for example:
	  • Use of annual and quarterly newsletters to inform industry of upcoming changes and / or completed research
	  • Communication between biologists, government and the fishery about the use of BRDs to reduce conflict over their adoption and use in the fishery
	  • Consultation among industry members and management staff on latent effort potential of inactive permits resulting in industry testimony to Legislature, in an attempt to reduce number of allowable permits

Formal mechanisms:	• Petition process that allows issues to be brought for Commission decision • Oregon Fishery Permit Review Board, which evaluates Oregon Dept. of Fish and Wildlife denials of limited entry permits and considers permit transfers • The tri-state coordination process administered by the Pacific States Marine Fisheries Commission that can be activated as needed to resolve shrimp fishery management issues or disputes among Washington, Oregon and California states • The coordination mechanism of the Pacific States Marine Fisheries Commission to resolve any disputes between state and federal fisheries

12.1.3 Respect for Rights

How does the **management system** deal with the legal rights of people dependent on fishing for food or livelihood?

How are those people's long-term interests taken into account within the legal and/or customary **framework** for managing fisheries?

Information provided can include:

- The extent to which fishery participants are aware of established rights;
- Historical responses within the fishery to disputes over established rights; and / or
- Accepted norms and practices across the fishery that is supportive of such established rights (MSC 2013b).

12.2 Consultation Roles and Responsibilities (MSC 3.1.2)

This PI deals with the consideration of the roles and responsibilities of the fishers in relation to their cooperation with the collection of relevant information and data, where relevant and/or necessary.

12.2.1 Roles and Responsibilities

What organisations and individuals / groups are involved in the management process? Note, the arrangements may not be formally codified, but may be widely understood across the **fishery**.

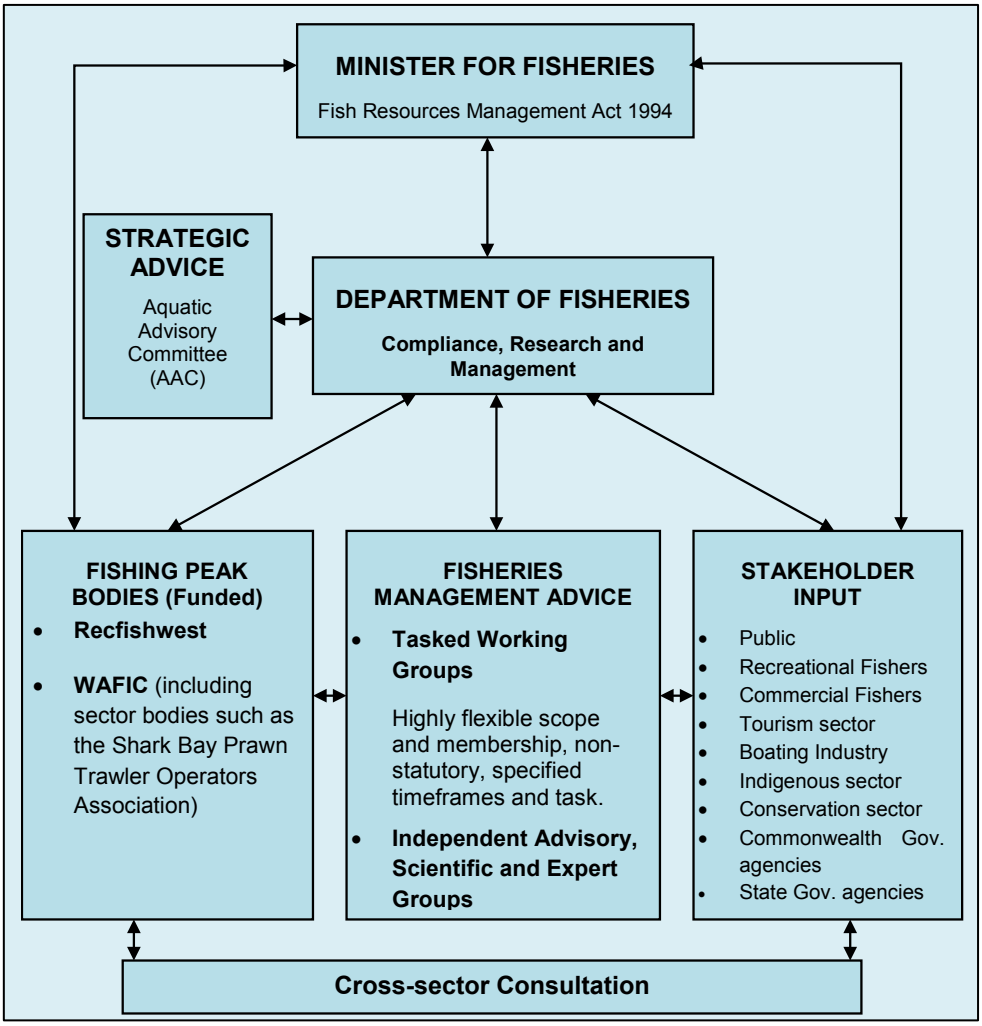
How does each organisation function?

