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MSC Assessment Report for

The Canadian Offshore Northern Shrimp (*Pandalus borealis*) Trawl Fishery - Shrimp Fishing Areas 2, 3, 4, 5 and 6

**Client: Canadian Association of Prawn Producers (CAPP) and
the Northern Coalition (NC)**

Version: Final Report Draft

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1 SUMMARY

This report sets out the results of the assessment of the Canadian Association of Prawn Producers (CAPP) and the Northern Coalition (NC) Northern Shrimp Trawl Fishery in Shrimp Fishing Areas 2-6 against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing. The assessment was carried out over the period September 2009 to December 2010.

The assessment of MSC Principle 1 was led by Michaela Aschan; Principle 2 was led by Howard Powles; and Principle 3 was led by John Angel. A full account of the assessment team's relevant experience is set out in section 10.1 of this report.

The evaluation process involved gathering information relevant to the fishery during a site visit in St. John's Newfoundland and Labrador (NL). Through discussions with other stakeholders, and by reviewing relevant literature the assessment team compiled a draft report, and 'scored' the performance of the fishery. The client agreed to the findings of the report and committed to an action plan to strengthen weaknesses identified against the MSC Principles and Criteria.

In draft form, the report was subject to critical review by appropriate, independent, scientists ('peer review'). The comments of these scientists were taken into account and appended to the report. Following peer review, the report was released for public scrutiny on the MSC website. Following 30 days public consultation, comments were taken into account and appended to the report. The revised report and the recommendation of the assessment team were considered by the Moody Marine Governing Board (a body independent of the assessment team) and the Governing Board made a determination on behalf of Moody Marine Ltd that the fishery should be certified. As a result, this Final Draft Report has been produced and will be posted on the MSC website for a further 15 working days public consultation to allow any objections to the determination to be lodged. If no objections are received a Public Certification Report will be produced and published on the MSC website and the fishery client will be issued with a certificate and the fishery will be subject to annual surveillance audits for the 5 year life of the certificate. If an objection is lodged then the MSC will initiate their objection procedure.

This assessment is one of four MSC assessments being undertaken for the CAPP and the NC by Moody Marine Ltd on shrimp fisheries within Canada's North West Atlantic Exclusive Economic Zone (EEZ). The others are identified as separate units of certification owing to the differences in species and management regime. They are:

- *P. borealis* in SFAs 1;
- *P. borealis* in SFA 7; and
- *P. montagui* (the striped shrimp) in SFAs 2, 3, 4

Separate assessment reports have been produced for each unit of certification.

The *P. borealis* fishery in SFAs 5, 6 and 7 has already been assessed against the MSC Principles and Criteria for sustainable fishing by Moody Marine Ltd for a different client – the Association of Seafood Producers, based in St. John's, NL. In that instance, the assessment was conducted prior to the development and implementation of the MSC Fisheries Assessment Methodology (FAM) and the default assessment tree. As a result, different Performance Indicators and Scoring Guideposts were used. In order to ensure that consistent assessment outcomes were achieved between these overlapping assessments, comparisons of the Performance Indicators for each assessment were made and the Conditions of Certification that remain from the original assessment were taken into account.

1.1 Scores of the Principles

This assessment has resulted in the following scores against the three MSC Principles:

Principle 1: 86.3

Principle 2: 82.0

Principle 3: 87.5

1.2 The main strengths of the fishery

- It is highly likely that the stock is above the point where recruitment would be impaired.
- There is considerable information available regarding the stock both through detailed monitoring of the fishery and fishery independent monitoring and research to support the quota levels and harvest strategy.
- The use of the Nordmore grate helps to ensure that bycatch of other fish species is kept to a minimum.
- The 100% observer coverage and dockside landings coverage provides high confidence in the monitoring data collected for target and other bycatch and discarded species.
- There is a very comprehensive monitoring and surveillance system in place.
- There is a high level of compliance in the fishery.

1.3 The main weakness of the fishery

- Limited knowledge of the effect the fishery on habitat structure and function and on other key elements of the ecosystem.
- A lack of explicit long and short term management objectives consistent with outcomes expressed by MSC's Principles 1 and 2.
- A research plan that is sufficient to achieve objectives consistent with MSC's Principles 1 and 2.

1.4 Conditions

The assessment team identified conditions that will enable the fishery to score at least 80 against all performance indicators. These conditions are summarised as:

1. The client is required by the fourth annual audit to present evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
2. The client is required to demonstrate by the fourth annual audit that there is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or habitats involved.
3. The client is required to demonstrate by the fourth annual audit that sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).
4. The client is required to present evidence by the fourth annual audit that the fishery is highly unlikely to disrupt benthic communities structure and function to a point where there would be a serious or irreversible harm.
5. The client is required to demonstrate by the fourth annual audit that:
 - i. There is a partial strategy in place, if necessary, that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem – in particular the non-catch impacts on benthic communities - to achieve the Ecosystem Outcome 80 level of performance.

- ii. The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems).
 - iii. There is some evidence that the measures comprising the partial strategy are being implemented successfully
- 6. The client is required to demonstrate by the fourth annual audit that:
 - i. Sufficient information is available on the impacts of the fishery on habitats to allow some of the main consequences for the ecosystem to be inferred.
 - ii. Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).
- 7. The client is required to present by the first annual audit evidence that short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
- 8. The client is required to present by the fourth annual audit a research plan that assembles current activity, identifies gaps, and provides the management system with a strategic approach to research including reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.

2 INTRODUCTION

This report sets out the results of the assessment of the Canadian Offshore Northern Shrimp (*Pandalus borealis*) Trawl Fishery in Shrimp Fishing Areas (SFAs) 2, 3, 4, 5 and 6 against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing.

This assessment is one of four MSC assessments being undertaken for the Canadian Association of Prawn Producers (CAPP) and the Northern Coalition (NC) by Moody Marine Ltd on shrimp fisheries within Canada's North West Atlantic Exclusive Economic Zone (EEZ). The others are identified as separate units of certification owing to the differences in species and management regime. They are:

- *P. borealis* in SFA1;
- *P. borealis* in SFA7; and
- *P. montagui* (the striped shrimp) in SFAs 2, 3, 4

Separate assessment reports will be produced for each unit of certification. Each report follows the same template and where there are similarities between the units of certification the same or similar sections of text are used.

The *P. borealis* fishery in SFAs 5, 6 and 7 has already been assessed against the MSC Principles and Criteria for sustainable fishing by Moody Marine Ltd. In August 2008 the Association of Seafood Producers (ASP), based in Newfoundland, successfully achieved MSC certification of the trawl fishery. That assessment used Moody Marine's own assessment tree – a combination of nearly 80 Performance Indicators (PIs) and associated Scoring Guideposts (SG). As of July 21st 2008 any fisheries entering into MSC assessment have been assessed using the MSC's Default Assessment Tree.

This assessment has taken account of the original assessment in accordance with MSC TAB Directive D-015 v2 that details the requirement to ensure consistency of assessment outcomes for any fishery assessments that overlap. The assessment team have also taken into account the outcome of the two annual surveillance audits that have taken place for the certified fishery. The relationship between the Performance Indicators used in this assessment and those used in the ASP assessment – i.e. the ASP assessment was undertaken prior to the development and implementation of the MSC's default assessment tree and Fisheries Assessment Methodology (FAM), is set out in a table in Appendix E to this report. The consideration and setting of Conditions for this fishery has also been done in a consistent manner to the ASP certified fishery and duly noted in the scoring table is Appendix A.

2.1 The Fishery Proposed for Certification

The MSC Guidelines to Certifiers specify that the unit of certification is "The fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel(s) pursuing the fish of that stock)." The fishery proposed for certification is therefore defined as:

Species:	Northern Shrimp (<i>Pandalus borealis</i>)
Geographical Area:	Shrimp Fishing Areas (SFAs) 2, 3, 4, 5 and 6
Method of Capture:	Trawl
Management System:	Canadian Department of Fisheries and Oceans
Client Group:	Canadian Association of Prawn Producers / Northern Coalition

In the course of the certification it is possible that further companies/vessels may join the client group. This would be in accordance with the MSC's stated desire to allow fair and equitable access to the certification. The client has provided a statement to this effect (see Appendix G) and will provide details of the sharing mechanism to the Certification Body and the MSC if the fishery is certified.

If new members join the client group in the course of the assessment or, if/when the fishery was certified, the client representative is obliged to contact the CB as soon as possible and request the inclusion of their new member within the scope of the fishery; provide information to show that the unit of certification had not been compromised; and, that new members had agreed to meet and abide by MSC requirements and conditions of certification.

On confirmation by the CB that any new member was within the scope of the assessment the CB would formally notify the MSC. If the fishery was to be successfully certified any new authenticated members would be added to the scope of the certificate and a copy of the amended certificate would be provided to the MSC for posting on their website.

A list of client group vessels is maintained by DFO (see Table 3 below for the current list). If a license holder with a chain of custody certificate intends to operate with a vessel not named in Table 3, this license holder will provide appropriate information that allows the CB to confirm that the vessel is within scope and also confirmation that their vessel will operate in accordance with any operational requirements that may result from any Condition of Certification.

2.2 Report Structure and Assessment Process

The aims of the assessment are to determine the degree of compliance of the fishery with the MSC Principles and Criteria for Sustainable Fishing, as set out in Section 8.

This report sets out:

- the background to the fishery under assessment and the context within which it operates in relation to the other areas where the target species is fished
- the qualifications and experience of the team undertaking the assessment
- the standard used (MSC Principles and Criteria)
- stakeholder consultation carried out. Stakeholders include all those parties with an interest in the management of the fishery and include fishers, management bodies, scientists and environmental Non-Governmental Organisations (ENGO's)
- the methodology used to assess ('score') the fishery against the MSC Standard.
- a scoring table with the Scoring Indicators adopted by the assessment team and Scoring Guidelines which aid the assessment team in allocating scores to the fishery. The commentary in this table then sets out the position of the fishery in relation to these Scoring Indicators.

The intention of the earlier sections of the report is to provide the reader with background information to interpret the scoring commentary in context.

Finally, as a result of the scoring, the Certification Recommendation of the assessment team is presented, together with any conditions attached to certification.

In draft form, this report is subject to critical review by appropriate, independent, scientists ('peer review'). The comments of these scientists are appended to this report. Responses are given in the peer review texts and, where amendments are made to the report on the basis of peer review comments; these are also noted in the peer review text. Following peer review, the report is then released for public scrutiny on the MSC website.

The report, containing the recommendation of the assessment team, any further stakeholder comments and the peer review comments is then considered by the Moody Marine Governing Board (a body independent of the assessment team). The Governing Board then make the final certification determination on behalf of Moody Marine Ltd.

It should be noted that, in response to comments by peer reviewers, stakeholders and the Moody Marine Governing Board, some points of clarification may be added to the final report.

Finally, the complete report, containing the Moody Marine Ltd Determination and all amendments, will be released for further stakeholder scrutiny.

2.3 Stakeholder Meetings Attended

Information used in the main assessment has been obtained from interviews and correspondence with stakeholders in this fishery, notably:

- A meeting with the client on September 2, 2009 at the Courtyard Marriott hotel, St. John's;
- A meeting with DFO and the client on September 3, 2009 at DFO offices in St. John's;
- A tour of FV Newfound Pioneer on September 2, 2009 in Bay Roberts; and
- Correspondence from stakeholder Ecology Action Centre and the Sierra Club of Canada.

2.4 Other Information Sources

Published information and unpublished reports used during the assessment for this fishery as are listed below. The list is generic to the four reports that have been produced in association with the assessment of the *Pandalus borealis* and *Pandalus montagui* fisheries in SFA 1-7.

Legislation and Treaties

- Fisheries Act (R.S. 1985, c. F-14C) and regulations
- Territorial Sea Geographic Co-ordinates (Area 7) Order (S.O.R./85-872
- The Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries, NAFO, 1979
- UN Convention on the Law of the Sea, United Nations, 1982
- UN Code of Conduct for Responsible Fishing, Food and Agricultural Organization of the United Nations

Policy Papers and Agreements and Reports

- Agreement between The Inuit of the Nunavut Settlement Area and Her Majesty The Queen in Right of Canada, 1993
- Agreement Between Nunavik Inuit and Her Majesty The Queen in Right of Canada Concerning Nunavik Inuit Land Claims, 2006
- Auditor General of Canada annual reports
- Collaborative Agreement Between Fisheries and Oceans Canada (DFO) and World Wildlife Fund, October 2008
- DFO Aboriginal Fisheries Strategy, www.dfo-mpo.gc.ca
- DFO Emerging Species Policy, www.dfo-mpo.gc.ca
- DFO Fishery Stewardship and Sustainability Checklist 2008-2009
- DFO Policy Framework for the Management of Fisheries on Canada's Atlantic Coast www.dfo-mpo.gc.ca
- DFO Sustainable Fisheries Framework Policy, www.dfo-mpo.gc.ca
- Integrated Fisheries Management Plan - Northern Shrimp - Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap, 2007
- Land Claims Agreement between the Inuit of Labrador and Her Majesty The Queen in Right of Newfoundland and Labrador and Her Majesty The Queen in Right of Canada, 2005
- Marine Institute: Project Proposal - Reducing Seabed Impacts of Bottom Trawls
- MSC Certification of the Offshore Shrimp Fisheries (>100') in areas 1, 2, 3, 4, 5, 6 and 7. Submission for the Main Assessment by the 17 Offshore Licence Holders September 2, 2009

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C-NOPB 2008. Strategic Environmental Assessment – Labrador Shelf Area. Canada-Newfoundland Offshore Petroleum Board, St. John’s. 519 pp + appendices.

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3 GLOSSARY OF ACRONYMS, TERMS AND ABBREVIATIONS

B _{MSY}	The level of biomass resulting in maximum sustainable yield
C-NOPB	Canada - Newfoundland and Labrador Offshore Petroleum Board
CAPP	Canadian Association of Prawn Producers
COSEWIC	Committee on Status of Endangered Wildlife in Canada
CPUE	Catch Per Unit Effort
CSAS	Canadian Science Advisory Secretariat
DFO	Department of Fisheries and Oceans or Fisheries and Oceans Canada
EEZ	Exclusive Economic Zone
ENGO	Environmental Non-Government Organization
ETP	Endangered, Threatened and Protected Species
FAO	Food and Agriculture Organization of the United Nations
FC	Fisheries Council of NAFO
F _{MSY}	The rate of fishing mortality that results in the maximum sustainable yield
ICES	International Council for the Exploration of the Seas
IFMP	Integrated Fisheries Management Plan
IQF	Individual Quick Frozen
MCS	Monitoring Control and Surveillance
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
NAFO	Northwest Atlantic Fisheries Organization
NC	Northern Coalition
NGO	Non-governmental Organization
NRA	NAFO Regulatory Area
NSA	Nunavut Settlement Area
NSAC	Northern Shrimp Advisory Committee
NSRF	Northern Shrimp Research Fund
NWMB	Nunavut Wildlife Management Board
PA	Precautionary Approach
PI	Performance Indicator
RISA	Resolution Island Study Area
SAR	Science Advisory Report
SARA	Species At Risk Act
SC	Scientific Council of NAFO
SFA	Shrimp Fishing Area
SG	Scoring Guidepost
TAC	Total Allowable Catch
VMS	Vessels Monitoring System

4 BACKGROUND TO THE FISHERY

4.1 Introduction

The Pandalid shrimp fisheries off of eastern Canada are described by two sets of geographical zones or areas, the Shrimp Fishing Areas (SFAs) established by the Department of Fisheries and Oceans, Canada (DFO), and the Divisions of the Regional Fisheries Management Organisation (RFMO) established by the Northwest Atlantic Fisheries Organisation (NAFO). There is not a one-to-one correspondence between these zones and divisions. The NAFO Divisions (Figure 1) originated for the assessment and management of groundfish stocks, and they pre-date the Canadian 200 mile limit that runs across the western divisions.

The Canadian SFAs 0-16 extend from Baffin Island to the Grand Banks, the Gulf of St Lawrence and the Scotian Shelf, and are wholly within the Canadian 200 mile limit that marks their seaward boundary. Figure 2 shows the location of the SFAs and, in particular, highlights SFA's 2 – 6.

4.2 Biology of the Target Species

The Northern shrimp (*Pandalus borealis* Kröyer 1838) has a discontinuous circumpolar boreal distribution, and occurs thereby in the West Atlantic from the Gulf of Maine to Davis Strait. This crustacean is usually found in areas with soft, muddy sediment and where the temperature ranges from 1-6 °C. The Northern shrimp occurs from Davis Strait in the North throughout the Labrador and the Newfoundland area and in “holes” on the Scotian Shelf at depths of 150-600m. *P. borealis* is easily identified both as young male and adult female.

Two species of *Pandalus* are harvested in Canadian waters of the northwest Atlantic. *P. borealis* is much more abundant and widespread in commercial quantities, and is the subject of most of the studies and assessments of commercial pandalid shrimp in the northwest Atlantic. *P. montagui* (striped shrimp), although widely distributed from Davis Strait to the Grand Banks, is most abundant in more northerly areas and at shallower depths (Orr et al 2003). *P. montagui* tends to be most abundant at depths less than 400 m, while *P. borealis* can be abundant at 200-600 m (Orr et al 2003). The two species tend to be found mixed in commercial densities in shelf areas near the entrance to Hudson Strait; inside Hudson Strait *P. montagui* predominates, while in other areas *P. borealis* predominates (DFO draft 2009).

P. borealis is a protandrous hermaphrodite, meaning that it matures as a male at age 2-5, mates as a male for two or three years before changing sex and spending the rest of its lifespan as a female. Shrimp in the Labrador, Newfoundland and Scotian Shelf area live for 5 to 8 years, depending on conditions. The shrimp spawn in autumn and the female carries the eggs until April-May when they hatch, and the pelagic larvae are released (Bergström 2000). The larvae will spend the first month in the upper layers but during their development they become more bottom orientated as they develop through 6 stages before finally settling on the bottom after approximately 2 months. Particle tracking models reveal that the larvae may be transported as far as 300km during the pelagic phase (Pedersen et al. 2000). Ocean currents at the Canadian west coast are generally from North to South and could act to foster dispersal of shrimp over large continental shelf areas (particularly at the larval stage) This larval transport may explain why the shrimp does not form genetically distinct populations, but rather consists of one meta-population with genetic gradients through the population (Martinez et al. 2006). However, isolated bays and fjords seem to develop their distinct populations (Sévigny et al. 2000; Drengstig et al. 2000).

The recruitment of one year old shrimp seem to be directly dependent on the spawning stock biomass (biomass of spawning females) but is also affected by the timing and duration of the phytoplankton

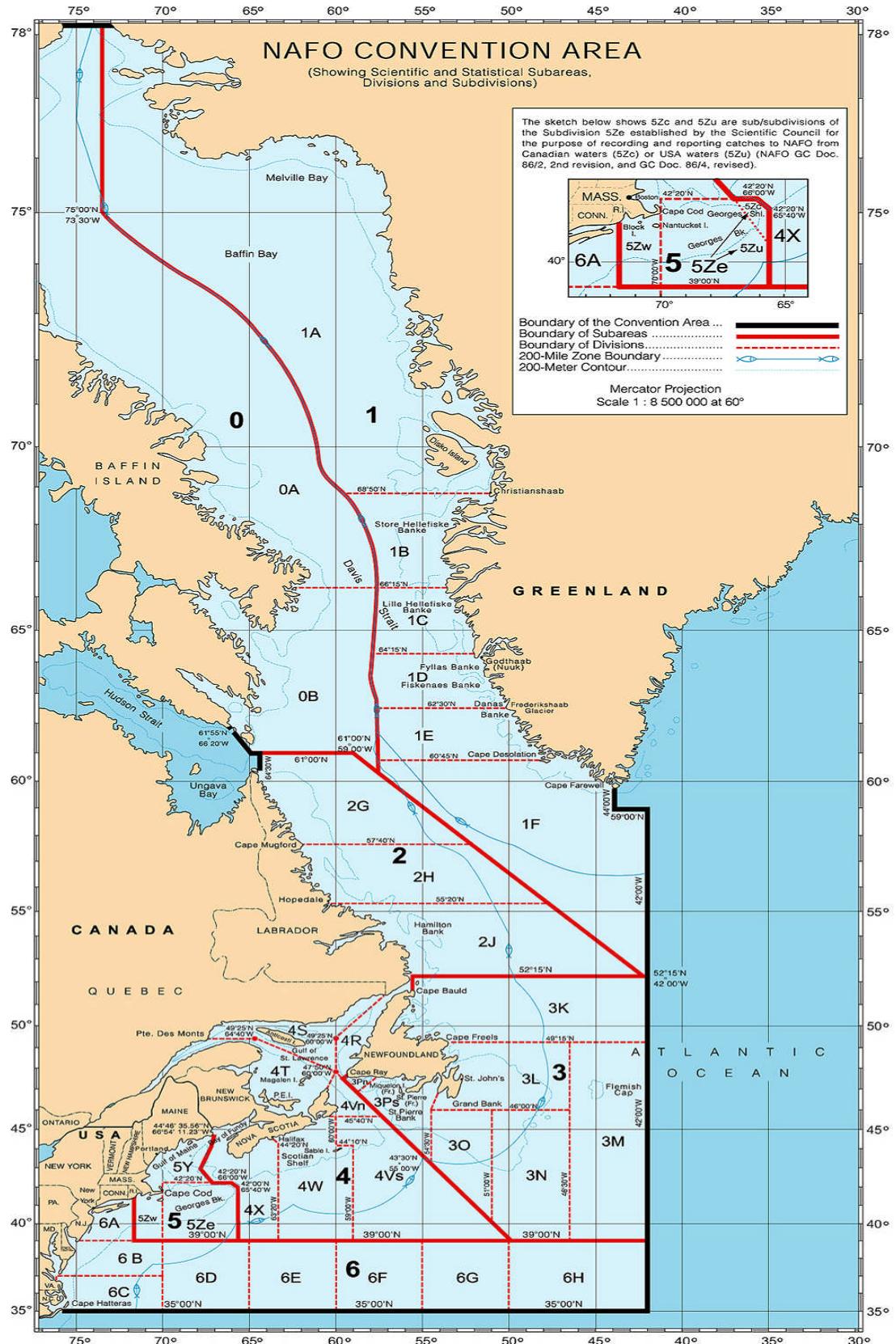


Figure 1: The Northwest Atlantic Fisheries Organisation (NAFO) Convention Area

Source: NAFO website: http://sattrax.ca/marine/map_nafo.html

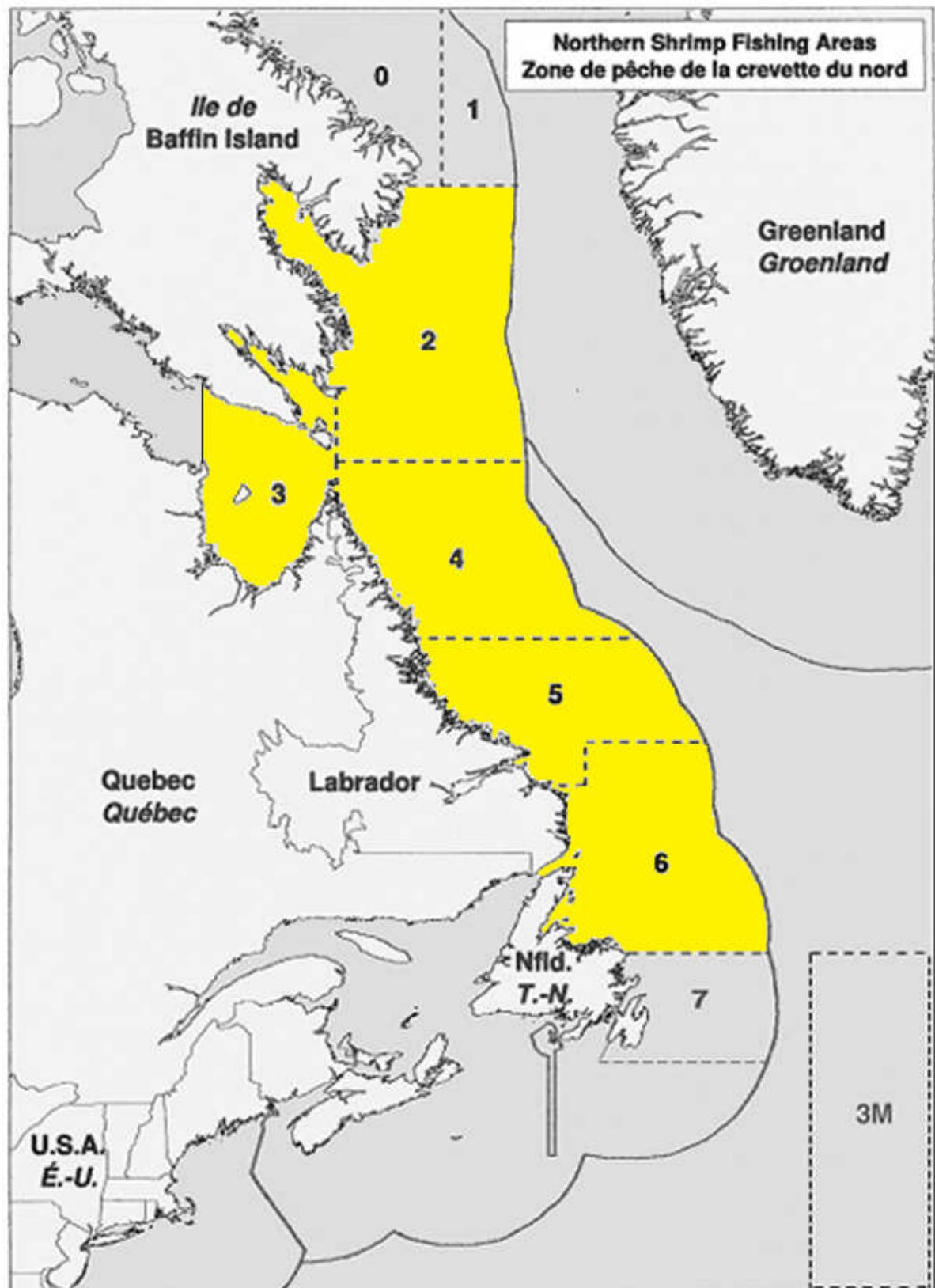


Figure 2: Shrimp Fishing Areas 0-7.

bloom (Aschan and Ingvaldsen 2009; Koeller et al. 2009a). Intuitively the relationship between parent stock and recruitment seem obvious. Studies using 1-year-old shrimp reveal direct dependence on spawning stock biomass (Aschan and Ingvaldsen 2009, Ouellet et al. 2007). However, the recruitment indices used in the assessments are of 2 and/or 3-year-old shrimp that has been subject to high mortality due to predation before caught by the survey trawl. Environmental conditions such as temperature, competition with other species and predation by demersal fish influence on the year class size until the shrimp is recruited to the fishery as 3-4 year olds (>15mm carapace length, 6cm total length). Thereby the spawning stock-recruitment relationship weakens from one to three year old recruits.

Mortality rate Z is equal to the P/B ratio of the population provided the population is in steady-state (Allen 1971). The age at first spawning as females varies between 4 and 7 years (highest in the north (Parsons et al. 1989). As age at first time spawning is related to maximum age and these parameters by far determine the mortality (Z) it is clear that the P/B ratio also varies within the area. When comparing with stocks possessing similar population parameters variables (Barents Sea and Iceland) it is likely that the P/B ratio varies between 0.5 and 1 (Nilssen and Hopkins 1991). However, large uncertainties are connected to such production estimates (Brey 2008).

4.3 History of the Fishery

The Northern shrimp fishery commenced in the early 1970s when an exploratory fishing program confirmed the presence of shrimp stocks in the waters stretching southward from Baffin Island to the Northeast coast of Newfoundland. Between 1978 and 1991, 17 offshore¹ licences were introduced and quotas established using an Enterprise Allocation regime (see section 6.1). In the 1990s, as the shrimp stocks grew in abundance and the cod moratorium came into effect, temporary inshore² licences were introduced throughout Atlantic Canada giving priority access to the under 65 feet fleet and to aborigines. A three-year plan was announced in 1997 with significant quota increases for both the offshore and temporary inshore licences. The Total Allowable Catch (TAC) has doubled since the late 1990s, rising from 85,000t in 1998 to over 160,000t in 2007. In 2006, DFO announced that additional access to the shrimp fishery would be frozen to encourage stability in the short term. Additionally, in 2007, temporary licences were converted to regular licences in an effort to further promote stability in the inshore fleet (DFO 2009a).

In the mid-1990's, a major expansion in the shrimp fishery was facilitated by an increase in shrimp biomass, which appears to have followed the decline in groundfish abundance (Worm & Myers, 2003). TACs were increased stepwise in line with the natural increase in shrimp stocks. The significant scale of the expansion phase is illustrated by the evolution of the TAC and fishery landings for the main SFAs. For example, the total TAC allocated to SFAs 0-7 inclusive increased from 8,200 t in 1978 to 85,000 t by 1998, and to 163,231 t by 2006 (DFO 2007a). Recorded landings increased from 3,630 t in 1978 to 137,528 t in 2006 (DFO, 2007a). In SFAs 4-7 catches have further increased in 2007 (Orr et al. 2008 SCR 58; NAFO/ICES 2008).

Following these developments the Canadian fishery for *P. borealis* has become one of the primary cold water shrimp resources in the North Atlantic. The following table shows the catch of Northern shrimp between 1977 and 2008.

^{1& 2} The “offshore” “inshore” distinction refers to processing, i.e. offshore vessels have processing facilities on board whereas inshore vessels do not. As a consequence inshore vessels are smaller (<65') and land fresh shrimp to shore based processors.

Table 1: The landings (t) of *P. borealis* and *P. montagui* caught between 1978 and 2008. (Provided by DFO, 2009).

YEAR				DIV2G	HOPE	CART	HAWKE	DIV3K	DIV3M	DIV3L	TOTAL	
	SFA1 ⁴	SFA2	SFA3 ²	SFA2,3,4 ³	SFA4	SFA5	SFA6	SFA7	SFA7			
1977				-	1,272	1,414	<1	<1	-	-	2,686	
1978				0	-	2,109	1,521	-	-	-	3,630	
1979	1,732			92	3	2,693	1,034	5	-	-	5,559	
1980	2,726			236	<1	3,938	170	-	-	-	7,070	
1981	5,284			13	2	3,382	67	135	-	-	8,883	
1982	2,064			0	5	1,829	154	<1	-	-	4,052	
1983	5,413			0	30	997	3	-	-	-	6,443	
1984	2,142			0	-	712	290	-	-	-	3,144	
1985	3,069			0	-	1,687	2	-	-	-	4,758	
1986	2,995			476	2	3,498	1,328	-	-	-	8,299	
1987	6,095			1,069	7	4,538	1,418	1,678	167	-	14,972	
1988	5,881	2,826		1,125	1,083	6,584	1,254	3,747	4,102	-	26,602	
1989	7,235	3,039		1,269	3,842	4,329	1,656	1,855	4,807	-	28,032	
1990	6,177	1,771		1,635	2,945	3,769	1,591	1,929	3,669	-	23,486	
1991	6,788	1,098		605	2,561	4,501	1,617	1,976	3,524	-	22,670	
1992	7,493	1,239		0	2,706	4,680	1,635	3,015	3,594	-	24,362	
1993	5,491	106		0	2,723	4,273	1,446	3,672	4,363	3,724	-	25,798
1994	4,766	475		244	3,982	7,499	-	10,978	1,041	-	28,985	
1995	2,361	2,721		245	5,104	7,616	-	10,914	970	-	29,931	
1996	2,632	3,968		0	5,160	7,383	-	10,923	906	-	30,972	
1997	517	5,235		435	5,217	15,103	-	21,246	785	-	48,538	
1998	933	5,163		2,703	8,051	15,170	-	46,337	484	82	78,923	
1999	2,046	5,132		3,714	7,884	15,109	-	51,202	477	78	85,642	
2000	1,590	4,261		3,005	8,048	14,645	-	63,175	540	4,229	99,493	
2001	3,625	5,829		3,751	7,991	15,036	-	52,554	295	4,876	93,957	
2002	6,247	5,597		3,369	8,516	15,180	-	60,198	8	5,316	104,431	
2003	6,592	5,368		1,053	13,020	30,437	-	71,227	0	10,008	137,705	
2004	7,021	5,231		2,069	9,644	22,690	-	77,776	0	10,613	135,044	
2005	6,921	6,202		1,834	10,247	22,898	-	75,129	0	11,184	134,415	

YEAR					DIV2G	HOPE	CART	HAWKE	DIV3K	DIV3M	DIV3L	TOTAL
	SFA1 ⁴	SFA2	SFA3 ²	SFA2,3,4 ³	SFA4	SFA5	SFA6	SFA7	SFA7			
2006	4,127	5,966	90	2,431	10,084		22,612		75,673		18,271	139,254
2007	1,945	6,310	406	947	9,839		22,637		74,437		18,312	134,833
2008 ¹	0	5,067	0	752	9682		20,503	0	74,506	0	21,187	125,878

** In 2003, the offshore licence holders were allowed to change their quota period from Jan 1 – Dec 31 to Apr 1 – Mar 31.

¹ Preliminary data

² Includes SFA2 within the NSA

³ *P montagui* only, all other areas *P borealis*

⁴ Catch in SFA 1,2,3
and 4 is by offshore
boats only

4.4 The Fleet and Gear

The offshore fleet comprises 13 large factory freezer trawlers operating from ports in Newfoundland and Nova Scotia with occasional landings in Greenland when fishing in far Northern waters (SFA 1). Vessels in the present fleet are 49-75 m, with 400 -1,960 cubic metres of hold capacity, purpose built for shrimp trawling and processing, but able to fish and process groundfish if required. The larger vessels make 6 to 8 trips a year averaging between 270 and 320 fishing days, and the smaller ones 8 to 10 trips averaging 200 to 250 fishing days. The vessels take crews of between 24 and 28 and operate a double-crewing system, i.e. one trip on, one off resulting in employment for more than 600 crew.



Source: DFO 2009a

Figure 3: Typical offshore shrimp fishing vessel (LOA> 100'; >500t)

The offshore fleet fish all year round, starting in SFA 5 & 6 then moving North when ice conditions and quotas allow. Vessels in the inshore fleet are smaller in size, i.e. < 65' and so are more restricted by weather conditions but also the ability to keep fresh shrimp for shore based processing. For these reasons their range is restricted and does not extend North beyond SFA 5.

The TAC season in SFA 2 to 6 runs from April 1st – March 31st. The fishery operates under enterprise allocations (EA) (see section 6.1) with equal shares of the TAC.

Offshore vessels pack their shrimp at sea, either raw-frozen for the Japanese market, or cooked and frozen for the Russian, Chinese and European market.

Canadian offshore shrimp licence holders are located in Nunavut, Quebec, Newfoundland and Labrador, Nova Scotia and in New Brunswick. All of the 17 offshore shrimp licence holders are party to the assessment, and are listed in section 6.2.

Demersal otter trawls with a minimum mesh size of 40 mm, and fitted with a Nordmore separator grate are used in the shrimp fishery (See Figure 4). Shrimp pass through the grate, but groundfish are directed upwards towards an exit window in the upper panel. The grate is mandatory in all fishing areas. In SFAs 6 and 7 the mandatory grate spacing is 22 mm. In SFAs 1 - 5 and 8 the mandatory

spacing is 28 mm. As a rule of thumb the length at which fish are sorted is 10 times the bar space (Roger Larsen pers. comm.). Bobbins or rubber discs are fitted to the ground rope, which is linked to the leading lower edge of the net by vertical toggle chains. The use of the chains is intended to allow the trawl to be towed clear of the bottom to minimise seabed contact and further reduce groundfish bycatch. In recent years various adjustments have been made to trawl doors, bridles, and the net in order to improve hydrodynamics and fuel efficiency (Winger, pers. comm.).

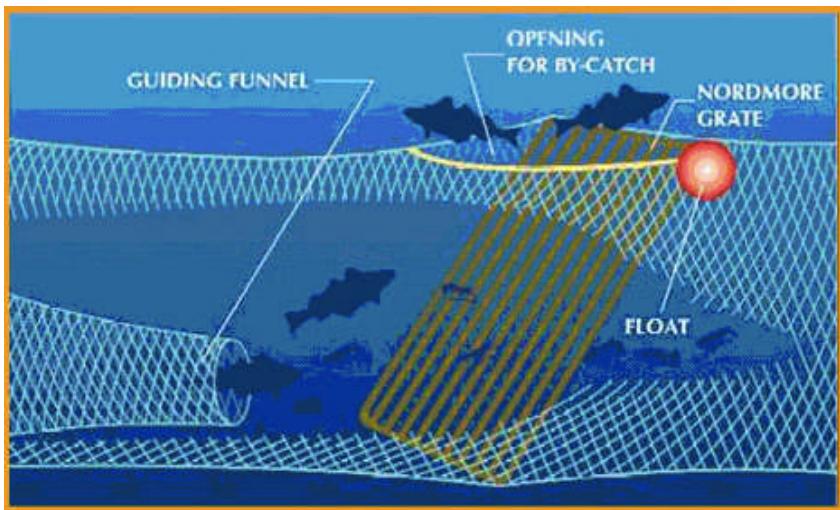


Figure 4: Nordmore Grate

(source: DFO 2009a)

5 STOCK ASSESSMENT

5.1 Management Unit

Separate stocks of *P. borealis* have not been clearly defined, however, scientists have observed differences in rates of growth and maturation, which are attributable to different habitat conditions across the geographic range of the species. These differences provide the present basis for delineating assessment and management units into SFAs (see Figure 2). These units also provide the basis for management of the fishery as a whole (DFO 2009a). *P. borealis* may represent a single metapopulation within the Northwest Atlantic, but treating fishery management and ecological relationships at a smaller spatial scale appears consistent with precautionary fishery management.

