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MSC Assessment Report for

**The Canadian Offshore Striped Shrimp (*Pandalus montagui*)
Trawl Fishery - Shrimp Fishing Area 2, 3 and 4**

**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) Striped Shrimp Trawl Fishery in Shrimp Fishing Areas 2, 3 and 4 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 SFAs 2-6; and
- *P. borealis* in SFA 7.

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

1.1 Scores of the Principles

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

Principle 1: 80.0

Principle 2: 81.3

Principle 3: 87.0

1.2 The main strengths of the fishery

- 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.
- The management system exists within an appropriate and effective legal and/or customary framework.
- 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.
- 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 - so as 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. Information is adequate to broadly understand the functions of the key elements of the ecosystem.

- ii. Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but may not have been investigated in detail.
 - iii. The main functions of the Components (i.e. target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known.
 - iv. 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.
 - v. 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 Striped Shrimp (*Pandalus montagui*) Trawl Fishery in Shrimp Fishing Areas 2, 3 and 4 (SFAs 2, 3, 4) 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 SFA 1
- *P. borealis* in SFAs 2-6; and
- *P. borealis* in SFA 7;

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.

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:	Striped Shrimp (<i>Pandalus montagui</i>)
Geographical Area:	Shrimp Fishing Areas 2, 3 and 4 (SFA 2, 3 and 4)
Method of Capture:	Trawl
Management System:	Department of Fisheries and Oceans, Canada
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 F) 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 Newfoundland 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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- Aschan, M. and Ingvaldsen, R. 2009. Recruitment of shrimp (*Pandalus borealis*) in the Barents Sea related to spawning stock and environment. Deep Sea Research Part II: Topical Studies in Oceanography, 56: 2012-2022.

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- Bowering, W. R. and D. C. Orr 2004. By-catch of Greenland halibut (*Reinhardtius hippoglossoides*, Walbaum) in the Canadian fishery for northern shrimp (*Pandalus borealis*, Koyer) in NAFO Subarea 2 and Divisions 3KL. NAFO SCR Doc. 04/67: 18 pp.
- Brodie, W., 1996. A description of the 1995 fall groundfish survey in Division 2J3KLMNO. NAFO SCR. Doc.96/27, Ser.No.N2700. 7p
- Clark, S. H., S. X. Cadrin, D. F. Schick, P. J. Diodati, M. P. Armstrong and D. McCarron 2000. The Gulf of Maine northern shrimp (*Pandalus borealis*) fishery: a review of the record. *J. Northw. Atl. Fish. Sci.* 27: 193-226.
- C-NOPB 2003. Orphan Basin Strategic Environmental Assessment. Canada-Newfoundland Offshore Petroleum Board, St. John's. 244 pp.
- C-NOPB 2008. Strategic Environmental Assessment – Labrador Shelf Area. Canada-Newfoundland Offshore Petroleum Board, St. John's. 519 pp + appendices.
- COSEWIC 2009. COSEWIC assessment and status report on the American Plaice *Hippoglossoides platessoides*, Maritime population, Newfoundland and Labrador population and Arctic population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 74 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
- COSEWIC 2010a. COSEWIC assessment and status report on the Atlantic cod *Gadus morhua* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 105 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
- COSEWIC 2010b. COSEWIC assessment and status report on the Deepwater Redfish/Acadian Redfish complex, *Sebastes mentella* and *Sebastes fasciatus*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 80 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
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- DFO 2007a. DRAFT Northern Shrimp Integrated Fisheries Management Plan, shrimp fishing areas (SFAs) 0-7, Flemish Cap. Effective January 2007. Resource Management Operations, Fisheries and Oceans Canada. Cat.N° XXX/2003
- DFO 2007b. Scotian Shelf (*Pandalus borealis*) Integrated Fisheries Management Plan. Scotia-Fundy Sector, Maritimes Region. 2007-2011. Fisheries and Aquaculture Management, Maritimes Region. Fisheries and Oceans Canada. DFO/2006-1140.
- 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 2008a. Assessment of divisions 2G-3K Northern shrimp. Can. Sci. Advis. Sec. Science Advisory Report 2008/08. 22pp.
- DFO 2008b. Assessment of northern shrimp (*Pandalus borealis*) and striped shrimp (*Pandalus montagui*) in shrimp fishing areas 0, 2 and 3. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2008/018.
http://www.dfo-mpo.gc.ca/CSAS/Csas/Publications/SAR-AS/2008/SARAS2008_018_E.pdf
- DFO 2008c. Proceedings of the Precautionary Approach Workshop on Canadian Shrimp and Prawn Stocks and Fisheries, November 26-27, 2008, Ottawa, Ontario. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2008/031.
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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) 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 1.

P. montagui is a target species in SFA 3 and taken as bycatch in the fishery targeting *P. borealis* in SFAs 2 and 4

4.2 Biology of the Target Species

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. montagui is a protandrous hermaphrodite, meaning that it matures as a male at age 1-2, mates as a male for one or two years before changing sex and then spending the rest of its lifespan as a female. Some individuals in the southernmost distribution area may perform as females in the first year. The shrimp spawn in autumn and the female carries the eggs until April when they hatch, and the pelagic larvae are released (Bergström 2000). The larvae will spend the approximately 1-2 months in the pelagic before they settle. It is assumed that *P. montagui* in SFA 2-4 belong to the same stock, but no studies on genetics or larval transport has been conducted. Allen (1963) working on the Northumberland coast identified an offshore migration among 1-2 year old shrimp, but this was under very different ecological conditions in the eastern Atlantic. Crawford et al. (1992) studied the horizontal and vertical distribution of *P. montagui* near Resolution Island in eastern Hudson Strait and found that the shrimp performed vertical migration following the zooplankton up to 200m above the bottom at night. Downward migration was observed during early daylight hours.

It is assumed that *P. montagui* has the same biology as *P. borealis*. The recruitment of one year old Pandalids 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 bloom (Aschan and Ingvaldsen 2009; Koeller et al. 2009a). Intuitively the relationship between parent stock and recruitment seem obvious. However empirical studies have demonstrated considerable difficulties in finding simple relationships between the size of the parent stock and the strength of recruitment. Stock-recruitment relationships in *Pandalus* are no exception in this respect. One reason is that the recruitment indices used 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. Studies using 1-year-old shrimp reveal direct

dependence on spawning stock biomass (Aschan and Ingvaldsen 2009, Ouellet et al. 2007). 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).

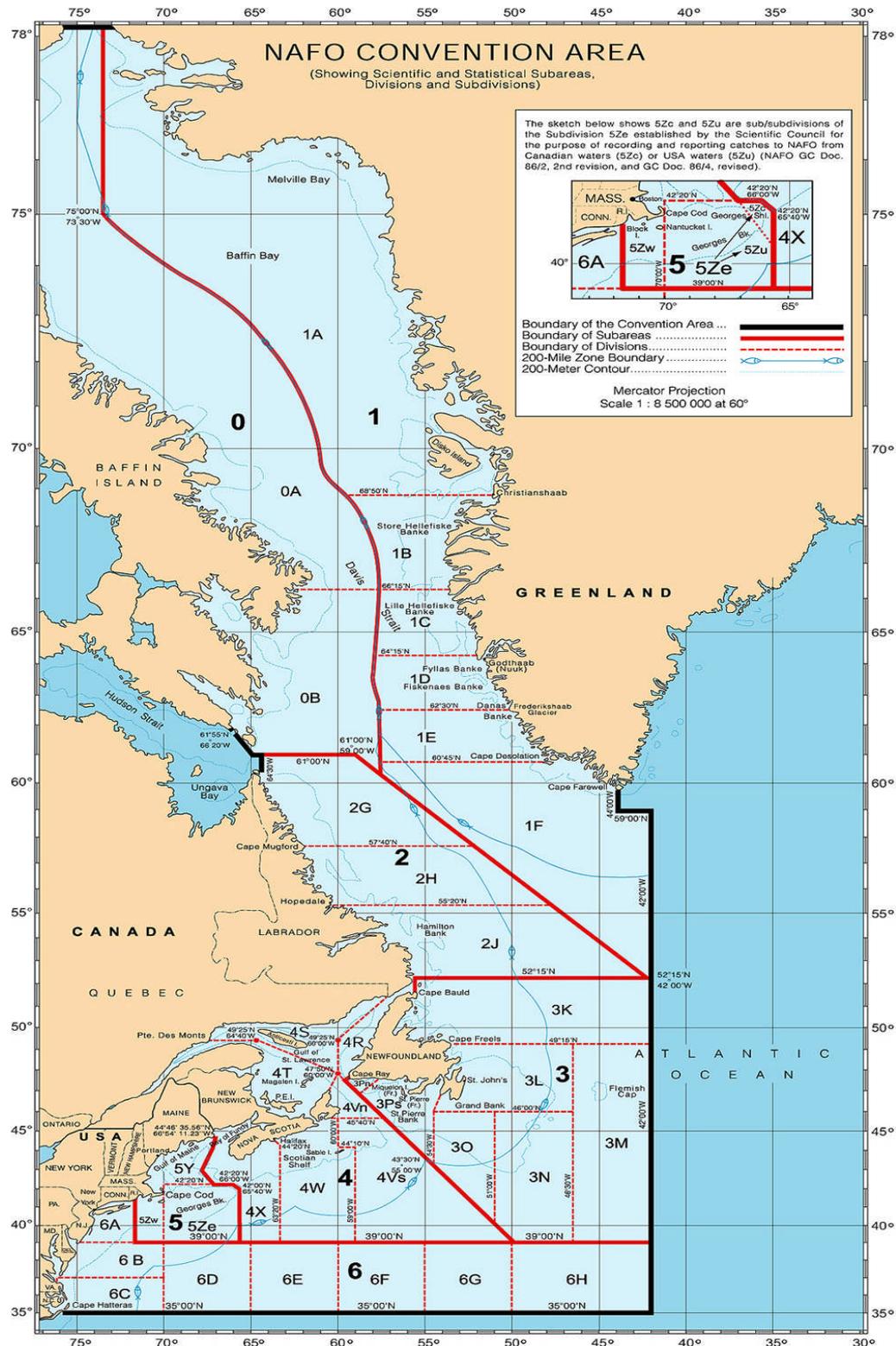


Figure 1: The Northwest Atlantic Fisheries Organisation (NAFO) Convention Area

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

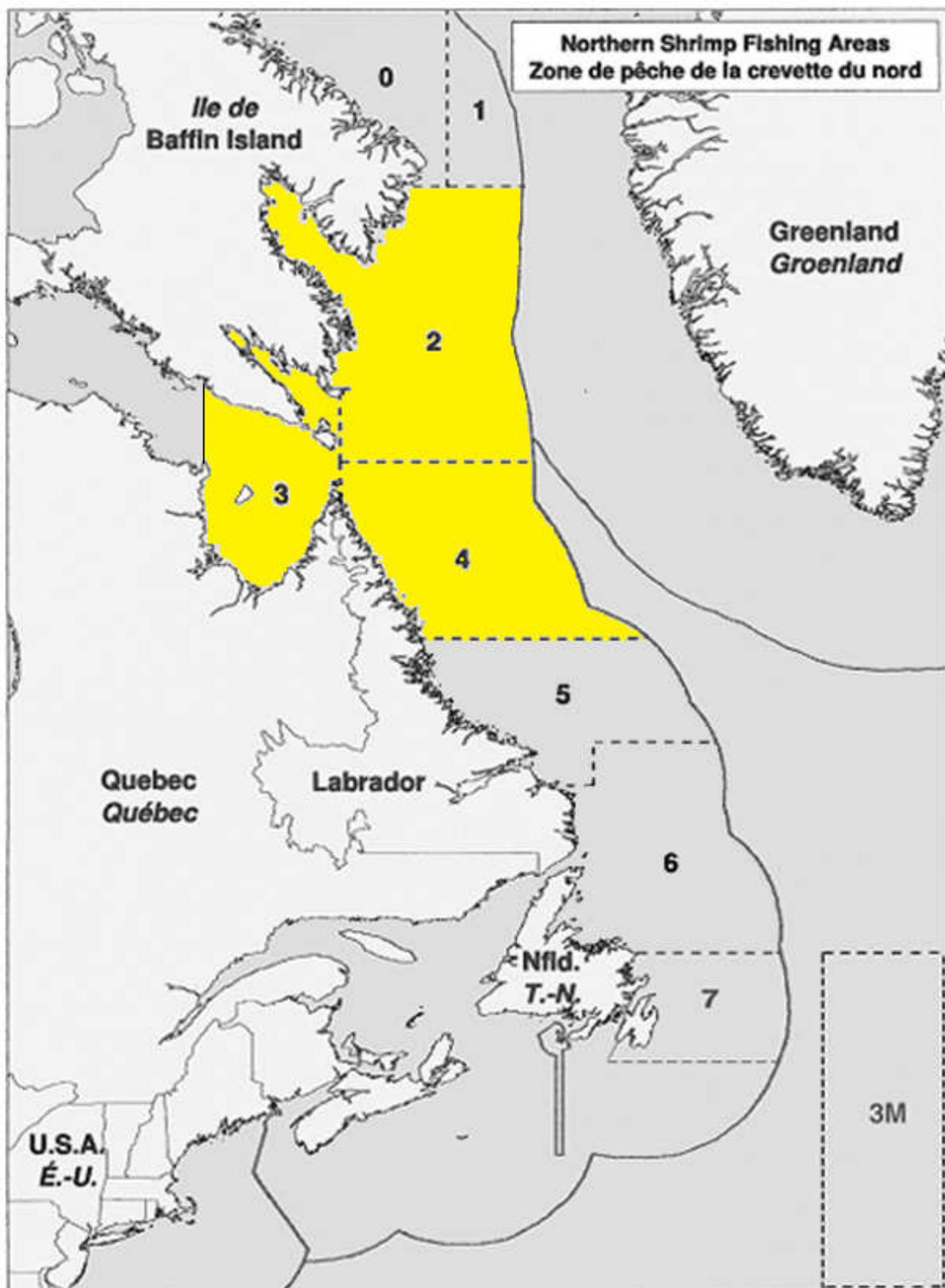


Figure 2: Shrimp Fishing Areas 0-7.