What is each organisation's role or responsibility?

How do these organisations relate to one another?

Specific roles and responsibilities may not always be clearly articulated or immediately apparent; however, this does not mean that different institutions or organisations do not undertake specific and agreed roles. Where this is the case, it may be useful to provide simple governance, institutional or system maps that provide a visual representation of the above information (see Example in Box 17 below).

Box 17. Fishery Example of diagrammatical representation of broad consultation framework and roles / responsibilities of each organisation / individual / group from Western Australia



12.2.2 Consultation Processes

Consultation processes should be appropriate to the scale, intensity and cultural context of the fishery and should be described at both the management system level and the fishery-specific management systems that occur within it (MSC 2013b). This section should focus on the **consultation** *process*, not on the actual information gathered.

Describe **consultation** processes in place to obtain and consider information from a wide range of sources, including **local knowledge**, for input into decisions, policies and practices within the **management system**.

How is the collected information used?

How is the effectiveness of the processes measured?

How is the consideration and / or use of the information explained to affected parties / **stakeholders** (i.e. how transparent is the consultation process)? See examples of evidence for reporting and consultation in Box 18.

Box 18. General examples of consultation reporting to industry and the public

Consultation and Reporting
• Regular newsletters, broadcasts or reports that go out to interested parties / **stakeholders**; • Information pages published and distributed; • Minutes of meetings put on the public record for people to see, electronic mail or other e-technologies used; and / or • Report-back meetings with stakeholders.

* In the absence of a documented consultation process, **evidence** of **consultation** can include:

- the existence, content and relative frequency of invitation letters to meetings;
- a consideration of activities of fisheries extension officers;
- how well local announcements are used;
- use of posters; and / or
- extent of awareness of fishers about meeting agendas, content and outcomes (MSC 2013b).

Evidence of effectiveness might include the general absence of discrimination against any individuals and / or organisations from known consultations (MSC 2013b).

12.2.3 Participation

What opportunities for all interested parties to be involved in the **management system** are available? See example in Box 19 below.

Is involvement by interested parties encouraged? If yes, how?

Box 19. General examples of interested parties and possible opportunities for involvement

Interested Parties may include:	Examples of opportunities for involvement:
• Fishers • Indigenous people • Local community representatives or groups • Local civil society groups, e.g. local NGOs, local fishing businesses • Local government representatives or politicians	• Dockside interactions between industry, biologists and compliance enforcement officers • Stakeholder meetings at management offices • General availability of management staff to public calls • Publication of newsletters • Public notice and access to management meetings

12.3 Long-Term Objectives (MSC 3.1.3)

This PI is about the presence of otherwise long-term objectives at the broader management level, i.e. the objective of the management agency for all fisheries under its control. Where

fisheries fall under dual control (e.g. internationally- or federally-managed fisheries), the wider organisation is the subject of this PI (MSC 2013).

12.3.1 Objectives

Describe the long-term management objectives (high-level, not fishery specific) in place under the management policy?

How do these objectives incorporate a **precautionary approach**?