SFAs 2, 3, 4, 5 and 6 are managed as domestic Canadian stocks.

5.2 Assessment and Stock Status SFA 2, 3, 4, 5 and 6

DFO conducts annual multi-species surveys in SFA6. In SFA 5, autumn multi-species surveys were conducted in the northern part of SFA 5 (NAFO Division 2H) between 1996 and 1999. Since then, surveys of the whole of SFA 5 were completed in only four of the last ten years ('01, '04, '06, '08). In SFA 4 the NSFR-DFO research survey has been conducted annually since 2005 and since 2006 in SFA 3 and 2 (DFO 2008/08; DFO 2010/18). Since the 2008 assessment, three research surveys in the north 2009 DFO survey of SFA 3 and western Hudson Strait, the 2008 and 2009 Northern Shrimp Research Foundation (NSRF)-DFO surveys of SFA 2EX and RISA) provide the fishery-independent data for the 2010 assessment (DFO 2010/24).

This resource is assessed on a biennial schedule and was last assessed in March 2010 (NB. The 2010 assessment reports were not available to the team when they produced the client draft report, however, this draft version has taken the assessments into account). An assessment framework workshop was held during May 2007 with the objective of determining the appropriate indices to use in the assessment, providing short term predictions of trends in future stock size and developing a precautionary approach to Northern Shrimp management, with clear limit reference points. The assessment follows the framework established by DFO (2007c) where possible. Fishery data from observer and logbook datasets and fishable and female spawning stock biomass (SSB) indices form the basis of the assessment. Fishable biomass refers to that portion of the survey catch with a carapace length greater than 17 mm and therefore includes both males and females. SSB refers to the female portion of the survey catch regardless of size. The recruitment index, is the abundance of the population from 11.5 to 17 mm carapace length. Exploitation rate indices were determined by comparing the catch to the survey fishable biomass index (DFO 2010/18).

According to the assessments conducted in 2008 the shrimp stock in SFA 3, 4, 5 and 6 was in a very good condition. The catches had been around the long-term mean. Catch per unit effort (CPUE) was above the long-term mean. The total biomass and female biomass was high, the abundance was increasing and the recruitment was good. Recruitment and female biomass were expected to support the fishery over the next years. Based on the most recent DFO Science Advisory Reports (SAR) (2010/18; 2010/24), the resource has been decreasing in the south but increasing in the north.

In SFA 6, the female spawning stock biomass (SSB) is presently within the cautious zone at 97% of the provisional Upper Stock Reference Point (USR), the fishable biomass (Figure 5) and the recruitment has declined since 2006. Large vessel CPUE (kg/hr) that was high from 1997 to 2006 fell below the 1980-2009 mean by 2009. Small vessel CPUE, previously increasing to 2007, decreased in 2009.

In SFA 5 the stock show a decline in fishable biomass by 16% from 2006 to 2008 (Figure 6), The SSB is still in the healthy zone in 2008 and recruitment appears average but is uncertain. Large vessel CPUE increased from 1992 to 2001, before declining gradually to 2009, but is still above the 1980-2009 mean. The exploration rate was 15% in 5 out of 9 years but was 20% in 1998 and again in 2008.

In SFA 4 fishable biomass (Figure 7), recruitment and SSB increased during the last five years. In SFA3 there is no direct fishery on *P. borealis*. Here the fishable biomass and SSB seem stable but recruitment is uncertain. Large vessel CPUE mainly fluctuates above the 1989-2009 mean and has increased since 2005. SBB is well above the provisional Upper Stock Reference Point (USR).

In SFA2 the fishable biomass increased from 33,000 t in 2006 to 78,000 t in 2009 also the SSB more than doubled in the same period, but the recruitment is uncertain.

The resource continues to be distributed over a broad area. The decline in CPUE and fishable biomass in the southern areas (SFA 6 and 5) indicate that recent catches have had impact on the resource. Recruitment has declined in SFA6 and is uncertain in the rest of the area. High uncertainty is still connected to the survey indices of the northern areas (DFO 2009b; DFO 2010/24).

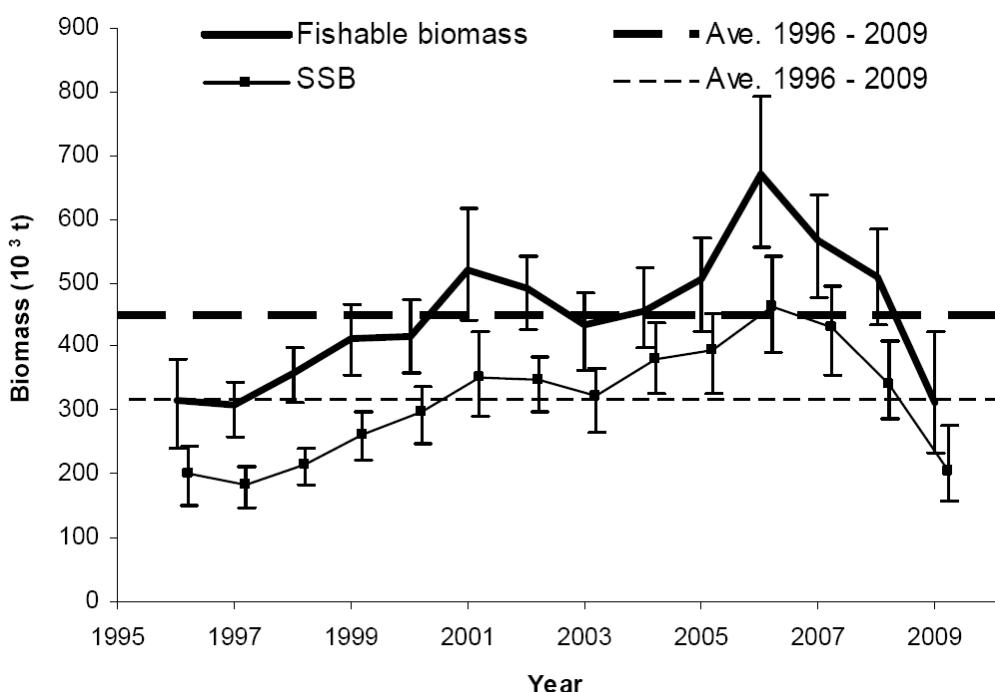


Figure 5. SFA 6 biomass indices (error bars indicate 95% confidence intervals) (DFO 2010/018).

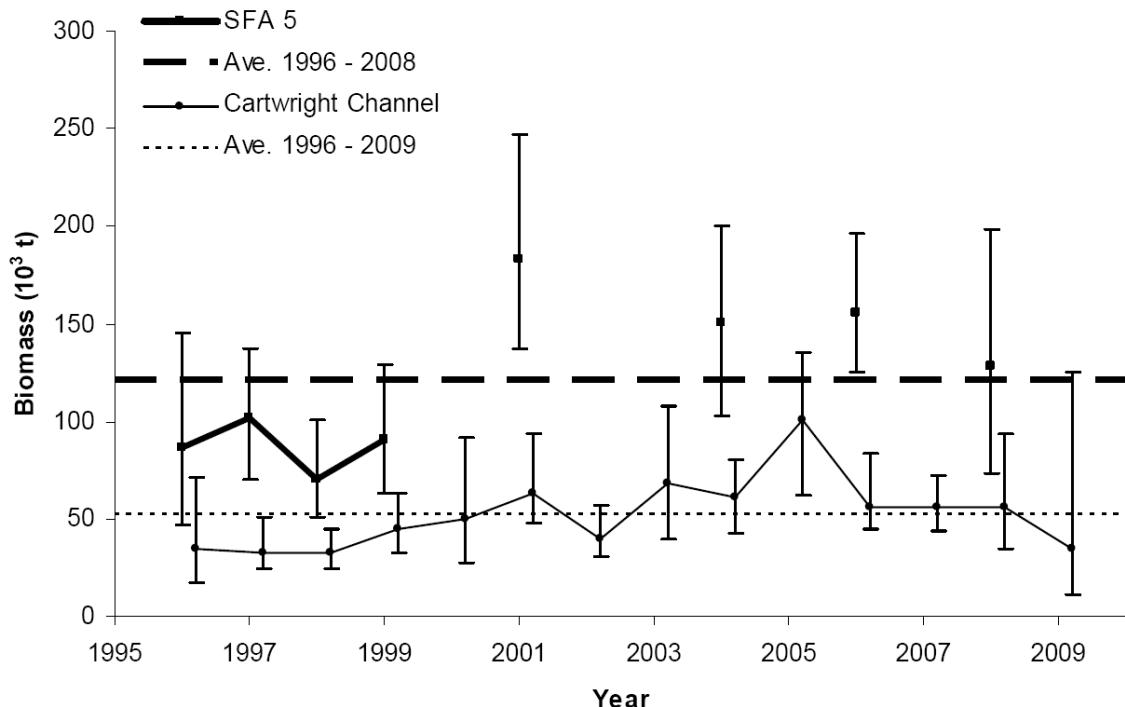


Figure 6. Fishable biomass index within the entire of SFA 5 and Cartwright Channel (error bars indicate 95% confidence intervals) (DFO 2010/018).

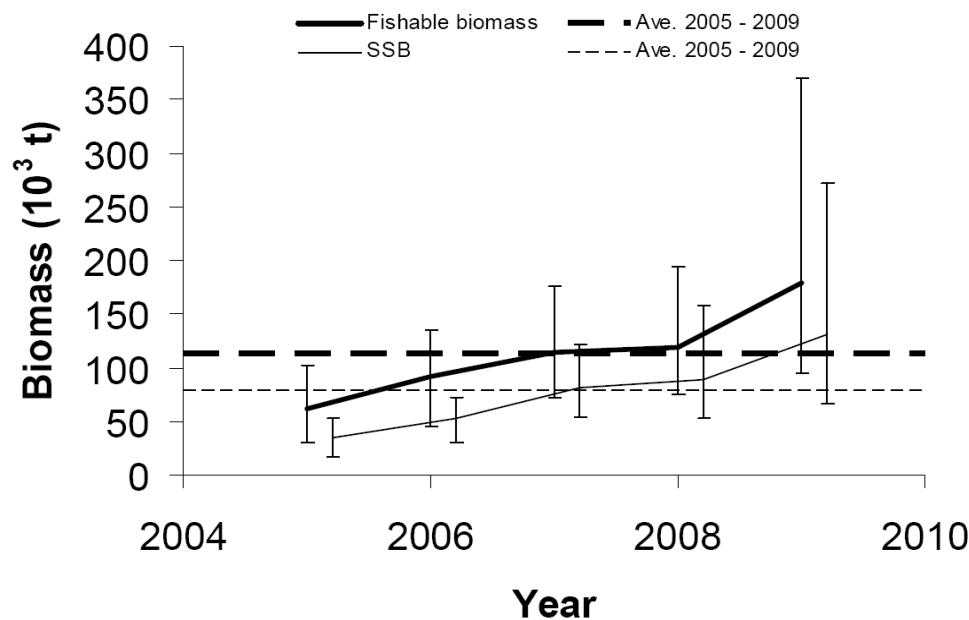


Figure 7. SFA 4 biomass index (error bars indicate 95% confidence intervals) (DFO 2010/018).

5.2.1 Uncertainty.

The trends in survey biomass and in vessel CPUE are provided with confidence intervals. Some survey series (e.g. SFA 5 south) are intermittent, which may affect biomass estimation. It is unknown

how survey biomass is affected by changes in the timing of surveys. The relationship between recruitment and spawning biomass, and the calculation of female mortality (there are no estimates for males) are uncertain.

Previous trials using the Bayesian model to make an analytical assessment of the risk associated with various TAC options under uncertainty failed, but a recent trial using the latest assessment data for SFA6 has been more successful (Hvingel and Orr, 2010, in draft). It will be presented for scrutiny by the Northern Shrimp RAP early in 2011, and could be an important step towards full implementation of the PA framework for Northern Shrimp.

5.3 Management Advice SFA 2, 3, 4, 5 and 6

DFO conducted a workshop in 2008 to consider how to apply the DFO precautionary approach framework to shrimp stocks (DFO 2009pas). A number of methods were considered. Following this, a framework for applying the precautionary approach has been put forward in the current northern shrimp fisheries management plan (DFO 2009a – Annex I), which provides a limit reference point, an upper stock reference (roughly equivalent to a target reference point), and guidelines on exploitation rates to be applied in the critical, cautious and healthy zones. The upper stock reference is set at 80% of biomass in a productive period, while the limit reference point is set at 30% of this biomass level. Exploitation rates are to be based on F_{msy} but this cannot be estimated at present. Pending determination of F_{msy} , a guideline exploitation rate of 15% is to be used in guiding setting of TACs. This is considered well below F_{msy} (DFO 2009a). Exploitation rates of up to 45% have been found to be sustainable in Gulf of St. Lawrence *P. borealis* stocks, while exploitation rates of 35% are used for *Pandalus* shrimp stocks on the Pacific coast of Canada (DFO 2009a).

As a result, within the last two years, reference points and harvest control rules have now been formulated for SFAs 2-6. They are described in Annex I of the Northern Shrimp Integrated Fisheries Management Plan (NSIFMP or IFMP) (DFO, 2009a), on which the following overview is based. These are termed “Provisional” in Annex I, but are being used in management; “Provisional” refers to the current non-feasibility of calculating F_{msy} on which decision rules would ultimately be based. The IFMP also states an intention that the provisional precautionary reference framework will be tested, no later than the end of 2014, by some form of Management Strategy Evaluation (MSE).

5.3.1 Provisional Biomass Reference Points

Following DFO (2006c) a limit reference point (LRP) defines the boundary between a lower critical zone and an intermediate cautious zone, and an upper reference point (URP) defines the boundary between the cautious zone and an upper healthy zone (see Figure 8).

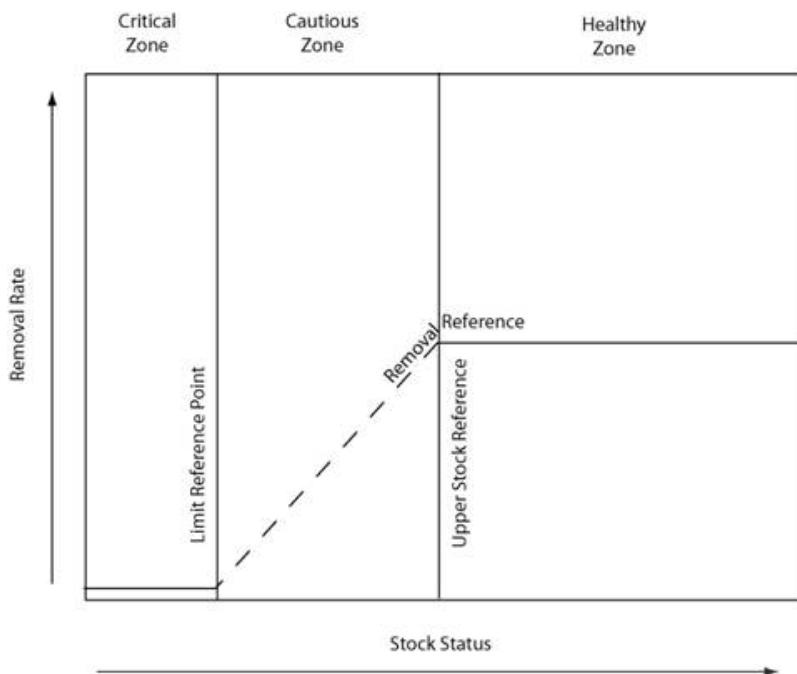


Figure 8. Reference points and stock status zones.

(Source: <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-eng.htm>).

For Northern shrimp, the *Provisional LRP* is 30% of the mean SSB for the moderately productive period 1996-2003 (analogous to the NAFO rule of 15% of maximum observed SSB), and the *Provisional URP* is 80% of the 1996-2003 mean SSB (the default option in the DFO draft PA framework - <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-eng.htm>).

5.3.2 Provisional Exploitation Rate and Harvest Control Rules for setting TACs

In the healthy zone (i.e. SSB is above URP)

- Measures should aim to keep SSB above URP, and there should be no increase in capacity or infrastructure during any period of stability or stock decline.
- Base exploitation rate should be 15% of exploitable biomass, but while in this zone, a stable TAC strategy and a decline in SSB may cause exploitation rate to exceed this base rate, subject to effective monitoring.
- E should not exceed F_{mfsy} (not yet calculated, but is thought to be well above the base rate).
- Changes in TAC should not exceed +/- 15%, unless stock is falling precipitously.

In the cautious zone (i.e. SSB is between the URP and the LRP)

- Measures should aim to rebuild SSB towards URP, subject to natural fluctuations
- If stock is projected to decline, the TAC should not be increased.
- Changes in TAC should not exceed +/- 15%, unless stock is falling precipitously
- Within the cautious zone, the maximum exploitation rate should not exceed 2/3F_{mfsy} in the upper two quartiles of the SSB range, 1/3F_{mfsy} in the second SSB quartile, and 15% (Note 1) in the first (lower) SSB quartile.

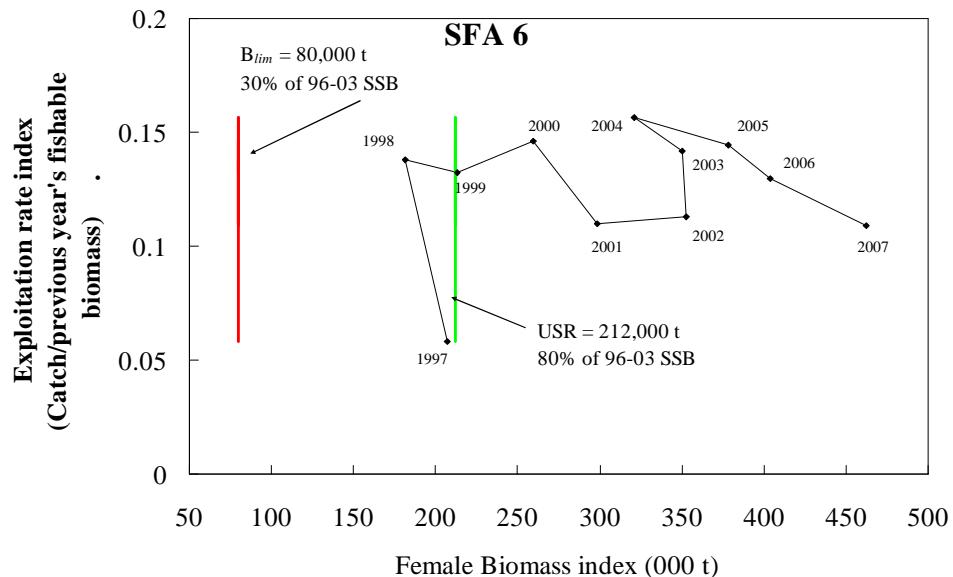
In the critical zone (i.e. SSB is below the LRP)

- Measures must explicitly promote an increase in SSB above LRP within 6 years.
- Harvesting is only permitted as part of a rebuilding plan, and the exploitation rate shall not exceed 10% (Note 2).

For SFAs 2, 4, 5, 6, & 7, the IFMP contains diagrams showing:

- URP, LRP, and harvest rule exploitation rate superimposed on indicative plots of SSB versus E as Percentage of Fmsy.
- URP, LRP, and observed exploitation rate superimposed on plots of SSB versus E as Percentage of fishable biomass

Figure 9 and Table 2 copied from the current IFMP, illustrate the application of the new framework to the data for SFA 6



Critical Zone	Limit 80,000 t	Cautious Zone	Upper 212,000 t	Healthy Zone
Measures must explicitly promote an increase in the biomass above the LRP as soon as feasible within 6 years. Any fishing mortality must be in the context of a rebuilding plan, and should not exceed 10%		<p>Changes in the TAC should generally not exceed 15% of the previous TAC, unless the stock is declining precipitously.</p> <p>If SSB is between 146,000 - 212,000 t, the exploitation rate should not exceed 2/3 FMSY, thought to be significantly above 15% of exploitable biomass.</p> <p>If SSB is between 113,000-146,000, the exploitation rate should not exceed ½ FMSY, thought to be above 15% of exploitable biomass.</p> <p>If SSB is between 80,000 - 113,000 t, the exploitation rate should not exceed 15% of exploitable biomass.</p>		<p>Measures should generally promote the SSB remaining above the URP.</p> <p>The base target exploitation rate will be 15% of exploitable biomass. This rate can increase gradually, particularly as an artefact of a stable TAC strategy applied during a time of declining SSB while in this zone, subject to monitoring/signals that excessive fishing mortality is being exerted on the stock.</p> <p>The exploitation rate should not exceed FMSY, a level that is yet to be calculated, but is thought to be well above the base target exploitation rate.</p> <p>Changes in the TAC should generally not exceed 15% of the previous TAC, unless the stock is declining precipitously.</p>

Figure 9 and Table 2. DFO Harvest Control Rules SFA 6. (DFO 2009a)

5.3.3 Implementation

Biomass reference points have been derived from the survey biomass estimates, but calculation of the corresponding exploitation rates has been impeded by the limited dynamic range of the impact of fishing on a stock driven largely by the environment. This has prevented the estimation of B_{msy} and F_{msy} , whether from a conventional stock-recruitment relationship, or from the application of the Greenland shrimp Bayesian production model (used to estimate B_{msy} and the risk associated with different TAC options (Hvingel, 2006, Hvingel & Kingsley, 2006.))

Nonetheless, the 2010 Northern Shrimp Advisory Committee (NSAC) (see Section 5.6) responded to the finding of the recent SFA 6 stock assessment, showing that SSB has fallen into the cautious zone at 97% of the provisional URP, and that if the 2008/2009 TAC of 85,275 t continued in 2010, E would likely become 28% of fishable biomass (20-37% at the upper and lower CI of the biomass estimate), much higher than any previous value, and well above the 15% maximum exploitation base rate. Because of concern for the stock, the NSAC responded by negotiating the 2010 SFA 6 TAC down to 61,632 t, requiring the elimination of access for two allocation holders on the last-in first-out (LIFO) principle (Rumbolt pers. comm. and <http://www.dfo-mpo.gc.ca/decisions/fm-2010-gp/atl-055-eng.htm>). We believe that the new TAC is equivalent to an E of 20% of the fishable biomass. This illustrates the implementation of the upper biomass reference point to identify a stock problem, followed by amendment of the harvest and access rules, under the provisional PA framework for Northern Shrimp. The outcome represents a significant reduction in the take for 2010, although the agreed TAC does not appear to reduce the prospective exploitation rate down to the 15% maximum base rate.

In SFA 2, 3, 4, and 5, SSB remains in the healthy zone above the provisional URP. Therefore no change in TAC is required, and the previous TACs were retained for 2010:

SFA	TAC (t)
2	10,750
3	4,700
4	11,320
5	23,300

6 FISHERY MANAGEMENT FRAMEWORK

Pursuant to the *Constitution Act*, 1867, the legislative authority governing seacoast and inland fisheries falls under the jurisdiction of the Government of Canada. Several pieces of legislation have been enacted to give effect to that responsibility, notably the *Fisheries Act* and regulations and the *Oceans Act*. With *The Fishery (General) Regulations, 1993*, provides a framework for the issue of fishing rights and licences to fish for the commercial fishery.

6.1 Licence Holders

There are seventeen offshore licence holders authorized to fish shrimp in SFAs 1-7. The thirteen offshore vessels that fish these licences do so, either through vessels owned by the licence holder or through joint ventures between the licence holders and vessel owners. The relationship between the licence holders and the vessel owners is displayed in Table 3.

Table 3: Licence Holders and Vessels

Licence Holder (No. of Licences)	Vessel	Vessel Owner
Labrador Fishermen's Union Shrimp Co. Ltd. (2)	Labrador Storm	Labrador Fishermen's Union Shrimp Co. Ltd.
Ocean Choice Intl. Inc. (2)	Newfoundland Lynx/ Katsheshuk II	Ocean Choice International Inc.
Mersey Seafoods Ltd. (2)	Mersey Venture Mersey Phoenix	Mersey Seafoods Ltd.
Lameque Offshore Ltd. (1)	Northern Eagle	M.V. Osprey Ltd.
Crevettes Nordiques Ltee ^{2[1]} (1)	Atlantic Enterprise	Clearwater Seafoods L.P./ Ocean Prawns Canada Joint Venture
Atlantic Shrimp Co. Ltd. ^{3[2]} (1)	Atlantic Enterprise	Clearwater Seafoods LP/ Ocean Prawns Canada Joint Venture
Torngat Fish Producers Coop Society Ltd. (1)	Mersey Phoenix Mersey Venture	Mersey Seafoods Ltd.
Caramer Ltd. (1)	Acadienne Gale II	Davis Strait Mgt. Ltd.
Makivik Corp. (1)	Newfound Pioneer	Newfoundland Resources Ltd.
Pikalujak Fisheries Ltd. (1)	Ocean Prawns	Ocean Prawns Canada Ltd.
Qikiqtaaluk Corporation (1)	Saputi	Qikiqtaaluk Corporation
Harbour Grace Shrimp Co. (1)	Ocean Prawns	Ocean Prawns Canada Ltd.
Unaaq Fisheries Inc. (1)	Arctic Enterprise	Clearwater Seafoods L.P./ Ocean Prawns Canada Joint Venture
Newfound Resources Ltd. (1)	Newfound Pioneer	Newfound Resources Ltd.,

The fishery is managed on a rights-based system called Enterprise Allocations (EA) with an equal sharing (1/17th each) formula. That percentage is multiplied by the quota assigned to the offshore

^{2[1]} Wholly owned subsidiary of Clearwater Seafoods Limited Partnership

^{3[2]} Ibid

licence holders for each SFA and allocated to each licence as a maximum tonnage that may be harvested for that fishing year in that particular area. There are further allocations provided to community and aboriginal interests (including some of the 17 licence holders) apart from the offshore licence holder portion *per se*.

6.2 Administrative Arrangements and Boundaries

The entire Canadian shrimp fishery takes place off the coast of eastern Canada from 46°00' N (Grand Bank) to 75° N (Baffin Bay) including the waters of the Hudson Strait and Ungava Bay east of 64°30' West longitude and east of 70°00'West longitude. As described above, although separate stocks of shrimp have not been clearly defined, the management of the fishery is conducted through Shrimp Fishing Areas (SFAs) (see Figure 2). These units also provide the basis for management of the fishery as a whole.

Within the Canadian EEZ, the DFO is the main administrative body responsible for the management of the Canadian portion of the catch. The Minister of DFO has the ultimate responsibility for the fishery and his/her authority is delegated to officials through the organizational structure of the department. The assessment area is within the Newfoundland and Labrador Region of DFO and the management of the fishery is conducted by the Resource Management Directorate of Ottawa.

In addition, the Parliament of Canada has enacted legislation to give effect to several aboriginal land claim agreements including the *Nunavut Land Claims Agreement Act*, the *Labrador Inuit Land Claims Agreement Act* and the *Nunavik Inuit Land Claims Agreement Act*. These Land Claim agreements set forth a framework under which the Inuit of Nunavut, Labrador and Nunavik may access adjacent fisheries resources. Elements of the agreement must be taken into consideration when developing management measures for the fishery as the agreements have a significant impact on access, allocation and management in the settlement areas of the land claims that include the marine waters within Canada's 12 mile limit. Management bodies have been created to exercise jurisdiction over harvesting and licensing to fish in the settlement areas. The SFAs affected by these agreements include parts of SFA's 2 and 3 for the Nunavut claim, SFA's 4 and 5 for the Labrador claim and SFA's 3 and 4 for the Nunavik claim, although the portion of the fishery in SFA 4 is so small as to be insignificant in terms of the overall fishery.

Within the Canadian management system, Integrated Fishery Management Plans (IFMP) are developed that outline the fisheries objectives and management measures by stock and area. The Northern Shrimp IFMP is a comprehensive document covering all the SFA's. It has been recently updated and posted on the DFO website (www.dfo-mpo.gc.ca, May 2010). The IFMP is very detailed than most containing a number of protocols, some harvest control rules and other measures. Although the IFMP is occasionally revised and reposted on the DFO web site, the title page does not indicate the date of publication, and there is no indication of changes made between versions. This makes tracking improvements to fishery management very difficult and is not consistent with transparency in the management process.

The NSAC (see section 5.6) is the main consultative and management body for the fishery. It is a widely representative group composed of all the major stakeholders in the fishery.

6.3 Legislation and Regulation

The legislative authority for the management of seacoast and inland fisheries in Canada falls under the exclusive jurisdiction of the Parliament of Canada. There are several pieces of legislation that apply to the fishing industry, the major one being the *Fisheries Act*. That *Act* grants wide discretionary authority to the Minister of Fisheries and Oceans and provides for the enactment of regulations respecting the management of the fishery. *The Atlantic Fishery Regulations, 1985* and the *Fishery (General) Regulations* are the main regulatory instruments governing the fishery. *The Species at Risk Act, 2002* is important when fishing near populations of designated vulnerable species.

The Oceans Act, 1996 is an overarching piece of legislation of general application. The *Coastal Fisheries Protection Act, 1985* applies to foreign vessels and comes into play more so in the shrimp fishery in SFA 1 as the boundary line abuts that of Greenland. The *Fish Inspection Act* governs the processing of shrimp on the factory freezer trawlers that are designated as processing plants for the purposes of the *Act*.

Also, as noted above legislation enacted to give effect to aboriginal land claim agreements has been enacted which outlines authorities and responsibilities for management of fish resources within the respective settlement areas, namely the *Nunavut Land Claims Agreement Act*, the *Labrador Inuit Land Claims Agreement Act* and the *Nunavik Inuit Land Claims Agreement Act*.

Table 4: Principal Acts and Policy Documents

Principal Acts and Policy Documents	Description
<i>The Fisheries Act, 1985</i>	Provides absolute discretion to the Minister for the management of fisheries and for the establishment of fishing licences, regulations, reporting requirements, powers of fishery officers, protection of fish habitat and pollution prevention.
<i>The Atlantic Fishery Regulations, 1985</i>	Prescribes conditions for the operation of the fishery including seasons, closures, management and conservation measures, etc. Variation Orders are used to alter conditions and to shorten or lengthen the fishing season as appropriate.
<i>The Fishery (General) Regulations 1993</i>	Provides for the issue of licences and the authority to specify conditions in a fishing licence, e.g. allocations, vessel monitoring systems, hail-in/hail-out requirement, observer coverage, dockside monitoring, etc.
<i>The Coastal Fisheries Protection Act, 1985</i>	Prescribes conditions under which foreign vessels are permitted to fish in Canadian waters.
<i>The Species at Risk Act 2002</i>	Authorizes actions aimed at managing species of special concern, preventing the extirpation or extinction of endangered marine species, or promoting their recovery.
<i>The Oceans Act 1996</i>	Prescribes the Canadian oceans management strategy, including sustainable development, the precautionary approach, and the implementation of integrated management of marine activities.
<i>The Fish Inspection Act</i>	Governs fish processing operations on shore and aboard vessels in Canadian waters, notably the processing of shrimp aboard the factory freezer trawlers in the fishery under assessment.
<i>Nunavut Land Claims Agreement Act; Labrador Inuit Land Claims Agreement Act; Nunavik Inuit Land Claims Agreement Act.</i>	Provide authority and responsibility for management and licencing within the settlement areas of the various land claim agreements.

These regulations create the legal framework for the management, licensing and registration of participants of fisheries in Canada and more specifically for SFA 2-6 *P. borealis*. They also provide a ticketing and court sanction system ranging from low fines to ones in the hundreds of thousands of

dollars as well as forfeiture of catch and equipment upon conviction

6.4 Harvest controls

Annual catch limits in the form of Total Allowable Catches (TAC) are the major harvest control measure used for the SFA 2-6 *P. borealis* fishery. Survey-based assessments by DFO scientists have been available since 2005 for the areas. Catch limits are not recommended but the status of the stock is clearly determined and outlined. The fishery has had no observable negative impact upon the resource in shrimp fishing areas 5 and 6 for several years up until the 2010 assessment which indicates a sharp decline in biomass in SFA 6.

The scientific information and advice is presented to the NSAC and the members develop recommendations to the Minister of Fisheries and Oceans with respect to TAC levels in each area. TAC's are conservatively set at a very low exploitation rate compared to northern shrimp fisheries elsewhere in Canada and internationally.

The TAC is allocated to licence holders in the form of individual enterprise allocations. Additional allocations are made to community and aboriginal groups. The fishery is closely regulated including the presence of on-board observers who track the catch on a tow-by-tow basis. Harvest limits are not exceeded and there are severe penalties provided in the *Fisheries Act* should such an event occur.

There is no minimum size identified in the management of the shrimp stock but a bycatch regulation is in place.

6.5 Monitoring, Control and Surveillance (MCS)

The DFO is the responsible enforcement agency for fishing in Canadian waters. It has a staff of land-based and seagoing Fishery Officers and a complete system of MCS, including:

- At-sea observations by patrol vessels and fixed-wing aircraft
- 100% industry funded on-board observer coverage
- Daily reporting of position and catch and submission of vessel fishing log books
- Random dockside monitoring of landings by 3rd party contractors or Fishery Officers
- Catch and Effort database to track catch against EA's
- Electronic vessel monitoring systems (VMS) on each vessel
- A ticketing system for minor offences
- A court-based system for more serious offences which can result in fines up to \$500,000, jail terms and forfeiture of catch and gear
- Conditions of licence covering such things as mandatory sorting grate, mesh size, no shrimp discarding etc.
- On-board observer/vessel protocols to monitor catch, species, package weights, etc.

DFO advises that the offshore shrimp fleet has not had any serious compliance issues and that there is no evidence of systematic non-compliance.

6.6 Consultation and Dispute Resolution

The major consultative mechanism in the fishery is the NSAC. It is composed of representatives of offshore licence holders, inshore licences holders, and special allocation holders, various processor, fishermen and aboriginal associations and wildlife management boards, a representative from the Nunavut government and provincial government representatives from Newfoundland and Labrador, Nova Scotia, New Brunswick and Prince Edward Island and Quebec. Fishery managers, scientists and enforcement staff from DFO attend the committee and provide advice and assistance. The Director General, Resource Management Operations, DFO, Ottawa, chairs the Committee. Non-members may also attend and can participate in discussions following input from members.

The IFMP outlines the formal structure and detailed terms of reference of the committee covering such things as, the purpose, scope, membership and operating procedures. Its main focus is quota allocations and management measures such as seasons, size limits, gear restrictions, other conservation and compliance issues and licensing policy.

There are additional requirements for the federal government to consult one-on-one with the parties to the Nunavut, Nunavik and Labrador land claim concerning management measures and allocations in and adjacent to their settlement areas.

Most disputes are resolved using the representational framework in the NSAC forum. Regional managers of DFO have a particular role to play in brokering solutions on policy related issues. The ultimate appeal of last resort is to the Minister of Fisheries, who is the final authority under Canadian fisheries legislation.

7 ECOSYSTEM CHARACTERISTICS

7.1 Pandalid Shrimp in the Ecosystem

Northern shrimp occur over very large areas of Northwest Atlantic continental shelves, from Greenland through Davis Strait, Hudson Strait, the Labrador and Newfoundland shelves, the Gulf of St. Lawrence, the Scotian Shelf and the Gulf of Maine. Ocean currents in this area are generally from north to south and could act to foster dispersal of shrimp over large continental shelf areas (particularly at the larval stage) (Figure 1010)



Figure 10: Currents in the fishery areas. Source: DFO

Although found over a broad latitudinal range, *P. borealis* concentrate in preferred habitat areas where the bottom is soft and muddy, with a high organic content (although they can be taken on hard bottom areas). Although reviews of continental shelf and slope geology have recently been completed for much of the Newfoundland-Labrador shelf (C-NOPB 2003, 2008), these provide little information on distribution of sediments and habitats in these areas. Soft and hard sediment areas are interspersed

in depths where shrimp are found, with channels and basin areas at the edge of the continental shelf being preferred areas for commercial shrimp concentrations over much of the area. Use of acoustic gear on commercial vessels to map bottom types is currently being explored (Marine Institute 2008) and such bottom typing information would help improve knowledge of benthic habitats in the fishery area.

The distribution of sensitive bottom habitat areas is becoming increasingly well known in the fishery area, based on recent studies of distribution of coldwater corals and sponges. Coldwater corals have been classified into five functional groups based on taxonomy, growth form and size, and all these groups overlap to some extent with the distribution of the shrimp fishery (Edinger et al. 2007). Despite the recent increase in information on distribution of these organisms, information on sensitive bottom habitats, and on bottom habitats in general, must still be considered incomplete.

Coldwater coral distribution in the fishery area has been mapped based on occurrence of corals in commercial and research survey trawls (Edinger et al. 2007; Wareham 2009). Areas of significant occurrence of sponges have been mapped in areas in and near Flemish Pass (Kenchington et al 2009); this study suggests that depths of occurrence of significant sponge concentrations are greater than those at which the shrimp fishery operates.