3.3 History of the Fishery

The fishery for *P. montagui* has a complex history, as a result of intermittent or variable interest in exploiting this species, establishment of new exploratory and commercial regulatory areas over time, and related to the overall development of the fishery for northern shrimp in northern Canada. The highest quantities of *P. montagui* are found in water shallower than 400 m, however, shrimp densities are variable both within areas and years. Because of the intermittent interest in this species, surveys and assessments of status have only been conducted recently. Assessment of stock status is subject to uncertainties due to short survey time series, patchy distributions, and strong currents in the survey areas (DFO 2009, IFMP).

P. montagui is primarily a by-catch species in the Northern shrimp (*P. borealis*) fishery in SFAs 2 and 4. There was previous interest in a targeted fishery in the Nunavut Settlement Area (NSA) portion of SFA 3, but there has been little or no fishery in this area in recent years.

During the development phase of the northern shrimp fishery from the mid-1970s, the main development occurred in the Northern areas when vessels from Newfoundland discovered shrimp concentrations along the Labrador coast in Hawke Channel (SFA 6), Hopedale and Cartwright Channels (SFA 5), as well as north to Davis Strait (SFAs 4 to 1) when ice conditions permitted. Limited entry licensing and TACs were introduced. After 1986 markets improved, and the groundfish by-catch issue was significantly reduced by the voluntary introduction in of the Nordmore groundfish separator grate. The grate became mandatory in the Scotian Shelf area in 1991, and in the Northern fishery in 1997 (DFO 2007a, 2007b).

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, allowing more fishing effort and landings by traditional licence holders. In the SFAs 2, 3, 4 west of 63°W quota area, special allocations were made to Nunavut, none of which have been made permanent.

A targeted fishery for *P. montagui* started in SFA 3 in the late 1970s when the TAC was 100 t. The annual catch subsequently increased, exceeding 1,000 t in 1987 and reaching 3,369 t in 2002. The catch subsequently declined rapidly to 1,000-2,000 t/yr from 2003; the catch in 2010 is likely to be a few hundred tons (Fig. 3). *P. borealis* is the preferred species and the recent decline is reportedly due to the ability of vessels to find clean *P. borealis* catches.

P. montagui is assessed in the fishing area "SFA 2, 3, 4 west of 63° W" (DFO 2010/024). Between 1996 and 2001 there was a 1,200 t quota but a 3,800 t catch limit for *P. montagui* in SFA's 2, 3 and 4 west of 63° W and 500 t to be fished within the NSA in SFA 3 only. During 2002 the *P. montagui* catch limit in SFA's 2, 3 and 4 west of 63° W was increased to 6,300 t. In 2006 a 400 t *P. borealis* bycatch limit was set within the NSA portion of SFA 2 and 3 *P. montagui* fishery.

The vast majority of *P. montagui* comes from SFA 2 south of 63°N (i.e., eastern part of the Resolution Island Study Area (RISA-East) – see Figure 5). There are quotas for directed *P. montagui* fisheries within the NSA in SFAs 2 and 3 but they have generally not been taken. Catch is taken between 63°W and 64°30'W with small amounts just over the border in SFA 3 with none taken further west than 66°W in recent years.

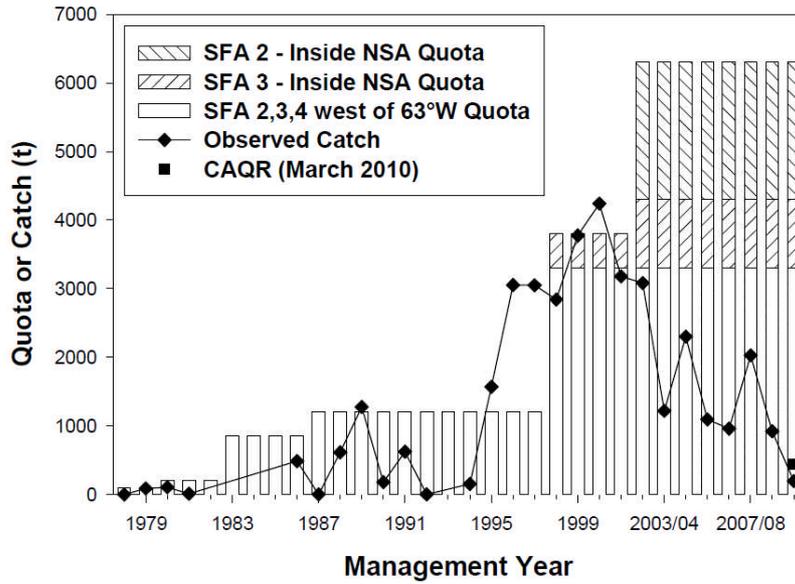


Figure 3. SFA 2, 3, 4 west of 63°W Quota Area quotas and catches. Observed catch records are incomplete for 2009/10 but CAQR (Central and Arctic Quota Report) (March 2010) reports 438 t. (CAQR should be the total catch in 2009/10 as the area is generally not fished past December.)

Table 1: The catch (t) of *P. borealis* and *P. montagui* (SFAs 2, 3, 4) caught between 1977 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	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

4.3 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 >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 and 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.)

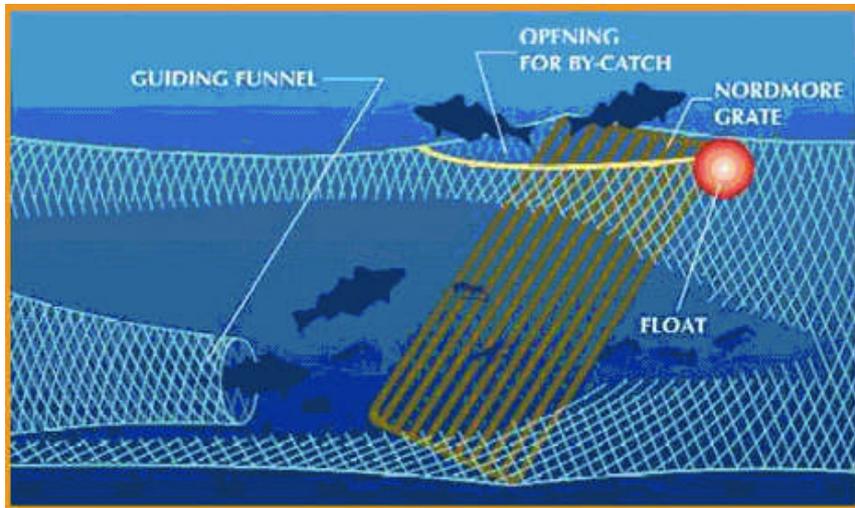


Figure 4: Nordmore Grate

(source: DFO 2009A)

5 STOCK ASSESSMENT

4.1 Management Unit

The *P. montagui* stock is assessed as a unit comprising SFAs 2, 3, and 4 west of 63°W. Management includes TACs for that area as a whole, and for subareas made up of waters in the Nunavut Settlement Area (NSA) (Fig. 3). In recent years the allocations to the NSA have not been harvested. Catches outside this management unit (i.e. to the east of 63°W) are as bycatch in the *P. borealis* fishery, and are small.

The stock structure of *P. montagui* is largely unknown. Reliable data is limited to the recent period of high abundance of shrimp having a relatively continuous presence within suitable depths and habitat, extending through SFAs 2-4. Due to larval drift and migration it is not likely that the shrimp in this area form genetically distinct populations; they are best characterised as one large population. SFAs 2, 3 and 4, are managed as domestic Canadian stocks.

The management and assessment subunits for *P. montagui* are shown in Figure 5. *P. montagui* is the dominant species in SFA 3. *P. borealis* is the dominant species in SFAs 0, 2EX and 4. The two species are highly mixed and interspersed in the RISAs. The RISAs (Resolution Island Study Area) includes the eastern part of SFA 3 and the southwestern part of SFA 2.

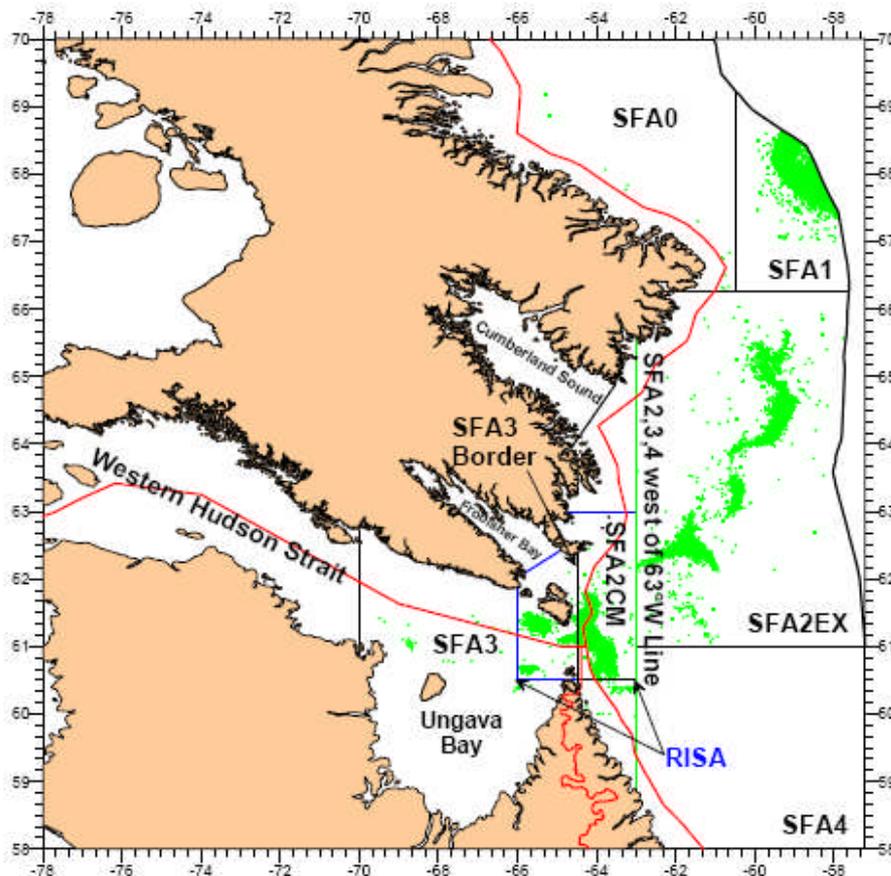


Figure 5: Map of Shrimp Fishing Areas and survey study areas in eastern Hudson Strait and Ungava Bay, Davis Strait and Baffin Bay. Green shading represents fishing locations from 1985-2009.

4.2 Assessment and Stock Status

P. montagui was previously assessed in 2003 (Orr et al. 2003), 2008 (DFO 2008b) and recently in 2010 (DFO 2010/024). From now on assessments are planned every two years.

Prior to the commencement of trawl surveys for *P. montagui* in 2006, resource status was evaluated on the basis of trends in fishery catch per unit effort (CPUE) and observer sampling. CPUE of *P. montagui* increased in the mid-1990s and has since varied without trend at a high level (Figure 6) (DFO 2010/024).