Informal approaches can be described by providing:

- A review of the factors that have influenced recent decisions in the fishery;
- Knowledge of the extent to which such factors are consistent with achieving sustainability; and
- The application of the **precautionary approach** (MSC 2013b).

12.4 Incentives for Sustainable Fishing (MSC 3.1.4)

This PI focuses on whether the management system has attributes, policies or principles that would tend to incentivise fishers to fish sustainably or engender a sense of stewardship of the resources.

12.4.1 Incentives

Describe any incentives in place under the **management system** that encourages fishers to fish sustainably or engender a sense of stewardship of the resources. For example, this may involve improving security and stability for fishers, to encourage a long-term view (see examples in Box 3 below).

Provide specific examples of how each incentive has worked in the **fishery**.

How often are these incentives reviewed?

Are there any incentives for fishers to fish unsustainably? If yes, what are they?

Is there a system to ensure that these types of incentives do not arise?

Box 20. General Example of incentives for sustainable fishing (MSC 2013b)

Policies that attempt to provide stability and / or security for fishers:	Cooperatives and Sideboards	Rights-based Measures	Informal incentives for 'good behaviour'
• Providing for a reduction in information gaps and uncertainties for fishers; • Providing strategic or statutory management planning to give certainty about rules and goals of management; • Features that encourage collective action while allowing individual choice, such that individual decisions are steered towards the public good. • Providing for the clarification of roles, rights and responsibilities of the various stakeholders; and / or • Providing for a participatory approach to management, research and other relevant processes.	• Economic and social incentives for sustainable fishing • Alleviate overcapitalisation in harvesting and processing sectors • End 'race to fish'	• Quotas • Territorial Use Rights in Fisheries (TURFs) • Rights of exclusion	• Peer pressure • Social beliefs and customs

13 Fishery-Specific Management Systems

This section deals with fishery-specific management systems as appropriate to the scale, intensity and cultural context of the fishery under assessment, not high-level governance and management as described above in Section 15.

13.1 Fishery-Specific Objectives (MSC 3.2.1)

It is the fishery-specific objectives themselves that are scored under this PI, with the strategies to implement the objectives assessed under P1 and P2. Thus, the fishery-specific objectives should align with achieving sustainability as expressed in P1 and P2 and should be consistent with the individual harvest strategy or management strategies in place (MSC 2013b). Objectives may also specify social and / or economic objectives.

13.1.1 Objectives

What are the fishery-specific management objectives (both long- and short-term)? Long-term objectives may be broader (e.g. "prevent **overfishing** while achieving, on a continuing basis, the optimum yield from each fishery" [Rice et al. 2010]), while short-term objectives may be more detailed (e.g. set in annual **TACs** and **ABCs**). See example in Box 21 below.

> Are these objectives clear and specific?
>
> What measures to achieve these objectives currently are in place (e.g. harvest strategy, etc.)?
>
> Are the objectives operationally-defined such that their performance can be measured?

Objectives may not always be stated quantitatively or expressed specific to the particular species or fishery under assessment. Objectives may also be defined in terms of addressing further declines, rather than maintaining optimum yields or biomass levels (MSC 2013b).

Box 21. Example of long- and short-term objectives for the Gulf of Alaska Pollock Fishery

Gulf of Alaska Pollock Fishery Objectives (Rice et al. 2010); Score: 100	
45 short and long-term objectives consistent with **precautionary approach** clustered into nine categories (left) , with specific objectives detailed for the first category (right):	
1. Prevent overfishing; →	• Adopt conservative harvest levels for multi-species and single species fisheries and specify optimum yield; • Continue to use the two million tonnes optimum yield cap for the BSAI groundfish fisheries; • Provide for adaptive management by continuing to specify optimum yield as a range; • Provide for period reviews of the adequacy of $F_{40\%}$ and adopt improvements, as appropriate; • Continue to improve the management of species through species categories.
2. Promote sustainable fisheries and communities;	
3. Preserve food web;	
4. Managed incidental catch and reduce bycatch and waste;	
5. Avoid impacts to seabirds and marine mammals;	
6. Reduce and avoid impacts to habitat;	
7. Promote equitable and efficient use of fishery resources;	
8. Increase Alaska Native consultation; and	
9. Improve data quality, monitoring and enforcement.	
Measuring performance:	
All objectives are measurable, although some require qualitative rather than quantitative assessment	

13.2 Decision-Making Processes (MSC 3.2.2)

This PI assesses whether the decision-making processes in place actually produce **measures** and **strategies** within the fishery-specific management system. It does not evaluate the quality of those measures or strategies, but instead focuses on the decision-making processes themselves (MSC 2013b).