Shrimp fishing gear operates in several marine communities and habitats:

- the benthic, including the bottom sediments and substrates and organisms which live in direct contact with the substrate. These include infauna such as burrowing worms, and epifauna such as echinoderms (sea and brittle stars, sea cucumbers), molluscs, crustacea, and attached fauna such as coelenterates (hard and soft corals) and sponges. Hard substrates in the fishery area may support anchored epifauna such as hard corals and sponges, while soft substrates may support anchored, mobile or burrowing organisms
- the demersal, organisms which live in the water near bottom and depend on the benthic community for much of their food or habitat. Key members of this community are the demersal fishes, both the commercially important (cod, flatfishes and others) and noncommercial (eelpouts, alligator fishes).
- the benthopelagic, organisms living somewhat further off bottom than those in the demersal community; shrimp and redfishes are members of this community.

Knowledge of the composition and dynamics of communities in which the shrimp fishery operates is sparse, with the exception of commercially-important species (demersal fishes and snow crab) for which population assessments are available. A comprehensive review of available information on benthic communities of the Orphan Basin and adjacent regions of the Grand Banks (C-NPOB 2003), notes that while literature appears extensive, most studies are spatially restricted or species-specific. This review indicates that benthic diversity is high on the Grand Banks, with epifauna dominated by echinoderms (sand dollars, brittle stars, sea urchins, sea cucumbers and asteroids), molluscs, crabs and soft corals. These results are probably applicable to some extent to the Labrador shelf and areas further north although one would expect species diversity to decrease toward the north. In general, no studies specific to bottom communities in which the shrimp fishery operates are available.

For SFAs 2-6, a review of the Labrador Shelf by C-NPOB (2008) emphasised the paucity of information on benthic communities. Much of the available information was for relatively shallow areas outside depths where the shrimp fishery operates. A study of benthic fauna of the northern Labrador Shelf and Davis Strait (Stewart et al 1985) listed species found, identified major species in each subarea, and explored relations between distribution of benthos and major water masses.

P. borealis, like other pandalid shrimp, is an opportunistic predator which feeds both near bottom and in the water column during vertical migrations at night (Bergstrom 2000). This species is a key component of the North Atlantic Ocean's food web, between the small organisms that it eats, including the zooplankton and benthos that form the base of the food web, and the top predators that

eat it, like cod and other commercially important finfish (Parsons 2006). As a result, it is an important marine indicator, sensitive to various types of changes in the ecosystem, sometimes even before they are generally evident. Coincident with collapse of groundfish populations in the Canadian Atlantic, pandalid shrimp populations increased substantially (along with other crustacean populations, snow crab and lobster). The increase may have been due to release of groundfish predation and/or to response of the crustacean populations to changes in environmental conditions. Different populations of *P. borealis* have adapted to local temperatures and bloom timing, matching egg hatching to food availability under average conditions. This strategy is vulnerable to inter-annual oceanographic variability and long term climatic change. (Koeller et al. 2009).

Studies have identified 26 species, which prey on *P. borealis* (Parsons 2005a, b, 2006). Principal predators include Atlantic cod (*Gadus morhua*), Greenland and Atlantic halibut (*Reinhardtius hippoglossoides* and *Hippoglossus hippoglossus*), redfishes (*Sebastes spp*), wolffishes (*Anarhichas spp*), skates (Rajidae) and harp seals (*Pagophilus groenlandicus*). In the Northern Gulf of St. Lawrence *P. borealis* feed on (in decreasing order of importance) detritus, large zooplankton (principally euphausiids, chaetognaths, hyperiid amphipods), small zooplankton (principally copepods), and phytoplankton (Savenkoff et al 2006) and one would expect a similar prey composition in this fishery area.

The IFMP (2009) does give explicit recognition to the importance of *P. borealis* as a forage species and the need for fishery management to consider this. Exploitation rates in the past have been set relatively low (below 15%) and this has been in part to ensure that shrimp remain available as prey (D. Orr, pers. comm.). The precautionary approach framework for *P. borealis* outlined in the IFMP (Appendix I) indicates that base target exploitation rates have in the past been set lower than might otherwise be the case because of the role of shrimp as a forage species. The precautionary approach framework makes no explicit mention of the trophic role of shrimp in setting reference points or exploitation rates, and allows for exploitation rates substantially higher than 15% when shrimp abundance is high.

The recent increase in abundance and in distribution of fishable concentrations of *P. borealis* over large parts of the Northwest Atlantic has coincided with changes in the marine environment, including cooling of ocean temperatures and substantial declines in populations of some groundfish species, particularly Atlantic cod. Changes in the ocean environment and release of predation pressure are considered potential factors to explain the increases in *P. borealis* abundance, but the relative importance of these factors and others is not well understood (Lilly 2006; Lilly et al. 2000; Parsons and Colbourne 2006; Worm and Myers 2003). Different factors may have predominated at different times during the long-term (1980's to present) increase in shrimp biomass (Lilly 2006). Off Alaska pandalid shrimp, including *P. borealis*, declined rapidly and to low levels in the late 1970s and early 1980s apparently in response to a regime shift in the ocean climate and coincident with changes in abundance of many species in their ecosystem (Anderson 2000).

Since pandalid shrimp populations are sensitive to changes in conditions in the marine environment (Anderson 2000; Clark et al 2000, Parsons and Colbourne 2006), some consideration should be given in establishing fishery management measures to potential future changes in marine conditions. *P. borealis* abundance has recently been very high in relation to the average of observed conditions, apparently in response to favourable environmental conditions including low abundance of some important predators and favourable temperatures. Although future conditions are impossible to forecast accurately, there is potential for *P. borealis* abundance to decrease rapidly and substantially if conditions change.

7.2 Fishery Interactions with the Ecosystem

7.2.1 Endangered, Threatened and Protected Species

Two species of wolffishes, Northern (*Anarhichas denticulatus*, sometimes called broadhead wolffish)

and Spotted (*Anarhichas minor*), both listed as Threatened on Schedule 1 of Canada's Species at Risk Act, co-occur with *P. borealis* and are taken as bycatch in the fishery. A third species, the Striped wolffish (*A. lupus*), is listed as "Special Concern" on SARA Schedule 1 and accordingly is not considered an ETP species for this assessment.

A recovery strategy for the two threatened wolffish species has been published, emphasising the need to avoid targeting these species, and to return any individuals caught to the sea in the best condition possible (Kulka et al 2008). These species are found on a wide range of bottom habitats, although only Spotted Wolffish is found on the soft mud habitats in which the shrimp fishery concentrates (Kulka et al 2008).

Detailed information on bycatch of these two species in the northern shrimp fishery is available over the entire distribution of the fishery (Orr et al 2008; unpublished data compilation, T. Siferd, DFO), indicating that bycatch is low. Licence conditions for shrimp fishing vessels, based on requirements in the recovery strategy, require no targeting of wolffishes and live release of any specimens caught in the best condition possible. DFO staff responsible for leading the implementation of the recovery strategy indicate that the shrimp fishery does not appear to have a significant impact on these species (D. Orr/M. Simpson, pers. comm.). A DFO status review for these species is planned for 2009-10 (D. Orr/M. Simpson, pers. comm.)

7.2.2 Bycatch

7.2.2.1 Retained Species

Bycatch in this fishery is well estimated and species are identified to the lowest taxonomic level possible. Observers are carried on 100% of trips, meaning that some 70% of tows are observed. Information on bycatch in SFAs 4, 5, 6 and 7 is regularly compiled and reviewed; a recent publication summarises complete information on bycatch species weights for 2007-8 and weights and numbers at length for 7 important groundfish species, including the two ETP wolffishes (Orr et al 2008bc). An unpublished compilation of bycatch weights annually since the late 1970s is available for SFAs 0, 1, 2 and 3 (information provided by T. Siferd, DFO).

For the purposes of this assessment, the only "retained" bycatch species is the striped shrimp, *P. montagui*. This species is widely distributed in areas where *P. borealis* is found, from Davis Strait to the eastern Grand Banks (Orr et al 2003), but it is quite rare south of SFA 4. It is most commonly taken in Hudson Strait and areas on the Labrador Shelf and Davis Strait near the entrance to Hudson Strait. Minimal quantities are taken as bycatch outside these areas (Orr et al 2008bc, unpublished data compilation, T. Siferd, DFO). The species generally is found in shallower depths (less than 400 m) than *P. borealis* (200-600 m).

7.2.2.2 Discarded Species

All other species taken as bycatch in this fishery are considered "discard" species for this assessment.

The Nordmore grate (See Section 4.4 and Figure 4) was introduced into the Canadian shrimp fishery in 1993 in response to concerns about the level of groundfish bycatch in the small-meshed shrimp trawls. This device sorts out the larger fish, allowing them to escape through an opening in the top of the net, while allowing smaller shrimp to pass through to be retained in the codend. Use of the Nordmore grate is currently mandatory in all SFAs in the fishery area.

A recent study (Orr and Cadigan 2009) in SFA 4 comparing shrimp catches and amounts of key commercial bycatch species using 28 mm and 22 mm (as used in more southerly SFAs) grate spacings suggested that more fishes were taken with the 28 mm grate, although the differences were not very large (e.g. +24% for redfishes). Shrimp catch was lower (27% lower in the area with the highest number of comparable tows) in tows with the 22 mm grate. The authors suggested that any

advantages in selectivity for fishes might be outweighed by greater time spent fishing to compensate for reduced shrimp catches. There is no current plan to move to the smaller grate spacing in areas where the 28 mm grate is in use.

Trawls are also rigged with toggle chains between footropes and netting, with a view to further decreasing bycatch of near-bottom species such as flatfishes.

Species in the bycatch include finfishes, both commercial and non-commercial species, and mobile and sessile invertebrates. A large number of species and species groups are recorded in the bycatch (Orr et al 2008bc; unpublished data compilation, T. Siferd, DFO).

Atlantic cod, redfishes and American plaice can be considered “depleted” species, as abundance is currently at low levels compared to historical levels in parts of the northwest Atlantic where the *P. borealis* fishery operates. Populations of these three species in the fishery area have been assessed as “at risk” by the Committee on Status of Endangered Wildlife in Canada (COSEWIC) due to their depleted status. Fishery management measures are in place to foster rebuilding of these species, either catch moratoria or strict catch limits, in much of the area between Davis Strait and the Grand Banks.

Annual estimated bycatch of all discard species combined is in almost all cases below 5% of catch weight of the target species, the notional guideline for identifying “main” bycatch species in MSC assessments. Accordingly, weights of individual species are generally well below the 5% guideline, in most cases an order of magnitude or more below. For most groundfish species, analyses have not been done to compare removals in the shrimp fishery to other sources of mortality. An exception is an analysis indicating that shrimp fishery bycatch of Greenland halibut took less than 5% of an average year-class of Greenland halibut in 1996-2003 on the Newfoundland and Labrador shelves (Bowering and Orr 2004). Bycatch levels can be put in perspective by considering that 100t of prey biomass (around the level of some of the higher annual single-species bycatch values recorded in individual SFAs) would support 10 t of predator biomass, based on an assumed 10% trophic transfer rate. This comparison suggests that bycatch levels of the order of several hundred tons per year (typical of fish bycatch levels in this fishery) are essentially negligible in ecological terms, as the fishery is not removing amounts which would be likely to have an impact on predator populations.

In SFAs 4-6, bycatch species at greatest abundance in 2007-8 varied between areas: capelin in SFA 6 (0.65% of the shrimp catch), lanternfishes in SFA 5 (0.4%), redfishes in SFA 4 (0.65%). All other species were below 0.5% of the shrimp catch. Numbers of important commercial species caught also varied by area: generally tens to hundreds for Atlantic cod, a maximum of 100,000 for American plaice, a maximum of 5 million for redfishes, a maximum of 1.5m for Greenland halibut (each number is a maximum for one area-year combination).

In SFA 3, total bycatch of all species was a maximum of 16.5 t in 1997 (3.4% of the shrimp catch), less than 1.1 t (less than 1.1%) in other years between 1997 and 2008. In SFA 2 for the same period, total bycatch of all species ranged between 76-350 t (1.0-3.9% of shrimp catch). The most important species in the bycatch were usually non-commercial species (alligatorfishes, 2.8 t in SFA 3 in one year; sculpins, alligatorfishes, eelpouts, Arctic cod in SFA 2). Redfish was the commercial species with highest bycatches, for example a maximum of 3 t (0.7% of the shrimp catch) in SFA 2 in the year with highest bycatch between 1997 - 2008, a maximum of 150 t (2.5% of the shrimp catch) in the peak year 1997-2008 in SFA 2. Greenland halibut also occurred consistently but at low levels in these two areas.

Overall bycatch levels have been very low in this fishery in recent years, and amounts taken do not appear significant in ecological terms. However one reason for low bycatch levels of commercial groundfish species is probably that several of these are currently depleted and at very low abundance compared to historical levels. Rebuilding of populations of these species could lead to greater bycatch, and impact of bycatch mortality on rebuilding might be a concern in a scenario where

population recovery was occurring.

7.2.3 Impacts on Habitat

Impacts of bottom fishing gear on habitats can be separated into direct impacts on sediments and substrates, and impacts on sessile erect organisms which may provide habitat for other organisms (for example erect corals, sponges).

Impacts by the trawl gear used to harvest northern shrimp on bottom habitats, species, and communities are incompletely known although some information is available which could be used to assess potential impacts. *P. borealis* prefer soft mud and silt bottoms and the fishery concentrates on these to minimise the potential for trawl damage, although occasional presence of hard corals and sponges in trawl bycatch indicates that hard bottoms may be contacted. Gear used is relatively light, and efforts are under way to further lighten gear (doors, foot gear, and netting) in order to reduce fuel costs (see for example a proposal by Newfoundland's Marine Institute, n.d). Trawl doors and footropes would be the only elements of the gear contacting the bottom in most areas. The exception to this overall pattern is use of twin trawls in some northern areas, where a very heavy (4 t) "shoe" is used between the two codends, which would dig into the ground over a narrow band (ca 3 m).

No studies of trawl impacts on habitats typical of *P. borealis* have been conducted in the fishery area. General impacts of trawling on bottom habitats have been reviewed in several studies (summarized in Rice 2006). There is considerable variation between results of the available studies of trawling impacts on soft bottom habitats. In general, it has been concluded that while trawl impacts show more rapidly on soft bottom habitats (mud, sand) than on harder bottom habitats, soft bottom habitats tend to recover more quickly (Rice 2006). A study of impacts of shrimp trawling in the Gulf of Maine on habitat and community structure of mud bottoms (Simpson and Watling 2006) showed little impact on habitat and relatively short-term (3 months) impacts on community structure. However, a meta-analysis of studies of mobile gear impacts showed that recovery times on mud-sand habitats can be relatively long (Kaiser et al 2006). Hinz et al (2009), in a study of changes in species abundance and community structure in mud-sand habitats along a gradient of trawling intensity in the Irish Sea, concluded that species abundance, biomass and diversity decreased with increased trawling intensity and that changes in community structure were also more marked with increasing trawling intensity. Overall, the results of studies to date depend greatly on methodology, whether the study is of chronic disturbance or of immediate impacts, and on habitat type and community structure (Lokkeborg 2007, Rice 2006).

Information on bycatch of coldwater corals in shrimp gear (Edinger et al. 2007) suggests that a relatively low proportion of shrimp sets takes hard corals (around 2% over the entire Newfoundland-Labrador shelf), but this probably underestimates the actual impact on habitats and species, since damage may occur even when corals are not taken as bycatch. Given the slow growth rates of coldwater corals these species are probably slow to recover from such impacts. Shrimp trawl fishermen, at least in the offshore fishery, avoid known areas of coral habitat as the likelihood of damage to trawls is high in these areas and cost of repairing trawls is high. Likelihood of damaging gear on hard bottoms is also increasing, as shrimp trawl gear is increasingly light to reduce fuel costs.

Studies of the proportion of bottom impacted by shrimp trawling (Spatialanalysis 2009) suggest that a relatively small proportion of the continental shelf is impacted by this fishery. While encouraging, these studies do not consider the relative sensitivity of the habitats trawled or the specific communities in which the fishery operates.

As noted earlier, information on distribution of coldwater corals and sponges is improving. Several closed areas have been put in place which could help protect bottom habitats (notably an area voluntarily closed to shrimp fishing off the entrance to Hudson Strait, to protect coldwater corals), and NAFO is working to define vulnerable marine ecosystem areas at the edges of the Grand Banks. DFO's Newfoundland/Labrador region has committed to developing a coral/sponge conservation

strategy by 2012, and DFO has developed a Policy on Managing Impacts of Fishing on Sensitive Benthic Areas which is intended to provide an overall framework for protecting bottom habitats.

Excellent information on distribution of fishing effort is available from VMS equipment carried on vessels and logbooks. Compilations of information on distribution of fishing are available (Spatialanalysis 2009; Orr et al MS 2008).

7.2.4 Impacts on Ecosystems

Two potential ecosystem-level impacts of this fishery have been identified: impact of removal of the target species on trophic relationships, and impacts on biological diversity and community structure due to non-catch mortality. The latter does not include impacts on sessile, erect organisms of hard bottoms such as corals and sponges as these have been considered under “habitat” (section 6.2.3).

7.2.4.1 Impact of Removal of *P. borealis* on Trophic Relationships

Given the importance of shrimp as forage for predators in ecosystems in which it occurs, maintenance of adequate biomass to support trophic relationships is an important issue for management. Shrimp abundance is currently high relative to historical levels, and exploitation rates are relatively low ($\leq 15\%$ in most areas), such that adequate amounts of shrimp are available as forage for predators. Although the IFMP does not include an explicit strategy to maintain adequate shrimp biomass for predators (IFMP 2009), exploitation rates have been set at a level consistent with maintaining adequate forage, and predator requirements are considered when setting exploitation levels.

Proposals for a new exploitation framework based on reference points and decision rules (IFMP 2009, Appendix I) appear to leave the way open to higher exploitation rates. This framework has an objective “to mitigate impacts on other species and the ecosystem”, and indicates that exploitation rates have been set lower than otherwise would have been the case in the past in order to accommodate predator requirements, but does not incorporate an explicit approach to ensure an allowance to predators. .

DFO has developed a Policy on New Fisheries for Forage Species but as the name indicates, this is intended to cover fisheries for new species rather than established fisheries such as northern shrimp.

7.2.4.2 Impact on Biological Diversity and Community Structure

Overall impact of the shrimp trawl fishery on ecological communities due to non-catch mortality in this area has not been studied. Shrimp trawl impacts on snow crab populations have been assessed in several studies, and the results of these suggest relatively little impact (Gilkinson et al 2006). Two areas in snow crab fishing habitat have been closed to shrimp trawling to reduce potential damage to the snow crab resource (Hawke Channel; Funk Island deep).

Non-catch mortality might be considered potentially low because of the use of large rollers on footgear, and relatively light ground gear and trawl doors. There remains an overall lack of knowledge of the role of individual species in benthic ecosystems and of the specific impacts of shrimp trawl gear on individual species. Studies of trawl gear on bottom habitats give rather variable results depending on the area and gear (Rice 2006), although decreases in abundance of some taxa following use of shrimp trawls have been observed in some studies (for example, Hansson et al 2000; Tanner 2003). Studies generally show that most reduction in abundance occurs when areas are first trawled (Tanner 2003).

8 OTHER FISHERIES AFFECTING TARGET STOCK

The “inshore” shrimp fishery (vessels <65 feet) operates in SFAs 5 and 6 and is subject to the same IFMP as the offshore fleet. This fishery has already been certified against the MSC Principle and Criteria and that assessment has been taken into account within this assessment.

No other fisheries exert significant impact on northern shrimp populations in the fishery area although there is a small, directed fishery for *P. montagui* in SFA’s 3 and 4 which takes *P. borealis* as bycatch. Groundfish trawl fisheries use mesh sizes that do not retain shrimp, and in any case, are at a very low level or not operating in the fishery area at present. Shrimp are not caught in other fisheries in the area (i.e. snow crab trap fisheries, gillnet and longline fisheries for finfish).

9 STANDARD USED

The MSC Principles and Criteria for Sustainable Fisheries form the standard against which the fishery is assessed and are organised in terms of three principles. Principle 1 addresses the need to maintain the target stock at a sustainable level; Principle 2 addresses the need to maintain the ecosystem in which the target stock exists, and Principle 3 addresses the need for an effective fishery management system to fulfil Principles 1 and 2 and ensure compliance with national and international regulations. The Principles and their supporting Criteria are presented below.

9.1 Principle 1

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.⁴:

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favour of short term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

Criteria:

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.
3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

9.2 Principle 2

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.

⁴ The sequence in which the Principles and Criteria appear does not represent a ranking of their significance, but is rather intended to provide a logical guide to certifiers when assessing a fishery. The criteria by which the MSC Principles will be implemented will be reviewed and revised as appropriate in light of relevant new information, technologies and additional consultations

3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

9.3 Principle 3

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

A. Management System Criteria:

1. The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:

2. Demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process.
3. Be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings.
4. Observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability.
5. Incorporates an appropriate mechanism for the resolution of disputes arising within the system⁵.
6. Provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing.
7. Act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty.
8. Incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion.
9. Require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted.

⁵ Outstanding disputes of substantial magnitude involving a significant number of interests will normally disqualify a fishery from certification.

10. Specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
 - a) setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
 - b) identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
 - c) providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
 - d) mechanisms in place to limit or close fisheries when designated catch limits are reached;
 - e) establishing no-take zones where appropriate.

11. Contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

B. Operational Criteria

Fishing operation shall:

12. Make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive.
13. Implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas.
14. Not use destructive fishing practices such as fishing with poisons or explosives;
15. Minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch etc.
16. Be conducted in compliance with the fishery management system and all legal and administrative requirements.
17. Assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

10 BACKGROUND TO THE EVALUATION

10.1 Evaluation Team

Lead Assessor: Paul Knapman

Paul is a lead assessor with Moody Marine and is responsible for Moody Marine operations in North America. He has extensive experience of the fishing industry in North America and Europe. He was previously Head of an inshore fisheries management organization, a senior policy advisor to the UK government on fisheries and environmental issues, a fisheries officer and a fisheries consultant working in Europe and Canada.

Project Coordinator: Don Aldous

Don is a fishery consultant based in Nova Scotia providing fisheries management development services to clients in the fishing industry of Atlantic Canada and to fisheries organizations overseas since 1992. He worked for the Canadian Department of Fisheries and Oceans for 13 years on control of foreign fishing, pelagic and groundfish fisheries management plans. He has extensive experience in the South Pacific Islands as an advisor to island governments and regional organizations concerning tuna fisheries management planning issues.

Expert Advisor P1: Michaela Aschan

Michaela is a Professor in fisheries biology and fisheries management at the Norwegian College of Fishery Science, University of Tromsø in North Norway. As Senior Scientist she was in charge of the Norwegian shrimp research including surveys and shrimp stock assessment in the Barents Sea in the period 1991-2005. She is former chair of the ICES (International Council for Exploration of the Sea) Pandalus Assessment Working Group and has been a member of ICES working groups (WG) including the Arctic Fishery WG, the Pandalus & Nephrops WG and the Benthos Ecology WG. Michaela was a member of the assessment team that undertook the assessment of the Eastern Canadian Northern and Scotian Shelf Shrimp fisheries in 2007.

Expert Advisor P2: Error! Reference source not found.

Howard has worked in fishery science, stock assessment, and conservation and management of fishery resources since the mid-1960's, as a working scientist, science manager, program manager, and consultant, with a recurrent focus on crustacean resources. He was a member of the NAFO Working Group on the shrimp resource in NAFO Areas 0 and 1 in 1996-2000, participating in annual assessment meetings with scientists from Canada, Denmark, Greenland and the USA to develop and peer review scientific advice. He also participated in Canadian assessment meetings on the shrimp resource in shrimp fishing areas off Labrador and eastern Newfoundland in the same period. As Director of Fisheries Science and of Biodiversity Science (1998-2004) at Department of Fisheries and Oceans (DFO) Headquarters he was active in developing ecosystem-based approaches to ocean management, in particular approaches based on defining ecosystem objectives and indicators. Howard was also a member of the assessment team that undertook the assessment of the Eastern Canadian Northern and Scotian Shelf Shrimp fisheries in 2007.

Expert Advisor P3: John Angel

John is retired from full time employment having previously worked with the federal Department of Justice before moving to the Department of Fisheries and Oceans as head of legal and regulatory affairs in 1983. His last position in government (1994) was as Regional Director of Fisheries Management for the Scotia-Fundy Region. He then went on to serve as Executive Director of a Canadian fishing industry trade association. John served as a member of the Fisheries Resource Conservation Council (Canada) from 2004 to 2009. He has extensive experience in the development of integrated resource management plans and fishing strategies as well as a background in Canadian fisheries law.

10.2 Previous Certification Evaluations

The *P. borealis* fishery in SFA 5, 6, 7 was certified against the MSC standard in August 8, 2008. The client group for that assessment is the Association of Seafood Producers.

10.3 Inspections of the Fishery

Inspection of the fishery focused on the practicalities of fishing operations, the mechanisms and effectiveness of management agencies and the scientific assessment of the fisheries.

Meetings were held as follows. Some of the key issues discussed have been identified for each meeting.

Name	Affiliation	Date	Key Issues
Bruce Chapman Cecil Bannister Christine Penny Brian MacNamara Rosalind Walsh	Cdn. Assoc. Prawn Prod. “ “ “ Northern Coalition	Sep 2, 2009	The client provided their perspective of the fishery and provided a submission for the team to consider. The client presented the submission in detail.
Tm Siferd Jason Simms David Orr Heather Bishop Bob Lambert Jim Davis Via conference call: Cedric Arseneau Joe Justice Marc Clements Jennifer Buie	DFO Winnipeg DFO Newfoundland “ “ “ “ DFO, Quebec Nun. Wildlife Mgt. Board DFO, Ottawa “	Sep 3, 2009	The stock assessment and supporting scientific ecosystem information were discussed with DFO scientists based in the Central/Arctic Region and the Atlantic Region. Management – including the integrated fisheries management plan, enforcement and DFO policy initiatives including - A Fishery Decision-Making Framework Incorporating the Precautionary Approach; Managing Impacts of Fishing on Benthic Habitat, Communities and Species; and, Policy on New Fisheries for Forage Species.
(Letter) Marine Issues Committee	Ecology Action Centre	Aug 31, 2009	Habitat, corals and bycatch – See Appendix D
(Letter) Fred Winsor	Sierra Club of Canada	Aug 27, 2009	Cold water corals, Vulnerable Marine Ecosystems – See Appendix D

11 STAKEHOLDER CONSULTATION

11.1 Stakeholder Consultation

A total of 10 stakeholders were identified and consulted specifically by Moody Marine. Information was also made publicly available at the following stages of the assessment:

Date	Purpose	Media
25 June 2009	Announcement of assessment	Direct E-mail/letter Notification on MSC website Advertisement in press
17 July 2009	Notification of Assessment Team nominees	Direct E-mail Notification on MSC website
22 July 2009	Notification of intent to use MSC FAM Standard Assessment Tree	Direct E-mail Notification on MSC website
27 July 2009	Notification of assessment visit and call for meeting requests	Direct E-mail Notification on MSC website
2-3 September 2009	Assessment visit	Meetings
21 st September 2010	Notification of Proposed Peer Reviewers	Direct E-mail Notification on MSC website
3 rd February 2011	Notification of Public Comment Draft Report	Direct E-mail Notification on MSC website
TBC	Notification of Final Report	Direct E-mail Notification on MSC website

11.2 Stakeholder Issues

Letters and supporting information were received from the Ecology Action Centre (EAC) and the Sierra Club of Canada prior to the site visit. These can be found in Appendix D along with comments from the assessment team. These stakeholders raised concerns relating to habitat impacts of trawls, particularly in areas of vulnerable ecosystems such as cold water corals, the bycatch of fish species, particularly juvenile Greenland halibut and redfish and highlighted the need for caution in directing a fishery toward low tropic level species supporting a food web in Northern latitudes.

The assessment team used these submissions to help in directing their information gathering.

Following publication of the public comment draft report comments were received from the Sierra Club of Canada and by the MSC. Both sets of comments are attached in Appendix D along with comments from the assessment team and Moody Marine.

12 OBSERVATIONS AND SCORING

12.1 Introduction to Scoring Methodology

The MSC Principles and Criteria set out the requirements of certified fishery. These Principles and Criteria have been developed into a standard (Fishery Assessment Methodology) assessment tree - Performance Indicators and Scoring Guideposts - by the MSC, which is used in this assessment.

The Performance Indicators (PIs) have been released on the MSC website. In order to make the assessment process as clear and transparent as possible, each PI has three associated Scoring Guideposts (SGs) which identify the level of performance necessary to achieve 100, 80 (a pass score), and 60 scores for each Performance Indicator; 100 represents a theoretically ideal level of performance and 60 a measurable shortfall.

For each Performance Indicators, the performance of the fishery is assessed as a ‘score’. In order for the fishery to achieve certification, an overall weighted average score of 80 is necessary for each of the three Principles and no Indicator should score less than 60. As it is not considered possible to allocate precise scores, a scoring interval of five is used in evaluations. As this represents a relatively crude level of scoring, average scores for each Principle are rounded to the nearest whole number.

Weights and scores for the fishery are presented in table 5 below.

13 LIMIT OF IDENTIFICATION OF LANDINGS FROM THE FISHERY

13.1 Traceability

Traceability of product from the sea to the consumer is vital to ensure that the MSC standard is maintained. There are several aspects to traceability that the MSC require to be evaluated: Traceability within the fishery; at-sea processing; at the point of landing; and subsequently the eligibility of product to enter the chain of custody. These requirements are assessed here.

13.2 Traceability Requirements Within the Fishery

Offshore license holders utilizing registered vessels registered with DFO (see Table 3 for the current list) fishing with trawl gear will be eligible to sell MSC certified Northern shrimp (*P. borealis*) if/when the fishery is certified. If a license holder with a chain of custody certificate intends to operate with a vessel not named in Table 3, this license holder will provide appropriate information that allows the CB to confirm that the vessel is within scope and also confirmation that their vessel will operate in accordance with any operational requirements that may result from any condition of certification.

The client representative will maintain and provide the CB and the MSC with an up to date list of eligible client group vessels.

With respect to traceability within the operation of the fishery, existing fisheries management requirements include the clear identification of species, quantity, fishing method and area of capture by all vessels landing fish from the fishery. All catches are reported in logbooks, on landing tickets, through daily radio hail-ins and by the 100% observer coverage.

Cross referencing of logbooks, aerial and at-sea surveillance reports also ensures that fish is reported from the correct area of capture. 100% dockside monitoring takes place.

13.3 At-Sea Processing

Product is generally landed as Individual Quick Frozen (IQF) product, which is bagged and/or boxed. There are no known risks with respect to traceability associated with this operation.

13.4 Points of Landing

The limit of identification of landings is the landing of *P. borealis* by CAPP and NC member vessels at recognised ports where appropriate recording and monitoring of landings takes place. The main ports of landing are in: Newfoundland - Bay Roberts, Harbour Grace and sometimes St Anthony; Nova Scotia - Country Harbour and North Sydney. Sometimes landings are made into Greenland, e.g. Nuuk, where vessels undergo rigorous inspection and catch validation.

There are no known risk factors after the point of landing that may influence subsequent chain of custody assessments. Chain of custody should begin from the first point of sale.

13.5 Eligibility to Enter Chain of Custody

P. borealis products landed by any of the vessels owned by any of the CAPP and NC member companies are eligible to enter further chains of custody. Companies buying directly from this fishery are required to have chain of custody certification. Any companies buying from the vessels owned by

any of the CAPP and NC member companies must also seek chain of custody certification in order to sell product as MSC.

13.6 Target Eligibility Date

In accordance with MSC Technical Advisory Board Directive (TAB D) 021v2 MSC product eligibility date may be up to a maximum 6 months prior to the publication of the Public Comment Draft Report (PCDR). The client representative has indicated the client member groups desire to have the opportunity, if they so wish, to take full advantage of this 6 month period.

This PCDR report was published on 3rd February 2011 and so the target eligibility date for this fishery is 3rd August 2010. This means that any *P. borealis* products landed by the certified fleet following this date will be eligible to enter chain of custody as certified product provided that:

- i. the company handling the fish is issued a valid CoC certificate before the date of certification of the fishery; and
- ii. the fishery in question is listed in the scope of the CoC certificate or in the dedicated under-MSC-assessment schedule attached to the certificate of the company handling the fish.

14 CERTIFICATION RECOMMENDATION

14.1 Certification Recommendation

The Performance of the Fishery in relation to MSC Principles 1, 2 and 3 is summarised below:

MSC Principle	Fishery Performance	
Principle 1: Sustainability of Exploited Stock	Overall: 86.3	Pass
Principle 2: Maintenance of Ecosystem	Overall: 82.0	Pass
Principle 3: Effective Management System	Overall: 87.5	Pass

The fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any Performance Indicator. It is therefore determined that the Canadian Offshore Northern Shrimp (*Pandalus borealis*) Trawl Fishery in Shrimp Fishing Area 2, 3, 4, 5 and 6 be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.

The scores for the individual Performance Indicators are summarised in Table 5. The scoring commentary and justification for the scores is set out in Appendix A of this report.

This assessment has taken account of MSC TAB Directive D-015 v2 that details the requirement to ensure consistency of assessment outcomes for any fishery assessments that overlap, i.e. part of this assessment overlaps with the ASP MSC certified Northern shrimp fishery in SFA 5, 6 & 7. In so doing, the assessment team have also taken into account the outcome of the two annual surveillance audits that have taken place for the certified fishery.

Table 5: MSC scoring table for the *Pandalus borealis* fishery in Shrimp Fishing Area 2, 3, 4, 5 and 6.

Scores highlighted lie in the 60 - < 80 range and have Conditions associated with them.

Principle	Component	Performance Indicator			Weight	Score
1	Outcome	1.1.1	Stock status		0.5	100
		1.1.2	Reference points		0.5	80
		1.1.3	Stock rebuilding		0	N/A
	Management	1.2.1	Harvest strategy		0.25	90
		1.2.2	Harvest control rules & tools		0.25	80
		1.2.3	Information & monitoring		0.25	80
		1.2.4	Assessment of stock status		0.25	80
2	Retained species	2.1.1	Outcome		0.33	80
		2.1.2	Management		0.33	95
		2.1.3	Information		0.33	90
	Bycatch	2.2.1	Outcome		0.33	80
		2.2.2	Management		0.33	85

Principle	Component	Performance Indicator			Weight	Score	
3	ETP species	2.2.3	Information	0.33	100		
		2.3.1	Outcome	0.33	100		
		2.3.2	Management	0.33	90		
		2.3.3	Information	0.33	100		
	Habitats	2.4.1	Outcome	0.33	60		
		2.4.2	Management	0.33	70		
		2.4.3	Information	0.33	70		
	Ecosystem	2.5.1	Outcome	0.33	70		
		2.5.2	Management	0.33	70		
		2.5.3	Information	0.33	70		
	Governance and policy	3.1.1	Legal & customary framework	0.25	100		
		3.1.2	Consultation, roles & responsibilities	0.25	95		
		3.1.3	Long term objectives	0.25	100		
		3.1.4	Incentives for sustainable fishing	0.25	85		
	Fishery specific management system	3.2.1	Fishery specific objectives	0.20	70		
		3.2.2	Decision making processes	0.20	80		
		3.2.3	Compliance & enforcement	0.20	95		
		3.2.4	Research plan	0.20	75		
		3.2.5	Management performance evaluation	0.20	80		
				Overall Score			
Principle 1 – Target Species				86.3			
Principle 2 – Ecosystem				82.0			
Principle 3 – Management				87.5			

14.2 Conditions

As a standard requirement of the MSC certification methodology, the fishery shall be subject to (as a minimum) annual surveillance audits. These audits shall be publicised and reports made publicly available.

The fishery attained a score of below 80 against 8 Performance Indicators. The assessment team has therefore set conditions for continuing certification that the client is required to address. The conditions are applied to improve performance to at least the 80 level within a period set by the certification body but no longer than the term of the certification.

As a standard condition of certification, the client shall develop an 'Action Plan' for meeting the conditions. The client has done this and it is has been approved by the assessment team and is included in Appendix C. The client has also sought and gained support of their Action Plan from the Department of Fisheries and Oceans (DFO) (see letter in Appendix H) and has also met with DFO representatives to format a collaborative work plan towards implementing the Action Plan.

The conditions are associated with four key areas (components) of performance of the fishery and are set out in tabular form below along with the narrative of the relevant Performance Indicator (PI), Scoring Guideposts (SG), the assessment team score, their scoring rationale (taken from the scoring

table in Appendix A) the condition and details regarding the client action plan and how the condition will be met.

As previously indicated, this assessment has taken account of MSC TAB Directive D-015 v2, in so doing and where appropriate, comparable conditions have been set with the overlapping fishery to ensure consistency of assessment outcome. Five conditions were given to the ASP certification. Three of these – related to reference points and decisions rules; ETP species; and unobserved fishing mortality – have been closed out in the course of the fishery’s two annual surveillance audits. The two that remain relate to the ecological impacts of the fishery and, long and short term management objectives. Conditions 1 - 7 below have taken account of the outcome requirements of these two remaining conditions.

Condition 8 below reflects the need for a research plan that provides the management system with a strategic approach to research. While research was an important factor in the assessment tree for the ASP assessment there was no PI with a specific requirement for a “plan” or “strategic approach”, hence, there was no condition set in the ASP certification.