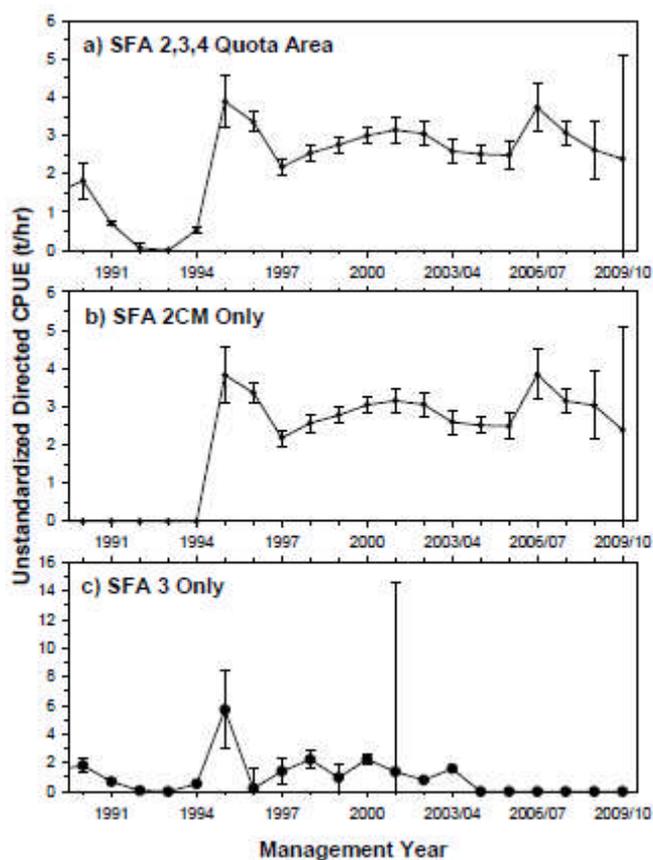


Figure 6. Unstandardized CPUE indices for directed *P. montagui* fishing in the a) SFA 2, 3, 4 west of 63°W Quota Area, b) SFA 2CM (CM = commercial; this is the main area where *P. montagui* are caught) and c) SFA 3 (there has been no fishery in recent years). 95% confidence intervals are shown. Observer records for 2009/10 season are incomplete.

Resource assessment now includes several years of Northern Shrimp Research Fund (NSRF)- DFO survey data: in SFA 2 and SFA 4, 4 surveys from 2006 using a Campelen trawl, and in SFA 3 east of 66°W, two surveys in 2007 and 2009 using a Cosmos trawl.

Total, fishable and female spawning stock survey biomass indices are used in the assessment. Fishable biomass refers to that portion of the survey catch with a carapace length 17 mm or greater and therefore includes both males and females. Female spawning stock biomass (SSB) refers to the female portion of the survey catch regardless of size. Currently, there is no recruitment index for this area but work continues to develop one.

The most recent (2010) assessment has treated survey biomass estimates for *P. montagui* differently

than in the last (2008) assessment. When surveys in SFAs 3 and 2+4 took place in the same year, the biomass estimates were not combined, due to the use of different types of survey trawls, vessels, and survey timing. In 2008 the fishable biomass index between 63°W and 66°W (RISA) was 22,500 t and in 2009, 13,500 t (Figure 9), while the SSB index in this area was 19,000 t (2008) and 11,000 t (2009). Confidence in the biomass estimates from the 2006 and 2007 NSRF-DFO surveys is low because of incomplete spatial coverage, thus no biomass values were provided in the assessment. The fishable biomass index for the SFA 3 survey area (west of RISA) was 48,000 t (2007) and 47,000 t (2009), while the SSB index for this area was 17,000 t (2007) and 18,000 t (2009). (DFO 2010/024)

Since the surveys conducted in these SFAs occur in about the middle of the fishing season, exploitation rate indices were calculated based on catch divided by fishable biomass index in the same year. Catch can only be related to biomass observed in the area of 63°W to 66°W as this is where the fishery occurs. The exploitation rate index for the last two years was low at about 4% (Figure 7). If the total quotas were taken in the area of 63°W to 66°W this would result in a much higher exploitation rate index of 28% (2008/09) and 47% (2009/10). Bootstrapped 95% confidence intervals have been included for each of the indices (DFO 2008b, DFO 2010/24).

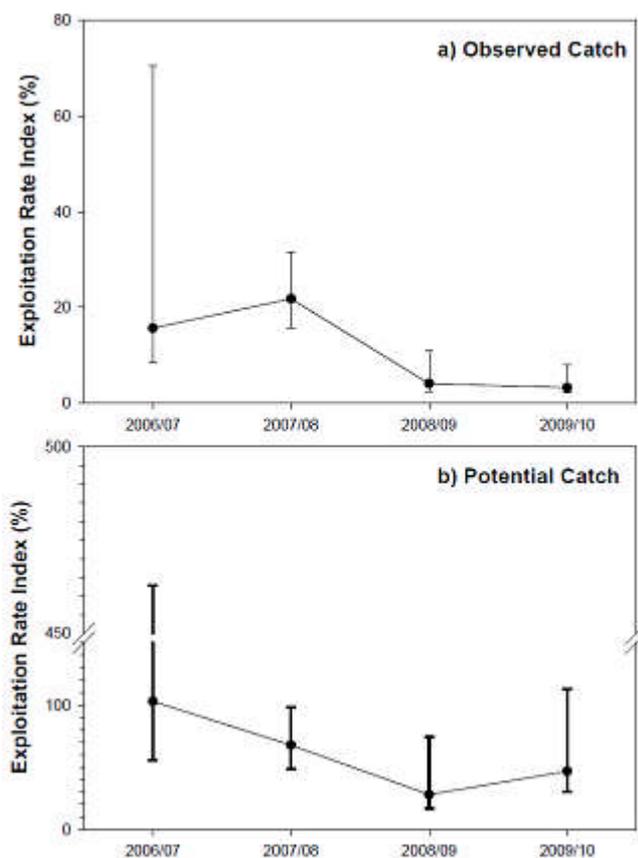


Figure 7. Exploitation rate index based on a) observed catch for 2006-2008 and b) potential catch should the entire TAC be taken in SFA 2, 3, 4 between 63°W and 66°W. Observer records are incomplete for the 2009/10 season.

RISA

Total catches (directed and bycatch) of *P. montagui* have dropped from about 4,000 t in 1999 to less than 1,000 t in 2006/07. The cause of the decline is mainly due to Captains developing the ability to find cleaner catches of *P. borealis*, the preferred species (DFO 2010/24). CPUE varied without trend from 1997 through 2005/06 but was significantly higher in 2006/07. Although there is no recruitment

index in this area, there was a dramatic increase in the <17 mm component of the *P. montagui* population from 2006 to 2007 (however information from these surveys is uncertain). The average exploitation rate index of the fishery for 2006/07 to 2007/08 was 22%. There are uncertainties in the assessment of stock status due to the short time series and large confidence intervals around survey biomass estimates.

SFA3 (west of 66°W)

No fishery has been conducted in the area in recent years. Abundance and fishable biomass index was 48,000 t (2007) and 47,000 t. (2009). The highest densities of *P. montagui* were in the 200-300 m depth range, slightly shallower than *P. borealis* in the same area, which corresponds to slightly cooler water temperatures. Recruitment is uncertain in the area but the proportion of <17 mm shrimp in the survey catches in SFA3 in 2007 was higher than seen in other northern SFAs. The current status is uncertain and the confidence in the biomass estimates is low because of incomplete spatial coverage.

Sources of Uncertainty

The fishery independent survey data are currently the best data available although they are based on short time series of up to four years.

Several sources of uncertainty in the assessments have been identified. If there is seasonality in the distribution of shrimp and/or the catchability of the shrimp in the trawl this could affect the assessment. Catchability of the trawl used in the survey is unknown but thought to be less than one; that is, the stock size indices are partial estimates. Therefore, the survey exploitation rate indices are greater than the stock exploitation rates. The RISA is currently the most important area in terms of total shrimp caught in the North. The high exploitation indices in the RISA are a concern. If a low biomass index was the result, this would inflate the exploitation rate index.

4.3 Management Advice

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 (IFMP reference – 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 Fmsy but this cannot be estimated at present. Pending determination of Fmsy, a guideline exploitation rate of 15% is to be used in guiding setting of TACs. This is considered well below Fmsy (DFO 2009). 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 2009).

As a result, within the last year, reference points and harvest control rules have been formulated for *P. montagui* in the fishery area. 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 to be used in management; “Provisional” refers to the current non-feasibility of calculating Fmsy 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).

4.3.1 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).

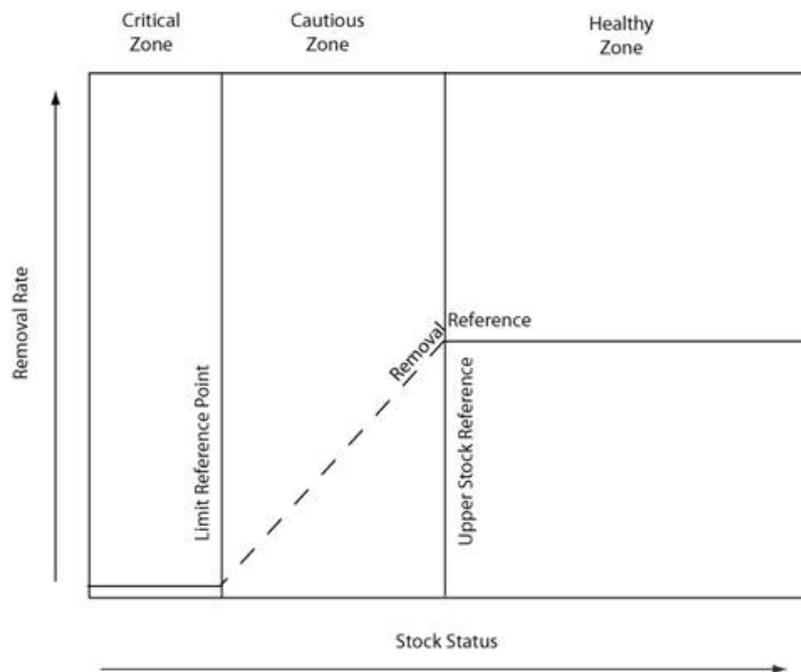


Figure 8. Reference points and stock status zones.

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

For striped and 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>).

5.1.1 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_{msy} (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)

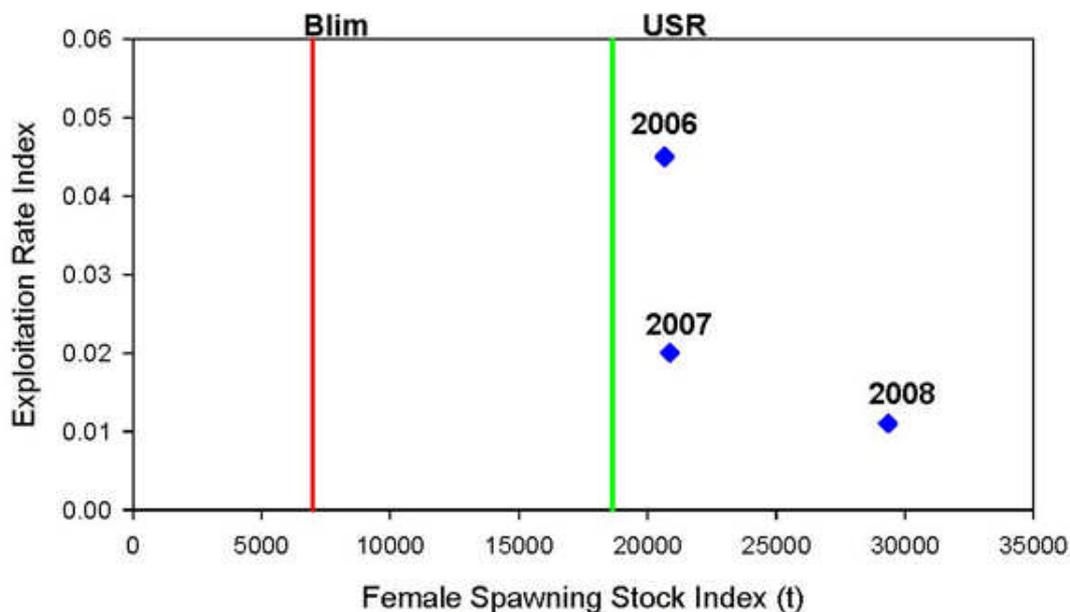
- Measures should aim to rebuild SSB towards URP, subject to natural fluctuations
- If stock is projected to decline, the TAC should not be increased.
- Changes in TAC should not exceed +/- 15%, unless stock is falling precipitously
- Within the cautious zone, the maximum exploitation rate should not exceed $2/3F_{msy}$ in the upper two quartiles of the SSB range, $1/3F_{msy}$ 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 *P. montagui* in SFAs 2, 3 and 4 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.