13.2.1 Decision-Making Processes

Describe the decision-making processes for management measures and strategies to achieve the fishery objectives. Note: these processes may or may not be formally documented or codified under an official statute. See example in Box 22 below.

> Is this process established in the fishery, i.e. can it be immediately triggered for fisheries related issues, has it been triggered in the past and has it led to decisions about sustainability in the fishery?
>
> Is this process recognised by stakeholders in the fishery?
>
> How durable / permanent is the decision making process?
>
> Provide a case-study example if available.

Box 22. Fishery Example of formal and informal decision making process in the Oregon Pink Shrimp Fishery

Oregon Pink Shrimp Fishery (IMM 2013) Decision-Making Process; Score: 100	
Formal processes (legislated):	**Informal processes:**
• Posting of announcements of Oregon Fish and Wildlife Commission meetings on Dept. of Fish and Wildlife website well in advance of meetings, with full information of meeting agendas • Encouragement of public attendance or comments through Commissions website • Dept. of Fish and Wildlife routinely posts notices of public meetings about upcoming regulations • Oregon Public Meetings Law ensures public notice and access to meetings • Annual planning meetings between enforcement and Dept. of Fish and Wildlife, as well as intra-season updates, establish enforcement priorities and adapt to enforcement issues as they emerge	• Includes a number of types of interaction and coordination among members, enforcement personnel and stakeholders • Management staff available for informal meetings with stakeholders as well as formal meeting arranged around a particular topic
Example: Eulachon bycatch reduction	
1. In 2010, the annual and supplemental mid-year edition of the Annual Pink Shrimp Review identified upcoming issues with eulachon in anticipation of its listing under the Endangered Species Act (ESA) a. Discussed need to take proactive action to further reduce bycatch of eulachon 2. Design, development and testing of refinements to bycatch reduction devices (BRDs) conducted in collaboration with industry members 3. Results of BRD testing led to a decision about new regulations	

13.2.2 Responsiveness of Decision-Making Processes

How do decision-making processes respond to issues identified in research, monitoring, evaluation and consultation?

Do they take place in a timely and adaptive manner?

How do decision-making processes take into account any wider implications of decisions, i.e. the consequences of decisions on management objectives for target species on the ecosystem or the impacts on those who depend on the fishery for the livelihood?

13.2.3 Use of Precautionary Approach

Demonstrate that the absence of adequate scientific information is not used as a reason for postponing or failing to take conservation and management measures.

How do decision-making processes deal with uncertain, unreliable or inadequate information?

13.2.4 Accountability and Transparency of Management System and Decision Making Process

How can the public access information on fisheries performance and fisheries data?

How is information on fishery performance made available to interested stakeholders?

How is information on management actions and the decision-making processes made available to stakeholders (transparency)? See Box 23 for examples.

Box 23. Measuring Transparency

MSC Guidance (2012)		
SG60	**SG80**	**SG100**
At least a general summary of information on subsidies, allocation, compliance and fisheries management decisions should be available to stakeholders on request	In addition to SG60, information on decisions, fisheries data supporting decisions and the reasons for decisions should be made available to all stakeholders on request	SG60 and SG80 information should be comprehensive and available openly, publicly and regularly to all stakeholders
Fishery Examples:		
	Hasting Fleet Herring Drift Net Fishery (Nichols et al. 2012)	**Burry Inlet Cockle Fishery** (Hough & Holt 2012)
	Explanations for the decisions taken are provided by relevant organisations and agencies, but there is no evidence of formal reporting.	Key developments in the management of the fishery, including research (notably the work of the Cockle Working Group in providing direction for future sustainable fishing practice) are discussed at Burry Inlet Management Advisory Group meetings and minutes are circulated to all attendees (i.e. affected stakeholders)

13.2.5 Approach to Disputes

This part of the PI deals with whether the fishery is operating within the legal or customary framework and if there is evidence that it is not.