14.2.1 Condition 1

Habitat Outcome	2.4.1
PI	The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.
SG 60	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
SG 80	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
SG 100	There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
Score	60
Scoring Rationale	Given its mode of operation, this fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm, but analyses of fishery impacts would be required to increase certainty, particularly with respect to potential impacts on hard coral areas; accordingly it cannot be said that the fishery is “highly unlikely” to have unacceptable impacts.
Condition	The client is required to present evidence by the fourth annual audit that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm
Client Action Plan	<p>The client has set out their actions and expected outcomes for this performance indicator in a logical step wise approach in association with Conditions 2 and 3, both of which relate to performance indicators for habitat:</p> <ul style="list-style-type: none"> • CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), towards development of a program (a) to enhance the collection of information, and (b) to conduct an evaluation of the nature and distribution of habitat types, their vulnerability, and the related impact of otter trawl fishing for shrimp in this area. A “project team” will be assembled for this purpose, which more generally will also ensure implementation of DFO’s Sustainable Fisheries Framework Policies, including with respect to Sensitive Benthic Areas as it applies to

	<p>the conduct of shrimp fishing in this area.</p> <ul style="list-style-type: none"> • By the first annual audit there will be documented evidence that a plan for the assembly of available information and a program for evaluation has been developed by the “project team”, and data collection and assembly for this purpose has commenced. • By the second annual audit there will be documented evidence showing the information that has been assembled and the results of analysis to date. • By the third annual audit there will be documented evidence showing that at least a provisional evaluation has been completed. • By the fourth annual audit there will be documented evidence that at least a partial strategy is in place, and incremental mitigation measures have been identified and are being implemented as appropriate for this fishing activity.
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14.2.2 Condition 2

Habitat Strategy	2.4.2
PI	There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.
SG 60	<p>There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.</p> <p>The measures are considered likely to work, based on plausible argument (e.g general experience, theory or comparison with similar fisheries/habitats).</p>
SG 80	<p>There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.</p> <p>There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or habitats involved.</p> <p>There is some evidence that the partial strategy is being implemented successfully.</p>
SG 100	<p>There is a strategy in place for managing the impact of the fishery on habitat types.</p> <p>The strategy is mainly based on information directly about the fishery and/or habitats involved, and testing supports high confidence that the strategy will work.</p> <p>There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.</p>
Score	70
Scoring Rationale	All scoring issues of the SG 60 are in place, as measures are in place to reduce impacts and these are considered likely to work. The suite of measures (light gear design; fishing mainly on mud-sand bottoms; coral conservation policy by the offshore fleet and developing DFO coral/sponge policy; voluntary closed areas) is considered a partial strategy as there is an understanding of how they work to conserve habitat and there is an awareness of the need to further modify the strategy if necessary. There is evidence that the strategy is being implemented successfully, since bycatch of corals and sponges is very low.

	However, further information on the fishery impacts on habitat would be necessary to provide a more objective basis for confidence that the strategy is meeting its objectives.
Condition	<p>The client is required to demonstrate by the fourth annual audit that:</p> <ul style="list-style-type: none"> i. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or habitats involved.
Client Action Plan	<p>The client has set out their actions and expected outcomes for this performance indicator in a logical step wise approach in association with Conditions 1 and 3, both of which relate to performance indicators for habitat:</p> <ul style="list-style-type: none"> • CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), towards development of a program (a) to enhance the collection of information, and (b) to conduct an evaluation of the nature and distribution of habitat types, their vulnerability, and the related impact of otter trawl fishing for shrimp in this area. A “project team” will be assembled for this purpose, which more generally will also ensure implementation of DFO’s Sustainable Fisheries Framework Policies, including with respect to Sensitive Benthic Areas as it applies to the conduct of shrimp fishing in this area. • By the first annual audit there will be documented evidence that a plan for the assembly of available information and a program for evaluation has been developed by the “project team”, and data collection and assembly for this purpose has commenced. • By the second annual audit there will be documented evidence showing the information that has been assembled and the results of analysis to date. • By the third annual audit there will be documented evidence showing that at least a provisional evaluation has been completed. • By the fourth annual audit there will be documented evidence that at least a partial strategy is in place, and incremental mitigation measures have been identified and are being implemented as appropriate for this fishing activity.

14.2.3 Condition 3

Habitat Information	2.4.3
PI	Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types.
SG 60	<p>There is a basic understanding of the types and distribution of main habitats in the area of the fishery.</p> <p>Information is adequate to broadly understand the main impacts of gear use on the main habitats, including spatial extent of interaction.</p>
SG 80	<p>The nature, distribution and vulnerability of all main habitat types in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery.</p> <p>Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial</p>

	<p>extent, timing and location of use of the fishing gear.</p> <p>Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).</p>
SG 100	<p>The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.</p> <p>Changes in habitat distributions over time are measured.</p> <p>The physical impacts of the gear on the habitat types have been quantified fully.</p>
Score	70
Scoring Rationale	The fishery meets all the scoring issues of the 60 SG in that there is a basic understanding of types and distribution of habitats in the fishery, and of the impacts of the fishery on habitats. The fishery is assigned a score above 60 because there is detailed information on nature and distribution of sensitive habitats (coral and sponge areas) and reliable information on spatial extent, timing and location of the fishery.
Condition	<p>The client is required to demonstrate by the fourth annual audit that:</p> <ul style="list-style-type: none"> i. Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).
Client Action Plan	<p>The client has set out their actions and expected outcomes for this performance indicator in a logical step wise approach in association with Conditions 1 and 3 both of which relate to performance indicators for habitat:</p> <ul style="list-style-type: none"> • CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), towards development of a program (a) to enhance the collection of information, and (b) to conduct an evaluation of the nature and distribution of habitat types, their vulnerability, and the related impact of otter trawl fishing for shrimp in this area. A “project team” will be assembled for this purpose, which more generally will also ensure implementation of DFO’s Sustainable Fisheries Framework Policies, including with respect to Sensitive Benthic Areas as it applies to the conduct of shrimp fishing in this area. • By the first annual audit there will documented evidence that a plan for the assembly of available information and a program for evaluation has been developed by the “project team”, and data collection and assembly for this purpose has commenced. • By the second annual audit there will documented evidence showing the information that has been assembled and the results of analysis to date. • By the third annual audit there will be documented evidence showing that at least a provisional evaluation has been completed. • By the fourth annual audit there will be documented evidence that at least a partial strategy is in place, and incremental mitigation measures have been identified and are being implemented as appropriate for this fishing activity.

14.2.4 Condition 4

Ecosystem Outcome	2.5.1
PI	The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.
SG 60	The fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
SG 80	The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
SG 100	There is evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm
Score	70
Scoring Rationale	One identified ecosystem element (changes in trophic relationships due to removal of the target species) meets the 80 SG, another (non-catch impacts on benthic communities) meets the 60. Overall it appears highly unlikely that the fishery is causing serious or irreversible harm to ecosystems. Accordingly an intermediate score of 70 is assigned.
Condition	The client is required to present evidence by the fourth annual audit that the fishery is highly unlikely to disrupt benthic communities structure and function to a point where there would be a serious or irreversible harm.
Client Action Plan	<p>The client has set out their actions and expected outcomes for this performance indicator in a logical step wise approach in association with Conditions 5 and 6, both of which relate to performance indicators for the ecosystem:</p> <ul style="list-style-type: none"> • CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), towards development of a program (a) to enhance the collection of information, and (b) to conduct an evaluation of the vulnerability of ecosystem components and the inferred impact of otter trawl fishing for shrimp in this area. A “project team” will be assembled for this purpose, which more generally will also ensure implementation of DFO’s Sustainable Fisheries Framework Policies as they applies to the conduct of shrimp fishing in this area. • By the first annual audit there will documented evidence that a plan for the assembly of available information and a program for evaluation has been developed by the “project team”, and data collection and assembly for this purpose has commenced. • By the second annual audit there will documented evidence showing the information that has been assembled and the results of analysis to date. • By the third annual audit there will documented evidence showing that at least a provisional evaluation has been completed. • By the fourth annual audit there will be documented evidence that at least a partial strategy is in place, and incremental mitigation measures have been identified and are being implemented as appropriate for this fishing activity.

14.2.5 Condition 5

Ecosystem strategy	2.5.2
PI	There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.
SG 60	<p>There are measures in place, if necessary, that take into account potential impacts of the fishery on key elements of the ecosystem.</p> <p>The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems).</p>
SG 80	<p>There is a partial strategy in place, if necessary, that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.</p> <p>The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems).</p> <p>There is some evidence that the measures comprising the partial strategy are being implemented successfully.</p>
SG 100	<p>There is a strategy that consists of a plan, containing measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem.</p> <p>This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.</p> <p>The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved.</p> <p>There is evidence that the measures are being implemented successfully.</p>
Score	70
Scoring Rationale	A partial strategy is in place to ensure that adequate forage is maintained for predators (guideline exploitation rate, ongoing monitoring) (SG 80). Measures are in place to ensure that non-catch impacts on benthic communities are low (light gear, soft-bottom areas with communities which recover relatively quickly are fished) (SG 60). Accordingly a score of 70 is assigned.
Condition	<p>The client is required to demonstrate by the fourth annual audit that:</p> <ul style="list-style-type: none"> i. There is a partial strategy in place, if necessary, that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem – in particular the non-catch impacts on benthic communities - to achieve the Ecosystem Outcome 80 level of performance. ii. The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems). iii. There is some evidence that the measures comprising the partial

	strategy are being implemented successfully.
Client Action Plan	<p>The client has set out their actions and expected outcomes for this performance indicator in a logical step wise approach and in association with Conditions 4 and 6, both of which relate to performance indicators for the ecosystem:</p> <ul style="list-style-type: none"> • CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), towards development of a program (a) to enhance the collection of information, and (b) to conduct an evaluation of the vulnerability of ecosystem components and the inferred impact of otter trawl fishing for shrimp in this area. A “project team” will be assembled for this purpose, which more generally will also ensure implementation of DFO’s Sustainable Fisheries Framework Policies as they applies to the conduct of shrimp fishing in this area. • By the first annual audit there will documented evidence that a plan for the assembly of available information and a program for evaluation has been developed by the “project team”, and data collection and assembly for this purpose has commenced. • By the second annual audit there will documented evidence showing the information that has been assembled and the results of analysis to date. • By the third annual audit there will documented evidence showing that at least a provisional evaluation has been completed. • By the fourth annual audit there will be documented evidence that at least a partial strategy is in place, and incremental mitigation measures have been identified and are being implemented as appropriate for this fishing activity.

14.2.6 Condition 6

Ecosystem Information	2.5.3
PI	There is adequate knowledge of the impacts of the fishery on the ecosystem.
SG 60	<p>Information is adequate to identify the key elements of the ecosystem (e.g. trophic structure and function, community composition, productivity pattern and biodiversity).</p> <p>Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but have not been investigated in detail.</p>
SG 80	<p>Information is adequate to broadly understand the functions of the key elements of the ecosystem.</p> <p>Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but may not have been investigated in detail.</p> <p>The main functions of the Components (i.e. target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known.</p> <p>Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.</p> <p>Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or</p>

	<p>the effectiveness of the measures).</p>
SG 100	<p>Information is adequate to broadly understand the key elements of the ecosystem.</p> <p>Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated.</p> <p>The impacts of the fishery on target, Bycatch, Retained and ETP species and Habitats are identified and the main functions of these Components in the ecosystem are understood.</p> <p>Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred.</p> <p>Information is sufficient to support the development of strategies to manage ecosystem impacts.</p>
Score	70
Scoring Rationale	<p>Very good information is available on the ecological relationships of <i>Pandalus</i> and on abundance of this target species, such that impacts of the fishery on predator-prey relationships can be assessed and mitigated if need be. Monitoring continues. As such the fishery meets the 80 SG for this issue.</p> <p>Partial knowledge of potential non-catch impacts of the fishery on benthic species and general knowledge of benthic communities exists, however information has not been compiled in such a way as to allow consequences on benthic communities to be assessed. As such the fishery meets the 60 SG for this issue.</p> <p>Overall, with respect to ecosystem impacts, the fishery is close to the 80 SG: information is adequate to broadly understand functions of key elements of the ecosystem, main impacts can be inferred, the functions of the components are understood, and some of the main consequences can be assessed.</p>
Condition	<p>The client is required to demonstrate by the fourth annual audit that:</p> <ul style="list-style-type: none"> i. Sufficient information is available on the impacts of the fishery on <u>benthic communities</u> to allow some of the main consequences for the ecosystem to be inferred. ii. Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).
Client Action Plan	<p>The client has set out their actions and expected outcomes for this performance indicator in a logical step wise approach and in association with Conditions 4 and 5, both of which relate to performance indicators for the ecosystem:</p> <ul style="list-style-type: none"> • CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), towards development of a program (a) to enhance the collection of information, and (b) to conduct an evaluation of the vulnerability of ecosystem components and the inferred impact of otter trawl fishing for shrimp in this area. A “project team” will be assembled for this purpose, which more generally will also ensure implementation of DFO’s Sustainable Fisheries Framework Policies as they applies to the conduct of shrimp fishing in this area. • By the first annual audit there will documented evidence that a plan for the

	<p>assembly of available information and a program for evaluation has been developed by the “project team”, and data collection and assembly for this purpose has commenced.</p> <ul style="list-style-type: none"> • By the second annual audit there will documented evidence showing the information that has been assembled and the results of analysis to date. • By the third annual audit there will documented evidence showing that at least a provisional evaluation has been completed. • By the fourth annual audit there will be documented evidence that at least a partial strategy is in place, and incremental mitigation measures have been identified and are being implemented as appropriate for this fishing activity.
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14.2.7 Condition 7

Fishery Specific Objectives	3.2.1
PI	The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.
SG 60	Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's management system.
SG 80	Short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
SG 100	Well defined and measurable short and long term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
Score	70
Scoring Rationale	Short and long-term objectives in the domestic fishery are well described in the management system. The lack of explicit mention of application of the precautionary approach to Principle 2 related issues and specific measurement indicators makes evaluation of some of the objectives difficult and keeps this indicator from achieving a higher score. The score would have also been higher if maintenance of biodiversity and maintenance of shrimp biomass to support predators had been included in the objectives.
Condition	The client is required to present evidence by the first annual audit that short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
Client Action Plan	CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), to amend the IFMP with explicit references to the precautionary approach being applicable to managing the impact of fishing on sensitive habitat, species and the ecosystem.

14.2.8 Condition 8

Research Plan	3.2.4
PI	The fishery has a research plan that addresses the information needs of management.
SG 60	Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2 Research results are available to interested parties.
SG 80	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. Research results are disseminated to all interested parties in a timely fashion.
SG 100	A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2 Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available
Score	75
Scoring Rationale	While there is significant ongoing research activity to support the fishery, there is no actual research plan that provides the management system with a strategic approach to research as is required by the 80 scoring guidepost. The research survey and assessment program is described and is published as part of the IFMP (Annex D) and, such as to provides management with necessary information. However this it is not comprehensive, as it does not address all issues identified in the stock assessments as requiring resolution through research. In addition, although ecosystem issues are addressed in ongoing research, there is not a comprehensive range of research topics identified to resolve issues related to ecosystem impacts of fishing". The research being conducted is circulated to all interested parties in a timely fashion, either directly to stakeholders, at advisory committee meetings or via the Canadian Science Advisory Secretariat (CSAS) system on the DFO website. The annual stock assessment is also posted on the NAFO website. It should be noted that the need for a research plan that provides the management system with a strategic approach to research was not a specific requirement in the assessment tree for the overlapping ASP assessment, hence, there was no condition set in the ASP certification.
Condition	The client is required to present a research plan by the fourth annual audit that assembles current activity, identifies gaps, and provides the management system with a strategic approach to research including reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.
Client Action Plan	CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), in assembling a working group to codify existing activity and develop a Research Plan for the short-to-mid term, that are linked to the objectives established for the fishery and for MSC Principles 1 and 2.

2.

By the first annual audit there will be documented evidence that a plan to conduct gap analysis has been developed by the working group.

By the second annual audit there will be documented evidence that a gap analysis has been completed.

By the fourth annual audit there will be documented evidence that a research plan is in place.

14.3 Recommendation

The assessment team recommend that the IFMP includes explicit recognition of the ecological role of the species with respect to the target reference point. The assessment team also strongly recommend that an amendment page is included in the IFMP indicating what and when sections are amended.

15 APPENDICES

Appendix A: Scoring Table

Appendix B: Peer Review Reports

1. Peer Reviewer Biographies
2. Peer Review Report A
3. Peer Review Report B

Appendix C: Client Draft Action Plan

Appendix D: Stakeholder Comments

Appendix E: A table showing the relationship between the Performance Indicators used in this assessment and Performance Indicators used in the ASP Northern shrimp MSC assessment for SFAs 5, 6, 7.

Appendix F: Registered companies / vessels within Unit of Certification: eligible to sell MSC certified product

Appendix G: Confirmation of Client Certificate Sharing Agreement

Appendix H: Letter of Support from Department of Fisheries Oceans, Canada

APPENDIX A

Scoring Table

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Principle 1	A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.
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1.1	Management Outcomes:
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1.1.1	Stock Status: The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing	<p>It is <u>likely</u> that the stock is above the point where recruitment would be impaired.</p> <p>The stock is at or fluctuating around its target reference point.</p>	<p>It is <u>highly likely</u> that the stock is above the point where recruitment would be impaired.</p> <p>The stock is at or fluctuating around its target reference point.</p>	<p>There is a <u>high degree of certainty</u> that the stock is above the point where recruitment would be impaired.</p> <p>There is a <u>high degree of certainty</u> that the stock has been fluctuating around its target reference point, or has been above its target reference point, <u>over recent years</u>.</p>
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Scoring Comments
Upper stock reference points (similar to target reference points) and limit reference points have been defined for all the SFAs within this fishery area. Generally, uncertainty is higher further north (SFAs 2-4) because of short survey time series and lower survey frequency; however stock status in all SFAs has been assessed relative to reference points. Results are as follows (from DFO 2010/018 and DFO 2010/024):
<ul style="list-style-type: none"> SFA 2 - SSB is in the healthy zone, well above the upper stock reference, and has been increasing for several years. SFA 3 - No directed fishery in this area, a bycatch quota of 400 T is in place, and survey biomass is of the order of 4,000-5,000 t. SFA 4 - SSB is in the healthy zone and well above the upper stock reference; biomass has been increasing since 2005 (duration of the survey series) and commercial CPUE has been essentially stable for many years. SFA 5 - SSB is in the healthy zone and well above the upper stock reference; it has been above the USR since 1998. Uncertainty around survey biomass estimates has increased in the most recent survey, and there are indications of declining biomass in the most recent years. SFA 6 - SSB in the most recent assessment year (2009) has dropped to 97% of the upper stock reference, following 10 years in which SSB was above this level. Biomass has been declining in the past 4 years. <p>Indices of pre-recruits are generally at or above long-term averages in SFAs 4-6; only short time series are available in SFAs 2-3.</p> <p>Overall none of the SFAs have SSB values near limit reference points and recruitment does not appear to be compromised. Uncertainty around actual values of biomass estimates has increased somewhat in recent years in southern SFAs, and is higher in the north because of short survey times series, but because biomass estimates are far above limit reference points (where recruitment might be compromised) it can be stated that it is highly likely that the stock is above levels where recruitment might be compromised.</p>
Score: 100

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
There is a high degree of certainty that overall the stock is above the point where recruitment would be impaired. The stock is well above (or in one case slightly below, after many years well above) the target reference point.			
Audit Trace References			
DFO 2010a. Assessment of Divisions 2G-3K Northern Shrimp. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/018. DFO 2010b. Assessment of Northern Shrimp (<i>Pandalus borealis</i>) in SFA 0, 2, 3 and Striped Shrimp (<i>Pandalus montagui</i>) in SFA 2, 3 and 4 west of 63°W. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/024.			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.1.2	Reference Points: Limit and target reference points are appropriate for the stock.	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.	Reference points are appropriate for the stock and can be estimated. The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of relevant <u>precautionary issues</u> .
			The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome. For low trophic level species, the target reference point takes into account the ecological role of the stock.	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, <u>or a higher level</u> , and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.

Scoring Comments

An upper stock reference (similar in intent to a Target Reference Point) and a limit reference point are defined for each SFA. The USR is set at 80% of the geometric mean of spawning stock biomass (survey) over a productive period, while the LRP is set at 30% of the SSB during the same period. Reference periods are determined for each SFA based on stock history and survey time series. Reference points based on stock models cannot be determined in these stocks because of the stock history (increasing abundance over the duration of the fishery) but these reference points are considered to be sound proxies for a level at which risk of recruitment failure would become high (LRP) and for B_{MSY} (USR).

The upper stock reference is set at a level which would ensure availability of forage to predators, although this is not explicitly part of the basis for the USR, and other parts of the management framework, in particular the low reference exploitation rate, accommodate the needs of predators. The exploitation rate guideline of 15% is set well below plausible values of F_{MSY} , although the latter has not yet been determined for these stocks.

Score: 80

Reference points are appropriate for the stocks and can be estimated. LRP is set above the level at which there is an appreciable risk of impairing reproductive capacity, and USR (TRP) is

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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such that the species is maintained at a level approximating B_{msy}. The upper stock reference (TRP) is set at a level which would ensure that the needs of predators are accommodated.

Audit Trace References

- DFO 2010a. Assessment of Divisions 2G-3K Northern Shrimp. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/018.
- DFO 2010b. Assessment of Northern Shrimp (*Pandalus borealis*) in SFA 0, 2, 3 and Striped Shrimp (*Pandalus montagui*) in SFA 2, 3 and 4 west of 63°W. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/024.
- DFO 2009a. Northern Shrimp Integrated Fisheries Management Plan, shrimp fishing areas (SFAs) 0-7, Flemish Cap. Effective September 2009. Resource Management Operations, Fisheries and Oceans Canada. <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/ifmp-gmp/shrimp-crevette/shrimp-crevette-2007-eng.htm>.
- DFO 2007c. Proceedings of the Assessment Framework for Northern Shrimp (*Pandalus borealis*) off Labrador and the northeastern coast of Newfoundland. Ed. J Ennis. Can Sci.Adv.Sec. Proc. Ser. 2007/34.
- DFO 2006c. A harvest strategy compliant with the precautionary approach. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2006/023. 7 pp.
- Hvingel and Orr 2010, draft

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.1.3	<p>Stock Rebuilding: Where the stock is depleted, there is evidence of stock rebuilding.</p> <p>Where stocks are depleted rebuilding strategies which have a <u>reasonable expectation</u> of success are in place.</p> <p>Monitoring is in place to determine whether they are effective in rebuilding the stock within a <u>specified</u> timeframe.</p>	<p>Where stocks are depleted rebuilding strategies are in place.</p> <p>There is <u>evidence</u> that they are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within a <u>specified</u> timeframe.</p>	<p>Where stocks are depleted, strategies are <u>demonstrated</u> to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete within the <u>shortest practicable</u> timeframe.</p>
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Scoring Comments

This stock is not depleted and as such this indicator is not applicable.

Score: N/A

Audit Trace References

N/A

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.2	Harvest Strategy (management)		
1.2.1	<p>Harvest Strategy: There is a robust and precautionary harvest strategy in place</p> <p>The harvest strategy is <u>expected</u> to achieve stock management objectives reflected in the target and limit reference points.</p> <p>The harvest strategy is <u>likely</u> to work based on prior experience or plausible argument.</p> <p><u>Monitoring</u> is in place that is expected to determine whether the harvest strategy is working.</p>	<p>The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy <u>work together</u> towards achieving management objectives reflected in the target and limit reference points.</p> <p>The harvest strategy may not have been fully tested but monitoring is in place and <u>evidence</u> exists that it is achieving its objectives.</p>	<p>The harvest strategy is responsive to the state of the stock and is <u>designed</u> to achieve stock management objectives reflected in the target and limit reference points.</p> <p>The performance of the harvest strategy has been <u>fully evaluated</u> and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.</p> <p>The harvest strategy is <u>periodically reviewed and improved</u> as necessary.</p>
<p>Scoring Comments</p> <p>A harvest strategy based on reference points and decision rules is outlined in the latest version of the IFMP (Annex I), and this is being applied in assessment (DFO 2010/018, 2010/024) and management. Exploitation rates in critical, cautious and healthy zones are to be based on proportions of Fmsy but this cannot yet be determined. Pending this, a base target exploitation rate of 15% is used to guide setting TACs. The harvest strategy is responsive to state of the stock as TACs are reset every two years based on the base exploitation rate and updated stock assessment.</p> <p>The exploitation rate guideline has generally been adhered to over the past decade; in some areas and years the exploitation rate has ended up above the guideline rate but averaged over years the guideline has been followed.</p> <p>Other elements of the harvest strategy include management regulations (mesh sizes, licence limitation), intensive monitoring (observer coverage on 100% of trips), a protection and surveillance system, and annual review of management performance through an Advisory Committee. The elements work together and there is evidence that the harvest strategy is achieving its objectives, in that TAC levels have been adhered to over the duration of the fishery, the stock has in almost all areas and years remained above the target reference points.</p>			
<p>Score: 90</p> <p>The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in target and limit reference points, thereby meeting the 100 SG. The strategy has not been fully tested in all SFAs and in all conditions but intensive monitoring is in place and evidence indicates that the strategy is meeting its objectives, meeting the 80 SG.</p>			
<p>Audit Trace References</p>			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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DFO 2010a. Assessment of Divisions 2G-3K Northern Shrimp. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/018.

DFO 2010b. Assessment of Northern Shrimp (*Pandalus borealis*) in SFA 0, 2, 3 and Striped Shrimp (*Pandalus montagui*) in SFA 2, 3 and 4 west of 63°W. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/024.

DFO 2009a. Northern Shrimp Integrated Fisheries Management Plan, shrimp fishing areas (SFAs) 0-7, Flemish Cap. Effective September 2009. Resource Management Operations, Fisheries and Oceans Canada.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.2.2	<p>Harvest control rules and tools: There are well defined and effective harvest control rules in place</p> <p>There is <u>some evidence</u> that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.</p>	<p><u>Generally understood</u> harvest control rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.</p> <p>The <u>selection</u> of the harvest control rules takes into account the <u>main</u> uncertainties.</p> <p><u>Available evidence indicates</u> that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules</p>	<p><u>Well defined</u> harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.</p> <p>The <u>design</u> of the harvest control rules take into account a <u>wide</u> range of uncertainties.</p> <p><u>Evidence clearly shows</u> that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.</p>
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Scoring Comments

An overall approach to setting reference points and harvest control rules has been outlined for this fishery (IFMP Annex I). The proposed harvest control rules depend on F_{MSY} but this has not yet been determined (DFO 2010 IFMP), so pending determination of this, a base guideline exploitation rate of 15% is used as the guiding harvest control rule. Although the guideline exploitation rate does not explicitly decline monotonically as the limit reference point is reached, the intent of the exploitation rate level chosen is to keep the stock above the limit reference point and near a level equivalent to a target reference point.

For SFA 5-6, where the inshore fishery operates, it has been agreed that inshore licences will have to be reduced according to the principle of “Last in first out”, if the stock declines to levels which might compromise sustainability. Owing to the observed stock decline in SFA 6, two licences were removed in 2010.

The exploitation rate guideline has generally been followed in the recent past. Although the guideline has been exceeded in some years and areas, the average exploitation rate in each SFA has been at or below the guideline over the past decade.

Harvest control tools (licence limitation, mesh size restrictions, monitoring, protection and surveillance) are appropriate and have proven effective in maintaining catches at or below TACs over a relatively long period. They are not yet tested in a system based on harvest control rules but should function as well as in the past.

Uncertainty on the estimate of stock biomass is taken into account, since survey catchability is less than one; thus actual biomass is greater than the estimates. Uncertainty about the influence of the fishery on the stock is taken into account by advising that the harvest rate be maintained at a moderate level (below F_{MSY}) in order to guard against overexploitation and to maintain food for predators – the 15% exploitation rate guideline in use is below exploitation rates practiced in other pandalid fisheries which have proved to be sustainable over periods of ≥1 decade (IFMP Annex I). This approach is intended to be precautionary, but does not take uncertainty into account in a structured way through the use of decision rules.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Score: 80

A well defined harvest control rule is in place, based on the harvest strategy; although the exploitation rate is not monotonically decreased as the limit reference point is reached, the intent of the exploitation rate is to keep the stock above the limit reference point and at a level equivalent to a target reference point. The selection of the harvest control rule takes into account the main uncertainties, as the base exploitation is relatively low for a pandalid fishery, and catchability in the survey is less than 1. Available evidence indicates that the harvest control tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.

Audit Trace References

DFO 2010a. Assessment of Divisions 2G-3K Northern Shrimp. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/018.

DFO 2010b. Assessment of Northern Shrimp (*Pandalus borealis*) in SFA 0, 2, 3 and Striped Shrimp (*Pandalus montagui*) in SFA 2, 3 and 4 west of 63°W. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/024.

DFO 2009a. Northern Shrimp Integrated Fisheries Management Plan, shrimp fishing areas (SFAs) 0-7, Flemish Cap. Effective September 2009. Resource Management Operations, Fisheries and Oceans Canada.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.2.3	<p>Information monitoring: Relevant information is collected to support the harvest strategy</p> <p>Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.</p>	<p><u>Some</u> relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.</p> <p>Stock abundance and fishery removals are <u>regularly monitored at a level of accuracy and coverage consistent with the harvest control rule</u>, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.</p> <p>There is good information on all other fishery removals from the stock.</p>	<p><u>Sufficient</u> relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.</p> <p>Stock abundance and fishery removals are <u>regularly monitored at a level of accuracy and coverage consistent with the harvest control rule</u>, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.</p> <p>There is good information on all other fishery removals from the stock.</p> <p>A <u>comprehensive range</u> of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly relevant to the current harvest strategy, is available.</p> <p>All <u>information</u> required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of the inherent <u>uncertainties</u> in the information [data] and the robustness of assessment and management to this uncertainty.</p>
Scoring Comments			
<p>With respect to stock structure, excellent information is available on the distribution and geographical range of the stock, relationship of the geographical range to the fishery and to the control of harvests, age, size and sex distribution of the stock. Genetic structure is not well known, however assessments are done, and the harvest strategy is applied, by SFAs which provides a level of protection against overexploiting local stock components.</p> <p>With respect to productivity, the general biology and population dynamics of <i>P. borealis</i> are well known. There is good information on maturity, growth, natural mortality and fecundity. Information on density dependent processes and the stock-recruitment relationship is incomplete. Proxy measures for reference points are used in the absence of stock-recruitment information, and the limit reference point is considered to reflect the level below which risks of impaired recruitment would be relatively high.</p> <p>Fleet composition and fleet characteristics are very well known. Observers are carried on 100% of trips.</p> <p>Stock status information is generally better in the south than in the north. DFO conducts annual multi-species surveys in SFA6, but in SFA 5 autumn multi-species surveys were conducted in the northern part of SFA 5 (NAFO Division 2H) between 1996 and 1999. Since then, surveys of the whole of SFA 5 were completed in three (01, 04, 06) of the last eight years. In SFAs 2-4 cooperative industry surveys (Northern Shrimp Research Foundation) have been conducted as follows: SFA 2, annually since 2006; SFA 3, surveys in 2007 and 2009 (no <i>P. borealis</i> fishery); SFA 4 annually since 2005. The surveys of SFA 2 reveal a high level of uncertainty.</p>			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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This resource is assessed on a biannual schedule and was last assessed in March 2010.

The biannual assessment makes use of fishery data from observer and logbook datasets when estimating catch rate indices and indices of fishery aggregation. The bottom trawl surveys mentioned above provide indices of recruitment, spawning stock biomass, fishable biomass and exploitation rate. 95% confidence intervals are provided for many of the indices.

Catches are well reported. *P.borealis* only occurs as by-catch in the *P. montagui* fishery (SFA 3) and this catch is also reported.

With respect to other fishery removals, the fishery under assessment is one of two fisheries taking this species in SFAs 5 and 6, the other being the small-boat “inshore” fleet. The total fishery for *P. borealis* in SFAs 5 and 6, including both large and small vessels, has been certified by the MSC (2008), and information from the small boat fleet was found to be excellent in that assessment. Fishery removals by the small-boat fleet are very well known from logbooks, verified by observer coverage, and from dockside monitoring.

Score: 80

Sufficient relevant information on stock structure, productivity, fleet composition, and removals is available to support the harvest strategy; information on the latter two topics is excellent. Detailed information on stock structure is not available but the harvest strategy is such as to prevent overexploitation of local stock components since it is applied by SFA. Abundance and removals are monitored regularly at a level of accuracy and coverage consistent with the HCR and indicators of survey biomass, CPUE, pre-recruits and fishery distribution are used to support the harvest strategy. Removals from the only other fishery exploiting stocks in this area are well documented.

Audit Trace References

- Allen, K.R., 1971. Relation between production and biomass. J. Fish. Res. Bd. Canada 28: 1537-1581.
- Brey, T. 2008. Population Dynamics in Benthic Invertebrates- A virtual handbook. <http://www.thomas-brey.de/science/virtualhandbook/navlog/index.html>
- DFO 2010a. Assessment of Divisions 2G-3K Northern Shrimp. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/018.
- DFO 2010b. Assessment of Northern Shrimp (*Pandalus borealis*) in SFA 0, 2, 3 and Striped Shrimp (*Pandalus montagui*) in SFA 2, 3 and 4 west of 63°W. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/024.
- Nilssen, E.M., Hopkins, C.C.E., 1991. Population parameters and life histories of the deep-water prawn *Pandalus borealis* from different regions. ICES CM 1991/K:2.
- Parsons, D. G., V. L. Mercer, and P. J. Veitch. 1989. Comparison of the growth of northern shrimp (*Pandalus borealis*) from four regions of the Northwest Atlantic. J. Northw. Atl. Fish. Sci., 9: 123–131.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.2.4	<p>Assessment of stock status: There is an adequate assessment of the stock status</p> <p>The major sources of uncertainty are identified.</p>	<p>The assessment estimates stock status relative to reference points.</p> <p>The assessment takes uncertainty into account.</p> <p>The stock assessment is subject to peer review.</p>	<p>The assessment is appropriate for the stock and for the harvest control rule, and is evaluating stock status relative to reference points.</p> <p>The assessment takes uncertainty into account.</p> <p>The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.</p> <p>The assessment has been <u>internally and externally</u> peer reviewed.</p>

Scoring Comments

This resource is assessed on a biennial schedule and was last assessed in March 2010. The biennial assessment makes use of fishery data from observer and logbook datasets to estimate catch rate indices and indices of fishery aggregation, and from bottom trawl surveys for indices of recruitment, spawning stock biomass and fishable biomass. Log book data provide information on CPUE and effort

The uncertainty on the estimate of biomass is obtained by calculating confidence intervals by Monte Carlo simulation using a non parametric method. The estimates of exploitation rate are not absolute estimates because of uncertainty about the catchability of the survey gear, however this is almost certainly less than 1 so this uncertainty provides a measure of insurance. Other sources of uncertainty are described in the assessment. Trawl survey estimates in SFA 2 have relatively high uncertainty.

The stock is assessed relative to reference points (biomass and exploitation rates).

The biennial assessment is subject to a formal peer review process involving DFO scientists, industry, a fishermen's organization and provincial government experts. Additional external experts are invited to participate in these reviews on an ad hoc basis when needed.

Score: 80

The assessment is appropriate for the stock and the HCR and assesses status relative to reference points. The assessment takes uncertainty into account, and is subject to peer review thus

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
meeting the 80 SG.			
Audit Trace References			
DFO 2009a. Northern Shrimp Integrated Fisheries Management Plan, shrimp fishing areas (SFAs) 0-7, Flemish Cap. Effective September 2009. Resource Management Operations, Fisheries and Oceans Canada. http://www.dfo-mpo.gc.ca/fm-gp/pesches-fisheries/ifmp-gmp/shrimp-crevette/shrimp-crevette-2007-eng.htm . DFO 2010a. Assessment of Divisions 2G-3K Northern Shrimp. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/018. DFO 2010b. Assessment of Northern Shrimp (<i>Pandalus borealis</i>) in SFA 0, 2, 3 and Striped Shrimp (<i>Pandalus montagui</i>) in SFA 2, 3 and 4 west of 63°W. DFO Can. Sci. Advis. Sec. Sci. Advis. R ep. 2010/024.			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Principle 2	Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends
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2.1	Retained non-target species		
2.1.1	<p>Status: The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species.</p> <p>Main retained species are <u>likely</u> to be within biologically based limits or if outside the limits there are <u>measures</u> in place that are <u>expected</u> to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.</p> <p>If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.</p>	<p>Main retained species are <u>highly likely</u> to be within biologically based limits, or if outside the limits there is a <u>partial strategy</u> of <u>demonstrably effective</u> management measures in place such that the fishery does not hinder recovery and rebuilding.</p>	<p>There is a <u>high degree of certainty</u> that retained species are within biologically based limits.</p> <p>Target reference points are defined and retained species are at or fluctuating around their target reference points.</p>

Scoring Comments

P. montagui is the only potential retained species in the fishery area. Amounts taken were negligible in 2007-8 in SFAs 5 (0.25% of *P. borealis* catch) and 6 (0.01%) (Orr et al 2008bc). Catch was 8.51% of *P. borealis* catch in SFA 4 (Orr et al 2008) and a relatively important proportion of the *P. borealis* bycatch in SFAs 2 and 3 (DFO 2008/0-3).