Critical Zone	Limit 7,000 t	Cautious Zone	Upper 18,700 t	Healthy Zone
<p>Measures must explicitly promote an increase in the biomass above the LRP as soon as feasible within 6 years.</p> <p>Any fishing mortality must be in the context of a rebuilding plan, and should not exceed 10%</p>		<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 12,700-18,700t, the exploitation rate should not exceed 2/3 FMSY, thought to be significantly above 15% of exploitable biomass.</p> <p>If SSB is between 9,700-12,700t, the exploitation rate should not exceed ½ FMSY, thought to be above 15% of exploitable biomass.</p> <p>If SSB is between 7,000-9,700t, 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 artifact 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. DFO reference points and harvest control rules for *P. montagui* in SFA 2, 3, 4 (From IFMP of May 2010)

Figure 10 below is based on female SSB between 63°W and 70°W, as presented to the March 2010 assessment meeting and as in the prior (2008) assessment. However, as the complete area between 63°W and 70°W is made up of a western survey area (SFA3) and an eastern survey area (RISA) surveyed independently using different ships, gears and times of years, the March 2010 assessment concluded that it was not possible to combine biomass estimates from the two surveys. Treating the two surveys separately meant that the biomass estimate to which the catch estimate was applied to obtain the exploitation rate was substantially lower than in the last (2008) assessment, since all catch was taken in the RISA area. At the March meeting of the Northern Shrimp Advisory Committee (NSAC – the management advisory committee), the process was started in which measures would be taken to reduce the TAC in that area so that it is in line with the biomass numbers observed. The latest version of the IFMP available to the team (May 2010) does not include changes to reference points based on the new assessment. Although this change in the assessment protocol means that exploitation rate indices are higher than previously estimated, it also means that there is a substantial reservoir of unexploited spawning biomass in SFA 3 which is considered to contribute to spawning in the fishery area.

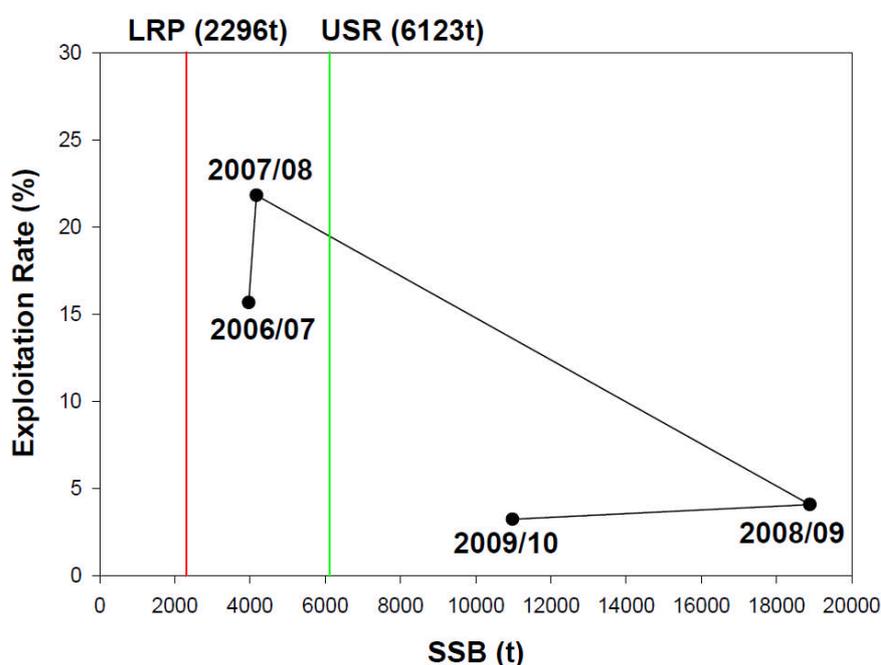


Figure 10. *P. montagui* in SFA 2, 3, 4, 63°-66°W precautionary approach framework with provisional limit reference points and trajectory of exploitation rate index vs SSB. Source: IFMP, based on 2008 assessment (DFO 2010).

The current status of this resource is considered healthy based on the provisional limit reference points within the area 63°W-66°W. The actual exploitation rate index is low due to limited *P. montagui* catches, however, the exploitation rate index based on TACs would be relatively high.

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*. For the commercial fishery, *The Fishery (General) Regulations, 1993*, provides a framework for the issue of fishing rights and licences to fish.

6.1 Licence Holders

There are seventeen offshore licence holders authorized to fish shrimp in SFAs 1-7. Thirteen offshore factory freezer trawlers fish those licences, 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 2

Table 2: 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 ^{1[1]} (1)	Atlantic Enterprise	Clearwater Seafoods L.P./ Ocean Prawns Canada Joint Venture
Atlantic Shrimp Co. Ltd. ^{2[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 *P. montagui* fishery in SFA's 2, 3 and 4 is managed on a competitive basis with all 17 offshore licences having access to the fishery until the quota is exhausted. While, the inshore fleet is authorized to fish this area, in fact few have done so.

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

^{2[2]} Ibid

6.2 Fishing Locations

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.

The individual fishing areas have varied considerably in their contribution to the commercial fishery since the inception of the fishery in 1979. The fishery has always been focused on *P. borealis* and in the early years was largely confined to the north whereas in recent years the southern areas 5-7 have accounted for approximately 80% of the catch in recent years. *P. montagui* has never been a significant portion of the overall catch, for the most part being a bycatch in the borealis fishery.

The management unit for *P. montagui* is SFA's 2, 3 and 4 west of 63°30' West longitude. For the past few years, the TAC has been set at 6,300 t, comprised of 2,000 t inside the Nunavut Settlement Area (NSA) of SFA 2 and 1,000t in SFA 3 inside the NSA. The remaining 3,300 t is allocated west of 64°30'W that includes all of SFA 3 and portions of SFA's 2 and 4.

Directed fishing for *P. montagui* has taken place in both SFAs 2 and 4 in recent years and it is also a bycatch species in the *P. borealis* fishery. Smaller sizes, lower yields and lower prices make *P. montagui* a less attractive species. *P. Montagui* is fished in SFA 2 (directed and bycatch) but catches have declined in recent years.

6.3 Administrative Arrangements and Boundaries

With the exception of some matters that fall under aboriginal land claim agreements, as outlined below, the Department of Fisheries and Oceans (DFO) is the administrative body responsible for the management of shrimp in Canada. 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 Atlantic region is divided into four regional fisheries management administrative areas, each with scientific, management and enforcement staff. The assessment area is within the Central and Arctic Region of DFO and the management of the fishery is conducted by the Resource Management Directorate of Ottawa.

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.df-mpo.gc.ca, 23rd of September 2009). The IFMP is detailed containing a number of protocols, some harvest control rules and other measures.

In addition, the Parliament of Canada has enacted legislation to give effect to various land claims agreements that have an impact on fisheries management. The management of fisheries resources within the various settlement areas outlined in the Nunavut, Labrador Inuit and Nunavik Inuit aboriginal land claims are set out in legislation enacted to give effect to those agreements, namely the *Nunavut Land Claims Agreement Act*, the *Labrador Inuit Land Claims Agreement Act* and the *Nunavik Inuit Land Claims Agreement Act*. This legislation governs fishing rights and management responsibility with respect to access, allocation and harvesting measures in the settlement areas of the land claims which include the marine waters within Canada's 12 mile limit. In some cases management bodies exercise jurisdiction over harvesting and licencing to fish in the settlement areas (e.g. the Nunavut Wildlife Management Board).

The Northern Shrimp Advisory Committee (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.

6.4 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 regulations 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 3: 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.

Principal Acts and Policy Documents	Description
<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;</i> <i>Labrador Inuit Land Claims Agreement Act;</i> <i>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 of fisheries in Canada and more specifically for the *P. montagui* fishery in SFA 2, 3 and 4 and for the licencing and registration of participants. 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.

6.5 Harvest Controls

Annual catch limits in the form of TACs are the major harvest control measure used for this fishery. Independent vessel surveys, on which stock assessments are based, began in SFA 3 in 2005 and in SFAs 2 and 4 in 2005. CPUE information is also available and has been used since 1979. Scientists from DFO assess the SFA 2, 3 and 4 *P. montagui* stock annually and the scientific information and advice is presented to the Northern Shrimp Advisory Committee. The members of that committee formulate recommendations to the Minister of Fisheries and Oceans with respect to TAC levels in the area.

There is a management plan, which includes *P. montagui* for the area that has been in place for several years with the TAC being created as a quota available to all licenced vessels on a competitive basis. The fishery is closely regulated including the presence of on-board observers who track the catch on a tow-by-tow basis. The annual catch of *P. montagui* has been far below the TAC in recent years.

6.6 Monitoring, Control and Surveillance

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 Monitoring Control Surveillance (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.

6.7 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.

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. Non-members may also attend and can participate in discussions following input from members.

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

Of the two species of *Pandalus* exploited in fisheries in the Northwest Atlantic, *P. montagui* (striped shrimp), 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).

There is some evidence that *P. montagui* prefer habitats of somewhat harder bottoms than *P. borealis*. However, fisheries for these two species primarily target *P. borealis*, and as such operate primarily in habitats characteristic of this species, consisting of areas where the bottom is soft and muddy, with a high organic content. Both species can be taken on hard bottom areas, but fisheries tend to target soft bottom areas to minimise gear damage. 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. Channels and basin areas at the edge of the continental shelf are areas where commercial shrimp concentrations are generally found over much of the area, but in SFAs 2-4 *P. montagui* would primarily be taken in shelf areas away from the shelf edge because of its shallower distribution. 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). There is relatively little overlap of areas where *P. montagui* is taken and areas of significant coral bycatches, but overlap does occur at the mouth of Hudson Strait, and soft corals are widely distributed in areas where *P. montagui* is taken (Edinger et al 2007; Wareham 2009).

Areas of significant occurrence of sponges have recently been mapped in areas near Flemish Cap and 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, particularly depths for the *P. montagui* fishery.

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 Bank (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 Bank, 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 northern Labrador shelf and Hudson Strait areas where the *P. montagui* fishery operates, although one would expect species diversity to decrease toward the north.

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.

Little is known about *P. montagui* in the ecosystem but its role is probably similar to *P. borealis*, for which a number of studies exist. The only targeted study of trophic interactions of *P. montagui* (Hudon et al 1992), conducted near Resolution Island, concluded that *P. montagui* is an opportunistic predator which feeds both on the bottom and in the water column near bottom and in the pelagial zone during vertical migrations at night. A wide variety of planktonic species, dominated by copepods, was found in individuals feeding in the water column, while food species were difficult to identify in individuals taken near bottom. This pattern of opportunistic feeding near bottom and in the water column during vertical migrations appears typical of pandalid shrimp (Bergstrom 2000).

Information on ecological relationships of the closely-related *P. borealis* is probably applicable to *P. montagui* (at least to a large extent) given their similar size, distribution and biology. *P. borealis* is an important component of the North Atlantic Ocean's food web, between the small organisms that it eats, including the phytoplankton and zooplankton 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 (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 northern shrimp 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. It can be inferred that in the areas and depths at which it occurs, *P. montagui* would have similar relationships with prey and predator species.

The recent increase in abundance and in distribution of fishable concentrations of pandalid shrimp 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 northern shrimp 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 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. montagui* abundance has recently been at or above 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 shrimp abundance to decrease rapidly and substantially if conditions change.

7.2 Fishery Interactions with the Ecosystem

7.2.1 Endangered, Threatened and Protected (ETP) 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. montagui* 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, indicating that bycatch is very low. In SFA 2, annual bycatch of spotted wolffish varied between 40 and 300 kg in the period 1997-2008; for northern wolffish the corresponding figures were 0-140 kg respectively (Siferd 2010). In SFA 3, there were no records of northern wolffish in the bycatch in the same period, while for spotted wolffish there were no records for all years but one which had a 50 kg bycatch. (Siferd 2010). For SFA 4, 0-2 individuals of northern wolffish were recorded in bycatch in 2004-8, while for spotted wolffish bycatches were less than 50 individuals in all years (Orr et al. 2008bc). 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 (M. Simpson, pers. comm.). A DFO status review for these species is planned for fall 2010 (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 SFA 4, 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 2 and 3 (information provided by T. Siferd, DFO).

For the purposes of this assessment, the only “retained” bycatch species is the Northern shrimp, *P. borealis*. *P. borealis* often occurs in catches in areas where *P. montagui* is targeted, but is generally found at greater depths (200-600 m vs less than 400 m for *P. montagui*). As such, the proportion of *P. borealis* in the catch tends to decrease in areas near and in the Hudson Strait.

7.2.2.2 Discarded Species

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

An exclusion device known as the Nordmore grate (see 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 minimum grate spacing of 28 mm is required in SFAs 2, 3 and 4.

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 (eg +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, if the fishery moved from the 28 to the 22 mm grate. There is no current plan to move to the smaller grate spacing in the fishery area, where the 28 mm grate is used.

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 is recorded in the bycatch (Orr et al 2008bc; Siferd 2010), but at low levels.