What other or higher authorities are available to whom **fishers** or other **stakeholders** may appeal if they are dissatisfied with fishery rules or their implementation in the fishery by local managers?

How does the management system deal with legal disputes or judicial decisions arising from legal challenges? Provide examples if available.

Is there record of repeated violation of the same law or regulation?

Is compliance with judicial decisions timely and rapid?

What actions are in place to proactively avoid legal disputes?

13.3 Compliance and Enforcement (MSC 3.2.3)

13.3.1 Monitoring, Control and Surveillance (MCS) Implementation

Explain the monitoring, control and surveillance mechanisms / systems that exist in the fishery. See examples in Box 24 below.

Are these systems comprehensive in relation to their coverage?

How independent are the monitoring, control and surveillance systems?

Are there any internal checks and balances between these systems?

How have these systems demonstrated an ability to enforce relevant management measures / rules?

Box 24. Examples of Formal and Informal systems to deter illegal activity

Formal mechanisms / systems to deter illegal activities

Fishery Example: Fishery for Northeast Atlantic cod and haddock by Euronor and Compagnie des Pêches St. Malo (MacAlister Elliott and Partners Ltd 2012)

Under bi-lateral agreement, there are three MCS system, the Norwegian, the European and the French:

Norwegian system

- Fisheries Monitoring Centre (FMC) receives position and daily electronic catch and activity data reports
- In Norwegian zone, vessels keep both Norwegian and European logbooks
- Norwegian logbooks more detailed and include haul-by-haul records for all species caught (no discards permitted). Offshore vessels have used electronic logbooks since 2010.
- Along with reporting activity and catches, vessels must also report all attempts to retrieve lost gear
- High degree of confidence vessels comply with management system, including providing information

European system

- European Community Fisheries Control Agency (CFCA) organises operational coordination of fisheries control and inspection activities by Member States to ensure effective and uniform application of Common EU Fisheries Policy rules
- Member States responsible for applying rules (1) in own territory; (2) in waters under their sovereignty and jurisdiction and (3) on fishing vessels flying their flag, wherever their activity is carried out.

French system

- MCS delivered through number of different agencies
- Compliance and enforcement matters coordinated by the pôle PAM
    - Dual role of collecting data in support of regulations and controlling fishing activities and landings
    - Police powers at sea and on land
- In European ports, controls ashore done by Customs officers, with fish caught in Norwegian waters considered imported products
- Activities for distant fleets organised through:
    - Collection, analysis and crosscheck of commercial fishing declarations, as daily effort by area, gear used, catch by species in European logbooks
    - Collection, analysis and crosscheck of market sales slips mandatory for all commercial fish sales and buyers

Examples of informal factors to deter illegal activity (MSC 2013b)**:**

- Social disapproval;
- Prevailing norms;
- The extent to which fishery participants are subject to fines, penalties or other repercussions or disincentives, such as

• Self-monitoring; • Presence of community fish watchers/wardens; • Accessibility to the resource; • Ability to smuggle catches onshore without detection; • Mobility and homogeneity of the fishery; and / or • Exclusivity of access and market-related factors, such as value, demand or preferences (e.g. regarding size).	public 'naming and shaming' for violating fishery customs, rules or regulations may also be considered. This includes fines and penalties imposed by community institutions or other local bodies (MSC 2013b).

13.3.2 Sanctions

What sanctions exist to deal with non-compliance?

How are these applied?

How do you know these provide effective deterrence?

Provide summary of all sanctions given for the fishery (historical and current).

13.3.3 Compliance

Do fishers readily cooperate with the collection of or provide important information for effective fishery management (i.e. catch levels, discard levels, ETP interaction information, etc.)?

13.3.4 Systematic Non-Compliance

Has there been any evidence of systematic non-compliance with fisheries rules?