Although there are some uncertainties about population status of *P. montagui* in SFAs 2-3, mainly due to short survey time series and patchy distributions, evidence indicates that the species is within biologically safe limits. Commercial CPUE in the RISA subarea of SFA 2, where the fishery has been most intensive, has been relatively stable since the mid 1990s, although commercial CPUE may not represent abundance well (DFO 2008/0-3). Inference from the closely related *P. borealis*, which is at high levels, suggests relatively high abundance for *P. montagui*. Reference points and decision rules have been identified for *P. montagui* and will be the basis for management in future.

A management strategy should be effective in maintaining *P. montagui* within biologically safe limits.

Score: 80

The only retained species is highly likely to be within safe limits and in addition is subject to a management strategy based on demonstrably effective measures. Hence meeting the 80 SG

Audit Trace References

DFO 2008/0-3; Orr et al 2008bc

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.1.2	<p>Management strategy: There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.</p> <p>The measures are considered <u>likely</u> to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).</p>	<p>There are <u>measures</u> in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.</p> <p>There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or species involved.</p> <p>There is <u>some evidence</u> that the partial strategy is being <u>implemented successfully</u>.</p>	<p>There is a <u>partial strategy</u> in place, if necessary that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.</p> <p>The strategy is mainly based on information directly about the fishery and/or species involved, and <u>testing supports high confidence</u> that the strategy will work.</p> <p>There is <u>clear evidence</u> that the strategy is being <u>implemented successfully</u>, and intended changes are occurring.</p> <p>There is some evidence that the strategy is <u>achieving its overall objective</u>.</p>
Scoring Comments			
No retained species occur in SFAs 5 and 6 (<i>P. montagui</i> is at negligible levels), while in SFA 4 <i>P. montagui</i> is at a relatively low level (8-9%) and measures for controlling the <i>P. borealis</i> fishery should ensure that <i>P. montagui</i> remains secure.			
For SFAs 2-4, a fishery management strategy is in place for <i>P. montagui</i> that is effective. In the past, this has been based on setting preventive TACs and adjusting these in response to changes in commercial CPUE, and it has been shown to be effective by stability in CPUEs. The management strategy is moving to an approach based on maintaining exploitation at relatively low, safe limits, following reference points and decision rules based on knowledge of the species biology. The harvest management tools available are effective in ensuring that the strategy is adhered to.			
Score: 95			
The fishery clearly meets all the 80 scoring elements and meets most of those for 100: there is a strategy (not a partial strategy), based on information about the species, there is evidence that it is being implemented successfully, and evidence that the strategy is meeting its objective (CPUEs have been more or less constant for 10-15 years). The only element missing for 100 is that in the absence of a long survey time series, it cannot be stated that the strategy has been rigorously tested.			
Audit Trace References			
Orr et al 2008bc. Integrated Fisheries Management Plan for Northern Shrimp.			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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2.1.3	<p>Information / monitoring: Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species.</p>	<p><u>Qualitative information</u> is available on the amount of main retained species taken by the fishery.</p> <p>Information is <u>adequate to qualitatively</u> assess outcome status with respect to biologically based limits.</p> <p>Information is adequate to support <u>measures</u> to manage <u>main</u> retained species.</p>	<p><u>Qualitative information</u> and some quantitative information are available on the amount of main retained species taken by the fishery.</p> <p>Information is <u>sufficient</u> to estimate outcome status with respect to biologically based limits.</p> <p>Information is adequate to support a <u>partial strategy</u> to manage <u>main</u> retained species.</p> <p>Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).</p>	<p>Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.</p> <p>Information is <u>sufficient to quantitatively</u> estimate outcome status with a <u>high degree of certainty</u>.</p> <p>Information is adequate to support a <u>comprehensive strategy</u> to manage retained species, and evaluate with a <u>high degree of certainty</u> whether the strategy is achieving its objective.</p> <p>Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.</p>
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Scoring Comments

Observers are carried on 100% of trips and observe some 70% of tows, so information on shrimp species composition is excellent. In mixed catch situations (*P. borealis* / *P. montagui*), removals are identified to species and recorded against individual species quotas. Summarised information, presented in a peer reviewed forum (NAFO), is available (Orr et al 2008bc), indicating that the only potential retained species occurs in negligible amounts; for example, 0.04% of the *P. borealis* catch in large vessels in 2007-8 (Orr et al 2008bc).

Accurate and verifiable (presented in a peer-reviewed forum, NAFO) information on amounts of the single retained species is available for SFAs 4, 5 and 6. Amounts taken were very low, essentially negligible, in 2007-8 in SFAs 5 (0.25% of *P. borealis* catch) and 6 (0.01%) (Orr et al 2008bc). Catch was 8.51% of *P. borealis* catch in SFA 4 (Orr et al 2008bc). The information in these areas is adequate to assess the fishery impact on the retained species. A high level of observer coverage is being maintained (100% of trips).

For SFAs 2 and 3, information on bycatch of the retained species (*P. montagui*) is combined with information from the directed fishery for this species. Information on overall removals, based on a high level of observer coverage, is considered accurate. However information on population status and future prospects of the retained species has uncertainties, as research vessel surveys are only available for a short time period, and commercial catch per unit effort may not represent abundance well. A high level of observer coverage is being maintained. The information on harvest levels is adequate to support assessment of the fishery's impact on the species.

Score: 90

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
In all fishery areas, quantitative information is available on amounts of retained species taken, which is peer reviewed through NAFO or CSAS processes. In SFAs where amounts taken are substantial, there is information on population status of the retained species although this has uncertainties due to short time series. Information is adequate to support a management strategy for the retained species in areas where amounts retained are substantial. Monitoring continues with a high level of observer coverage. Information on status of the retained species is less complete in SFA 2-3 than in SFAs 4-6, due to shorter survey time series. Overall the fishery meets greater than the 80 SG in SFAs 2 and 3, and the 100 SG in SFAs 4-6.			
Audit Trace References			
DFO 2008/0-3; Orr et al. 2008bc			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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2.2	Discarded species (also known as “bycatch” or “discards”)			
2.2.1	<p>Status The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups.</p> <p>If the status is poorly known there are measures or practices in place that are expected result in the fishery not causing the bycatch species to be biologically based limits or hindering recovery.</p>	<p>Main bycatch species are <u>likely</u> to be within biologically based limits, or if outside such limits there are mitigation <u>measures</u> in place that are <u>expected</u> to ensure that the fishery does not hinder recovery and rebuilding.</p>	<p>Main bycatch species are <u>highly likely</u> to be within biologically based limits or if outside such limits there is a <u>partial strategy</u> of <u>demonstrably effective</u> mitigation measures in place such that the fishery does not hinder recovery and rebuilding.</p>	<p>There is a <u>high degree of certainty</u> that bycatch species are within biologically based limits.</p>

Scoring Comments

For all species, bycatch levels are well below the levels at which they would be considered a “main” bycatch species (5% of the shrimp catch) and for most species, there is no indication that they are outside safe biological limits. Bycatches of the order of 300 t/yr (toward the maximum observed in any one SFA for commercial or non-commercial species) are equivalent to an amount required to develop 30 t of predator biomass, assuming a simple 10% conversion factor between trophic levels, which is considered negligible in ecological terms.

Several important groundfish species that occur in the bycatch are currently considered to be depleted or outside safe biological limits (Atlantic cod, American plaice, redfishes), but the amounts of bycatch taken are so small as to be ecologically negligible. .

The principal management measure in place, use of the Nordmore grate with a grate spacing of 22 mm (SFA 6) or 28 mm (other SFAs), is effective in maintaining bycatch levels of all species far below the 5% level which notionally would indicate a “main” bycatch species. Although this could be considered a single measure rather than a strategy, its widespread impact in reducing bycatch can support considering this a partial strategy. Trawls are rigged with toggle chains designed to reduce bycatch of bottom-living species such as flatfishes. A study of the impact of reducing Nordmore grate spacing has been conducted, indicating that there is awareness of the need to modify the strategy if necessary.

Bycatch management strategies do not consider potential impacts if depleted groundfish populations were to recover. Current low bycatch levels may partly be due to low groundfish abundance, and some consideration of potential impacts should populations recover would help to complete the existing bycatch management approach.

Score: 80

No bycatch species is considered a “main” bycatch species, as bycatch levels are very low both in relation to target species catch and ecologically insignificant. A partial strategy is in place to mitigate bycatch impacts, based on the Nordmore grate and use of toggle chains; the strategy was designed to reduce bycatch and there is awareness of the need to change the strategy if necessary. Most bycatch species are likely to be within safe limits; several are not, but bycatches of these species are insignificant.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
Audit Trace References			
See 2.2.3			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
2.2.2	<p>Management strategy: There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations.</p> <p>The measures are considered likely to work, based on plausible argument (e.g general experience, theory or comparison with similar fisheries/species).</p>	<p>There are measures in place, if necessary, which are expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.</p> <p>The measures are considered likely to work, based on plausible argument (e.g general experience, theory or comparison with similar fisheries/species).</p>	<p>There is a partial strategy in place, if necessary, for managing bycatch that is expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.</p> <p>There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or the species involved.</p> <p>There is some evidence that the partial strategy is being implemented successfully.</p>	<p>There is a strategy in place for managing and minimising bycatch.</p> <p>The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategy will work.</p> <p>There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.</p>

Scoring Comments

The principal management measure in place, use of the Nordmore grate with a grate spacing of 22 mm (SFA 6) or 28 mm (other SFAs), is effective in maintaining bycatch levels of all species well below the 5% level which notionally would indicate a “main” bycatch species. Bycatch of all species is very low, at a maximum of several hundred tons/yr in any SFA; for most species bycatches are much lower than this. Trawls are rigged with toggle chains designed to reduce bycatch of bottom-living species such as flatfishes. Although amounts taken have not been compared to other sources of mortality for most species (the exception being Greenland halibut, Bowering and Orr 2004), amounts taken appear very small in ecological terms: for example a bycatch of 300 t, toward the maximum for redfishes (the most common bycatch species) in any SFA in this fishery area, is equivalent to the amount needed to develop 30 t of predator biomass based on a notional 10% conversion factor between trophic levels, ecologically insignificant.

A move to a 22 mm grate spacing has been considered for SFAs currently using 28 mm. A recent study (Orr and Cadigan 2009) in SFA 4 comparing shrimp catches and amounts of important commercial bycatch species using these two grate spacings suggested that more fishes were taken with the 28 mm grate, although the differences were not very large (eg +24% for redfishes). Shrimp catch was lower (-27% in the area with the highest number of comparable tows) in tows with the 22 mm grate. The authors suggested that any advantages in selectivity for fishes might be outweighed by greater time spent fishing to compensate for reduced shrimp catches, if the fishery moved from the 28 to the 22 mm grate. Moving to a smaller grate would further restrict the size range of fishes in the bycatch, and could help to reduce mortality on pre-recruit year classes if depleted groundfish populations were to begin recovering.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Bycatch management strategies do not consider potential issues if depleted groundfish populations were to recover. Current low bycatch levels may partly be due to low groundfish abundance, and some consideration of potential impacts should populations recover would help to complete the existing bycatch management approach.

Score: 85

A strategy based on use of the Nordmore grate and toggle chains is associated with very low bycatch levels, essentially negligible in ecological terms. This is based on information directly about the fishery and species involved, and testing supports high confidence that the strategy will work; there is clear evidence that it is being implemented successfully and that it is achieving its objectives.

The fishery meets all elements of the 100 SG, however, a score of 85 is given because the strategy does not include a moving protocol (as in SFA 7) and does not consider the potential need for future modifications if groundfish populations should recover.

Audit Trace References

See 2.2.3; Bowering and Orr 2004; Orr and Cadigan 2009

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.2.3 Information / monitoring Information on the nature and amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch.	<p><u>Qualitative information</u> is available on the amount of main bycatch species affected by the fishery.</p> <p>Information is <u>adequate</u> to <u>broadly understand</u> outcome status with respect to biologically based limits.</p> <p>Information is adequate to support <u>measures</u> to manage bycatch.</p>	<p><u>Qualitative information and some quantitative information are</u> available on the amount of main bycatch species affected by the fishery.</p> <p>Information is sufficient to estimate outcome status with respect to biologically based limits.</p> <p>Information is adequate to support a <u>partial strategy</u> to manage main bycatch species.</p> <p>Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).</p>	<p><u>Accurate and verifiable information</u> is available on the amount of all bycatch and the consequences for the status of affected populations.</p> <p>Information is <u>sufficient</u> to quantitatively estimate outcome status with respect to biologically based limits with a <u>high degree of certainty</u>.</p> <p>Information is adequate to support a <u>comprehensive strategy</u> to manage bycatch, and evaluate with a high degree of certainty whether a strategy is achieving its objective.</p> <p>Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.</p>
Scoring Comments			
<p>Observers are carried on 100% of trips and observe some 70% of tows (the maximum that can be achieved), and as such, coverage is excellent. All species in the bycatch are identified to the lowest level possible.</p> <p>For SFAs 4-6, accurate information, reviewed through the NAFO process, has been published on all bycatch species for the management year 2007-2008, and information is available for other years. Estimated numbers at length in bycatch for four commercial fish species of particular importance have been published for 2004-2007: Atlantic cod, redfishes, American plaice, Greenland halibut. The first three are considered at low abundance and/or under moratorium in or near the fishery area.</p> <p>This information indicates that all bycatch species are well below the 5% notional guideline for “main” bycatch species, almost all at least an order of magnitude below and most much less. Species at greatest abundance in 2007-8 in the bycatch vary between areas: capelin in SFA 6 (165 t, 0.65%), lanternfishes in SFA 5 (97 t, 0.4%), redfishes in SFA 4 (71 t, 0.65%). All other species are below 0.5% of the shrimp catch. Numbers of key commercial species caught also vary by area: generally tens to hundreds for Atlantic cod, a maximum of 100,000 for American plaice, a maximum of 5 million for redfishes, a maximum of 1.5m for Greenland halibut (each number is a maximum for one area-year combination).</p>			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
For SFAs 2 and 3, information on total bycatch by weight is available in unpublished tabular form for a 25+ year period. Total bycatch of all species was a maximum of 16.5t in SFA 3 in 1997 (3.4% of the shrimp catch), less than 1.1 t (less than 1.1%) in other years between 1997 and 2008; in SFA 2 total bycatch of all species ranged between 76-350 t (1.0-3.9% of shrimp catch). The most important species in the bycatch were usually non-commercial species (alligatorfishes, 2.8 t in SFA 3 in one year; sculpins, alligatorfishes, eelpouts, Arctic cod in SFA 2). Redfish was the commercial species with highest bycatches, for example a maximum of 3 t (0.7% of the shrimp catch) in SFA 2 in the year with highest bycatch between 1997-2008, a maximum of 150 t (2.5% of the shrimp catch) in the peak year 1997-2008 in SFA 2. Greenland halibut also occurred consistently but at low levels in these two areas. Information on numbers at length taken from 1997 to 2007 is available for four important commercial species (Atlantic cod, American plaice, redfishes, Greenland halibut.			
Score: 100			
Accurate and verifiable (onboard observers) information is available on bycatch levels, indicating that this is extremely low in ecological terms. Information is adequate to estimate outcome status with a high degree of certainty, and is adequate to support monitoring of the impact of the bycatch management strategy and evaluation of whether this is achieving its objective. Monitoring continues at a level of detail which will continue to allow estimation of bycatch mortality to all species.			
Audit Trace References			
Orr et al. 2008bc; unpublished data compilation provided by T. Siford, DFO.			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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2.3	Endangered, Threatened and Protected (ETP) species			
2.3.1	<p>Status: The fishery meets national and international requirements for protection of ETP species.</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species.</p>	<p>Known effects of the fishery are <u>likely</u> to be within limits of national and international requirements for protection of ETP species.</p> <p>Known direct effects are <u>unlikely</u> to create <u>unacceptable impacts</u> to ETP species.</p>	<p>The effects of the fishery are known and are <u>highly likely</u> to be within limits of national and international requirements for protection of ETP species.</p> <p>Direct effects are <u>highly unlikely</u> to create <u>unacceptable impacts</u> to ETP species.</p> <p>Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.</p>	<p>There is a <u>high degree of certainty</u> that the effects of the fishery are within limits of national and international requirements for protection of ETP species.</p> <p>There is a <u>high degree of confidence</u> that there are <u>no significant detrimental effects (direct and indirect)</u> of the fishery on ETP species.</p>

Scoring Comments

Two ETP species occur in the area and could be impacted by the fishery: spotted wolffish and northern wolffish, both listed as threatened on Schedule 1 of the *Species at Risk Act* (see 2.3.3 below). Bycatch of both species was negligible, based on observer coverage on 100% of trips (see 2.3.3). The recovery strategy for these species concluded that current levels of fishing mortality are such as to allow for population rebuilding (Kulka et al 2008).

Score: 100

This fishery exceeds requirements in terms of impact on ETP species, and is not having a detrimental effect on these species.

Audit Trace References

See 2.3.2, 2.3.3

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.3.2 Management strategy The fishery has in place precautionary management strategies designed to: - meet national and international requirements; - ensure the fishery does not pose a risk of serious or irreversible harm to ETP species; - ensure the fishery does not hinder recovery of ETP species; and - minimise mortality of ETP species.	<p>There are <u>measures</u> in place that minimise mortality, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.</p> <p>The measures are <u>considered likely</u> to work, based on <u>plausible argument</u> (eg general experience, theory or comparison with similar fisheries/species).</p>	<p>There is a <u>strategy</u> in place for managing the fishery's impact on ETP species, including measures to minimise mortality, that is designed to be highly likely to achieve national and international requirements for the protection of ETP species.</p> <p>There is an <u>objective basis for confidence</u> that the strategy will work, based on <u>some information</u> directly about the fishery and/or the species involved.</p> <p>There is <u>evidence</u> that the strategy is being implemented successfully.</p>	<p>There is a <u>comprehensive strategy</u> in place for managing the fishery's impact on ETP species, including measures to minimise mortality, that is designed to achieve <u>above</u> national and international requirements for the protection of ETP species.</p> <p>The strategy is mainly based on information directly about the fishery and/or species involved, and a <u>quantitative analysis</u> supports <u>high confidence</u> that the strategy will work.</p> <p>There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is evidence that the strategy is achieving its objective.</p>

Scoring Comments

A recovery strategy for northern and spotted wolffish was published in February 2008 (Kulka et al 2008), identifying threats and mitigating measures for these species. Fishing was identified as a potential threat, although areas of greatest decline in these species (inshore shelf areas) are areas where trawling rarely occurs (Kulka et al 2008). Current levels of take in all fisheries are consistent with allowing these species to rebuild (Kulka et al 2008).

Retention of spotted and northern wolffishes is prohibited by licence conditions for all fisheries, including the shrimp fishery in this area, and wolffishes if caught must be released in good condition. These measures, the requirement to protect these two species, and the general need to fish in ways which will reduce impacts on species at risk, are noted in the Integrated Fishery Management Plan for northern shrimp.

Under the current strategy for managing bycatch in this fishery area (mandatory use of the Nordmore grate with a 22 mm grate spacing in SFA 6, with a 28 mm grate spacing in the other SFAs, use of toggle chains) bycatch of spotted wolffish and northern wolffish is extremely low, essentially ecologically negligible (see 2.3.3).

Score: 90

All elements of the 80 SG are met: there is a strategy for managing impact on ETP species, consistent with national and international requirements; there is an objective basis for confidence that the strategy will work, based on information from the fishery and on the species; there is evidence that the strategy is being implemented successfully. In addition, several elements of the 100 SG are met: a quantitative analysis (analysis of trends) has shown that the ETP species are stable or increasing under recent levels of catch in all fisheries, and there is

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
clear evidence that the strategy is being implemented successfully in that the catch in this fishery is extremely small. Evidence is from ongoing observer programs. The primary reason the 100 SG is not fully met is that the strategy is not considered comprehensive because it does not consider measures to be taken should groundfish populations begin to recover, and begin to occur in greater numbers in bycatch.			
Audit Trace References			
Kulka et al 2008; IFMP; see 2.3.3			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.3.3 <i>Information / monitoring</i> Relevant information is collected to support the management of fishery impacts on ETP species, including: - information for the development of the management strategy; - information to assess the effectiveness of the management strategy; and - information to determine the outcome status of ETP species.	<p>Information is <u>adequate</u> to broadly understand the impact of the fishery on ETP species.</p> <p>Information is adequate to support <u>measures</u> to manage the impacts on ETP species</p> <p><u>Information</u> is sufficient to <u>qualitatively</u> estimate the fishery related mortality of ETP species.</p>	<p>Information is <u>sufficient</u> to determine whether the fishery may be a threat to protection and recovery of the ETP species, and if so, to measure trends and support a <u>full strategy</u> to manage impacts.</p> <p><u>Sufficient data</u> are available to allow fishery related mortality and the impact of fishing to be <u>quantitatively</u> estimated for ETP species.</p>	<p>Information is <u>sufficient</u> to quantitatively estimate outcome status with a high degree of certainty.</p> <p>Information is adequate to support a <u>comprehensive strategy</u> to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.</p> <p><u>Accurate and verifiable information</u> is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species</p>
Scoring Comments			
Observers are carried on 100% of trips and observe some 70% of tows (the maximum that can be achieved), and as such, coverage is excellent.			
For SFAs 4-6, information on weights of spotted and northern wolffish caught in 2007-8, and on weights and numbers by length caught in 2004-2007, is available in a NAFO document produced for a peer review process (Orr et al 2008bc). Incidental catches were very low in 2004-2007: 14-45 individuals of spotted, 0-2 of northern wolffish in SFA 4; 14-165 and 1-61 respectively in SFA 5; 182-400 and 7-27 respectively in SFA 6.			
For SFA 2, information on weights caught for 25+ years, and information on numbers at length caught for 2004-2007, are available in an unpublished compilation of observer data. Estimated annual catches are 3-490 northern wolffish in 2004-7, 63-372 spotted wolffish 2002-7. For SFA 3 information on weights caught for 25+ years is available; in 1997-2008, no northern wolffishes were recorded, and 0.05 t of spotted wolffish were estimated in one year with no records in other years.			
Populations of the two species have been stable or increasing with recent catches in all fisheries (Kulka et al 2008). The extremely low bycatch amounts in this fishery indicate a negligible ecological impact. The recovery strategy suggests that current levels of fishery impacts are such as to allow recovery to occur. Specialists in wolffish biology have indicated that impact of the shrimp fishery on these species is negligible (D. Orr/M. Simpson, pers. comm.). An assessment of northern and spotted wolffishes is planned for 2009-2010.			
Score: 100			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
Information is sufficient to quantitatively estimate outcome status with a high degree of certainty (very high observer coverage, very low numbers taken), to support a comprehensive strategy to manage impacts, and to evaluate with a high degree of certainty whether the strategy is achieving its impacts. Accurate and verifiable information (observers) is available on mortalities of ETP species caused by this fishery, and to estimate their impacts on the populations (negligible).			
Audit Trace References			
Orr et al 2008bc; Kulka et al 2008; unpublished data compilation from T. Siferd, DFO			

SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.4 Habitat				
2.4.1	Status The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.	The fishery is <u>unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.	The fishery is <u>highly unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.	There is <u>evidence</u> that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
Scoring Comments				
<p>The fishery concentrates on mud bottoms (or sand, or mixed mud-sand), and vessels avoid hard bottoms to minimise the risk of damage to trawls. Trawl gear is relatively light and efforts are underway to further reduce gear contact with the bottom in order to reduce fuel costs. Bottom rollers and trawl doors are the principal parts of the trawl contacting the bottom, although in northern areas when twin trawls are used a heavy “shoe” would dig deeply into the bottom.</p> <p>Studies are unavailable on the impacts of shrimp gear on mud and mud-sand bottoms in this area, but some inferences can be made from studies on sand bottoms, recognising that impacts are to some extent site specific and that inference leaves some uncertainty about conclusions. In a 3-year study of impacts of trawl gear on the Grand Banks, there was no alteration to benthic communities and recovery of the sand habitat occurred within a year (results summarised in Gordon et al 2009). Soft bottoms are impacted relatively rapidly by trawling gear but recover relatively quickly (DFO 2006benthic).</p> <p>The fishery probably produces occasional impacts on hard-bottom areas with erect sessile fauna which may be important as habitat. Coral bycatch is low, suggesting that contact with such areas is relatively rare, but bycatch information probably under represents interactions with such sensitive areas since impacts may occur when coral is not retained. Such habitats probably recover relatively slowly as growth rates of hard corals are low (Gilkinson and Edinger eds 2009).</p> <p>A voluntary closed area to protect coral habitat is in place in SFAs 2 and 4, and two closed areas further south may help to reduce impacts on benthic habitats, but the benefits of these areas have not been assessed.</p> <p>This PI is equivalent to PI 2.1.3.1 used in the ASP assessment of this overlapping fishery. It too failed to meet a score of 80 and resulted in a single Condition (Condition 2 in the ASP report) which was set for multiple PIs.</p>				
Score: 60				
Given its mode of operation, this fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm, but analyses of fishery impacts would be required to increase certainty, particularly with respect to potential impacts on hard coral areas; accordingly it cannot be said that the fishery is “highly unlikely” to have unacceptable impacts.				
Audit Trace References				

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Gordon et al 2009; DFO 2006benthic; interviews (see 2.4.2), IFMP; Gilkinson and Edinger eds 2009.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.4.2 Management strategy There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.	<p>There are <u>measures</u> in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.</p> <p>The measures are considered <u>likely</u> to work, based on plausible argument (e.g general experience, theory or comparison with similar fisheries/habitats).</p>	<p>There is a <u>partial strategy</u> in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.</p> <p>There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or habitats involved.</p> <p>There is <u>some evidence</u> that the partial strategy is being implemented successfully.</p>	<p>There is a <u>strategy</u> in place for managing the impact of the fishery on habitat types.</p> <p>The strategy is mainly based on information directly about the fishery and/or habitats involved, and testing supports high confidence that the strategy will work.</p> <p>There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.</p>
Scoring Comments			
<p>Several measures are in place which would help to reduce impacts of the fishery on habitats. The fishery is concentrated on soft bottoms (mud and/or sand), preferred habitat for shrimp and with less risk of damage to trawls, and these types of habitats are generally considered relatively resilient to trawl impact (Rice 2006; Gordon et al 2006). Trawls and doors used are relatively low-impact, and work is under way to further lighten the gear in the interests of saving fuel (interviews at <i>Newfound Pioneer</i>, 2009; Marine Institute, 2007; Marine Institute n.d.) (however the shoe used between codends on twin trawls could cause substantial bottom damage). The relatively low proportion of trawl sets with corals as bycatch suggests that impacts on these habitats may be low, although presence in sets would underestimate impact since trawls may impact corals without retaining them.</p> <p>The offshore fleet has developed a coral conservation policy (GEAC et al 2007) including one voluntary closed area (12,500 km²) to protect corals in SFAs 2-4. Two closed areas have been established in the fishery area which could have benefits for bottom habitat conservation (Hawke Channel; Funk Island deep).</p> <p>Steps are being taken toward developing a strategy for managing potential habitat impacts. A Closed Areas Working Group of the Northern Shrimp Advisory Committee has been established to consider closed areas and other ecosystem impacts of the fishery. DFO Newfoundland Region has committed to developing a coral/sponge conservation strategy for its continental shelf, and this is expected to be complete by 2012. DFO has developed a national policy for Managing the Impacts of Fishing on Sensitive Benthic Habitats (April 2009) (http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/benthic-eng.htm), which is expected to provide an overall framework for actions to improve protection of sensitive habitats and species.</p> <p>This PI is equivalent to PI 2.1.4.3 and 3B.2.1 used in the ASP assessment of this overlapping fishery. These also failed to meet a score of 80 and resulted in a single Condition (Condition 2 in the ASP report) which was set for multiple PIs.</p>			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Score: 70

All elements of the SG 60 are in place, as measures are in place to reduce impacts and these are considered likely to work. The suite of measures (light gear design; fishing mainly on mud-sand bottoms; coral conservation policy by the offshore fleet and developing DFO coral/sponge policy; voluntary closed areas) is considered a partial strategy as there is an understanding of how they work to conserve habitat and there is an awareness of the need to further modify the strategy if necessary. There is evidence that the strategy is being implemented successfully, since bycatch of corals and sponges is very low. However, further information on the fishery impacts on habitat would be necessary to provide a more objective basis for confidence that the strategy is meeting its objectives.

Audit Trace References

Interviews at FV *Newfound Pioneer*, Marine Institute, DFO, CAPP; DFO web site; Integrated Fisheries Management Plan; GEAC et al 2007

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
2.4.3	<p>Information / monitoring Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types.</p>	<p>There is a basic understanding of the types and distribution of main habitats in the area of the fishery.</p> <p>Information is adequate to broadly understand the main impacts of gear use on the main habitats, including spatial extent of interaction.</p>	<p>The nature, distribution and vulnerability of all main habitat types in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery.</p> <p>Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent, timing and location of use of the fishing gear.</p> <p>Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).</p>	<p>The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.</p> <p>Changes in habitat distributions over time are measured.</p> <p>The physical impacts of the gear on the habitat types have been quantified fully.</p>
Scoring Comments				
<p>No mapping of bottom sediments in the fishery area has been done (C-NOPB 2008), although some information is available and fishermen are aware of bottom type distribution and concentrate on preferred bottom types (mud and sand bottoms). Part of the area is outside areas reviewed by the Canada-Newfoundland Offshore Petroleum Board Strategic Environmental Assessments (eg C-NOPB 2008 on the Labrador Shelf), but in any case little information on bottom habitats is covered by the C-NOPB assessments. Information on bottom types may be improved through a project to use acoustic equipment on commercial shrimp vessels to type bottoms in the fishery area (Marine Institute, School of Ocean Technology 2008).</p> <p>Information on distribution of particularly sensitive habitat areas, i.e. coral concentration areas, is available and level of detail of this information continues to improve (Edinger et al 2007; Wareham and Edinger 2007; Wareham 2009). This information is mainly based on observations of corals in commercial trawl sets (observer program) and trawl survey programs. Observations have been mapped separately for the various groups of corals, including hard and branching corals (mainly associated with hard-bottom areas) and soft corals (often found on soft bottoms). Sampling covered the entire fishery area and corals were recorded in all areas, however hard and branching corals (particularly important for habitat) are concentrated along the edge of the continental shelf. Areas of concentration of sponges, another type of sensitive habitat area, have been identified in preliminary fashion in areas near the Flemish Pass, based on trawl survey and observer data (CAPP submission; Kenchington et al 2009). Preliminary indications are that sponge concentration areas are at depths greater than those at which the shrimp fishery operates.</p> <p>Distribution of fishing operations is very well known from VMS and logbook information and is compiled (Spatialanalysis 2009; Orr et al MS 2008. Corals were recorded in 1.8% of</p>				

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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shrimp trawl sets in this and adjacent fishery areas, most of these being soft corals (Edinger et al. 2007).

Vulnerability of habitat types in the fishery area to bottom trawl gear is generally known (eg Rice 2006; Gordon et al 2006).

Available information has not been compiled into an overall summary which would provide adequate detail on the nature and distribution of habitat types relative to fishery operations, in relation to vulnerability of habitat types to impacts from trawl gear.

This PI is equivalent to PI 2.1.1.1 used in the ASP assessment of this overlapping fishery. It too failed to meet a score of 80 and resulted in a single Condition (Condition 2 in the ASP report) which was set for multiple PIs.

Score: 70

All elements of the 60 SG are met, as there is basic understanding of types and distribution of habitats in the fishery area, and information is adequate to understand interactions and impact of the fishery.

There is reliable information on spatial extent, timing and location of the fishery (observer information and VMS), and information on distribution of particularly sensitive habitats is available; since these elements of the 80 SG are met, a score of 70 is assigned.

Audit Trace References

C-NPOPB 2008; Marine Institute, School of Ocean Technology 2008; Edinger et al 2007; Wareham and Edinger 2007; Wareham 2009; Kenchington et al 2009; Rice 2006; Gordon et al 2006; information presented by CAPP pp 41-42; Spatialanalysis 2009; Orr et al MS 2008.

SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.5	Ecosystem			
2.5.1	<i>Status</i> The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.	The fishery is <u>unlikely</u> to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The fishery is <u>highly unlikely</u> to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is <u>evidence</u> that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
Scoring Comments				
<p>The principal issues to be addressed here are (a) impact of removal of the target species, which are a key element in trophic webs and are forage for a wide range of predator species, on trophic relationships (b) non-catch impacts on biological diversity and community structure, particularly for benthic species. Impacts on hard coral and sponge communities have been addressed in 2.4 relative to habitat impacts, while bycatch impacts have been addressed in 2.2. In addition, overall impact on ecosystems is considered consistent with MSC FAM.</p> <p><i>Impact of removal of target species on trophic relationships.</i> Shrimp abundance is currently high relative to historical levels, such that there should be no impacts on trophic relationships at present and in the near future. A guideline on exploitation rate to be used in the fishery (15%) in future is consistent with maintaining adequate forage, and is lower than has been practised in other fisheries where there have not been apparent impacts on predators (IFMP). The new exploitation framework based on reference points and decision rules (IFMP) appear to leave the way open to higher exploitation rates in future. The conclusion that removal of target species is highly unlikely to disrupt trophic relationships is based on quantitative information on population status.</p> <p><i>Non-catch impact on benthic species and communities.</i> Given the configuration of the gear (light foot gear, “flying” codend, light doors) this fishery is unlikely to be having serious or irreversible impacts on benthic species and communities. However, no assessment has been done. An assessment of spatial distribution of the fishery has been done, suggesting that a low proportion of the continental shelf has been affected by shrimp trawling; this is a good initial step but additional analyses of communities in which the fishery operates and their sensitivity would be needed to assess impact. The conclusion that the fishery is unlikely to disrupt benthic communities is based on inference.</p> <p>Recent work on unobserved fishing mortality (Grant and Hiscock 2010, <i>in press</i>) produced in accordance with meeting a Condition in the existing certified Northern shrimp fishery in SFA 5, 6 & 7 and reported in the second annual surveillance audit report for that fishery (Moody Marine Ltd 2010) concludes that unobserved mortality is likely to be low, thus bycatch information would assess impact of the gear on non-target species relatively well.</p> <p>Overall, it appears highly unlikely that the fishery is causing serious or irreversible at the level outlined in the MSC FAM (S. 7.1.12 – extinctions, trophic cascades, gross changes in species composition).</p> <p>This PI is equivalent to PI 2.1.3.2 and 2.1.4.4 used in the ASP assessment of this overlapping fishery. These also failed to meet a score of 80 and resulted in a single Condition (Condition 2 in the ASP report) which was set for multiple PIs.</p>				
Score: 70				

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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One identified ecosystem element (changes in trophic relationships due to removal of the target species) meets the 80 SG, another (non-catch impacts on benthic communities) meets the 60. Overall it appears highly unlikely that the fishery is causing serious or irreversible harm to ecosystems. Accordingly an intermediate score of 70 is assigned.

Audit Trace References

See sections 2.5.2 and 2.5.3; Grant & Hiscock *in press*; Moody Marine 2010

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.5.2 Management strategy There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.	<p>There are <u>measures</u> in place, if necessary, that take into account potential impacts of the fishery on key elements of the ecosystem.</p> <p>The measures are considered likely to work, based on <u>plausible argument</u> (eg, general experience, theory or comparison with similar fisheries/ ecosystems).</p>	<p>There is a <u>partial strategy</u> in place, if necessary, that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.</p> <p>The partial strategy is considered likely to work, based on <u>plausible argument</u> (eg, general experience, theory or comparison with similar fisheries/ ecosystems).</p> <p>There is <u>some evidence</u> that the measures comprising the partial strategy are being implemented successfully.</p>	<p>There is a <u>strategy</u> that consists of a <u>plan</u>, containing measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem.</p> <p>This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.</p> <p>The measures are considered likely to work based on <u>prior experience</u>, plausible argument or <u>information</u> directly from the fishery/ecosystems involved.</p> <p>There is <u>evidence</u> that the measures are being implemented successfully.</p>

Scoring Comments

Shrimp as a forage species. The IFMP does not make specific reference to the need to practice a conservative exploitation strategy to ensure that shrimp is available to predator species, although it provides evidence that the guideline exploitation rate (15%) is well below that practiced in other shrimp fisheries which have not had apparent impacts on predators, and it is considered low enough to ensure that predator needs are met. The new exploitation framework based on reference points and decision rules (IFMP) appear to leave the way open to higher exploitation rates in future. This new framework does not explicitly address predator requirements in setting exploitation rates.

Impacts on biological diversity and benthic communities (other than bycatch species and habitat issues). The mode of operation of the fishery is consistent with reducing potential impacts on biological diversity and on benthic communities. Fishing operations are concentrated on soft bottom areas, which have shorter recovery times than harder bottoms and whose mobile or infauna is generally less vulnerable to damage than erect, sessile, long-lived fauna of hard bottoms. Trawls are relatively light and fitted with rollers which should roll over rather than digging into the bottom, although in areas where twin trawls are used the “shoe” would dig into soft bottom sediments. Recorded bycatch of benthic fauna is very low, but non-catch impacts on bottom fauna are not well known and some assessment of potential impacts would help to increase certainty that these are low.