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 northern shrimp fishery operates. Atlantic cod has been assessed as “Endangered” on the Newfoundland-Labrador shelf (where SFA 4 is located) and “Data deficient” in marine waters further north (SFA 2) (COSEWIC 2010a); the northern population of deepwater redfish, which includes waters in the fishery area, has been assessed as “threatened” (COSEWIC 2010b); the Atlantic population of Acadian redfish which includes waters in the fishery area has been assessed as “threatened” (COSEWIC 2010b); the Newfoundland-Labrador shelf population of American plaice, including SFA 4, has been assessed as “threatened” (COSEWIC 2009); and the Arctic population of American plaice, including SFA 2, has been assessed as “data deficient” (COSEWIC 2009). 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 bycatch of all discard species combined in any SFA 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 groundfish species in the fishery area, formal analyses have not been done to compare removals in the shrimp fishery to other sources of mortality, but the catches taken are extremely low. Bycatch levels can be put in perspective by considering that 100 t 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, negligible in ecological terms.

In SFA 4, the species at greatest abundance in the 2007/08 fishery year in the bycatch was redfishes at 71 t (0.65% of the shrimp catch). All other species were below 20 t (0.2% of the shrimp catch). In 2004-2007 numbers of key commercial species caught varied between 28 and 443 for Atlantic cod, 3,700-46,000 for American plaice, 2 - 5 million for redfishes, 198,000- 448,000 for Greenland halibut.

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 the same period 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.

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 organisms which may provide habitat for other organisms (for example erect corals, sponges).

Impacts by the trawl gear used to harvest pandalid 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*, the target species, 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 deeply into the ground over a narrow band (ca 3 m).

No studies of trawl impacts on habitats typical of pandalid shrimp 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 impact soft bottom habitats (mud, sand) more rapidly than 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 structure and community structure of mud bottoms (Simpson and Watling 2006) showed little impact on habitat structure 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 avoid known areas of coral habitat as the likelihood of damage to trawls is high in these areas and costs 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). DFO's Newfoundland/Labrador region has committed to developing a coral 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. montagui* on Trophic Relationships

Given the probable importance of *P. montagui* as forage for predators in ecosystems in which it occurs, maintenance of adequate biomass to support trophic relationships is an important issue for management. *P. montagui* abundance (as measured by CPUE) has not declined over the period of the fishery, and exploitation rates are generally relatively low ($\leq 15\%$ in most areas; recent indications of higher exploitation rates for *P. montagui* are subject to many uncertainties), such that adequate amounts of this species would appear to remain available as forage for predators. The base exploitation rate set for this species, 15%, is considered low relative to exploitation rates practiced in other pandalid shrimp fisheries which have had no apparent negative effects on predator populations (IFMP 2009).

The new exploitation framework based on reference points and decision rules (IFMP 2009, Appendix I) appears to leave the way open to higher exploitation rates, when shrimp abundance is very high. 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, “...given that shrimp have a significant role as a forage species...”, 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 *Pandalus* species.

7.2.4.2 Impact on Biological Diversity, Community Structure

Overall impact of the shrimp trawl fishery in this area on large parts of ecological communities has not been studied, although information is available on some species groups and some impacts. Shrimp trawl impacts on snow crab populations have been assessed in several studies to the south of the fishery area, on the Labrador shelf; although 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 impacts from passage of gear, or extrusion from netting, are not known. Although these might be considered potentially low, because of the use of large rollers on footgear, and relatively light 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. Use of the heavy shoe in twin trawling could potentially dig into sediments and damage sessile invertebrates over a narrow swathe of around 3 m. 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 THE TARGET STOCK

The major fishery impacting *P. montagui* is the fishery targeting *P. borealis* in SFA 2-6, which is also under assessment.

No other fisheries exert significant impact on *P. montagui* populations in the fishery area. Groundfish trawl fisheries use mesh sizes that would 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.³

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.

³ 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 system⁴.
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.

⁴ 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: Howard Powles

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. montagui* shrimp fishery in SFA 2, 3 and 4 has not previously been the subject of a MSC main assessment against the MSC Principle and Criteria.

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 the table 4 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. montagui* 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. montagui 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. montagui* 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-MSA-assessment schedule attached to the certificate of the company handling the fish.

14 ASSESSMENT RESULTS

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: 80.0	Pass
Principle 2: Maintenance of Ecosystem	Overall: 81.3	Pass
Principle 3: Effective Management System	Overall: 87.0	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 Striped Shrimp (*Pandalus montagui*) Trawl Fishery in Shrimp Fishing Area 2, 3, and 4 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 4. The scoring commentary and justification for the scores is set out in Appendix A of this report.

Table 4: MSC scoring table for the *Pandalus montagui* fishery in SFAs 2, 3 and 4.

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	0.50	80
		1.1.2	Reference points	0.50	80
		1.2.3	Stock Rebuilding	0	N/A
	Management	1.2.1	Harvest strategy	0.25	80
		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
		2.2.3	Information	0.33	100
	ETP species	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

Principle	Component	Performance Indicator		Weight	Score
		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	60
3	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	70
		3.2.5	Management performance evaluation	0.20	80
Overall Score					
Principle 1 – Target Species				80.0	
Principle 2 – Ecosystem				81.3	
Principle 3 – Management				87.0	

14.2 Conditions

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 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.

14.2.2 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>

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

14.2.3 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	There is a basic understanding of the types and distribution of main habitats in the area of the fishery. Information is adequate to broadly understand the main impacts of gear use on the main habitats, including spatial extent of interaction.
SG 80	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. 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. 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).
SG 100	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types. Changes in habitat distributions over time are measured. The physical impacts of the gear on the habitat types have been quantified fully.
Score	70
Scoring Rationale	All scoring issues 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 detailed information on distribution of particularly sensitive habitats (hard coral areas); since these scoring issues of the 80 SG are met, a score of 70 is assigned.
Condition	The client is required to demonstrate by the fourth annual audit that: <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	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: <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

	<p>Policies, including with respect to Sensitive Benthic Areas as it applies to the conduct of shrimp fishing in this area.</p> <ul style="list-style-type: none"> • 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.
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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 bentic 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

	<p>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.</p> <ul style="list-style-type: none"> • 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.
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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> <ol 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 - so as 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 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	60
Scoring Rationale	<p>Knowledge of ecological relationships is considered relatively good, based on a directed study on trophic relationships and by inference from <i>P. borealis</i>.</p> <p>General knowledge is available on potential impacts of the fishery on benthic species and of benthic communities in the area, although this is less known for the more northerly parts of the fishery area.</p> <p>The fishery meets the 60 SG in that information is available on the key elements of the ecosystem and the impacts of the fishery on these elements can be inferred.</p>

<p>Condition</p>	<p>The client is required to demonstrate by the fourth annual audit that:</p> <ol style="list-style-type: none"> i. Information is adequate to broadly understand the functions of the key elements of the ecosystem. ii. Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but may not have been investigated in detail. iii. The main functions of the Components (i.e. target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known. iv. 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. v. 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>Client Action Plan</p>	<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 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.

14.2.7 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	<p>Short and long-term objectives in the domestic fishery are well described in the management system but generally apply more to the <i>P. borealis</i> stocks. They are less clear for the <i>Pandalus montagui</i> stock. In addition, 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.</p> <p>The score would also have been higher if maintenance of biodiversity and maintenance of shrimp biomass to support predators had been included in the objectives.</p>
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	70
Scoring Rationale	<p>The score would have been higher if there was a research plan that provided the management system with a strategic approach to research as is required by the 80 scoring guidepost.</p> <p>A survey research plan is available and is published as part of the IFMP (Annex D), such as to provide management with necessary information. However, it is not comprehensive and it does not address all issues identified in the stock assessments as requiring resolution through research, especially for this <i>pandalus montagui</i> stock. 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".</p> <p>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.</p> <p>Research conducted in the Resolution Island Study Area (RISA) in SFA 3, 4, and in SFA 4 southeast of RISA is generally not species specific (environmental, predator study, bottom impact, etc). There is much less direct research on <i>P. montagui</i> than on <i>P. borealis</i> and the IFMP notes that there is concern about the future of the stock as there is no fishery independent data.</p>
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

	<p>linked to the objectives established for the fishery and for MSC Principles 1 and 2.</p> <p>By the first annual audit there will be documented evidence that a plan to conduct gap analysis has been developed by the working group.</p> <p>By the second annual audit there will be documented evidence that a gap analysis has been completed.</p> <p>By the fourth annual audit there will be documented evidence that a research plan is in place.</p>
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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: Registered companies / vessels within Unit of Certification: eligible to sell MSC certified product

Appendix F: Confirmation of Client Certificate Sharing Agreement

Appendix G: 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	It is <u>likely</u> that the stock is above the point where recruitment would be impaired.	It is <u>highly likely</u> that the stock is above the point where recruitment would be impaired. The stock is at or fluctuating around its target reference point.	There is a <u>high degree of certainty</u> that the stock is above the point where recruitment would be impaired. 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> .
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Scoring Comments

Spawning stock biomass from surveys is estimated at 28,000 – 39,000 t in 2008-2009, based on surveys in the two fishing areas (SFA 2 between 63 and 66 W, and SFA 3). Survey time series are short, and earlier values (2006-2007 – available only for SFA 2) were lower. The fishery has not operated in SFA 3 but the spawning biomass in SFA 3 is considered to contribute to maintaining reproductive potential in the fishery area as a whole. Catches have been <2000 t since 2003 and in the hundreds of tons since 2008. Commercial CPUEs have remained essentially stable since 1995; although commercial CPUE may have weaknesses as an abundance indicator, it is considered relatively reliable here because the fleet composition and gear have changed little over the years. The decline in catch is a result of better targeting of *P. borealis* which is the preferred species.

SSB was below the USR in 2006/07 and 2007/08, above this reference value in 2008/09 and 2009/10.

Score: 80

It is highly likely that the stock is above the point where recruitment would be impaired. There has been no fishery in a substantial part of the stock area. SSB has moved from below to above the Target Reference Point in the years for which information is available. CPUE has remained essentially stable for 15 years. The fishery therefore meets the 80 SG.

Audit Trace References

DFO 2010. Northern Shrimp Integrated Fisheries Management Plan, shrimp fishing areas (SFAs) 0-7, Flemish Cap. Effective May 2010. 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 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. R ep. 2010/024.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<p>1.1.2</p>	<p>Reference Points: Limit and target reference points are appropriate for the stock.</p>	<p><u>Generic</u> limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.</p>	<p>Reference points are appropriate for the stock and can be estimated.</p> <p>The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.</p> <p>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.</p> <p>For low trophic level species, the target reference point takes into account the ecological role of the stock.</p>	<p>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>.</p> <p>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.</p>
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<p>Scoring Comments</p>
<p>An upper stock reference (similar in intent to a Target Reference Point) and a limit reference point are defined for the fishery. 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 relatively short and recent because of the short history of surveys in this fishery area. Reference points based on stock models cannot be determined in this stock because of the relatively short survey series, 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).</p> <p>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.</p>
<p>Score: 80</p>
<p>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 such that the species is maintained at a level approximating B_{msy}. The upper stock reference (TRP), along with other management measures (exploitation rate guideline) is set at a level which would ensure that the needs of predators are accommodated. The fishery therefore meets 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 2010. Northern Shrimp Integrated Fisheries Management Plan, shrimp fishing areas (SFAs) 0-7, Flemish Cap. Effective May 2010. 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 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. R ep. 2010/024.

DFO. 2009. Biomass of Northern Shrimp (*Pandalus borealis*) and Striped Shrimp (*Pandalus montagui*) in Shrimp Fishing Area 2. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep.2009/011.

DFO, 2006c. A harvest strategy compliant with the precautionary approach. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2006/023. 7 pp.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<p>1.1.3</p>	<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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<p>Scoring Comments</p>
<p>This stock is not depleted and as such this indicator is not applicable.</p>
<p>Score: N/A</p>
<p>Audit Trace References</p>
<p>N/A</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.2	Harvest Strategy (management)		
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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>
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Scoring Comments

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 2010/024) and management. Exploitation rates in the harvest strategy are ultimately to be based on Fmsy but as this has not yet been estimated, a base target exploitation rate of 15% is to be used to guide setting TACs. The harvest strategy is responsive to state of the stock as TACs are to be reset every two years based on the base exploitation rate and updated stock assessment.

The exploitation rate guideline has generally been adhered to in the 4 years for which information (survey SSB) is available, although this has been due to catches being below TACs. The actual ER (based on catches) was 15% in 2006/07, 22% in 2007/08, below 5% in the two subsequent years. The exploitation rate based on TACs was well above these values in 2006/07 and 2007/08 and remained above the guideline for the two subsequent years.

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 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, CPUEs have remained stable over a long time period, and the stock has varied around the target reference point for the period for which information is available.