13.4 Research Plan (MSC 3.2.4)

A **research plan** is a written document that includes a specific **research plan** for the fishery under assessment, relevant to the scale and intensity of the fishery and issues requiring research.

Box 25. Fishery example of a Comprehensive Research Plan

Research Plan for the New Zealand Hoki Fishery (Akroyd et al. 2012)**; Score: 100**

- A Research Coordinating Committee meets stakeholders annually to discuss, evaluate and make recommendations on the direction of research that is to be conducted
- Research recommendations come from Research Planning Groups who contribute to the process in regards to specific research areas
- A 10-Year Research Program for deepwater fisheries has been developed by the Ministry of Fisheries and the Deepwater Group Ltd, which focuses on (1) Research to monitor and assess stock status and (2) Research to monitor interactions with the marine environment.
    - Fisheries research falls into key areas, each with own specific goal:
        - Fisheries Research: to provide the information on sustainable yields and stock status required for the sustainable utilisation of New Zealand's fisheries resources;
        - Harvest Levels: to determine the nature and extent of commercial and recreational catch, Maori customary take, illegal catch, and fishery induced mortality;
        - Cultural, Economic and Social Research: to provide information on cultural, economic, and social factors that may need to be considered in the management decision-making process to enable people to provide for their social, economic and cultural well-being; and
        - Traditional and Customary Research: to provide information on the traditional and customary factors that may need to be considered in the management decision making-process to enable the Minister to discharge his/her obligations to tangatawhenua under the Deed of Settlement and the Treaty of Waitangi (Fisheries Claims) Settlement Act to enable Maori to provide for their traditional and customary well-being.
    - Also has flexibility to deliver one-off specific research projects to address particular management requirements, for example:
        - Hoki trawl surveys (Chatham Rise, Sub-Antarctic, WCSI);
        - Acoustic surveys for hoki (WCSI and Cook Strait);
        - Hoki stock assessment;
        - ETP monitoring and quantification for hoki;
        - Bycatch monitoring and quantification for hoki;
        - Taxonomic ID of benthic samples;
        - Trawl ground assessments; and
        - Ecological Risk Assessment for deepwater fisheries
- The research planning process ensures that results are disseminated to all interested parties in a timely fashion. All Plans from goals and objectives of Fisheries 2030, Statements of Intention, the National Fisheries Plan and the Annual Operational Plan are readily available, and stakeholders provide input into these plans. Research results are reported in publically available reports and articles and press statements to the media.

13.4.1 Research Plan

What research is conducted in the fishery to achieve objectives consistent with P1 and P2?

Is this conducted as part of a fishery-specific **research plan**?

How does the research plan consider the relevant long-term management needs of the fishery (i.e. a **comprehensive research plan**)?

How do you know the research outputs are **reliable**?

Is there effective coordination among researchers?

Are the **research plans** and results accessible to the managing 'entity'?

What is the quality of the research?

13.4.2 Research Results

How are the results of the research made available to interested parties and the public?

13.5 Monitoring and Management Performance Evaluation (MSC 3.2.5)

This PI relates to the management systems having a process of monitoring and evaluation management performance, appropriate to the cultural context, scale and intensity of the fishery, and relevant to the whole system, not just management outcomes (MSC 2013b).

13.5.1 Evaluation Coverage

Are there opportunities and / or forums for decision makers to receive feedback on the management system?

How regularly are these opportunities available?

What mechanisms are in place to evaluate all or **part** of the management system?

13.5.2 Internal and / or External Review

How often is the management system subject to internal and / or external review? See examples in Box 26 below.

Box 26. General examples of External Review

Depending on the scale and intensity of the fishery, external review could be:	
• By another department within an agency; • By another agency or organisation within the country; • Through a government audit that is external to the fisheries management agency;	• By a peer organisation nationally or internationally; or • By external expert reviewers.

14 References

14.1 General References (Sections 1 – 3)

14.2 Principle 1 References (Sections 4 – 6)

14.3 Principle 2 References (Sections 7 – 11)

14.4 Principle 3 References (Sections 12 – 13)

15 Appendices