This PI is equivalent to PI 2.1.4.5 used in the ASP assessment of this overlapping fishery. It also failed to meet a score of 80 and resulted in a single Condition (Condition 2 in the ASP

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
report) which was set for multiple PIs.			
Score: 70			
A partial strategy is in place to ensure that adequate forage is maintained for predators (guideline exploitation rate, ongoing monitoring) (SG 80). Measures are in place to ensure that non-catch impacts on benthic communities are low (light gear, soft-bottom areas with communities which recover relatively quickly are fished) (SG 60). Accordingly a score of 70 is assigned.			
Audit Trace References			
IFMP; interviews <i>Newfound Pioneer</i> , DFO, CAPP.			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.5.3 Information / monitoring There is adequate knowledge of the impacts of the fishery on the ecosystem.	<p>Information is adequate to <u>identify</u> the key elements of the ecosystem (e.g. trophic structure and function, community composition, productivity pattern and biodiversity).</p> <p>Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>have not been investigated in detail</u>.</p>	<p>Information is adequate to <u>broadly understand the functions</u> of the key elements of the ecosystem.</p> <p>Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>may not have been investigated in detail</u>.</p> <p>The main functions of the Components (i.e. target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are <u>known</u>.</p> <p>Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.</p> <p>Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).</p>	<p>Information is adequate to <u>broadly understand the key elements</u> of the ecosystem.</p> <p>Main <u>interactions</u> between the fishery and these ecosystem elements can be inferred from existing information, and <u>have been investigated</u>.</p> <p>The impacts of the fishery on target, Bycatch, Retained and ETP species and Habitats are identified and the main functions of these Components in the ecosystem are <u>understood</u>.</p> <p>Sufficient information is available on the impacts of the fishery on the Components and <u>elements</u> to allow the main consequences for the ecosystem to be inferred.</p> <p>Information is sufficient to support the development of strategies to manage ecosystem impacts.</p>

Scoring Comments

(a) Trophic role of the target species. The ecological role of the target species is relatively well known. Pandalus shrimps prey on, and are prey for a variety of species (Parsons 2005a, 2005b, 2006; Savenkoff et al 2006), although other species (such as capelin for cod, fishes for seals) may be preferred by predators when available. Trophic structures related to northern shrimp have not been studied in this area, but studies in nearby continental shelf areas (eg Savenkoff et al 2004) probably provide an adequate picture of trophic relationships in the fishery area. Quantitative information on abundance of the target species is available.

Recent work on unobserved fishing mortality (Grant and Hiscock 2010, *in press*) produced in accordance with meeting a Condition in the existing certified Northern shrimp fishery in SFA

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
5, 6 & 7 and reported in the second annual surveillance audit report for that fishery (Moody Marine Ltd 2010) concludes that unobserved mortality is likely to be low, thus bycatch information would assess impact of the gear on non-target species relatively well.			
(b) Non-catch impacts on benthic communities. Information on benthic and demersal communities in which the fishery operates is relatively general, with the exception of exploited groundfishes for which detailed stock assessments are available. Only basic life history information is available for non-commercial demersal fishes (eg Scott and Scott 1988; Fishbase). Benthic community composition is generally known for the Grand Banks (C-NOPB 2003), although much of the available information is from a trawl impact study in a sand habitat and information specific to benthic communities of shrimp fishery habitat is not available. Information on benthic fauna on the Labrador Shelf is limited (C-NOPB 2008). Polychaete diversity and distribution is known for much of the Labrador Shelf (Gagnon and Haedrich 1991) while species composition of benthos, major species, and relations of distributions to environmental conditions are known for stations in SFAs 1, 2, 3 and 4 (Stewart et al 1985). Information on distribution of corals is available and is improving but was dealt with in 2.4.3.			
Non-catch impacts on these species and others in the benthic community could result from gear passage, i.e. impact of rockhopper gear rollers or trawl doors; these impacts may be low, given that the gear is relatively light and large rollers are used, but have not been assessed. Twin trawling gear used in some parts of the fishery area requires use of a very heavy shoe which could damage benthic invertebrates over a relatively narrow strip (ca 3 m).			
Ability of potentially impacted communities to recover from impacts is not available for the area. Ability to recover generally varies with lifespan; slow-growing, long-lived species (such as some species of hard corals) will recover more slowly than short-lived species (eg tube-dwelling worms). A 3-year study of trawl impacts on sand bottoms on the Grand Banks suggested that benthic communities were little altered over this period (summarised by Gordon et al 2009).			
With respect to general ecosystem issues, sizes of shrimp in the population are monitored annually and there have been no indications of significant long-term shifts to smaller sizes. Bycatch size spectra are focussed on small individuals (with high mortality) because of use of the Nordmore grate.			
This PI is equivalent to PI 2.1.1.3, 2.1.1.4, 2.1.2.3, 2.1.4.1, and 2.1.4.2 used in the ASP assessment of this overlapping fishery. These also failed to meet a score of 80 and resulted in a single Condition (Condition 2 in the ASP report) which was set for multiple PIs.			
Score: 70			
Very good information is available on the ecological relationships of <i>Pandalus</i> and on abundance of this target species, such that impacts of the fishery on predator-prey relationships can be assessed and mitigated if need be. Monitoring continues. As such the fishery meets the 80 SG for this issue.			
Partial knowledge of potential non-catch impacts of the fishery on benthic species and general knowledge of benthic communities exists, however information has not been compiled in such a way as to allow consequences on benthic communities to be assessed. As such the fishery meets the 60 SG for this issue.			
Overall, with respect to ecosystem impacts, the fishery is close to the 80 SG: information is adequate to broadly understand functions of key elements of the ecosystem, main impacts can be inferred, the functions of the components are understood, and some of the main consequences can be assessed.			
Audit Trace References			
Parsons 2005a, 2005b, 2006; Savenkoff 2006; Scott and Scott 1988; Fishbase; C-NOPB 2003, 2008; Gagnon and Haedrich 1991; Stewart et al 1985; Orr et al 2008bc; unpublished observer data compilation provided by T. Siferd, DFO; Gordon et al 2009; Grant and Hiscock 2010, <i>in press</i> ; Moody Marine 2010			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
Principle 3	The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable			
3.1	Governance and Policy			
3.1.1	<p>Legal and/or customary framework</p> <p>The management system exists within an appropriate and effective legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> - Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; - Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and - Incorporates an appropriate dispute resolution framework. 	<p>The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>The management system incorporates or is subject by law to a <u>mechanism</u> for the resolution of legal disputes arising within the system.</p> <p>Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.</p> <p>The management system has a mechanism to <u>generally respect</u> the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.</p>	<p>The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>The management system incorporates or is subject by law to a <u>transparent mechanism</u> for the resolution of legal disputes which is <u>considered to be effective</u> in dealing with most issues and that is appropriate to the context of the fishery.</p> <p>The management system or fishery is attempting to comply in a timely fashion with binding judicial decisions arising from any legal challenges.</p> <p>The management system has a mechanism to <u>observe</u> the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.</p>	<p>The management system incorporates or is subject by law to a <u>transparent mechanism</u> for the resolution of legal disputes that is appropriate to the context of the fishery and has been <u>tested and proven to be effective</u>.</p> <p>The management system or fishery acts proactively to avoid legal disputes or rapidly implements binding judicial decisions arising from legal challenges.</p> <p>The management system has a mechanism to <u>formally commit</u> to the legal rights created explicitly or established by custom on people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.</p>
<p>Scoring Comments</p> <p>Canadian fisheries management has a well-established legislative and policy framework. As noted Section 6.1 above, the federal government has jurisdiction for seacoast and inland fisheries in Canada, and it has enacted several pieces of legislation that govern fisheries, notably the <i>Fisheries Act</i>. That Act grants authority for fisheries management to the Minister of Fisheries and Oceans as well as providing the power to enact regulations governing a wide variety of management measures of which the <i>Atlantic Fishery Regulations</i>, 1985 and the</p>				

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
<p><i>Fishery (General) Regulations</i> are the main legal instruments governing the fishery. Management measures are developed under the authority of the <i>Act</i> and the regulations and ministerial powers are delegated to officials of the DFO. All areas of management responsibilities and roles are clearly defined within the department and fishery management programs are delivered in an organized and controlled manner. There is an elaborate sanction and penalty structure in the <i>Act</i> and regulations and a ticketing and court based program for the resolution of legal disputes. Government legislation and policy ensures the protection of aboriginal rights and Inuit, Innu and Indian people participate in the fishery through licences and allocations in the SFA 2-6 P. borealis fishery.</p>			
<p>In addition, legislation has been enacted by the Parliament of Canada to give effect to three land claim agreements in the areas. The <i>Nunavut Land Claims Agreement Act</i>, the <i>Labrador Inuit Land Claims Agreement Act</i> and the <i>Nunavik Inuit Land Claims Agreement Act</i> contain provisions for the access, allocation and management of fisheries in the settlement areas of the land claims. Those areas include the marine waters within Canada's 12-mile limit. Management bodies created as a result of the agreements exercise jurisdiction over fisheries matters in the settlement areas including harvesting and licensing to fish.</p>			
<p>Several policy initiatives have been developed to guide decision-making in the management of fisheries in Canada, three of which are important for this assessment. The "<i>Policy Framework for the Management of Fisheries on Canada's Atlantic Coast</i>" envisions robust fisheries that include all stakeholders and which are biologically and economically sustainable. The "<i>Sustainable Fisheries Framework</i>" incorporates the precautionary and ecosystem approaches into fisheries management decisions. Finally, the "<i>Aboriginal Fisheries Strategy</i>" which is aimed at ensuring that aboriginal entitlements are respected in the development of stable fisheries management regimes for aboriginal peoples.</p>			
<p>All areas of management responsibilities and roles are clearly defined within the department and fishery management programs are delivered in an organized and controlled manner. There is an elaborate sanction and penalty structure in the <i>Act</i> and regulations and a ticketing and court based program for the resolution of legal disputes. Government legislation and policy ensures the protection of aboriginal rights and Inuit people do participate in the fishery through licenses and allocations in SFAs 2-6.</p>			
<p>Legal disputes respecting fishing are adjudicated quickly and fairly in a public forum through the Canadian judicial process and have been shown to be effective. For example, disputes regarding aboriginal fishing rights have been fairly resolved (<i>R.v Sparrow</i>, <i>R.v Marshall</i>) and have led to current legislation and policy that ensures the protection of aboriginal rights. Native people participate in the offshore shrimp fishery through licences and allocations and their representatives are members of the advisory process. The legal and policy framework has been otherwise tested on several occasions in such areas as licencing (<i>Saulnier v The Royal Bank</i>), fishing rights and allocation practices {<i>Larocque v. Canada (Minister of Fisheries and Oceans)</i>} and through numerous prosecutions in an open and transparent process. The system has quickly reacted to implement binding legal decisions.</p>			
<p>Many disputes, legal and otherwise, are avoided through a proactive co-management advisory process and frequent communication between the regulator and the fishery participants.</p>			
<p>All management regimes described are consistent with the UN Convention on the Law of the Sea (United Nations, 1982) as well as with the main principles of the 1995 United Nations Code of Conduct for Responsible Fishing.</p>			
<p>Score: 100</p> <p>The Canadian and land claims management systems are consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries. The Canadian system for the settlement of legal disputes is fair and transparent and proven to be effective. Both systems seek to avoid disputes and both systems respect legal and customary rights of participants.</p>			
<p>Audit Trace References</p> <p><i>Fisheries Act</i> (R.S. 1985, c. F-14C) and regulations; <i>Territorial Sea Geographic Co-ordinates (Area 7) Order</i> (S.O.R./85-872); <i>UN Convention on the Law of the Sea</i> (United Nations,</p>			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1982), *UN Code of Conduct for Responsible Fishing*; *Agreement between The Inuit of the Nunavut Settlement Area and Her Majesty The Queen in Right of Canada*, 1993; *Land Claims Agreement between the Inuit of Labrador and Her Majesty The Queen in Right of Newfoundland and Labrador and Her Majesty The Queen in Right of Canada*, 2005; *Agreement Between Nunavik Inuit and Her Majesty The Queen in Right of Canada Concerning Nunavik Inuit Land Claims*, 2006; "Policy Framework for the Management of Fisheries on Canada's Atlantic Coast"; "Sustainable Fisheries Framework"; "Aboriginal Fisheries Strategy"

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.1.2 Consultation, roles and responsibilities The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>generally understood</u> . The management system includes consultation processes that <u>obtain relevant information</u> from the main affected parties, including local knowledge, to inform the management system.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood</u> for <u>key areas</u> of responsibility and interaction. The management system includes consultation processes that <u>regularly seek and accept</u> relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood</u> for <u>all areas</u> of responsibility and interaction. The management system includes consultation processes that <u>regularly seek and accept</u> relevant information, including local knowledge. The management system demonstrates consideration of the information and <u>explains how it is used or not used</u> . The consultation process <u>provides opportunity</u> for all interested and affected parties to be involved.
Scoring Comments			
<p>The Northern Shrimp Advisory Committee (NSAC) is the major consultative mechanism for the fishery. It is a structured body with terms of reference and rules of procedure outlined in the Annex B of the Integrated Fisheries Management Plan. The committee is composed of representatives of the northern shrimp industry, including offshore licence holders, inshore licences holders, and special allocation holders, Fisheries and Oceans Canada staff, representatives of the Nunavut Wildlife Management Board, as well as provincial and territorial governments. NSAC meetings are held at least annually to review updated scientific advice for the SFA 2-6 stocks of <i>P. borealis</i> and to develop recommendations for TAC's in each area. The committee also meets to develop advice to the Minister when government or industry puts new proposals or new management regulations forward.</p> <p>Members make presentations to the committee for consideration and debate. DFO managers and scientists also attend and present information and advice to guide the committee's deliberations. Non-members may attend NSAC meetings but they may not sit at the table. They can participate in discussions following input from members.</p> <p>There is a collaborative agreement between DFO and one non-governmental organization, the World Wildlife Fund that aims to "<i>to achieve shared objectives for the conservation, protection, and sustainable development of Canada's oceans as mandated by the Oceans Act.</i>" through a collaborative and constructive partnership.</p>			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Score: 95

Stakeholders have been identified and roles and responsibilities have been defined in the NSAC terms of reference. The consultative process has a built-in procedure for seeking and accepting relevant information, including local knowledge from fishermen, aboriginal peoples, and other stakeholders. The information is reviewed and discussed and participants are aware of how it is used and how decisions are made.

The score would have been higher if the official membership of NSAC included Non Government Organisations.

Audit Trace References

Collaborative Agreement Between Fisheries and Oceans Canada (DFO) and World Wildlife Fund, October 2008; Annex B of the IFMP - *Northern Shrimp Advisory Committee Membership And Terms Of Reference*

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
3.1.3	<p>Long term objectives The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach.</p>	<p>Long-term objectives to guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>implicit</u> within management policy.</p>	<p><u>Clear</u> long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>explicit</u> within management policy.</p>	<p><u>Clear</u> long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>explicit</u> within <u>and required by</u> management policy.</p>
Scoring Comments				
<p>Canadian fisheries management has a hierarchy of broad policy measures beginning with a solid legislative foundation through the <i>Fisheries Act</i> and several sets of associated regulations (see 6.4 above). From that legal framework flows an elaborate outline of policy goals, objectives, processes and procedures. The following outline the broad policy objectives that are the most relevant to this assessment.</p> <p>Four overarching objectives for fisheries management are outlined in the <i>Atlantic Fisheries Policy Framework</i> - conservation and sustainable use of marine resources and habitat; self-reliant fisheries contributing to the well-being of coastal communities; shared stewardship involving participants in fisheries management decision-making processes and a stable and transparent access and allocation approach through a rules-based process.</p> <p>The “<i>Sustainable Fisheries Framework</i>” focuses on the incorporation of the precautionary and ecosystem approaches to fishery management decisions while protecting biodiversity and fisheries habitat. This policy requires that the precautionary approach be used in the management of all fisheries and includes a specific document entitled “A fishery decision-making framework incorporating the Precautionary Approach”. This policy document requires that management action be taken depending on whether the stock status is deemed to be in a healthy, cautious or critical zone. The policy requires that uncertainty be incorporated in the calculation of the stock status. Under the framework, fishery management decision rules must be established to respond to these various scenarios for all fisheries.</p> <p>The “<i>Policy to Manage the Impacts of Fishing on Sensitive Benthic Areas</i>” deals with the mitigation of the impacts of fishing on sensitive benthic areas or avoidance of impacts of fishing that are likely to cause serious or irreversible harm to sensitive marine habitat, communities and species.</p> <p>The <i>Emerging Species Policy</i> sets out the requirements and procedures for new fisheries. A cornerstone of the policy is the establishment of a scientific base with which stock responses to new fishing pressures can be assessed.</p> <p>The <i>Aboriginal Fisheries Strategy</i> was developed to implement the Supreme Court of Canada decision that aboriginal people have a right to fish for food, social and ceremonial purposes, a right that takes priority, after conservation, over other users of the resource. The policy seeks to provide stability where DFO manages the fishery and where land claims settlements have not already put a fisheries management regime in place.</p>				

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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These broad policy guidelines are implemented through fisheries specific objectives that are outlined in species management plans.

Score: 100

There is a clearly articulated legislative and policy framework consistent with MSC Principles and Criteria that guides decision-making including guidelines for the precautionary approach. Reference points are included in the current management plan and a provisional framework for setting TACs for SFAs 4, 5 and 6 *P. borealis* has been adopted. The long-term objectives are clear, explicit and required by management policy.

Audit Trace References

Fisheries Act and regulations; DFO *A Policy Framework for the Management of Fisheries on Canada's Atlantic Coast* and the *Sustainable Fisheries Framework*; IFMP, Annex I - *Provisional Precautionary Approach Framework for Northern Shrimp in Shrimp Fishing Areas (SFAs) 4-7*; DFO *Aboriginal Fisheries Strategy*; DFO *Emerging Species Policy*

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
3.1.4	Incentives for sustainable fishing The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that negative incentives do not arise.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and <u>explicitly considers</u> incentives in a <u>regular review</u> of management policy or procedures to ensure that they do not contribute to unsustainable fishing practices.
Scoring Comments				
<p>The Enterprise Allocation system of fishing provides a quasi property right to each offshore licence holder. Such stability and security of access provide strong economic incentives to harvest for the long-term, maximize value and not volume and minimize negative impacts on the stock and its ecosystem. A sense of stewardship is evident in the attitude of the licence holders.</p> <p>The necessity of enhanced stock knowledge before extending the range of stock exploitation has been an incentive for the offshore fleet to fund and conduct research on the stocks in these areas. In 2003, CAPP and the NC formed the Northern Shrimp Research Fund (NSRF), a non-profit organization dedicated to the conduct of research of shrimp, especially north of 2J where there was an absence of surveys. The NSRF now provides funding and a vessel for surveys as far north as SFA 2. Fishing vessels also contribute data for use in the stock assessment process.</p> <p>Attention by NGO's to bottom contact fishing gear has led to initiatives to minimize impacts. There are extensive resources and infrastructure at the Marine Institute of Memorial University where developments in gear technology are encouraged and jointly funded by governments, industry and university organizations through gear trials, experiments etc.</p> <p>The high cost of labour to separate high quantities of by-catch provides an incentive to avoid catching these species in the first place. This led to the voluntary use of the Nordmore grate by the offshore shrimp before it became a legal requirement.</p> <p>There is also a detailed legislative penalty structure with significant financial penalties to deter negative behaviour.</p>				
Score: 85				
<p>The EA approach encourages good fishing practices and avoids overharvesting and waste. The licence holder and its Captains take part in surveys, trials and gather information for the biannual assessments. There are neither negative incentives nor subsidies in the fishery.</p> <p>The score on this indicator would have been higher if the management system explicitly considered incentives in a regular review of management policy or procedures to ensure that they do not contribute to unsustainable fishing practices as required by the scoring guidepost for 100.</p>				

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Audit Trace References

Annex E of the IFMP - Northern Shrimp Enterprise Allocation Program: MSC Certification of the Offshore Shrimp Fisheries (>100') in areas 1,2,3,4,5,6 and 7. Submission for the Main Assessment by the 17 Offshore Licence Holders September 2, 2009;

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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3.2	Fishery- specific management system			
3.2.1	Fishery- specific objectives The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.	<u>Objectives</u> , which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>implicit</u> within the fishery's management system.	<u>Short and long term objectives</u> , which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>explicit</u> within the fishery's management system.	<u>Well defined and measurable short and long term objectives</u> , which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>explicit</u> within the fishery's management system.

Scoring Comments

The IFMP contains a detailed description of objectives for the shrimp fishery. Scientific advice and assessments are the basis for the determination of TACs. The resource within SFAs 2-6 is monitored and assessed on a bi-annual basis and new advice is provided if a significant change is detected.

The IFMP contains a detailed matrix of goals and objectives beginning with the following three principles:

- Conservation and Sustainable Harvest - ecosystem based approach; cost-effective harvesting strategies: mitigate the impacts on other species an ecosystem; stabilize industry infrastructure
- Benefits to Stakeholders - commercially viable and self-sustaining fishery;
- Co-management of the Shrimp Resource - provide licence holders with an effective sharing of responsibility, accountability and decision making

Detailed strategies and very specific management measures are outlined under each of these three principles under in 1.1 of the IFMP – *Fishery Objectives*. Long and short-term objectives covering major components of MSC Principle 2 are explicitly included in the management plan, but several components could be addressed more directly, in particular, explicit mention of application of the precautionary approach to Principle 2 related issues, e.g. sensitive habitat, species, ecosystem. This would be consistent with the existing requirements of the ASP certified Northern shrimp fishery in SFAs 5, 6 & 7. (Moody Marine 2008)

A general performance review of the fishery takes place at the annual NSAC meeting but does not include an assessment of whether the enumerated objectives are being met and key management issues are being addressed. A Fishery Checklist is in the process of being developed which will also be useful in identifying areas for improvement in the management of the fishery. The Conservation and Enforcement Working Group, a joint DFO-Industry group, focuses on conservation measures but does not conduct a performance review against stated objectives.

This PI is equivalent to PI 3A.6.2 and 3A.7.2 used in the ASP assessment of this overlapping fishery. These also failed to meet a score of 80 and resulted in a single Condition (Condition 5 in the ASP report) which was set for multiple PIs.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Score: 70

Short and long-term objectives in the domestic fishery are well described in the management system. The lack of explicit mention of application of the precautionary approach to Principle 2 related issues and specific measurement indicators makes evaluation of some of the objectives difficult and keeps this indicator from achieving a higher score. The score would have also been higher if maintenance of biodiversity and maintenance of shrimp biomass to support predators had been included in the objectives.

Audit Trace References

Integrated Fisheries Management Plan - *Northern Shrimp - Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap, 2007*; Pers. Com. - *Fishery Checklist*
Moody Marine 2008

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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3.2.2	<p>Decision-making processes The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives.</p>	<p>There are <u>informal</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>Decision-making processes respond to <u>serious issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take <u>some</u> account of the wider implications of decisions.</p>	<p>There are <u>established</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>Decision-making processes respond to <u>serious and other important issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.</p> <p>Decision-making processes use the precautionary approach and are based on best available information.</p> <p><u>Explanations</u> are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>	<p>Decision-making processes respond to <u>all issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.</p> <p><u>Formal reporting</u> to all interested stakeholders describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>
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Scoring Comments

The IFMP sets out the decision making process. The Northern Shrimp Advisory Committee (NSAC) serves as a forum for the discussion of issues on the management and development of the northern shrimp fishery providing advice and recommendations to the Minister of Fisheries and Oceans. NSAC provides input for the content of the Integrated Fisheries Management Plan, including but not limited to advice on quota allocations and regulatory measures such as seasons, size limits, gear restrictions, conservation, compliance issues and licencing policy. Advice to the Minister is analyzed by the DFO after which decisions are made and incorporated into the IFMP.

In the case of the Nunavut Wildlife Management Board (for fishing within 12 miles), the decision-making process is described in impressive detail in the land claims agreement. It follows a series of logical steps from recommendations of the NWMB to decisions of the Minister of DFO with time frames and restrictions on the nature of the review. For example, the Minister can only reject decisions of the NWMB for a valid conservation purpose, to give effect to the allocation system outlined in this Article, or to provide for public health or public safety. The Minister is obliged to give reasons if he rejects a decision whereupon it is returned to the NWMB for review.

Score: 80

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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There is a well-established decision making process that results in measures and strategies to achieve the fishery objectives.

Explanations regarding findings recommendations, etc are usually outlined or are evident in the IFMP and in fishery management decisions issued prior to the annual fishery. The provision of a formal reporting process to all stakeholders outlining explanations for action of the lack thereof would enhance the score on this indicator.

A framework based on reference points along with the use of harvest control rules is being brought into management of this stock and the management regime follows the precautionary approach.

Audit Trace References

Integrated Fisheries Management Plan - *Northern Shrimp - Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap, 2007; Nunavut Land Claims Agreement*

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.2.3 Compliance and enforcement Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with.	<p>Monitoring, control and surveillance <u>mechanisms</u> exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.</p> <p>Sanctions to deal with non-compliance exist and there is some evidence that they are applied.</p> <p>Fishers are <u>generally thought</u> to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.</p>	<p>A monitoring, control and surveillance <u>system</u> has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.</p> <p>Sanctions to deal with non-compliance exist, <u>are consistently applied</u> and thought to provide effective deterrence.</p> <p><u>Some evidence exists</u> to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.</p> <p>There is no evidence of systematic non-compliance.</p>	<p>A <u>comprehensive</u> monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.</p> <p>Sanctions to deal with non-compliance exist, are consistently applied and <u>demonstrably</u> provide effective deterrence.</p> <p>There is a <u>high degree of confidence</u> that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.</p>

Scoring Comments

There is a comprehensive monitoring and surveillance system in place within SFA's 2-6. All vessels are issued a licence containing an extensive list of conditions and which is to be on board the vessel at all times for the information of the Captain and crew. Measures such as VMS, hail-in/out requirement, daily hails of position, catch and other information, 100% on-board industry funded observer coverage, aircraft surveillance, at-sea boardings and spot-checks of landings ensure good coverage of the fishery. A ticket and court-based sanction framework is outlined in the *Fisheries Act* and regulations with court based prosecution for serious offences through the *Criminal Code of Canada*. Upon conviction maximum penalties of \$500,000 and up to two years in jail may be imposed along with forfeiture of catch and equipment at the discretion of the court.

Score: 95

The Canadian monitoring, control and surveillance system in place for the offshore shrimp fishery is very elaborate and has been shown to be effective in enforcing the requirements and rules of the fishery. Offenders are regularly pursued and the sanctions under the *Fisheries Act* are strong deterrents. The offshore shrimp fleet has not had any serious compliance issues.(pers.com DFO). There is a high degree of confidence that fishers comply with the management system and provide necessary information through the observer program and through the submission of logbooks. There is no evidence of systematic non-compliance.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
The score would have been higher on this performance indicator if there had been evidence of a regular review mechanism with data <u>to support</u> the conclusion of effective deterrence.			
Audit Trace References			
Integrated Fisheries Management Plan - <i>Northern Shrimp - Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap, 2007</i> ; fishing licence for offshore shrimp holders; <i>Fisheries Act</i> and regulations			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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3.2.4	<p>Research plan The fishery has a research plan that addresses the information needs of management.</p> <p>Research results are <u>available</u> to interested parties.</p>	<p>Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.</p>	<p>A <u>research plan</u> provides the management system with a strategic approach to research and <u>reliable and timely information</u> sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.</p> <p>Research results are <u>disseminated</u> to all interested parties in a <u>timely</u> fashion.</p>	<p>A <u>comprehensive research plan</u> provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and <u>reliable and timely information</u> sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.</p> <p>Research <u>plan</u> and results are <u>disseminated</u> to all interested parties in a <u>timely</u> fashion and are <u>widely and publicly available</u>.</p>
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Scoring Comments

Ongoing stock assessment research is described in detail in Annex D of the IFMP. For the purposes of stock assessment, all shrimp fishing areas are monitored through research surveys and sampling of the commercial catch. Catch rates of shrimp and fish species are recorded, and detailed observations are made on shrimp size distribution, sex, maturity and egg production. These data provide useful information on the distribution and abundance of the resource, the effects of fishing, changes in the environment, and potential for the fishery in the near future.

Present research is directed towards age determination, estimation of mortality rates, effects of environmental parameters (e.g., temperature, currents) and relationships with major predators, especially Greenland halibut and cod.

Due to the lack of research activities and scientific data in the north, the offshore licence holders formed the Northern Shrimp Research Foundation (NSRF) to conduct scientific research surveys in the north. DFO provides the scientific advice on sample design and analysis of the data collected. The first of an on-going annual survey was conducted in the summer of 2005. Currently three study areas are being surveyed including the Resolution Island Study Area (RISA), the SFA 2 Exploratory and SFA 4 southeast of RISA.

A 5 year \$CAD5million research proposal by the Marine Institute of Memorial University has been developed and submitted for funding that has the objective of reducing the bottom impact of various trawls currently used in the industry. The approach for this project is to complete design and simulation using various trawl configurations, complete physical modeling using the flume tank, and then evaluate prototypes under commercial conditions.

A study is currently being undertaken by the Marine Institute to develop a methodology to use industry single beam sounders to collect bottom type data and compile these data to create an acoustic classification map for fishing grounds off Newfoundland and Labrador. The study will focus in particular on northern shrimp, although the results will be applicable to other benthic species. The study will help to guide more detailed investigation of sensitive habitats and the correlation between shrimp abundance and seabed habitat.

Additional research is being conducted at the DFO Maurice Lamontagne Institute in Mont Joli, Quebec in tank rooms designed to simulate the natural living conditions of *P. borealis*. The studies are exploring the effect of water temperature on the various stages in their life cycle.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
It should be noted that while research was an important factor in the assessment tree for the ASP assessment there was no PI with a specific requirement for a “plan” or “strategic approach”, hence, there was no condition set in the ASP certification.			
Score: 75			
While there is significant ongoing research activity to support the fishery, there is no actual research plan that provides the management system with a strategic approach to research as is required by the 80 scoring guidepost.			
The research survey and assessment program is described and is published as part of the IFMP (Annex D) and, such as to provides management with necessary information. However this it is not comprehensive, as it does not address all issues identified in the stock assessments as requiring resolution through research. In addition, although ecosystem issues are addressed in ongoing research, there is not a comprehensive range of research topics identified to resolve issues related to ecosystem impacts of fishing".			
The research being conducted is circulated to all interested parties in a timely fashion, either directly to stakeholders, at advisory committee meetings or via the Canadian Science Advisory Secretariat (CSAS) system on the DFO website. The annual stock assessment is also posted on the NAFO website.			
It should be noted that the need for a research plan that provides the management system with a strategic approach to research was not a specific requirement in the assessment tree for the overlapping ASP assessment, hence, there was no condition set in the ASP certification.			
Audit Trace References			
Integrated Fisheries Management Plan - Northern Shrimp - Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap, 2007; MSC Certification of the Offshore Shrimp Fisheries (>100') in areas 1,2,3,4,5,6 and 7. Submission for the Main Assessment by the 17 Offshore Licence Holders September 2, 2009			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.2.5 Monitoring and management performance evaluation There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system.	The fishery has in place mechanisms to evaluate <u>some</u> parts of the management system and is subject to <u>occasional internal</u> review.	The fishery has in place mechanisms to evaluate <u>key</u> parts of the management system and is subject to <u>regular internal</u> and <u>occasional external</u> review.	The fishery has in place mechanisms to evaluate <u>all</u> parts of the management system and is subject to <u>regular internal</u> and <u>external</u> review.
Scoring Comments			
Ongoing monitoring and evaluation mechanisms include an extensive reporting system on the commercial fishery through logbooks, VMS, dockside monitoring and 100% observer coverage. Research surveys supply additional data and full scientific reviews of the performance of the fishery are conducted and annual assessments produced.			
A meeting of the Newfoundland and Labrador Regional Advisory Process on Shellfish was held May 28-30, 2007 to review the assessment framework for Northern Shrimp (<i>borealis</i>) off the coast of Newfoundland and Labrador. The meeting produced a substantially revised performance report spreadsheet to be used in the shrimp assessments.			
A general review to evaluate key parts of the management system is conducted at annual NSAC meetings, attended by licence holders, provincial and federal government representatives First Nations' representatives. Meetings are open to the public. DFO is in the process of developing a "Fishery Checklist"- an internal diagnostic tool containing more than a 100 questions designed to assess a fishery's status against necessary elements of a sustainable fishery, which will assist in reviewing the fishery against objectives.			
With respect to external review, the Canadian Auditor General has the authority to and has in the past conducted reviews of the fisheries management regime on an <i>ad-hoc</i> basis - see Auditor General of Canada, 1999 Report (updated in 2000) - <i>Managing Atlantic Shellfish in a Sustainable Manner</i> ; Spring 2009 Report - Chapter 1- <i>Protecting Fish Habitat</i> ; October 2004 Report -Chapter 5— <i>Fisheries and Oceans Canada—Salmon Stocks, Habitat, and Aquaculture</i> ; December 2000 Report - Chapter 31— <i>Fisheries and Oceans—Fleet Management</i> ; March 2008 Status Report - Chapter 6— <i>Ecosystems—Control of Aquatic Invasive Species</i> .			
Occasionally the Fisheries and Oceans committees from the Parliament and Senate of Canada conduct reviews of specific issues in the fishery and require the Minister or officials of DFO and the industry to appear as witnesses to the review.			
Score: 80			

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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The annual NSAC meeting and the stock assessment process are regular review mechanisms in place to evaluate key parts of the management system, and may include external participants.

The score on this indicator would have been higher if there was a regular review mechanism for the review of the management system against its objectives and if there was a provision for regular external review.

Audit Trace References

Integrated Fisheries Management Plan - *Northern Shrimp - Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap, 2007; MSC Certification of the Offshore Shrimp Fisheries (>100') in areas 1,2,3,4,5,6 and 7. Submission for the Main Assessment by the 17 Offshore Licence Holders September 2, 2009; DFO Fishery Stewardship and Sustainability Checklist, 2008-2009*

APPENDIX B

Peer Review Reports

PEER REVIEWERS BIOGRAPHIES

Don Parsons

Don is a retired shrimp population biologist having worked with the Department of Fisheries and Oceans Canada, Newfoundland Region, for over 25 years. Don has represented Canada at several international fora on *Pandalus* species and has published extensively on the biology and population dynamics of northern shrimp. He has been an expert team member of the Oregon Pink Shrimp and Gulf of St. Lawrence Northern Shrimp fisheries and is a member of the team presently assessing the Scotian Shelf *Pandalus* fishery.

Sean Cox

Sean holds a Doctorate in Resource Management and Environmental Studies. He is Assistant Professor of Fisheries Science in the School of Resource and Environmental Management at Simon Fraser University. He has undertaken significant work in the field of design and evaluation of stock assessment and management procedures for commercial fisheries. His collaborative work on groundfish has involved stakeholders, groundfish managers, scientists, and academics in the collaborative development of precautionary fishery management policies that meet conservation and economic objectives

Peer Reviewer 1

Background

Need a very close inspection of all sections and appendices to this report for numerous typographical and spelling errors.

Some elements of the Glossary do not appear in this report (e.g., ASPIC), perhaps because they appear in one of the other reports?

MML Assessment Team Response – The Glossary has been amended.

The last sentence at the bottom of Section 3.1 incorrectly refers to SFA 1. The figure actually highlights the UoCs in question SFA 2-6.

MML Assessment Team Response - This has been corrected

What is the point to the stock-recruitment discussion at the end of Section 3.2? The authors claim that stock-recruitment relationships are hard to find, yet the paper cited (Aschan and Ingvaldsen 2009) shows a clear (and statistically significant), density-dependent relationship between spawning stock and age-3 recruitment. This contradicts the author's statement that the difficulty in finding relationships for Pandalus is because indices "... are for 2 and/or 3-year-old shrimp that has been subject to high mortality due to predation before caught by the survey trawl."

MML Assessment Team Response - This section has been modified

This raises another question: if the authors have access to stock-recruitment data for the same species, then why don't they compute an optimal harvest rate and compare this to harvest rate reference points presented later in this, and other, reports?

MML Assessment Team Response - This is a good idea, however, the assessment team has only considered reports and assessments and has not had access to raw data. There is work in progress on this matter initiated by Canadian scientists and co-workers.

The units of catch should be presented in caption to Table 1.

MML Assessment Team Response – This has been added.

Section 4.2

1. replace occurrences of "long time mean" with "long-term mean"

MML Assessment Team Response – The text has been amended.

2. what information is being used to describe these assessments. It would help to have some data here rather than stand-alone text, especially without references.

MML Assessment Team Response – Additional text and references have been provided.

The assessment methodology also needs to be described since there is a whole MSC indicator devoted to judging whether the assessment is appropriate and reliable for informing the harvest control rule.

MML Assessment Team Response – Additional text and references have been provided.

What is the "nominal adaptive approach"? In general, the term "adaptive" should be removed, because what is being called adaptive is really "*ad hoc*". In general, there needs to be more consistency in the

presentation here. One sentence suggests that there are no reference points, and soon after, the text states that reference points are partly established. I realize that these reference points are under development, but this description is really unclear. If the stock declines below 1996 values (and why is this year chosen?), then how many of the "last" licenses will be removed? Are these license removals permanent? How are licenses added back as the stock recovers?

MML Assessment Team Response – Section 4.3 has been rewritten and updated

Near the bottom of page 24 I would add [text in brackets]: "...averaging only 41% [of the *P. montagui* catch] for the period..."

MML Assessment Team Response – This section has been amended.

This section uses a vague descriptor "appears positive" to describe stock status. This is impossible to judge against MSC standards, and it will raise doubts about the validity of this certification. A more reasonable approach would use specific, quantitative descriptions based on the available CPUE and survey data. Why doesn't the report provide plots of survey and CPUE time-series?