Score: 80

The harvest strategy is responsive to the state of the stock and the elements work together toward achieving management objectives expressed in target and limit reference points. The harvest strategy has not been fully tested, given its recent development, but intensive monitoring is in place and there is evidence that the strategy is achieving its objective, ie the catches have been well

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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below TACs and stock is above the target reference point. Therefore the 80 SG is met.

Audit Trace References

DFO 2010a. Northern Shrimp Integrated Fisheries Management Plan, shrimp fishing areas (SFAs) 0-7, Flemish Cap. Effective May 2010. 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 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. R ep. 2010/024.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.2.2	Harvest control rules and tools: There are well defined and effective harvest control rules in place	<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>There is <u>some evidence</u> that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.</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>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>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
<p>A theoretical harvest control rule is in place that would reduce the exploitation rate as SSB declines from upper stock reference to limit reference point (IFMP). This exploitation rate is based on a proportion of Fmsy, but the latter cannot presently be estimated. Pending information on this, a base exploitation rate of 15% of stock biomass is to be used. The harvest control rule has not yet been used in management since the strategy has recently been adopted. The base exploitation rate is low relative to that used in pandalid fisheries which have proven to be sustainable (IFMP), thus it can be stated that the main uncertainties are taken into account.</p> <p>The exploitation rate based on Fmsy is intended to decline as the stock declines towards its limit reference point, but the base rate of 15% current used is constant. Given that the stock is currently at relatively high abundance, this is not an issue at present. Further work on Fmsy and actual exploitation rates for use in the strategy is planned for the near future. 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.</p> <p>Harvest control tools include SFA-level TACs, mesh and gear regulations, intensive monitoring (observers are carried on 100% of trips), a protection and surveillance system. These tools are considered appropriate for pandalid fisheries and have proven effective in achieving exploitation levels as outlined in TACs.</p>
Score: 80
<p>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</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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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. Northern Shrimp Integrated Fisheries Management Plan, shrimp fishing areas (SFAs) 0-7, Flemish Cap. Effective May 2010. Resource Management Operations, Fisheries and Oceans Canada.

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. R ep. 2010/024.

DFO 2008c. Proceedings of the Precautionary Approach Workshop on Canadian Shrimp and Prawn Stocks and Fisheries, November 26-27, 2008, Ottawa, Ontario. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2008/031.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.2.3	<p>Information / monitoring: Relevant information is collected to support the harvest strategy</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 monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.</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><u>All 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>
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Scoring Comments
<p>Good 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 (DFO 2010/024). Genetic structure is not well known but since the fishery is managed by subareas (SFAs) the risk of overexploiting individual genetic components is reduced.</p> <p>With respect to productivity, there is good information on maturity, growth, natural mortality (Z= a proxy for production) 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. The fishery under assessment is the only fishery taking this species in this area, the fleet is relatively small, and observers are carried on 100% of trips.</p> <p>Stock abundance is monitored by surveys and by commercial CPUE, while stock composition is monitored by surveys. Removals are very well monitored by observers and through lobook returns.</p>
Score: 80

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Sufficient relevant information (stock structure, productivity, fleet composition) is available to support the harvest strategy. Stock abundance and removals are regularly monitored at a level consistent with the harvest control rule, and indicators (fishable biomass, SSB) are available and monitored at a frequency suitable for application of the harvest control rule. There are no fishery removals from this stock other than from the fishery under assessment. All of the scoring issues under the 80 SG are therefore met.

Audit Trace References

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. R ep. 2010/024.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.2.4	Assessment of stock status: There is an adequate assessment of the stock status	<p>The assessment estimates stock status relative to reference points.</p> <p>The major sources of uncertainty are identified.</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 stock assessment is subject to peer review.</p>	<p>The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.</p> <p>The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.</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>
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Scoring Comments
<p>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 CPUE and effort, and from bottom trawl surveys for indices of spawning stock biomass and fishable biomass and for size and sex composition.</p> <p>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) and because the catch estimate originates from areas of high density, whereas biomass is estimated over a much wider area of the stock. Trawl survey estimates in SFA 2 have relatively high uncertainty.</p> <p>The stock is assessed relative to reference points (biomass and fishing mortality).</p> <p>The biennial assessment is subject to a formal peer review process involving DFO scientists. External experts are invited to participate in these reviews on an ad hoc basis when needed.</p>
Score: 80
<p>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, thereby meeting all for he scoring issues for the 80 SG.</p>
Audit Trace References

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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. R ep. 2010/024.

DFO. 2009. Biomass of northern shrimp (*Pandalus borealis*) and striped shrimp (*Pandalus montagui*) in shrimp fishing area 2. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2009/011.

DFO. 2008. Assessment of northern shrimp (*Pandalus borealis*) and striped shrimp (*Pandalus montagui*) in shrimp fishing areas 0, 2 and 3. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2008/018.

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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
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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>
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Scoring Comments	
<p><i>P. borealis</i> is the only retained species in the <i>P. montagui</i> fishery in this fishery area.</p> <p>In SFA 4, <i>P. borealis</i> abundance is very likely to be within safe biological limits, as stock assessments indicates that abundance is high relative to historical conditions and recruitment indicators are positive. A management strategy is in place for this species (see 2.1.2).</p> <p>In SFAs 2 and 3, survey information is only available for a short time series; commercial fishery information suggests that <i>P. borealis</i> abundance has been stable for 15 years but may not be a precise indicator of abundance (DFO 2008/b). Exploitation rates for this species are generally low although an exploitation rate of 48% was estimated for one important fishery subarea (RISA). Inference based on status in other areas to the south suggests that abundance should be high relative to historical levels, as there has been an increase in <i>P. borealis</i> abundance and distribution in the northwest Atlantic in the past two decades. A management strategy for <i>P. borealis</i> is in place in these areas (see 2.1.2).</p> <p>Management measures (TACs, gear restrictions, monitoring by observers) are demonstrably effective in limiting catches of the retained species.</p>	
Score: 80	
<p>The only retained species is likely to be within biologically based limits; management strategies based on demonstrably effective measures, designed to keep this species within safe limits, are in place throughout the fishery area, hence the 80 SG is met.</p>	
Audit Trace References	

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DFO 2008a, b

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<p>2.1.2</p>	<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>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>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 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>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>strategy</u> in place for managing retained species.</p> <p>The strategy is mainly based on information directly about the fishery and/or species involved, and <u>testing</u> supports <u>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>
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Scoring Comments
<p>A harvest strategy is in place for managing the single retained species, <i>P. borealis</i>. In SFAs 4 this has been based on a traffic light analysis based on 10 indicators. In SFAs 2 and 3 this has been based on an adaptive approach where preventive TACs are adjusted based on trends in CPUEs. In all areas, a management framework based on reference points and decision rules has been put in place for management from 2009.</p> <p>The management strategy is supported by stock assessments based on survey cruises (relatively short time series in SFAs 2-4), commercial CPUEs, regular stock assessments, a strong monitoring program (observers on all vessels) and a strong protection and surveillance program.</p> <p>There is evidence that the harvest strategy is achieving its objectives, as abundance of the retained species is apparently being maintained, but it has not been tested as the stock has not been down below target levels and in some SFAs survey time series are short.</p>
<p>Score: 95</p>
<p>There is a strategy in place for managing the single retained species, which is based on information directly about the fishery and the species. There is clear evidence that the strategy is being implemented successfully and is achieving its overall objective (maintenance of abundance of the retained species). These scoring issues of the 100 SG are met.</p>

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There is every indication that the strategy will work, based on information on the fishery and species. However the strategy is not considered to have been tested because of the short survey time series.

Audit Trace References

IFMP; DFO 2008/008; DFO 2008/018

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<p>2.1.3</p>	<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</u> to <u>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</u> to <u>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

Good quantitative information on removals of the retained species, *P. borealis*, is available, thanks to an industry-funded observer program which covers 100% of trips. Information on removals as bycatch and in the directed fishery is combined. Proportion of *P. borealis* in the fishery varies with subarea and over time but can be over 20%. Information on *borealis* removals and status is peer-reviewed during assessments of *P. borealis* and published (DFO 2008a, b).

Quantitative information on population status of *P. borealis* is available, although this is subject to several uncertainties. Survey time series are short (3 yr); commercial CPUE index is stable or slightly increasing since the mid-1990s but may not be a precise abundance indicator. Information is considered adequate to indicate that *P. borealis* has been stable since 2000, in the area (RISA) where the fishery is most intensive. Qualitative information based on inference from SFAs to the South would suggest that *P. borealis* is within safe biological limits, as this species has increased substantially in abundance and distribution over the past two decades. Information is adequate to support a strategy to manage the retained species, and data continue to be collected (observer coverage is maintained, annual surveys will continue).

Score: 90

Accurate and verifiable information (peer reviewed through assessments) is available on catch of the retained species. Information is sufficient to assess consequences of removals for the population, and is adequate to support a comprehensive management strategy and to evaluate whether the strategy is achieving its objectives. Monitoring continues in sufficient detail to monitor consequences for the retained species.

The fishery meets most of the 100 SG issues; however estimating outcome status with a high degree of certainty will require longer survey time series to better understand status of the retained

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species. .
Audit Trace References
DFO 2008/ a, b

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2.2	Discarded species (also known as “bycatch” or “discards”)
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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>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>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>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>
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Scoring Comments
<p>Amounts of bycatch for all species are so small as to be ecologically negligible, well below the levels at which they would be considered a “main” bycatch species (5% of the shrimp catch). Bycatches of the order of 300 t/yr (toward the maximum observed for any 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, negligible in ecological terms.</p> <p>Several key groundfish species which occur in the bycatch are currently considered to be depleted or outside safe biological limits in or near the fishery area (information on status of these species is very sparse in SFAs 2 and 3): Atlantic cod (COSEWIC 2010a), American plaice, (COSEWIC 2009), redfishes (COSEWIC 2010b), and thus could be considered “vulnerable” species; however the amounts of bycatch taken are so small as to be ecologically negligible.</p> <p>Use of the Nordmore grate with a grate spacing of 28 mm, along with toggle chains, is considered an effective strategy for maintaining bycatch levels of all species at ecologically negligible levels (see 2.2.2).</p>
Score: 80
<p>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.</p>
Audit Trace References
<p>See 2.2.2 and 2.2.3</p>

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<p>2.2.2</p>	<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>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>
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Scoring Comments
<p>Use of the Nordmore grate (28 mm spacing) and toggle chains (rigged to reduce bycatch of bottom-associated species such as flatfishes) are considered to represent a strategy for managing bycatch that is effective at maintaining bycatch at ecologically negligible levels (2.1.3). The strategy was explicitly designed to reduce bycatch and is based on information about the fishery and its ecosystem.</p> <p>A move to a 22 mm grate spacing has been considered to bring SFAs 2-4 to the same spacing as more southerly SFAs 5 - 6. A recent study (Orr and Cadigan 2009) in SFA 4 comparing shrimp catches and amounts of key 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. Use of a smaller grate spacing would exclude a greater fraction of young fish which would further reduce mortality on young groundfish, should depleted groundfish stocks begin to recover.</p> <p>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.</p>
<p>Score: 85</p>

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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 scoring issues 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

Orr and Cadigan 2009; Siferd 2010; Orr et al 2008bc

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<p>2.2.3</p>	<p><i>Information / monitoring</i> 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>	<p><u>Qualitative information</u> is available on the amount of main bycatch species affected by the fishery.</p> <p>Information is <u>adequate to 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</u> are 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>
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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 taxonomic level possible.</p> <p>For SFA 4, 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 (Orr et al 2008bc): Atlantic cod, redfishes, American plaice, Greenland halibut. The first three are considered at low abundance and/or are under moratorium in or near the fishery area.</p> <p>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 were redfishes in SFA 4 at 71 t (0.65%). All other species were below 20 t (0.2% of the shrimp catch). In 2004-2007 numbers of key commercial species caught varied between 28 and 443 for Atlantic cod, 3,700-46,000 for American plaice, 2 - 5 million for redfishes, 198,000- 448,000 for Greenland halibut.</p> <p>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</p>

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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.

These bycatch levels can be put into ecological perspective by considering that 100 t of bycatch (below the level for any given species in any year in this area) would support 10 t of predator biomass, based on a notional 10% transfer efficiency – very small.

Score: 100

Accurate, published information on weights of all bycatch species is available over a long period, as is accurate, published information on numbers at length for important groundfish species; given the very low amounts taken, the information can be considered sufficient to estimate outcome status with a high degree of certainty, information is adequate to support a strategy to manage bycatch and evaluate with a high degree of certainty whether the strategy is meeting its objective. Monitoring is continuing at an adequate level of detail to assess ongoing mortalities to all bycatch species.

The fishery meets all scoring issues of the 100 SG.

Audit Trace References

Orr et al. 2008; Siferd 2010.