MML Assessment Team Response – We have inserted recent survey-time series as plots and described stock status by area.

Principle 1

Stock status

Statements that only demonstrate low statistical power should be used with caution or avoided. For instance, the statement "no apparent level of SSB below which recruitment would definitely be impaired...". This is logically false because a level of impairment must exist: this fishery has just not observed it. I suggest rewording this to state that recruitment is increasing over the time series and has probably never been impaired.

I do not see the value in the claim that recruitment of one year old shrimp seems to be directly dependent on spawning biomass in other areas. This is probably referring to the Aschan and Ingvaldsen (2009) paper, in which this direct dependence actually breaks down by age-3 where recruitment appears density-dependent. So, why is the whole story not presented? Density-dependent recruitment is required for fishing to be sustainable, whereas fishing is not sustainable when recruitment is density-independent, as implied in the text and in the paper.

The opening sentence is repeated two paragraphs later.

Replace "certainly" with "certainty"

"...it is felt" cannot be used in place of "high degree of certainty", where the latter has a very specific definition in the MSC FAM.

While I agree that the first element of SG100 is probably met, how can there be a high degree of certainty of fluctuating around or above a target reference point that does not exist? The comments associated with score repeat information related to the first element of SG100, and provide no information about the second element.

MML Assessment Team Response – The text has been extensively revised and the scoring reviewed, to take account of these comments.

Management strategy: there was no description of the "traffic light" analysis and how/why it is robust and precautionary.

MML Assessment Team Response – The text has been revised – the traffic light is no longer used in this stock.

The fixed 15% exploitation rate harvest strategy is actually more precautionary than implied here. For instance, by using the lower 95% confidence limit for biomass in computing the exploitation rate index, the harvest strategy compensates for better or worse stock assessment information. If the survey provides a highly uncertain estimate of biomass, then the exploitation rate index will be raised even if the stock remains constant. If the strategy used the point estimate of biomass, then the exploitation rate index would not change. This approach of using a pre-determined lower confidence limit in harvest strategies has been shown to be very robust against a wide range of uncertainties in simulations of other fisheries (e.g., Cooke, J.G. 1999. Improvement of fishery-management advice through simulation testing of harvest algorithms. ICES Journal of Marine Science, 56: 797–810).

MML Assessment Team Response – P1.2.1 has been updated and rewritten. The score has increased to 90 as the management has proven to respond to increased exploitation rate.

Harvest control rules and tools: The description of the exploitation rate index calculation is not the same here as in the **Management strategy** section, or later in this same section.

There was no direct evidence showing that trends in Northern shrimp are driven by environmental and predation factors. If there is a lack data to determine a stock-recruit relationship, then how can one make an even more difficult conclusion like this?

The scoring comments are not consistent with the score of 80 when compared against the actual elements in SG80. For example,

First paragraph [my underline]: "...there is general agreement than an exploitation rate index..." contrasts with "Well defined..." in SG80, and is instead more consistent with "Generally understood..." in SG60.

Second paragraph [my underline]: "In some recent years, the exploitation rate index has accordingly been above the 15% level." Compare this to SG80: "Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules".

These inconsistencies weaken this section of the assessment and make the score of 80 questionable. The strengths of the exploitation rate index based on lower 95% C.L. should be highlighted at the top and then used to addressed each element of SG80. The first element is clearly the most difficult to demonstrate because (i) the rule may or may not be "well-defined" and (ii) it is a fixed exploitation rate and thus does not get reduced when limit reference points are approached".

MML Assessment Team Response – The text has been extensively revised to take account of these comments and to better justify the score. The rule is relatively well-defined. Point (ii) on the fixed exploitation rate is well taken – however the intent is to use this while the stock is at high levels (as at present) and to bring the new HCR with diminishing exploitation rate into play if and when the stock declines. We believe that the system meets the 80 SG although time will tell whether the strategy outlined in the IFMP is effectively used in a declining stock situation.

Information monitoring: There is no clear connection between the scoring comments and the score of 85. Scoring Guidepost 80 does not ask whether life history of the species is known and instead asks about stock structure, productivity, abundance, as well as fleet composition and removals. The two main unknowns here seem to be stock structure and productivity. Stock structure and productivity must be assumed unknown based on the available information. Although stock productivity is unknown, there should be some reference to Panalid stocks exploited in other parts of the world where information is better and productivity is assessed regularly (e.g., Alaska).

MML Assessment Team Response – We have revised the text to address these comments.

The comment justifying the score: "The score would have been higher if..." is irrelevant and should be removed. Instead, there should be some logical arguments here to justify the actual score given, especially how either of the SG100s are met.

MML Assessment Team Response – We have revised the text to better justify the score.

Assessment: the scoring comment: "There is no analytical assessment and no limit reference points are established but the exploitation rate is kept at a rather low level below 15%. " conflicts with SG80 element 1 regarding assessment relative to reference points.

MML Assessment Team Response – The text has been revised to address this comment.

Principle 2

This section is reasonably well organized and documented; however, like other sections, there is no obvious connection between the scoring guideposts, the comments, and the scores.

MML Assessment Team Response – The scoring rationales have been improved to show a clearer relation to the given scores.

Information/monitoring (P72-73): To disallow a score of 100 because there is not an obvious verification procedure for bycatch information seems a bit severe and inconsistent with the scoring above, and in relation to P1 in particular where there is a lot more leeway given to reference points, harvest control rules, and management strategy. Section 5.5 of the report provides a list of the quality controls on data collection and some of these may act as verification. I don't see how peer-review would be a more effective means of verifying bycatch data, compared to elements in 5.5 like VMS to verify positional information and tow duration, 3rd party observers and dockside monitoring to verify bycatch and discards, etc.

MML Assessment Team Response – This is a good point – mechanisms such as those mentioned are more important for verifying bycatch than peer review, and the mechanisms noted are significant in this fishery. The score is adjusted to 100.

Management strategy (P80): the scoring comments list both industry and DFO policy documents that outline strategies for managing habitat impacts. Why do these not qualify as "partial strategies"? The DFO policy, in particular might even be considered comprehensive.

MML Assessment Team Response – We agree with this and have refined the text, although the score has not been changed.

Ecosystem, Management strategy (P85): In general, there is a lot of repeated information here as well as reference to earlier sections, which seems to imply that the author is not clearly distinguishing among criteria. The MSC FAM (7.6.2) for these indicators explicitly recognizes the need to avoid repeating assessments from earlier sections, e.g., "The Ecosystem Component does not repeat the status assessment of these elements individually but rather considers the wider system structure and function...". There is probably enough information to assess whether any of the potential issues listed in 7.6.3(a-e) are likely to be important or not. The existing size composition data for shrimp as well as finfish bycatch (and predators) should at least be examined.

MML Assessment Team Response – Text has been added to address these issues.

Principle 3

This section seems to be well-organized, although like the others, there is a lack of clear relationships between the scores and the individual elements within each scoring guidepost.

Long term objectives: I don't see where most of these policies are relevant to this indicator. The MSC FAM Section 8.2.24 indicates that this section should explain how management policy is consistent with the precautionary approach (and there is a specific definition therein for use in scoring). Yet, there are no specific examples of high-level policy objectives.

MML Assessment Team Response – The MSC FAM for PI 3.1.3 Long Term Objectives requires that this PI deal with management policy at a high level and within a broad context and outside the specific fishery under assessment. The PI should deal with overarching legislation, policies and custom that applies within a broader management system.

To that end, the report outlines several broad fishery management legislative and regulatory instruments along with policy documents that form a high-level policy framework. Four of these specific high-level policy documents are dealt with in some detail in the report that apply to all fisheries. One of those, the "*Sustainable Fisheries Framework*" deals with the implementation of the precautionary approach through a decision-making framework that requires that action be taken when the status of the stock indicates a cautious or critical state.

The narrative under Scoring Comments of PI 3.1.3 in the report has been amended to clarify the use of the PA through these policy objectives.

Fishery-specific objectives (P89): there is no discussion of "measurable" objectives. The objectives presented are all aspirational rather than operational as required under this PI.

MML Assessment Team Response – While the team does not agree that the objectives are all aspirational, they do lack a degree of specificity such that the score should be lowered. This PI is now scored at 70 with additional comments in the scoring table as well as the addition of a condition.

Stakeholder comments

1. Some of the comments made by EAC with respect to Principle 1 have been cutoff.

MML Assessment Team Response – The EAC comments on Principle 1 were limited and were not cut off.

2. The comments for Principle 1 are also duplicated under concerns for Principle 2.

MML Assessment Team Response – This has been amended

3. Figure 1 is missing.

MML Assessment Team Response – The figure was not included in the submission

Suitability of conditions of certification: Conditions, where established seem appropriate to meet the requisite standard and also seem fair to the client; that is, they can be accomplished in the time given and with the expected data that will accumulate. The recommendations for meeting conditions seem prescriptive. I expected a list of evidence required to demonstrate that conditions are met, not a step-wise approach since the UoC may have other ways of meeting the conditions.

MML Assessment Team Response – Our recommendations are in-line with those that were made in a separate certification of the northern shrimp fishery in SFA 5-7 in 2008 and are intended to provide some guidance and a joined up approach with that assessment. The MSC have clearly stated that Conditions should not be too prescriptive and it is for the client to set out how they intend to demonstrate that conditions are met. The client's action plan has to be agreed with the assessment team.

Peer Reviewer 2

Review of MSC Assessment Report for The Canadian Offshore Northern Shrimp (*Pandalus borealis*) Trawl Fishery - Shrimp Fishing Areas 2, 3, 4, 5 and 6

Version: Client Draft

Part A - General Comment:

Reviews of four MSC draft Assessment Reports were performed:

1. The Canadian Offshore Northern Shrimp (*Pandalus borealis*) Trawl Fishery - Shrimp Fishing Areas 2, 3, 4, 5 and 6 (this review),
2. The Canadian Offshore Northern Shrimp (*Pandalus borealis*) Trawl Fishery - Shrimp Fishing Area 1,
3. The Canadian Offshore Northern Shrimp (*Pandalus borealis*) Trawl Fishery - Shrimp Fishing Area 7, and
4. The Canadian Offshore Striped Shrimp (*Pandalus montagui*) Trawl Fishery - Shrimp Fishing Areas 2, 3 and 4.

All reviews include both editorial changes/corrections and comments of substance. The former is not exhaustive. There were numerous errors which, in some cases, were quite minor, whereas, in others, they had impact on the meaning and/or understanding of the text.

More substantial comments are given for both the reports and the scoring tables, and are relevant to the interpretation of information for the purpose of scoring the performance indicators. Some editorial changes are also suggested for the tables.

When considering their merit, the assessment team should ensure that any resulting changes, minor or substantial, are applied across all assessment reports where it is deemed appropriate. Moreover, much of the information in the report sections was identical or similar. The SFA 2 – 6 assessment for *P. borealis* was reviewed first and comments provided on the report (Part B) of that review can apply to the other three. Consequently, most of the comments for the other three reports relate to the rationale provided in the scoring tables.

Part B – Comments on the Report:

1- Introduction:

1. Page 4, para.5 – Although it is stated that the “assessment has taken account of the original assessment in accordance with MSC TAB Directive D-015 v2”, there is little evidence of that in the report. There is no comparison of assessment trees and, therefore, no assurance that key aspects of the original assessment are included in the default assessment tree (DAT). Furthermore, there is no comparison of conditions between the original and current assessments and no mention of surveillance audits. (See also Part D, below.)

MML Assessment Team Response – Comparison of the assessment trees has been included in an appendix; further comment and comparison has been provided in relation to the Conditions and mention has been made of the two surveillance audits that have taken place for the certified fishery.

2. Page 6, *Published papers* – A minor point but, throughout the list, there are instances where genus and species are not italicized or underlined. These should be addressed in the final version.

MML Assessment Team Response – We have italicized genus and species names in all four reports (e.g. *Pandalus borealis*, *P. borealis* but Pandalus).

3. Pages 6 - 12, *Published papers* – This list appears to be generic for all four certification reports in that there are references to papers for other fisheries and species not found in the text of this report. Technically, only those germane to the current report should be included. (Also, see comments on Section 1.4 in other reports.)

MML Assessment Team Response – This has been amended.

4. Page 8, *Published papers* – The same GEAC reference appears twice.

MML Assessment Team Response – One of the references has been deleted.

2 - Glossary:

1. CSAS not CSASS.
2. Align F_{LIM} with first line of description.
3. Include “NC = Northern Coalition” in list.
4. Also, see comments on the Glossary in other reports.

MML Assessment Team Response – The Glossary has been amended.

3 - Background:

1. Page 15, Section 3.1, para. 1 – “... Regional Fisheries Management Organisation (RFMO) established by the Northwest Atlantic Fisheries Organisation (NAFO).”
2. Page 15, Section 3.1, para. 2, last sentence – SFA’s 2 – 6 are highlighted, not SFA 1.
3. Page 18, Section3.2, last sentence – Greater than (>) 15 mm.
4. Page 18, Section3.3, last sentence – The catch table covers the 1977 – 2008 period.

MML Assessment Team Response – The corrections have been made

4 - Stock Assessment:

1. Page 23, General comment – Based on the most recent SAR’s (2010/18 and 24), the resource has been decreasing in the south but increasing in the north. In SFA 6, for example, the “female spawning stock biomass (SSB) is presently within the cautious zone at 97% of the provisional Upper Stock Reference Point (USR)”. Clearly, this MSC assessment report was prepared before the last stock assessments of March, 2010 and lacks the most recent information. This has major implications for the report with respect to stock assessment, reference points and management. If

- assessments were annual, this might not be a major issue but, when they are performed every two years, significant changes can occur. (See also Part D, below.)
2. Page 23, Section 4.2, para. 4, second sentence – “Catches” rather than “catch rates”?
 3. Page 23, Section 4.3 – As indicated above, this section is dated with respect to stock status, reference points and management advice. Had conditions been status quo, this would not be a major issue but, in the current context, revision appears necessary.
 4. Page 24, Section 4.3, para. 4, line 4 – Delete “do”.

MML Assessment Team Response – The reviewer is correct we did not have access to the 2010 SARs before completing the client draft report. We have now taken account of these and also taken account of the suggested corrections.

6 - Ecosystem Characteristics:

1. Page 33, Section 6.1, line 5 – Include a reference to support the statement “Although much of this was eventually attributed to the decrease in predation by fish on shrimp...”.

MML Assessment Team Response – This section has been amended.

2. Page 35, Section 6.2.2.2, para. 4, last sentence – It is not clear how the 10% trophic transfer rate gives bycatch levels perspective. Can this be elaborated?

MML Assessment Team Response – Some additional detail on the rationale has been provided.

3. Page 37, Section 6.2.3, second line – Spatial analysis 2009 is not listed as a reference.

MML Assessment Team Response – We have added this to the list of references.

11 - Observations and Scoring:

1. Page 45, penultimate paragraph, last sentence – The scores were actually presented to the first decimal (see Section 13.1). Also, no weights are given.

MML Assessment Team Response – The MSC FAM V2 requires Principle scores to be to 1 decimal place. Weighting in the assessment scoring table are not required to be shown.

13 - Certification Recommendation:

See comments on Conditions below (Part D – Concluding Remarks)

Part C – Comments on the Scoring Tables:

1. PI 1.1.1 – Within Scoring Comments, first para., last sentence – > 15 mm, not <; and “predatory” not “predating”. Last para., last sentence – high “spawning stock” rather than “recruitment”. More importantly, the summary of the state of the stock over the full range of SFA’s requires revision based on the 2010 SAR’s.

MML Assessment Team Response – We have made these changes and referred to the 2010 SARs in this version of the draft.

2. PI 1.1.2 – Need to explain the reference point(s) currently used. If it is a work in progress, SG80 is not met. However, SAR 2010/18 refers to a URP which was used in the 2010 assessment, so it appears that revision is required. Also, any progress regarding reference points should be linked to the condition proposed for the 5, 6, 7 ASP certification.

MML Assessment Team Response – Reference points are now in place in all SFAs, text has been modified.

3. PI 1.1.3 – Commentary on the recent decline of SSB below USR in SFA 6 and any decision to reduce TAC could be mentioned here.

MML Assessment Team Response – Text has been added to this effect.

4. PI 1.2.1 – There is confusion throughout the report whether or not reference points exist and if they have been implemented. Through revision by including the 2010 assessment methods and results, this confusion can be resolved.

MML Assessment Team Response – Additional text in Section 4.3 has been added and in light of this P1.2.1 has been updated and rewritten. The score has increased to 80 as the management has proven to respond to increased exploitation rate.

5. PI 1.2.2 – Same confusion as 1.2.1. Scoring Comments say reference points and harvest control rules have been put into practice whereas the scoring section says a framework for them is being brought into management.

MML Assessment Team Response – Additional text in Section 4.3 has been added and reference to most recent SARs and IFMP have been made. In light of this P1.2.2 has been updated and rewritten.

6. PI 1.2.3 – The resource was last assessed in March, 2010. Also, bullet 3 of SG 80 requires good information on all other fishery removals from the stock.

MML Assessment Team Response – The text has been revised to address these comments – no other fishery exploits this stock.

7. PI 2.1.2 – Under Scoring Comments, the last sentence in the first paragraph should refer to SFA's 2, 3 and 4.

MML Assessment Team Response – Noted and changed.

8. PI 2.1.3 – There are several Orr et al. 2008 references. Which one(s) is/are relevant here? Also, it would be useful to include a statement that, in a mixed *Pb/Pm* catch situation, removals are recorded against individual species quotas.

MML Assessment Team Response –Text has been modified to take account of these comments.

9. PI 2.2.1 – Scoring Comments, first para. – The second sentence should be explained more clearly (see 6-2 above). Second para. – add “Therefore, the fishery does not

hinder recovery or rebuilding for these species.” Although the elements of SG 80 appear to be met, there is no rationale as to why the score has been increased to 85.

MML Assessment Team Response – We have reviewed this section to ensure that score and text on scoring elements are consistent.

10. PI 2.2.2 – Is there not a rule or requirement for vessels to move a safe distance if, say, an area of high fish bycatch were encountered, as noted for SFA 7? Also, in the Score section, would the use of toggle chains and/or requirement to move be considered components of the partial strategy? Although the elements of SG 80 appear to be met, there is no rationale for increasing the score to 85.

MML Assessment Team Response – The moving requirement is specific to SFA 7. We have reviewed our assessment (and elsewhere) to ensure that scores are based on the scoring elements. The score has been reduced to 80.

11. PI 2.2.3 – As determined in the status and management PI’s, the information supports a partial, not a comprehensive strategy, suggesting an even lower score.

MML Assessment Team Response – We believe that the information obtained meets a 100 score, and would be adequate to support a comprehensive strategy.

12. PI 2.3.1 – At the end of the first Scoring Comments sentence, add “(see 2.3.3 below)”.

MML Assessment Team Response – Done

13. PI 2.3.2 – In the Score section, “ETP” not “EPT”. Also, a 100 score was not awarded “because potential strategies to be implemented should these species increase in abundance are not given explicit consideration “. It could be added that the strategy, therefore, is not comprehensive and the PI scores <100.

MML Assessment Team Response – This is the principal reason 2.3.2 does not meet 100.

14. PI 2.3.3 – It can be argued that the lack of a more recent wolffish assessment should not warrant a penalty for the shrimp fishery. What might be deficient here is information on injuries.

MML Assessment Team Response – We agree that this is a valid point.

15. PI 2.4.1 – Although SG 60 is met, there is no reason given for increasing the score to 65.

MML Assessment Team Response – This has been clarified in revised text.

16. PI 2.4.2 – Under Scoring Comments, the first sentence states “several measures are in place” but only closed areas are described. What are the others? Also, as there is no partial strategy, what is the basis for the intermediate score of 70?

MML Assessment Team Response – We have clarified this in revised text.

17. PI 2.4.3 – The Score section concludes: “Overall, information on habitat types and impacts at a level of detail relevant to the scale and intensity of the fishery is not yet available.” Furthermore, there is no evidence that sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified. A lower score is more appropriate.

MML Assessment Team Response – We agree with the comments and have lowered the score and clarified the text.

18. PI 2.5.1 – Based on the kinds of evidence required, a score of 75 is excessive. There is only qualitative assessment and expert judgment, nothing quantitative.

MML Assessment Team Response – We agree with the comments and have lowered the score and clarified the text.

19. PI 2.5.2 – If there is no partial strategy, the score must be lower than 80. However, the reasons for awarding an intermediate score of 70 are not given.

MML Assessment Team Response – We agree with the comments and have lowered the score and clarified the text.

20. PI 3.1.1 – Has the mechanism for resolution of disputes been tested and proven to be effective?

MML Assessment Team Response – The text in the Scoring Comments of the PI has been amended to better address the issue noted.

21. PI 3.1.3 – Include the phrase “consistent with MSC P&C” after “framework” in the first sentence of the Score section.

MML Assessment Team Response – Agree, the text has been amended.

Also, assuming objectives are required by management policy, the score could be higher.

MML Assessment Team Response – The team has reviewed the scoring of this PI and find that it meets all the requirements of the 100 scoring guidepost. The score has been changed accordingly. Reference point information should be updated. **MML Assessment Team Response** – The text of the scoring rationale has been amended.

22. PI 3.1.4 – What justifies the extra 5 points?

MML Assessment Team Response – Five (5) extra points were awarded as the fishery meets the first part of the first sentence of PI 100 but not the second (the explicit and regular review) which MMI judges to be the significant difference between the two.

23. PI 3.2.1 – Second bullet point under Scoring Comments: “commercially viable and self-sustaining fishery” appears twice.

MML Assessment Team Response – The text has been corrected.

24. PI 3.2.2 – Would the minutes of the NSAC meetings not provide explanations of actions in a timely manner? If not, would they not be reviewed in subsequent NSAC meetings? This could support a higher score.

MML Assessment Team Response – NSAC is not a decision-making body. It makes recommendations only to the DFO. There remains a gap in the reporting system that also

makes it difficult to determine whether the system reacts to all issues identified as required by the 100 scoring guidepost.

25. PI 3.2.4 – Lacking a research plan, the rationale requires a statement about the timely dissemination of research results to support a score >60.

MML Assessment Team Response – The text under Score in this PI has been amended to reflect how research results are disseminated.

Part D – Concluding Remarks:

Instructions for the review stated that “comments should concentrate on the following, as far as is appropriate:

- i) The accuracy of information quoted in the report
- ii) Whether this information has been applied appropriately to the scoring indicators used in the table
- iii) Whether the interpretation of this information justifies the decision made on whether to certify the fishery
- iv) The suitability of the conditions attached to certification.”

These instructions were followed and are further commented below.

The accuracy of the information quoted in the report appears to be sufficient for the MSC assessment process. The evidence for scoring was well documented and traceable within the references. The assessment team clearly applied due diligence in the course of their work.

Part B, Section 1, Comment 1 above noted there is little evidence that the current assessment considered the original assessment as required by MSC (TAB Directive D-015 v2). Assessment trees were not compared; therefore, it has not been demonstrated that key aspects of the original assessment are included in the current DAT. A table, comparing the two, could accomplish this.

MML Assessment Team Response – Such a table has been included, as has reference in the scoring table.

As stated above in Part B, Section 4 (Stock Assessment), the report lacks the most recent stock assessments conducted in March 2010. Without that information, the current MSC assessment report is dated with respect to stock status, reference points and management. Regarding reference points, revision would help eliminate the confusion about their status and whether or not they are being implemented. Significant changes have seemingly occurred between the 2008 and 2010 assessments and need to be addressed.

MML Assessment Team Response – The 2010 assessment reports were not available to us at the time of writing the client draft reports. However, these have now been taken into account.

Notwithstanding, the information provided has been appropriately applied to the scoring indicators in most instances (see Part C, above). However, in some cases, it was difficult to identify the rationale for intermediate scores. Some intermediate scores were explained by how they were deficient from the higher SG but, for those where added value was given, the reasons were not clearly stated.

MML Assessment Team Response – We agree with this statement and have re-scored or provided clearer rationale for any intermediate score.

The outcome of the assessment might need revision should some Performance Indicator scores change in response to comments and suggestions provided herein.

MML Assessment Team Response – Agreed and has been taken into account.

The conditions designed to improve the scores for habitat (2.4.1, 2.4.2, 2.4.3), ecosystem (2.5.1, 2.5.2, 2.5.3) and research plan (3.2.4) performance indicators appear suitable for achieving scores of 80 or more under the DAT. The timescales suggested to meet the conditions also appear reasonable. However, as noted above (Part B, Section 1, Comment 1), there is no comparison of conditions between the original and current assessments and no mention of progress from surveillance audits of the former. For example, the original included a condition on the development of reference points while the current assessment does not, without explaining the reasons.

MML Assessment Team Response – This has now been taken into account.

APPENDIX C

Client Action Plan

Client Action Plan for MSC Certification of the Canadian Offshore Shrimp Fishery

Pandalus Borealis SFA2-6

Condition 1 Habitat Outcome

Relevant Performance Indicators: 2.4.1

The client is required to present evidence by the fourth annual audit that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.

Condition 2 Habitat Strategy

Relevant Performance Indicators: 2.4.2

The client is required to demonstrate by the fourth annual audit that there is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or habitats involved.

Condition 3 Habitat Information

Relevant Performance Indicators: 2.4.3

The client is required to demonstrate by the fourth annual audit that sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).

Client Action: To achieve the 3 habitat related conditions above:

- CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), towards development of a program (a) to enhance the collection of information, and (b) to conduct an evaluation of the nature and distribution of habitat types, their vulnerability, and the related impact of otter trawl fishing for shrimp in this area. A “project team” will be assembled for this purpose, which more generally will also ensure implementation of DFO’s Sustainable Fisheries Framework Policies, including with respect to Sensitive Benthic Areas as it applies to the conduct of shrimp fishing in this area.
- By the first annual audit there will documented evidence that a plan for the assembly of available information and a program for evaluation has been developed by the “project team”, and data collection and assembly for this purpose has commenced.
- By the second annual audit there will documented evidence showing the information that has been assembled and the results of analysis to date.
- By the third annual audit there will documented evidence showing that at least a provisional evaluation has been completed.
- By the fourth annual audit there will be documented evidence that at least a partial strategy is in place, and incremental mitigation measures have been identified and are being implemented as appropriate for this fishing activity.

Condition 4 Ecosystem Outcome

Relevant Performance Indicator: 2.5.1

The client is required to present evidence by the fourth annual audit that the fishery is highly unlikely to disrupt benthic communities structure and function to a point where there would be a serious or irreversible harm.

Condition 5 Ecosystem Strategy

Relevant Performance Indicator: 2.5.2

The client is required to demonstrate by the fourth annual audit that:

- iv. There is a partial strategy in place, if necessary, that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem – in particular the non-catch impacts on benthic communities - to achieve the Ecosystem Outcome 80 level of performance.

- v. The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems).
- vi. There is some evidence that the measures comprising the partial strategy are being implemented successfully

Condition 6 Ecosystem Information

Relevant Performance Indicator: 2.5.3

The client is required to demonstrate by the fourth annual audit that:

- iii. Sufficient information is available on the impacts of the fishery on benthic communities to allow some of the main consequences for the ecosystem to be inferred.
- iv. Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).

Client Action: To achieve the 3 ecosystem related conditions above:

- CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), towards development of a program (a) to enhance the collection of information, and (b) to conduct an evaluation of the vulnerability of ecosystem components and the inferred impact of otter trawl fishing for shrimp in this area. A “project team” will be assembled for this purpose, which more generally will also ensure implementation of DFO’s Sustainable Fisheries Framework Policies as they applies to the conduct of shrimp fishing in this area.
- By the first annual audit there will documented evidence that a plan for the assembly of available information and a program for evaluation has been developed by the “project team”, and data collection and assembly for this purpose has commenced.
- By the second annual audit there will documented evidence showing the information that has been assembled and the results of analysis to date.
- By the third annual audit there will documented evidence showing that at least a provisional evaluation has been completed.
- By the fourth annual audit there will be documented evidence that at least a partial strategy is in place, and incremental mitigation measures have been identified and are being implemented as appropriate for this fishing activity.

Condition 7 Fishery Specific Objectives

Relevant Performance Indicator: 3.2.1

The client is required to present evidence by the first annual audit that short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC’s Principles 1 and 2, are explicit within the fishery’s management system.

Client Action:

CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), to amend the IFMP with explicit references to the precautionary approach being applicable to managing the impact of fishing on sensitive habitat, species and the ecosystem.

Condition 8 Research Plan

Relevant Performance Indicator: 3.2.4

The client is required to present a research plan by the fourth annual audit that assembles current activity, identifies gaps, and provides the management system with a strategic approach to research including reliable and timely information sufficient to achieve the objectives consistent with MSC’s Principles 1 and 2.

Client Action:

- CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), in assembling a working group to codify existing activity and develop a Research Plan for the short-to-mid term, that are linked to the objectives established for the fishery and for MSC Principles 1 and 2.
- By the first annual audit there will be documented evidence that a plan to conduct gap analysis has been developed by the working group.
- By the second annual audit there will be documented evidence that a gap analysis has been completed.
- By the fourth annual audit there will be documented evidence that a research plan is in place.

Note: Timelines associated with action planning to address Conditions 1 through 4 above are subject to special processes required through Land Claims Agreements.

General Recommendations

The assessment team recommends that the IFMP include explicit recognition of the ecological role of the species with respect to the target reference point. The assessment team also strongly recommends that an amendment page is included in the IFMP indicating what and when sections are amended.

- CAPP and NC will collaborate with other stakeholders and the Department of Fisheries & Oceans Canada (DFO), to implement these recommendations.

APPENDIX D

STAKEHOLDER COMMENTS

August 31, 2009

Moody Marine Ltd.
Moody International Certification
28 Fleming Drive
Halifax, Nova Scotia
Canada B3P 1A9

**RE: Stakeholder Input for Assessment Team Site Visit,
Canada Offshore Northern and Striped Shrimp Full MSC Assessment**

Atlantic Canadian Waters, FAO Statistical Area 21

**'Striped Shrimp Fishery', Shrimp Fishing Areas (SFAs) 2,3,4.
'Northern Shrimp Fishery', Shrimp Fishing Areas (SFAs) 1,2,3,4,5,6,7.**

Attn: Paul Knapman and Canada Offshore Northern and Striped Shrimp Assessment Team

The Ecology Action Centre has been an active stakeholder in the MSC assessment processes for Atlantic Canadian fisheries. We appreciate the opportunity to participate in third party assessments, and as such we submit the following comments for your review and incorporation into your fishery site visit process. We respect the significant amount of work required to gather the data needed to assess the Striped and Northern Shrimp fisheries. We assert that **Nature of Bycatch** and **Habitat Effects** (both areas of Principle II concern) are areas of most critical concern in this fishery.

Principle I: Health of Fish Stock

Comments and Concerns:

Assessment should include a significant consideration of the consequences of removing vast biomass of a species from the food web that play an important role in the lower levels of the marine food chain.

R E S P E C T I N G & P R O T E C T I N G O U R E N V I R O N M E N T S I N C E 1 9 7 1

Principle II: Impact on Ecosystem

Comments and Concerns:

BYCATCH/ DISCARDS:

Because of the high volume of shrimp being landed, low bycatch percentages nonetheless amount to a high bycatch volume for finfish and invertebrates. Even higher are the overall numbers of fish that are incidentally caught, since all bycatch consists of small or juvenile fish. Bycatch numbers are particularly concerning for Greenland halibut and redfish.

Finfish bycatch

The Canadian Northern Shrimp Trawl Fishery is the largest fishery by volume in Atlantic Canada. In 2005, shrimp catches in Atlantic Canada totaled 167,386 tons, with the majority of the catch coming from Newfoundland and Labrador. In comparison, all groundfish catches of Atlantic Canada combined, totaled 134,193 tons in 2005 (USDA 2007). As a result of this, the total finfish bycatch of the shrimp fishery is high, even if the percentage bycatch rates are low. All finfish bycatch in the northern shrimp fishery is discarded (Koeller et al. 2007).

The Nordmore grate did reduce finfish bycatches in the shrimp fishery. However, small and juvenile fish continue to be caught and the total number of groundfish bycatch is still high. Total fish bycatch in 2005 by the shrimp fishery in SFAs 5,6 & 7 was 186.78 tons.

Particularly concerning are the high catch numbers for juvenile Greenland halibut and redfish. On the Grand Banks (NAVO div. 3LNO), shrimp fishing vessels caught an estimated 143, 728 juvenile Greenland halibut in 2006, most of which were of age 1 (Orr et al. 2006). In the divisions 2GH, 2J3K and 3L combined, the shrimp fishery caught an estimated 4,722,274 Greenland halibut as bycatch in 2003 (Bowring and Orr 2006). Greenland halibut stocks off Newfoundland are at an all time low and recruitment is below average. Targeted fishing effort for Greenland halibut has been high and has exceeded rebuilding targets by more than 22% (Healey and Mahe 2007). Because Greenland halibut is one of the last remaining commercially significant groundfish stocks in the Northwest Atlantic (Shelton 2005) and its stock status is alarming, the high Greenland halibut bycatch in the prawn fishery is a cause for concern. Bowring and Orr (2006) attempted to estimate the impact of Greenland halibut bycatch on the overall Greenland halibut population and were not able to demonstrate a severe impact. However, the study pooled all data for the entire NAFO subarea 2 and divisions 3KL, thereby making it difficult to elucidate the effect of bycatch on Greenland halibut in different areas. This is particularly relevant given the cod collapse, and the past assumption that all cod were from the same stock. Further research is needed to separate out the effect of Greenland halibut bycatch in smaller arrears of the shrimp fishery. Furthermore, an estimated 326, 793 juvenile redfish

(*Sebastes spp.*) were caught as bycatch in 2005 in shrimp trawls on the Grand banks (Orr et al. 2006). On part of the Grand Banks (NAFO div. 3LN), there is a moratorium against directed fishing of redfish (Avila de Melo et al. 2007) while on the remainder (NAFO div. 3O) there is a small redfish fishery (Parsons and Power 2007). The impact of this bycatch on the redfish population is unclear. Considering the low abundance of redfish, however, it is possible that the shrimp fishery is having a detrimental impact on redfish stocks. Further research is needed to address this concern.

Due to the above, EAC recommends that Moody Marine require a complete assessment of the impact of shrimp trawling on the populations of Greenland halibut, redfish and other affected groundfish.

Coral bycatch

Cold water corals are an important component of benthic habitats (Henry and Roberts 2007; Hargrave et al. 2004). However, information on coral bycatch in the Canadian Northern Shrimp trawl fishery is incomplete. Fisheries observers only note presence or absence of corals in shrimp sets (Edinger, personal communication). In addition to that, corals that are dangling from the net are often removed and discarded by fishing crews before the corals can make it to the sorting tables on the ship, where fisheries observers are working (Edinger, personal communication). This incomplete observer data makes it very difficult to determine the actual impact of shrimp trawling on cold water corals. A shrimp set with corals can contain anything from a few fragments of a coral, to several hundred kilograms of coral. It is therefore impossible to tell when large coral patches are trawled for the first time and just how severe the coral bycatch problem is. For this reason EAC urges Moody Marine to require coral bycatch to be quantified by fisheries observers as a condition for MSC certification. Despite the inaccuracies in observer data, there is evidence that shrimp trawls do catch coral, and are second only to the Greenland halibut fishery (Figure1).

Furthermore, a large proportion of invertebrates that are destroyed by trawl nets never show up as bycatch in the first place. Invertebrate mortality from trawling is more likely to occur from disturbance to the seabed and the passage of the net, rather than from being taken as bycatch (Ball et al. 2000). In addition to that, shrimp trawls in this area have 70cm+ toggle chains (Moody Marine 2008a). It can therefore be assumed that a large quantity of the corals that are destroyed by the footgear never make it into the net. For this reason, EAC recommends a field study be completed where a retainer bag is placed behind the footgear of the shrimp trawl to quantify coral mortality. A similar study has already been completed to assess snowcrab bycatch (Gilkinson et al. 2006).

Finally, areas with little or no coral bycatch might historically have been important coral habitats. Cold water corals are slow growing and it may take from decades to centuries for a damaged coral patch to recover (Roberts and Hirshfield 2004). Therefore, if a large coral patch has been destroyed, subsequent shrimp trawls in the same area may have little to no coral bycatch. There is no information on the damage to corals that has

already been done by the shrimp fishery. While it may prove to be impossible to distinguish historical coral habitat that has been destroyed, it is at least possible to freeze the footprint of the shrimp fishery on corals.

EAC therefore recommends that the Canadian Offshore Northern and Striped Shrimp Fisheries not be allowed to expand into any new areas, as a requirement for MSC certification.

Damage to snowcrab

The impact of the shrimp fisheries on the snowcrab resource is less well understood than is assumed. The snowcrab industry has for some time argued that shrimp trawling is damaging snowcrabs and that an unusually large number of crabs with missing limbs are caught in areas that are being trawled for shrimp. Three DFO research studies (summarized by Gilkinson et al. 2006) attempted to demonstrate an impact of shrimp trawling on snowcrab. All three studies were not able to show any substantial snowcrab mortality or damage from shrimp trawling. However, the second study, in which retainer bags were attached right behind the footgear of the trawl, showed that large numbers of snowcrabs did encounter the footgear of the shrimp trawl. Leg loss in this study was 4% (Gilkinson et al. 2006). All three studies were conducted in summer and fall. Snowcrabs tend to molt in the spring (DFO 2003), and are most sensitive to losing their limbs during that time. It can therefore be inferred that during molting season, substantially higher leg loss of snow crabs occurs than these three DFO studies demonstrated. Furthermore, when the high volume of the prawn fishery is taken into consideration, 4% of snow crabs losing limbs might be a considerable number of crabs.

EAC recommends that a study on damage to snowcrabs be carried out in the spring, during molting season, when crabs are most sensitive.

HABITAT:

Damage to benthic habitat

The research on the impact of shrimp trawling on sandy and muddy bottom habitats remains inconclusive. Studying the impact of bottom trawling is challenging and costly and there are only a handful of studies that specifically investigated the impact of shrimp trawls. Of those, Hansson et al. (2000) showed a reduction of the abundance of echinoderms, particularly ophiuroids as a result of shrimp trawling in soft sediment communities in Sweden. Tanner (2003) investigated the impacts of shrimp trawling in Australia and observed a decline in the abundance of sessile epifauna as well as a decreased persistence for all taxa exposed to trawling, in particular sponges and bryozoans. Tanner pointed out that the impact from the experimental trawls used in his study was remarkably lower than the impact that is to be expected from larger, heavier commercial shrimp trawls (Tanner 2003). Sparks McConkey and Watling (2001) studied

the effects of trawling on soft sediment communities in Maine, and observed a significant decrease in the number of individuals, the abundance of species and diversity at trawled sites. Video camera observations of shrimp trawling by Gilkinson et al. (2006) did observe extensive furrows being drawn into the sediment that lasted for 4 days. Sediment remained suspended in the water column for one day after trawling. A number of studies also showed little to no impact by shrimp trawling on soft sediment communities (summarized by Rice 2006). The impact of groundfish otter trawls have been studied more in depth and sometimes with large and expensive studies (Freese et al. 1999). The damaging impact of the groundfish otter trawl fishery is well established in the literature (Freese et al. 1999; Sparks-McConkey and Watling 2001; Gordon et al. 2006; Rice 2006). There are no explicit spatial closures associated with this fishery that adequately protect representative seafloor habitat.

Principle III: Management System

Comments and Concerns:

The Ecology Action Centre strongly advocates for the implementation of an Ecosystem Approach that applies the precautionary principle and resilience thinking to the management of natural marine resources and social-ecological systems. We assert that it is at least as important to manage systems to enhance their resilience, as it is to manage for the optimization of specific species stocks. Resilience is the capacity of a system to absorb disturbance and still retain its basic function and structure. A fishery that is deemed to be sustainable and well managed must demonstrate high priority to the need to manage the environment to reduce risks and buffer against uncertainty and surprise.

Recommendations to Moody Marine Ltd.:

- Require the completion of a full assessment on the impact of shrimp trawling on the populations of Greenland halibut, redfish and other groundfish.
- Require fisheries observers to quantify coral bycatch in the shrimp fishery.
- Require the completion of a field study on the impact of shrimp trawling on corals, using a grab bag behind the footgear.
- Freeze the footprint of shrimp trawling on benthic habitats by not allowing the fishery to expand into new coral areas.
- Require the completion of a study on damage to snowcrabs during the springtime when crabs are molting.

Yours sincerely,

Marine Issues Committee
Ecology Action Centre
2705 Fern Lane
Halifax, Nova Scotia
B3K 4L3

Tel. 902-446-4840
Fax 902-405-3716
Email: seachoiceatlantic@gmail.com
Web: www.ecologyaction.ca

15.1 Moody Marine Assessment Team Response to EAC Recommendations

The EAC made a number of recommendations in their submission and the following represents the team's response:

Recommendation 1 - Require the completion of a full assessment on the impact of shrimp trawling on the populations of Greenland halibut, redfish and other groundfish.

The assessment team did gather information on the bycatch of groundfish species – section 6.2.2 – Performance Indicators 2.2.1, 2.2.2 and 2.2.3 specifically deal with the issue of bycatch:

- PI 2.2.1 is an ‘Outcome’ Performance Indicator that considers the status of the impact or the risk that the fishery poses to bycatch species;
- PI 2.2.2 is a ‘Management Strategy’ Performance Indicator that considers the basis, reliability and implementation of the management strategy for bycatch species; and
- PI 2.2.3 is an ‘Information’ Performance Indicator that considers the nature, extent, quality and reliability of the monitoring and information that is relevant to bycatch in: (i) developing and implementing the management strategy and (ii) measuring the outcomes of the strategy.

The assessment team concluded that most bycatch species are considered to be within safe limits, but several are not. A partial strategy based on use of the Nordmore grate and toggle chains is demonstrably effective, associated with very low bycatch levels that are essentially negligible in ecological terms. As a result the fishery attained scores above the 80 Scoring Guidepost for each of the aforementioned Performance Indicators. The assessment team also recognised that low bycatch levels may be partly due to current low groundfish abundance levels and some consideration of bycatch management strategies under a groundfish recovery scenario would be necessary to increase the score including moving to smaller grate spacing.

It should be noted, if it is determined that the fishery is certified against the MSC standard the issues such as this will be reviewed at annual surveillance audits

Recommendation 2 - Require fisheries observers to quantify coral bycatch in the shrimp fishery.

The assessment team understands that the observer programme does record coral bycatch.

Recommendation 3 - Require the completion of a field study on the impact of shrimp trawling on

corals, using a grab bag behind the footgear.

The assessment team considered corals in the habitat related Performance Indicators. Deficiencies in all three habitat related Performance Indicators were identified and were combined in a single Condition of Certification - the client is required to ensure by the fourth annual audit information is compiled and assessed, a strategy developed, and measures taken, such that it can be confirmed that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.

Recommendation 4 - Freeze the footprint of shrimp trawling on benthic habitats by not allowing the fishery to expand into new coral areas.

The assessment team set the aforementioned Condition related to habitat. It should be noted that the MSC require that Conditions follow the narrative or metric of the Performance Indicators and Scoring Guideposts and do not prescribe how the client shall achieve the Condition. On occasions however, the assessment team may provide an indication or recommendation to the client on how they may meet the Condition.

Recommendation 5 - Require the completion of a study on damage to snowcrabs during the springtime when crabs are molting.

The assessment team is aware that three DFO research studies (summarized by Gilkinson et al. 2006) attempted to demonstrate an impact of prawn trawling on snowcrab. All three studies were not able to show any substantial snowcrab mortality or damage from prawn trawling. Two areas in snowcrab fishing habitat have been closed to shrimp trawling to reduce potential damage to the snow crab resource (Hawke Channel; Funk Island deep).

Atlantic Canada Chapter
Sierra Club of Canada
53 Warbury Street
St. John's, Newfoundland
A1E 1N9

27 August 2009

Paul Knapman
Moody Marine Limited
28 Fleming Drive
Halifax, Nova Scotia
B3P 1A9

Dear Sir:

We write in response to your advertisement appearing in *The Telegram* August 22, 2009 re: Marine Stewardship Council Assessment, Canadian Association of Prawn Producers and the Northern Coalition, Northern and Striped Shrimp Fishery.

Our organization, the Sierra Club of Canada has a long standing policy to conserve and protect marine environments. Following from that position we consult and work with independent ocean scientists based in Canada and elsewhere, using the best scientific information available to advocate for healthy, abundant, and bio-diverse marine environments. We see these as the foundation for maintaining healthy sustainable fisheries.

Over the past few years we have worked with Dr. Richard Haedrich (deep-sea ocean habitat specialist) and Dr. Evan Edinger (cold-water corals specialist) and their teams of graduate students based at Memorial University in St. John's. Through a collaborative process they were able to identify certain Vulnerable Marine Ecosystems(VMEs) situated along the eastern edge of the Northwest Atlantic Continental Shelf. These VMEs contain high concentrations of cold-water corals and from historical data have been identified as areas of abundance and bio-diversity for both commercial and non-commercial species.

Protection for these areas, ie. no human activity aside from baseline scientific monitoring would permit rejuvenation and restoration of abundance and bio-diversity. Elsewhere in the planet's oceans such protections have often led to significant recoveries resulting in upwellings of species into other areas of the shelf and restoration of migration patterns for mobile fish stocks.

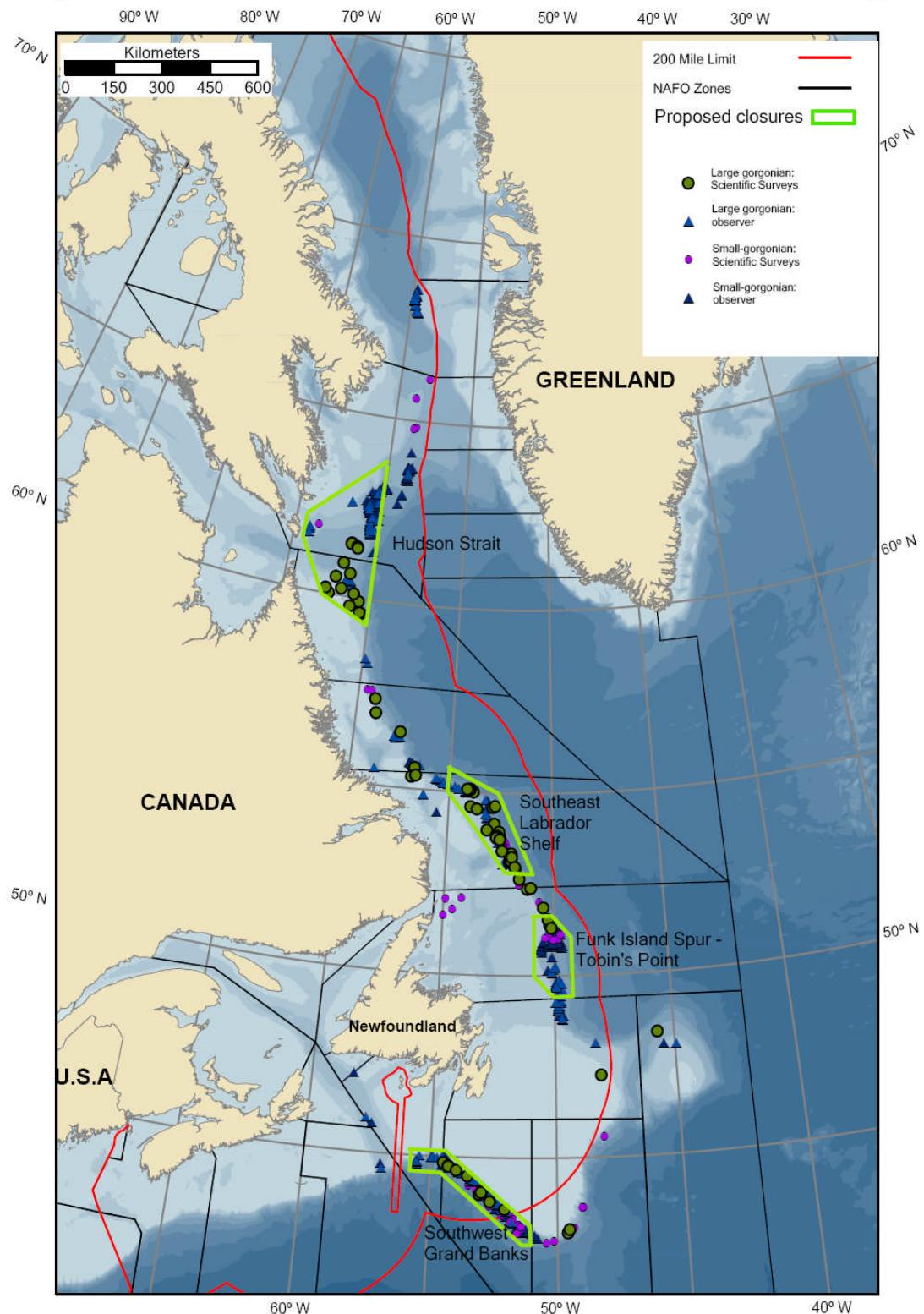
The Sierra Club would like to see similar recovery occur off Labrador and Newfoundland. We recommend that the areas identified through the scientific research be closed. Small, specific, well known and recognized shrimp trawling areas outside the aforementioned zones should be set aside for shrimp trawling. These can be identified from examining fishing log books and fisheries observer records and should be much easier to manage. Fishing technologies other than mid-water trawling should be investigated for fishing shrimp as in some areas of the North-west Atlantic using traps or pots to catch shrimp has enjoyed some success.

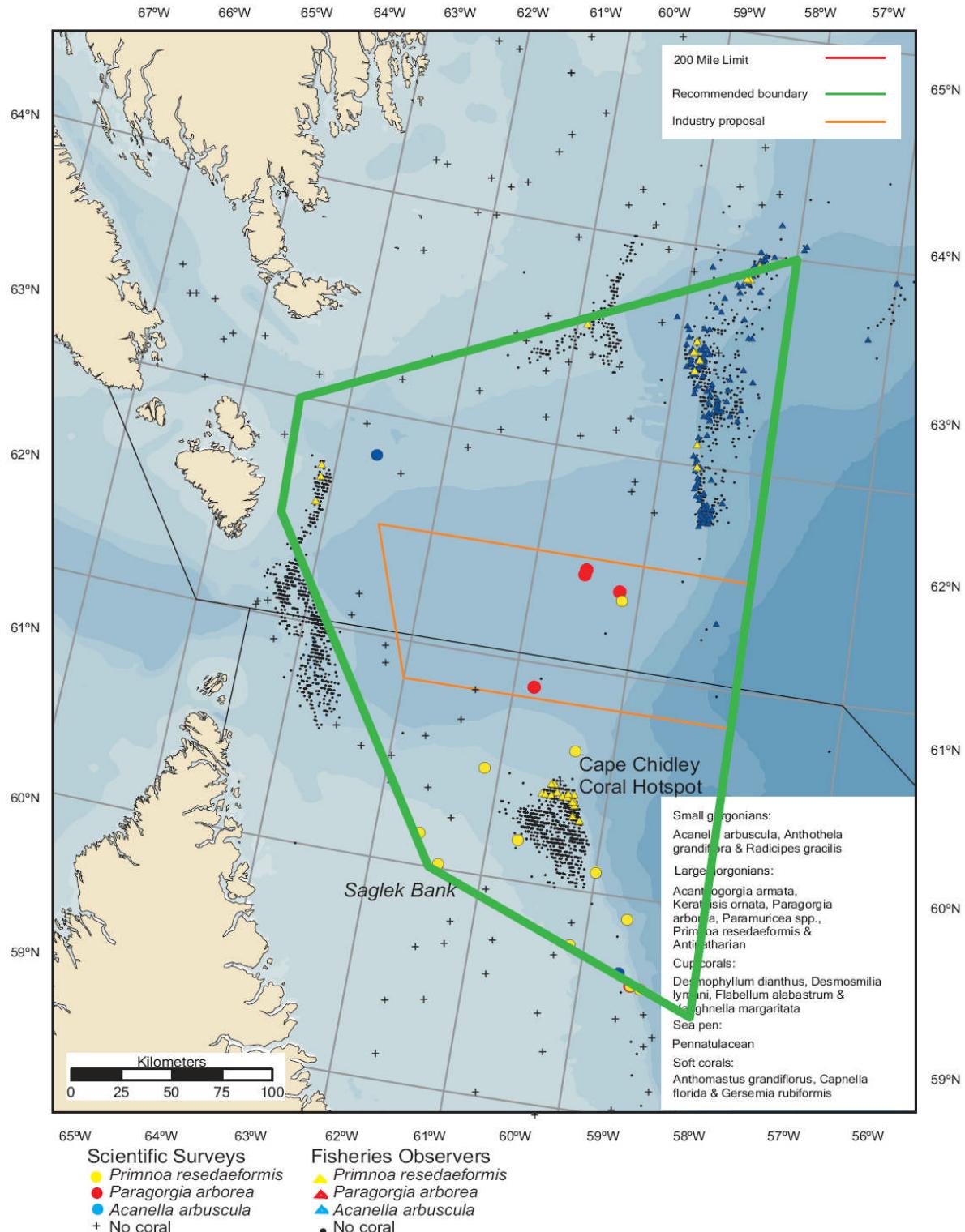
Please find attached maps outlining areas identified as being Vulnerable Marine Ecosystems. If you wish further supporting data please feel free to contact myself or Gretchen Fitzgerald, Director, Atlantic Canada Chapter, Sierra Club Canada, Halifax, Nova Scotia; tel. 1-902- 444-3113.

Sincerely

Fred Winsor PhD. (Northwest Atlantic fisheries history)
St. John's, Newfoundland

Proposed closures to protect Vulnerable Marine Ecosystems: Deep-sea Corals in the Newfoundland and Labrador Region





15.2 Moody Marine Assessment Team Response to the Sierra Club of Canada Recommendations

In their submission the Sierra Club recommend that, “...*the areas identified through the scientific research [concentrations of cold water corals] be closed. Small, specific, well known and recognized shrimp trawling areas outside the aforementioned zones should be set aside for shrimp trawling. These can be identified from examining fishing log books and fisheries observer records and should be much easier to manage. Fishing technologies other than mid-water trawling should be investigated for fishing shrimp as in some areas of the North-west Atlantic using traps or pots to catch shrimp has enjoyed some success.*”

The assessment team considered cold water corals under the three Performance Indicators associated with habitat:

- PI 2.4.1 is an ‘Outcome’ Performance Indicator that considers the status of the impact or the risk that the fishery poses to habitat;
- PI 2.4.2 is a ‘Management Strategy’ Performance Indicator that considers the basis, reliability and implementation of the management strategy for habitat; and
- PI 2.4.3 is an ‘Information’ Performance Indicator that considers the nature, extent, quality and reliability of the monitoring and information that is relevant to habitat in: (i) developing and implementing the management strategy and (ii) measuring the outcomes of the strategy.

All three Indicators were scored below 80. As a result the assessment team set a single Condition that covers each of the scoring issues that were considered to be deficient. This Condition requires the client to ensure by the fourth annual audit information is compiled and assessed, a strategy developed, and measures taken, such that it can be confirmed that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.



4/3/2011

Sent via eCert

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SUBJECT: MSC Review and Report on Compliance with the scheme requirements

Dear Paul Knapman

Please find a below the results of our partial review of compliance with scheme requirements.

CB	Moody Marine Ltd
Lead Auditor	Paul Knapman
Fishery	Canada offshore northern and striped shrimp
Fishery Assessment Product Type	Public Comment Draft Report Posted
Type of Review	Desk Study

No.	Type of Finding	Scheme Requirement	Requirement Description	Report Reference	Description and Evidence of non-conformity

1	Major	FCM	3.4.3	...the CB shall advise the client that mandatory action will need to be taken...	striped shrimp - P. 57, Conditions 1 and 2; northern shrimp SFA 1 - P. 49-50, Conditions 1 and 2; northern shrimp SFA 2-6 - P. 56, Conditions 1 and 2; northern shrimp SFA 7 - P. 57-58, Conditions 1, 2, and 3	The stated conditions include 'recommended' actions that should be stated as mandatory because some of the recommended text directly pertain to PIs that scored below 80. Currently the recommendations address specific PIs that actually require a condition statement. If it's a recommendation, it isn't enforceable. (For example with striped shrimp, Condition 1: the first part only addresses 2.4.1. 2.4.3 is addressed under recommendation a, and 2.4.2 relates to recommendations b and c. The condition needs to be reworded to cover all three PIs.) To ensure clarity and completeness, it is suggested that the CB split the conditions so there is one condition for each PI.
2	Major	TAB	D-015 v2: 2.4	The assessment team shall base their assessment on the rationale and scores detailed for the previously scored fishery. Any difference in the scores shall be clearly detailed and justified in the scoring rationale for all relevant performance indicators.	northern shrimp SFA 1 - P. 44; northern shrimp SFA 2-6 - P. 5 and 50; northern shrimp SFA 7 - P. 5 and 51	Harmonisation with MSC certified fisheries (e.g., Canada northern prawn) must be considered. The text provided is insufficient to explain whether this assessment complies with TAB D-015v2, Section 2.4. Particularly where differences occur in conditions assigned to these fisheries, justification must be provided in scoring rationales.

3	Major	FCMv6	Appendix 1: 5.2	The report shall set out the scope of the fishery assessment in the context of the assurances the certification body can make about the point to which products from the fishery can be traced.	All UoCs - Section 13.2	As per section 2.1 it is possible that further companies/vessels may join the client group. This section does not provide information on how the list of vessels that are eligible to land <i>P. boralis</i> or <i>P. montagui</i> , also shown in Table 3 section 6.1, will be updated if this were the case and where the information is kept.
4	Major	FCMv6	Appendix 1: 5.2	The report shall set out the scope of the fishery assessment in the context of the assurances the certification body can make about the point to which products from the fishery can be traced.	All UoCs - Section 13.4	This section does not state the names of the ports or a reference to where a list of the ports can be found. The first sentence of this section contradicts section 13.2 because it states that appropriate recording and monitoring of landings may take place. This implies that some ports do not follow the fisheries management requirements such as clear identification of species, quantity, fishing method and area of capture by all vessels landing fish from the fishery.
5	Major	TAB	D-021: 4	The target eligibility date shall be included in the traceability section of the Public comment draft report.	All UoCs - Section 13.6	This section does not contain the target eligibility date and the text provided does not correspond with the requirements.

6	Major	TAB	D-021: 4	The fishery CB shall document their rationale for the date specified and include an assessment regarding how the risks to the traceability system in the fishery are adequately addressed by the client to give confidence in this date.	All UoCs - Section 13.4	The rationale for the date specified and an assessment regarding how the risks to the traceability system in the fishery are adequately addressed are not given.
7	Major	FCMv6	3.4.8	The CB shall consult with all relevant entities when setting conditions, if those conditions are likely to require investment of time or money by these entities, or changes to management arrangements or regulations, or re-arrangement of research priorities by these entities, in order to satisfy the CB that the conditions are both achievable by the certification client and realistic in the time frame specified.	striped shrimp - P. 56-58; northern shrimp SFA 1 - P. 49-51; northern shrimp SFA 2-6 - P. 55-57; northern shrimp SFA 7 - P. 56-58	No evidence is provided showing that external parties have been consulted on conditions that require external commitment.

8	Major	TAB	D-003	Principle 1: The Standards Council agreed that Principle 1 applies to the whole of the fish stock(s) exploited by the fishery seeking certification. So a fishery could only pass if the whole fish stock(s) meet this standard, and it would not pass if the standard was not met irrespective of who was responsible for the stock not meeting the standard.	striped shrimp - P. 65-68	Scoring rationale is not justified because P1 deals with the entire stock, including management of it that may not relate to the client. Greenland's portion of the catch does not appear to be considered because "This report is intended to assess the Canadian harvest strategy." Additionally, the rationale provided states "The lack of a stock-wide harvest strategy based on a bilateral agreement between Canada and Greenland remains a potential source of concern."
9	Guidance				northern shrimp SFA 2-6 - P. 49; northern shrimp SFA 7 - P. 50	Expert Advisor P2: error with insertion of name.
10	Guidance				All UoCs - Section 13.2	The companies are not identified in 1.1 as suggested in this section of the report.
11	Guidance	PA	5v2: 5	e. What are the traceability risks associated with each category of at-sea processing operation undertaken? How is this risk mitigated?	All UoCs - Section 13.3	This section does not contain a risk assessment on traceability associated with the type of processing operation.

12	Guidance			striped shrimp - P. 56; northern shrimp SFA 1 - P. 49; northern shrimp SFA 2-6 - P. 55; northern shrimp SFA 7 - P. 56	The 'Ecosystem' component should be referred to as such in the summary tables, not as 'Trophic Function'.
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This report is provided for action by the Certification Body and ASI in order to improve consistency with the MSC scheme requirements; MSC does not review all Certification Bodies work products and this review should not be considered a checking service. If any clarification is required, please contact Jodi Bostrom on +44 (0)20 7811 3335 for more information.

Regards,



Maylynn Nunn

Senior Fishery Certification Manager (Acting)
Standards and Licensing Department

cc: Accreditation Services International

15.3 Moody Marine and Assessment Team Response to the MSC Comments

Finding No.	MML and Assessment Team Comment
1	Conditions 1 and 2 have been separated into their component PIs resulting in a separate condition for each PI.
2	Further detail has been added in sections 1, 2 14.2 and within the scoring table in Appendix A with respect to harmonising with the existing certified overlapping fishery.
3	Clarification on how the eligible vessel list will be updated if new vessels or client group members were to join the client group has been added in sections 2.1 and 13.2.
4	The names of the ports where landing takes place has been included in section 13.4 along with clarification on the recording and monitoring of landings.
5	The target eligibility date has been included with further clarifying text in section 13.6.
6	The rationale for the target eligibility has been included and comment on the risks to the traceability system provided in section 13.4.
7	Additional text and Appendix H has been included to show that external parties have been consulted on conditions that require external commitment.
8	MSC comment does not apply to this UoC.
9	Comment noted and text amended.
10	Comment noted and text amended.
11	Comment noted and text amended.
12	Comment noted and text amended.

Atlantic Canada Chapter
2011
Sierra Club Canada
53 Warbury Street
St. John's, Newfoundland

14 March

Paul Knapman
Moody Marine
99 Wyse Road
Dartmouth, Nova Scotia

Re: Comments Draft Reports for the Offshore Northern and Striped Shrimp Fisheries

While research on marine life and marine environments has been conducted for decades there is still much to learn about the marine ecosystems and non-commercial species in the proposed fishing area.

Sections of the area have been extensively overfished for groundfish and pelagics during the past few decades. Shark and other top predator populations have been severely decimated dating back to the late 1950s and show little or no sign of recovery. Some of this is evidenced by the explosion of the major prey of sharks - the seal populations of the North-west Atlantic. Similarly, coastal state (Canada and Denmark/Greenland), and regional fisheries management organization(NAFO) efforts at recovery of these predator populations have produced minimal results.

In the proposed fishing region, only one relatively small area has been set aside as a “no take” zone mainly because the high concentrations of corals and sponges found there. Other areas in the same vicinity have significant cold water coral populations but they have been left open as fishing grounds. No areas have been set aside to permit migrations of marine mammals or top predators. Similarly no areas have been set aside to permit recovery of other previously decimated commercial stocks or to permit recovery of previously overfished and now environmentally degraded ocean habitats.

It appears the Canadian fisheries management practice “risk management” remains in place as opposed to the internationally accepted “precautionary approach.” The former has functioned as a major component of Canadian fisheries management for many decades. Over that time few, if any, commercial fish stocks using the risk management approach have been able to reach or maintain robust, sustainable abundance levels. Similarly the notion that commercial species relegated to by-catch status will somehow recover on their own is at best, highly problematic. The record over the past five decades shows very clear that few if any commercial species with designated “by-catch” protection status have ever recovered to previous robust sustainable levels. Closer observation reveals that commercial stocks showing signs of improved recruitment and recovery are often quickly decimated because they are captured as by-catch in other directed fisheries. In the case of the NS shrimp fishery, NAFO & DFO documents on the fishery off NL and NS report bycatch of groundfish species (e.g. **NAFO SCR Doc. No. 10/45**, DFO CSAS **Research Document 2006/090** attached) - some of which are endangered or under moratoria - and a DFO study in the Gulf of St. Lawrence has shown that fishermen commonly see coral bycatch in shrimp tows (attached).

While there is much discussion about the precautionary approach and Canada's commitment to incorporate it into its fisheries management policies, little has occurred in management practice. Even the recently touted Sustainable Fisheries Framework (SFF), with its Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas, still espouses the risk management notion that exploratory frontier fishing will do little harm. This is simply a denial of the previous outcomes using risk management and of the environmental damage wrought from bottom trawl overfishing over the past six decades. The notion that we can carry on and use the same destructive management practices we have employed before and expect different results falls within Albert Einstein's definition of what constitutes insanity.

The best available ocean habitat science clearly indicates the need set aside very specific areas as fishing zones and to close other

sensitive areas to all fishing activity to provide protection for endangered and decimated species to recover. The North-west Atlantic like any other ocean is a natural system. If specific vulnerable ecosystems are protected and left alone, restoration, recovery, and maintenance of robust marine ecosystems will occur. Ignoring that will only contribute to further environmental degradation of vulnerable marine ecosystems in the area. These function as life generating cornerstones in the North Atlantic. Creating a new sustainable fisheries management regime which is a true departure from the unsustainable fishing and management practices of the past can produce healthy sustainable oceans and healthy sustainable commercial fisheries.

In the meantime, the credibility of the Marine Stewardship Council is being called into question by some of the world's top fisheries scientists (Jacquet, J., Pauly, D., Ainley, D., Holt, S., Dayton, P. and Jackson, J. 2010. *Seafood stewardship in crisis.* *Nature*. 467, 28-29 (2 September 2010) | doi:10.1038/467028a; Published online 1 September 2010, attached . The listing of this fishery, with its known impacts on deep sea habitats, expanding footprint into formerly untouched marine habitats, and impact bycatch species should give pause to assessors wishing to improve the reputation of the MSC process.

However Canada and its fishing industry need to come to terms with the thinking and assumptions which brought about its collapse in the first place. To date this has not occurred. Consequently we cannot see how the present fishing plan for Northern Shrimp can be regarded as sustainable within the context of the principles and goals of the Marine Stewardship Council.

Sincerely

Fred Winsor
Conservation Chair
Atlantic Canada Chapter
Sierra Club Canada
St. John's, NL

15.3.1 Moody Marine and Assessment Team Response to the Submission by the Sierra Club of Canada.

The submission was received via email on 16th March 2011. The closing date for submissions was 7th March 2011. The submission has been appended to the report and it has been considered in the context of our request for stakeholder comment on: (1) the factual content of the report, either in relation to specific scoring indicators or sections in the body of the report; and, (2) any recommendations or criticisms supported with data or literature citations that the assessment team would be able to evaluate. The submission does not contain comment on the content of the report nor specific points of contention with its conclusions, and so, neither Moody Marine nor the assessment team have provided a response to this submission.

APPENDIX E

A table showing the relationship between the Performance Indicators used in the CAPP/NC assessment, i.e. the MSC default assessment tree, and the Performance Indicators used in Association of Seafood Producers (ASP) assessment of for the Northern shrimp fishery in SFA 5, 6 & 7.

FAM Assessment Tree				Moody Marine Assessment Tree
Principle	Component	Performance Indicator		Performance Indicator
1	Outcome	1.1.1	Stock status	1.1.3.4,
		1.1.2	Reference points	1.1.3.2, 3A.6.2
		1.1.3	Stock rebuilding	1.1.4.1
	Management	1.2.1	Harvest strategy	1.1.3.3, 1.1.3.6
		1.2.2	Harvest control rules & tools	1.1.3.7, 1.1.3.8
		1.2.3	Information & monitoring	1.1.1, 1.1.1.2, 1.1.1.3, 1.1.1.4, 1.1.1.5, 1.1.1.6, 1.1.1.7, 1.1.2.1, 1.1.2.2, 1.1.2.3, 1.3.1.1, 1.3.1.2, 3B.6.1
		1.2.4	Assessment of stock status	1.1.3.1, 1.1.3.5
2	Retained species	2.1.1	Outcome	2.3.1.3,
		2.1.2	Management	2.3.1.2, 3B.1.1
		2.1.3	Information	2.1.1.2, 2.1.2.1,
	Bycatch	2.2.1	Outcome	2.3.1.3,
		2.2.2	Management	2.1.2.2, 3B.1.1
		2.2.3	Information	2.1.1.2,
	ETP species	2.3.1	Outcome	2.2.1.3,
		2.3.2	Management	2.2.2.1
		2.3.3	Information	2.2.1.1, 2.2.1.2,
	Habitats	2.4.1	Outcome	2.1.3.1,
		2.4.2	Management	2.1.4.3, 3B.2.1
		2.4.3	Information	2.1.1.1,
	Trophic function	2.5.1	Outcome	2.1.3.2, 2.1.4.4,
		2.5.2	Management	2.1.4.5,
		2.5.3	Information	2.1.1.3, 2.1.1.4, 2.1.2.3, 2.1.4.1, 2.1.4.2,
	Governance and	3.1.1	Legal & customary framework	3A.1.1, 3A.1.2, 3A.2.1, 3A.2.2, 3A.2.3

3	policy	3.1.2	Consultation, roles & responsibilities	3A.3.5, 3B.5.1,
		3.1.3	Long term objectives	3A.3.1, 3A.3.2, 3A.3.3, 3A.7.1,
		3.1.4	Incentives for sustainable fishing	3A.4.1, 3A.4.2
		3.2.1	Fishery specific objectives	3A.6.2, 3A.7.2
	Fishery specific management system	3.2.2	Decision making processes	3A.3.6, 3A.6.3
		3.2.3	Compliance & enforcement	3A.8.1, 3A.8.2, 3A.8.3, 3B.3.1, 3B.4.1, 3B.5.2, 3B.5.3
		3.2.4	Research plan	3A.5.1, 3A.5.2, 3A.5.3,
		3.2.5	Management performance evaluation	3A.1.3, 3A.1.4, 3A.3.4,

APPENDIX F

**Registered companies / vessels within Unit of Certification:
eligible to sell MSC certified product**

Licence Holder (No. of Licences)	Vessel	Vessel Owner
Labrador Fishermen's Union Shrimp Co. Ltd. (2)	Labrador Storm	Labrador Fishermen's Union Shrimp Co. Ltd.
Ocean Choice Intl. Inc. (2)	Newfoundland Lynx/Katsheshuk II	Ocean Choice International Inc.
Mersey Seafoods Ltd. (2)	Mersey Venture Mersey Phoenix	Mersey Seafoods Ltd.
Lameque Offshore Ltd. (1)	Northern Eagle	M.V. Osprey Ltd.
Crevettes Nordiques Ltee ^{6[1]} (1)	Atlantic Enterprise	Clearwater Seafoods L.P./ Ocean Prawns Canada Joint Venture
Atlantic Shrimp Co. Ltd. ^{7[2]} (1)	Atlantic Enterprise	Clearwater Seafoods LP/ Ocean Prawns Canada Joint Venture
Torngat Fish Producers Coop Society Ltd. (1)	Mersey Phoenix Mersey Venture	Mersey Seafoods Ltd.
Caramer Ltd. (1)	Acadienne Gale II	Davis Strait Mgt. Ltd.
Makivik Corp. (1)	Newfound Pioneer	Newfoundland Resources Ltd.
Pikalujak Fisheries Ltd. (1)	Ocean Prawns	Ocean Prawns Canada Ltd.
Qikiqtaaluk Corporation (1)	Saputi	Qikiqtaaluk Corporation
Harbour Grace Shrimp Co. (1)	Ocean Prawns	Ocean Prawns Canada Ltd.
Unaaq Fisheries Inc. (1)	Arctic Enterprise	Clearwater Seafoods L.P./ Ocean Prawns Canada Joint Venture
Newfound Resources Ltd. (1)	Newfound Pioneer	Newfound Resources Ltd.,

^{6[1]} Wholly owned subsidiary of Clearwater Seafoods Limited Partnership

^{7[2]} Ibid

APPENDIX G

Confirmation of Client Certificate Sharing Agreement

CANADIAN ASSOCIATION OF PRAWN PRODUCERS

1362 Revell Drive, Manotick, Ontario, K4M 1K8 · Tel: (613) 692-8249 Fax: (613) 692-8250 Email: bchapman@sympatico.ca

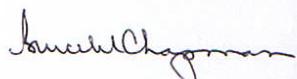
June 22, 2009

Paul Knapman
North America Regional Manager
Moody Marine Ltd.
28 Fleming Drive
Halifax, N.S.
B3P 1A9

Dear Mr. Knapman:

With respect to the proposed MSC certification of the offshore shrimp fisheries in the designated areas, this will confirm that other eligible parties will be accepted as participants in the fisheries certification based on an equitable sharing of costs associated with obtaining and maintaining the fisheries certificate.

Sincerely,



Bruce Chapman
Executive Director

APPENDIX H

Letter of Support from Department of Fisheries Oceans, Canada



Fisheries and Oceans Canada Pêches et Océans Canada

JAN - 4 2011

Mr Bruce Chapman
Executive Director
Canadian Association of Prawn Producers
1362 Revell Drive
Manotick, Ontario
K4M 1K8

Your file Votre référence

Our file Notre référence

Dear Mr Chapman

Thank you for submitting your revised Client Action Plan for Marine Stewardship Council (MSC) Certification of the Canadian Offshore Shrimp Fishery (dated November 24, 2010) and for considering the suggestions and recommendations of Fisheries and Oceans Canada in your revision.

I am pleased to confirm that after having addressed the concerns of the Department, we are supportive of your Client Action Plan to address the conditions of certification by the Marine Stewardship Council.

I am also aware that you recently met with representatives of the Department to format a collaborative work plan towards implementing the Action Plan. The Department, as much as possible, and in keeping with established work plans and priorities, will assist you to meet the conditions of your MSC Certification requirements. However, in this time of fiscal constraint, the Department is limited in terms of resources that can be dedicated to assisting with implementation of the Action Plan. We would encourage you to consider hiring a consultant to help deliver on the Action Plan in the prescribed timelines.

Please continue to contact Heather Bishop (709-772-2920) for assistance and/or direction as required. I wish you every success in your progress towards certification.

Sincerely,

Barry Rashotte
Director General
Resource Management

cc. D. Balfour, A/SR.ADM – Ecosystems and Fisheries Management
J.W Baird, RDG, Newfoundland and Labrador Region
R. Lambe, RDG, Central and Arctic Region
M. Knight, RD, Fisheries and Aquaculture Management, Newfoundland and Labrador Region

Ottawa, Canada
K1A 0E6

Canada