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2.3	Endangered, Threatened and Protected (ETP) species
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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>
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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 <i>Species at Risk Act</i> . 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
There is a high degree of certainty that fishery exceeds national and international requirements in terms of impact on ETP species, and that there are no significant detrimental effects on these species.
Audit Trace References
Orr et al. 2008bc; Kulka et al. 2008; Siferd 2010.

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<p>2.3.2</p>	<p>Management strategy The fishery has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> - 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>
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Scoring Comments

A recovery strategy for northern and spotted wolffishes 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). Population trajectories of these species have been stable or increasing in recent years, under existing levels of fishing (including this shrimp fishery), indicating that current levels of 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 28 mm grate spacing, use of toggle chains) bycatch of spotted wolffish and northern wolffish is extremely low, essentially ecologically negligible (see 2.3.3).

Score: 90

There is a strategy in place which is demonstrably effective, that is designed to achieve above national and international requirements. The strategy is based entirely on information directly about the fishery and species involved, and quantitative analysis (analysis of population trends under current fishing pressure) provides a high degree of confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and that it is achieving its objectives.

The fishery meets most scoring issues of the 100 SG but is assigned a score of 90 because the strategy does not explicitly consider measures to be taken should wolffish populations begin to

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recover.

Audit Trace References

Kulka et al 2008; IFMP

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<p>2.3.3</p> <p>Information / monitoring Relevant information is collected to support the management of fishery impacts on ETP species, including:</p> <ul style="list-style-type: none"> - 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 <u>broadly understand</u> 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 <u>quantitatively</u> 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>
<p>Scoring Comments</p>			
<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.</p>			
<p>For SFA 4, 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. Incidental catches were very low in 2004-2007: 14-45 individuals/yr of spotted, 0-2 of northern wolffish.</p>			
<p>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/yr 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.</p>			
<p>Information on wolffish population status is incomplete (Kulka et al 2008) and no formal assessment of shrimp fishery impacts has been done. However the extremely low bycatch amounts suggest a negligible ecological impact. The recovery strategy indicates that population trends for the two wolffish species have been stable or increasing in recent years, thus that current levels of fishery impacts would not impede recovery (Kulka et al 2008). A specialist in wolffish biology have indicated that impact of the shrimp fishery on these species is negligible (M. Simpson, pers. comm.). An assessment of northern and spotted wolffishes is planned for fall 2010.</p>			
<p>Score: 100</p>			
<p>Information is sufficient to quantitatively estimate outcome status with a high degree of certainty – bycatch is negligible from a population or ecological point of view. Information is adequate to support a comprehensive strategy to manage impacts and to evaluate whether the strategy is achieving its objectives. Information on impacts and consequences is considered accurate and has</p>			

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been published for all SFAs thereby meeting all of the 100 SG scoring issues.

Audit Trace References

Orr et al. 2008bc; Kulka et al. 2008; Siferd 2010.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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2.4	Habitat		
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2.4.1	<p><i>Status</i> The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.</p>	<p>The fishery is <u>unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.</p>	<p>The fishery is <u>highly unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.</p>	<p>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.</p>
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Scoring Comments			
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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 areas when twin trawls are used a heavy “shoe” would dig deeply into the bottom.

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 2006 benthic).

P. montagui is generally taken at depths less than those for *P. borealis*, where hard corals are less abundant. 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 underrepresents 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 (Edinger et al 2007; Wareham 2009). A voluntary closed area to protect coral habitat is in place in SFAs 2 and 4, and industry is developing a coral conservation strategy (GEAC/CAPP/Northern Coalition 2007)..

Score: 60			
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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			
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Gordon et al 2009; DFO 2006benthic; interviews (see 2.4.2), IFMP; Edinger et al 2007; Wareham 2009; GEAC/CAPP/Northern Coalition 2007.

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<p>2.4.2</p>	<p>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>	<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>
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Scoring Comments

Several measures are in place that help to reduce impact 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. However the shoe used between codends on twin trawls could cause substantial bottom damage over a narrow swathe of around 3 m wide.. 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.

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. While this closed area is considered a good first step, biological studies suggest that a wider closed area would be necessary to fully protect coral hot spots in the fishery area (Wareham 2009; Edinger and Gilkinson 2009).

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/benthi-eng.htm>), which is expected to provide an overall framework for actions to improve protection of sensitive habitats and species

Score: 70

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

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strategy is meeting its objectives.

Audit Trace References

Interviews at *Newfound Pioneer*, Marine Institute, DFO, CAPP; DFO web site; Integrated Fisheries Management Plan; Wareham 2009; Edinger and Gilkinson 2009

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2.4.3	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.	There is a basic understanding of the types and distribution of main habitats in the area of the fishery. Information is adequate to broadly understand the main impacts of gear use on the main habitats, including spatial extent of interaction.	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. 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. 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).	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types. Changes in habitat distributions over time are measured. The physical impacts of the gear on the habitat types have been quantified fully.
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Scoring Comments

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). 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).

Information on distribution of particularly sensitive habitat areas, 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 in waters deeper than those where the *P. montagui* fishery is concentrated. Based on a detailed study off the Grand Banks (Kenchington et al 2009) and on observations of bycatch, it appears that sponge concentration areas are at depths greater than those at which the shrimp fishery operates.

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 shrimp trawl sets in this and adjacent fishery areas, most of these being soft corals which are not considered to contribute significantly to habitat (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). Ground gear and trawl doors are relatively light in this fishery, and trawls are fitted with rollers, all of which would tend to minimise bottom impacts. However when twin trawls are used (on some tows), gear is fitted with a heavy (4 t) "shoe" which would dig deeply into soft bottom sediments and damage hard bottom communities which could contribute to habitat.

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P. montagui is generally taken at shallower depths than *P. borealis*, in areas where hard coral communities are not as highly developed as in deeper waters. As such, the *P. montagui* fishery probably has a lower impact on coral communities than the *P. borealis* fishery. However, available information has not been compiled into an overall summary that 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.

Score: 70

All scoring issues 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 detailed information on distribution of particularly sensitive habitats (hard coral areas); since these scoring issues 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
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2.5	Ecosystem
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2.5.1	<p>Status The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.</p>	<p>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.</p>	<p>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.</p>	<p>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.</p>
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Scoring Comments

The principal issues to be addressed here are (a) impact of removal of the target species, which probably provides forage for a wide range of predator species, on trophic relationships (b) 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.

Impact of removal of target species on trophic relationships. There is no indication that recent fisheries are having a negative impact on biomass of *P. montagui*, although some concern has been expressed about exploitation rates being higher than guidelines (ca. 22%) in the RISA area of SFA 2 (DFO 2008/0-3). TACs have been set at levels which are considered conservative but which allow exploration of impact of fishing. The management system has moved to an approach based on reference points and harvest control rules, which use a base exploitation rate of 15% or less to help ensure that forage will be available for predators.

Impact on benthic species and communities. This fishery is unlikely to be having serious or irreversible impacts on benthic species but 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 and their sensitivity would be needed to assess impact.

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 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.

Score: 70

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

DFO 2008/0-3; Grant and Hiscock 2010, *in press*; Moody Marine 2010

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<p>2.5.2</p>	<p>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>	<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>
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<p>Scoring Comments</p>
<p>(a) <i>Shrimp as a forage species.</i> The new management framework for <i>P. montagui</i> (IFMP Annex I) is based on use of a base exploitation rate of 15% which is lower than that practiced in other pandalid fisheries which have had no apparent impacts on predator populations. TACs in the past have been set at levels which are considered to be fairly low relative to biomass, with a view to exploring impact of fishing on this species, which should help to ensure that predator needs are met. Recent exploitation rates in SFA 2 (RISA area) are in the range of 22% which is higher than the 15% notional level which would ensure an adequate allocation to predators, but there are several uncertainties underlying this estimate (DFO 2008/018)</p>
<p>(b) <i>Non-catch impacts on biological diversity and benthic communities.</i> 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 mobile or infauna that is generally less vulnerable to damage than the erect, sessile, long-lived fauna of hard bottoms; trawls are relatively light and fitted with rollers which should roll over rather digging into the bottom, although the “shoe” used in twin trawling would dig deeply into soft sediments. The voluntary closed area in SFAs 2-4 should help to protect benthic communities.</p>
<p>Score: 70</p>
<p>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.</p>

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Audit Trace References
DFO 2008/18; IFMP; interviews <i>Newfound Pioneer</i> , DFO, CAPP;

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<p>2.5.3</p>	<p>Information / monitoring There is adequate knowledge of the impacts of the fishery on the ecosystem.</p>	<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 <u>and 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>
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Scoring Comments
<p>(a) Impact of prey removal on trophic relationships. The ecological role of the target species has been the subject of a targeted study in the northwest Atlantic (Hudon et al 1992), which concluded that, like other pandalid shrimp, <i>P. montagui</i> is an opportunistic predator which feeds both near bottom and in the water column. Size, habitat and life cycle are generally similar to <i>P. borealis</i>, so the ecological role is probably similar. <i>Pandalus</i> shrimps prey on, and are prey for a variety of species (Parsons 2005a, 2005b, 2006; Savenkoff et al 2006; all for <i>P. borealis</i>), although other species (such as capelin for cod, fishes for seals) may be preferred prey. Trophic structures related to striped shrimp have not been studied in this area, but studies in nearby continental shelf areas (eg Savenkoff et al 2004) probably provide a general picture of trophic relationships in the fishery area.</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>

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(b) Non-catch impacts on benthic species and communities. Information on benthic and demersal communities in which the fishery operates is relatively general. Some stock assessment information is available for exploited groundfishes, but little detail is available for the most northerly area (SFAs 2 and 3). Basic life history information is available for non-commercial demersal fishes (eg Scott and Scott 1988; Fishbase). 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 Davis and Hudson Straits and Ungava Bay, in SFAs 1, 2, 3 and 4 (Stewart et al 1985). As noted above (2.4.3), information on distribution of corals, including soft and non-erect species (not covered in consideration of habitat 2.4 series) is available and is improving.

Sponge fragments, cnidarians, anthozoans, anemones, molluscs, non-Pandalus shrimps, crabs, sea cucumbers, sea stars, and hard corals are recorded but all (except unidentified crustacea at 0.03%) at less than 0.01% of the shrimp catch and in very low absolute numbers (Orr et al 2008bc; Siferd 2010). 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. In areas where twin trawls are used, the heavy shoe separating the codends could cause substantial damage to invertebrates over a narrow band (ca 3 m).

Ability of potentially impacted communities to recover from impacts is not known for the area, with the exception of commercial groundfishes (although there is some uncertainty about ability to recover from current low abundance levels). Inferences on recovery ability of other groups can be made from work in other areas. 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). Recovery times of hard branching corals may be in the hundreds of years (Edinger and Gilkinson 2009). 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.

Score: 60

Knowledge of ecological relationships is considered relatively good, based on a directed study on trophic relationships and by inference from *P. borealis*.

General knowledge is available on potential impacts of the fishery on benthic species and of benthic communities in the area, although this is less known for the more northerly parts of the fishery area.

The fishery meets the 60 SG in that information is available on the key elements of the ecosystem and the impacts of the fishery on these elements can be inferred.

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 2008; Gordon et al 2009; Hudon et al 1992. Orr et al 2008bc; Siferd 2010; Edinger and Gilkinson 2009; Grant and Hiscock 2010, *in press*; Moody Marine 2010

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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
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3.1	Governance and Policy
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3.1.1	<p>Legal and/or customary framework 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 of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.</p>
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Scoring Comments
<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 in SFAs 2, 3 & 4 P. montagui fishery.</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>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>
Score: 100
<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>
Audit Trace References
<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, 1982), <i>UN Code of Conduct for Responsible Fishing</i>; <i>Agreement between The Inuit of the Nunavut Settlement Area and Her Majesty The Queen in Right of Canada</i>, 1993; <i>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</i>, 2005; <i>Agreement Between Nunavik Inuit and Her Majesty The Queen in Right of Canada Concerning Nunavik Inuit Land Claims</i>, 2006</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<p>3.1.2</p>	<p>Consultation, roles and responsibilities The management system has effective consultation processes that are open to interested and affected parties.</p> <p>The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties.</p>	<p>Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>generally understood</u>.</p> <p>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.</p>	<p>Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood for key areas</u> of responsibility and interaction.</p> <p>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.</p> <p>The consultation process <u>provides opportunity</u> for all interested and affected parties to be involved.</p>	<p>Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood for all areas</u> of responsibility and interaction.</p> <p>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>.</p> <p>The consultation process <u>provides opportunity and encouragement</u> for all interested and affected parties to be involved, and <u>facilitates</u> their effective engagement.</p>
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Scoring Comments

The Northern Shrimp Advisory Committee (NSAC) is the major consultative mechanism for the fishery within Canada’s EEZ. 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, 3 and 4 stock of *P. montagui* and to develop recommendations for the TAC’s in the Canadian zone. The committee also meets to develop advice to the Minister when government or industry puts new proposals or new management regulations forward.

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.

There is a collaborative agreement between DFO and one non-governmental organization, the World Wildlife Fund that aims to “*to achieve shared objectives for the conservation, protection, and sustainable development of Canada’s oceans as mandated by the Oceans Act.*” through a collaborative and constructive partnership.

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. NSAC meetings are open to the public and all scientific documents and minutes of meetings are posted on the DFO website.

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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*

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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>
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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> <p>These broad policy guidelines are implemented through fisheries specific objectives that are outlined in species management plans.</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Score: 100
<p>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. The long-term objectives are clear, explicit and required by management policy.</p> <p>The provisional only status of the precautionary approach framework prevents a higher score.</p>
Audit Trace References
<p><i>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</i></p>

SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.1.4	<p>Incentives for sustainable fishing</p> <p>The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing.</p>	<p>The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.</p>	<p>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.</p>	<p>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.</p>
<p>Scoring Comments</p> <p>Although the pandalus montagui fishery is managed on a fleet-wide competitive quota, the use of the Enterprise Allocation system for the vast majority of the fishery (pandalus borealis) 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. 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 in the shrimp fishing areas, 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>				
<p>Score: 85</p> <p>The score for this indicator would have been higher if incentives were explicit in management policy along with periodic reviews in order to monitor their effect as required by the scoring guidepost for 100.</p>				
<p>Audit Trace References</p> <p>Annex E of the IFMP - <i>Northern Shrimp Enterprise Allocation Program: MSC Certification of the Offshore Shrimp Fisheries (>100')</i> in areas 1,2,3,4,5,6 and 7. Submission for the Main Assessment by the 17 Offshore Licence Holders September 2, 2000</p>				

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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3.2	Fishery- specific management system
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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.	Objectives, 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.	Short and long term objectives, 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.	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 <u>explicit</u> within the fishery's management system.
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Scoring Comments
<p>The IFMP contains a detailed description of objectives for the shrimp fishery, but the objectives and other parts of the Plan do not address the specifics of the <i>P. montagui</i> fishery, treating it as part of the “northern shrimp” fishery (which normally would refer to <i>P. borealis</i>). Scientific advice and assessments are the basis for the determination of TACs. The resource within SFAs 2, 3 and is monitored and assessed on a bi-annual basis and new advice is provided if a significant change is detected.</p> <ul style="list-style-type: none"> • 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; 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 <p>Detailed strategies and very specific and measurable management measures are outlined under each of these three principles under in 1.1 of the IFMP – <i>Fishery Objectives</i>. 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.</p> <p>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.</p>
Score: 70
<p>Short and long-term objectives in the domestic fishery are well described in the management system but generally apply more to the <i>P. borealis</i> stocks. They are less clear for the <i>Pandalus montagui</i> stock. In addition, 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.</p> <p>The score would also have been higher if maintenance of biodiversity and maintenance of shrimp biomass to support predators had been included in the objectives.</p>

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Audit Trace References
Integrated Fisheries Management Plan - <i>Northern Shrimp - Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap, 2007</i> ; Pers. Com. - <i>Fishery Checklist</i>

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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 informal decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.</p>	<p>There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>Decision-making processes respond to serious and other important issues 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>Explanations 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 all issues 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>Formal reporting 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
<p>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.</p> <p>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.</p>
Score: 80
<p>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</p>

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<p>of a formal reporting process to all stakeholders outlining explanations for action of the lack thereof would enhance the score on this indicator.</p> <p>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.</p>
<p>Audit Trace References</p>
<p>Integrated Fisheries Management Plan - <i>Northern Shrimp - Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap, 2007</i>; <i>Nunavut Land Claims Agreement</i></p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<p>3.2.3</p>	<p>Compliance and enforcement Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with.</p>	<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>
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<p>Scoring Comments</p>
<p>There is a comprehensive monitoring and surveillance system in place within SFA's 2, 3 and 4. 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 <i>Fisheries Act</i> and regulations with court based prosecution for serious offences through the <i>Criminal Code of Canada</i>. 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.</p>
<p>Score: 95</p>
<p>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 <i>Fisheries Act</i> are strong deterrents. The DFO advises that the offshore shrimp fleet has not had any serious compliance issues and 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.</p> <p>The score would have been higher on this performance indicator if there had been evidence of a regular review mechanism with data to support the conclusion of effective deterrence.</p>

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Audit Trace References
Integrated Fisheries Management Plan - <i>Northern Shrimp - Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap, 2007</i>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<p>3.2.4</p>	<p>Research plan The fishery has a research plan that addresses the information needs of management.</p>	<p><u>Research</u> is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.</p> <p>Research results are <u>available</u> to interested parties.</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
<p>The research survey and assessment program 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, although the work focuses more on <i>pandalus borealis</i> than <i>pandalus montagui</i>. 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.</p> <p>Other 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.</p> <p>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) in SFA 3, 4, the SFA 2 Exploratory and SFA 4 southeast of RISA.</p> <p>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.</p> <p>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.</p> <p>These research initiatives are conducted by a variety of agencies and parties and contribute to the total body of science. However, there is no plan per se that takes a strategic approach to research as is required by the 80 scoring guidepost.</p>

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Score: 70
<p>The score would have been higher if there was a research plan that provided the management system with a strategic approach to research as is required by the 80 scoring guidepost.</p> <p>A survey research plan is available and is published as part of the IFMP (Annex D), such as to provide management with necessary information. However, it is not comprehensive and it does not address all issues identified in the stock assessments as requiring resolution through research, especially for this <i>pandalus montagui</i> stock. 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".</p> <p>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.</p> <p>Research conducted in the Resolution Island Study Area (RISA) in SFA 3, 4, and in SFA 4 southeast of RISA is generally not species specific (environmental, predator study, bottom impact, etc). There is much less direct research on <i>P. montagui</i> than on <i>P. borealis</i> and the IFMP notes that there is concern about the future of the stock as there is no fishery independent data.</p>
Audit Trace References
<p>Integrated Fisheries Management Plan - <i>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</i> September 2, 2009; pers. com. DFO</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<p>3.2.5</p>	<p>Monitoring and management performance evaluation There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives.</p> <p>There is effective and timely review of the fishery-specific management system.</p>	<p>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.</p>	<p>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.</p>	<p>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.</p>
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Scoring Comments
<p>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.</p> <p>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.</p> <p>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 be assist in reviewing the fishery against objectives.</p> <p>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—Fisheries and Oceans Canada—<i>Salmon Stocks, Habitat, and Aquaculture</i>; December 2000 Report - Chapter 31—Fisheries and Oceans—<i>Fleet Management</i>; March 2008 Status Report - Chapter 6—<i>Ecosystems—Control of Aquatic Invasive Species</i>.</p> <p>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.</p>
<p>Score: 80</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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There are regular review mechanisms in place to evaluate key parts of the management system, some of which 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*

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.

P20: the units of catch should be stated in the caption to Table 1.

MML Assessment Team Response – This has been added.

P27: Some of the wording in this section is vague and poorly defined. For example,

1. what is a "preventive TAC" and where is the evidence that these are being used in the fishery? I expected to see such definitions within the main body of the report.

2. What is the "nominal adaptive approach"? According to the SAR, TACs have essentially been unchanged since the fishery began. What is adaptive about that? In general, the term "adaptive" should be stricken from this section, because what is being called adaptive is really "*ad hoc*", and the only observed TAC changes have been increases in response to increasing CPUE.

3. "As the exploitation rate is very low the stock abundance is more dependent on environmental conditions than removals by the fishery." This statement only applies in some of the SFAs, whereas in others, exploitation rates may be quite high and/or uncertain according to the information cited from DFO SAR 2008/018.

4. "No changes in TACs are recommended because of uncertainties surrounding the biomass indices, and also because CPUE has been stable since 2000". The first part of this statement is asking for trouble. According to the Precautionary Approach, uncertainty cannot be used as the basis for inaction. The second part of the statement seems more appropriate.

P28: There is an incorrect citation of DFO 2008/031 here. I think it should be DFO 2008/018 because that is where these hypothetical exploitation rates come from. In any case, there is no documentation of a limit exploitation rate of 15%, or who "generally agrees" on it. There is also no documentation of empirical reference points.

MML Assessment Team Response – With respect to all of the above points Section 4.3 has been rewritten and updated. The most recent assessment, DFO 2010/024, was not available to the team prior to the peer review draft report. This has now been used and cited.

P62: "The CPUE has varied around the long term mean". This statement is true by definition because any time-series varies around a long-term mean. Please provide something more informative, or an example time-series plot.

MML Assessment Team Response - The plot has been inserted in chapter 4.2. and a new sentence has been inserted in the table 1.2.1. "CPUE trend indicates that the biomass of *P. montagui* increased in the mid-1990s and has since varied without trend at a high level (DFO 2010/024)"

Principle 1

In general, the scoring comments need to clearly show how the scores are derived from the elements listed under the Scoring Guideposts. Most scores just appear even though the fishery does not clearly meet certain elements under particular scoring guideposts.

Stock Status (P56): These scoring comments are not very convincing and given the scant information, I cannot see how either of the SG100 criteria could be met, as implied by the score of 85. In general, there are many statements that simply cannot be made given the existing situation of very low statistical power in survey biomass indices. For instance,

1. The claim that "...a three year survey indicates a stable situation..." cannot be made here. There is no way that 3 highly uncertain surveys can indicate anything other than an average; assessment of stability or trends cannot be made. The only claim one can make here is that the survey is currently not useable as a trend index because there are not enough surveys relative to the uncertainty in each one. The stronger claim is the preceding one about "no change" in long term CPUE.

2. "[1]There is not a strong statistical relationship between spawning stock size (SSB) and recruitment and [2]no apparent level of SSB below which recruitment would definitely be impaired in the area." There are two problems here. First, no evidence exists to support claim [1] or even that an attempt was made to detect a stock-recruitment relationship. Second, the latter claim [2] violates the precautionary principle and approach, which I assume MSC is concerned about, especially given the lack of data.

3. I could not find a clear definition of "the recently introduced target reference point", so there is little basis to claim that the stock is above it.

It would be more appropriate to base the Stock Status (outcomes) assessment on the argument that these fisheries are still not fully developed, and that a large part of the stock area remains unexploited. The combination of (i) a short history of exploitation, (ii) large area unexploited, (iii) approximately steady fishery CPUE; and (iv) a fishery that appears to be managed reasonably well so far may be adequate to justify the "highly likely" claim that SSB is above the point at which recruitment may be impaired. The weakest part of this argument is probably steady fishery CPUE; however, some evaluation could be made of whether the fishery CPUE trends are likely to be reliable as a biomass index during the fishery development phase, e.g., has the area occupied by the fishery changed rapidly or not? Have the vessels and gear remained somewhat constant over the time series?

MML Assessment Team Response - These are very good comments and we have revised the text to try to take account of them. The text has been amended and updated according to recent assessments-which were not available prior to the peer review - and the given advice and the score has been reduced to 80.

Reference Points (P58): Like Stock Status, there is generally a lack of information in this section to justify or define reference points. Therefore, without actually reviewing IFMP 2009 myself, it is difficult to judge the validity of this section. There are simply no specifics about reference points, target and limit levels, or how well they can be estimated.

1. What exactly are the reference points? If they are empirical (say in terms of fishery CPUE, or survey biomass, or exploitation rate) then they should be provided. There is nothing in the main body or the report, or these scoring comments to show how they are "in accordance with international practice".

2. The appropriateness of reference points should be discussed more openly. The text only says that reference points exist, but doesn't explain why they are appropriate or how they are estimated. For instance, perhaps reference points can be discussed in the context of other shrimp fisheries for which

one can say whether a 15% (limit?) exploitation rate is likely to be sustainable. Note: The SAR (DFO 2008/018) includes female biomass as well as exploitable biomass, so it is not clear what biomass the 15% exploitation rate reference point applies to.

3. "However, there appears to have been no explicit consideration of the ecological role of the stock in developing the reference points." – How can the fishery score 80, given this statement? The text in the "Score" box seems to contradict this by providing some explanation of how some consideration is actually given to the ecological role of shrimp in these ecosystems.

This section needs to clearly state the explicit or implicit target and limit values for either fishery CPUE, spawning biomass (estimated directly by the survey), or the exploitation rate. If reference points are based on fishing mortality, for which the exploitation rate is a reasonable surrogate, then there should be some explanation as to why the limit of 15% value will protect the stock from recruitment failure. This can be accomplished based on the information at hand (e.g., lack of CPUE trend given exploitation rates higher than 15% in some areas). The more difficult point to make is how the target exploitation rate (which is not defined) will maintain the stock near B_{MSY} or greater.

MML Assessment Team Response - This section has been extensively revised the section to address the points raised by the reviewer: we have outlined what the reference points, are, what they are based on, and how ecological role of the stock is addressed. Specifics about the estimation of provisional biomass reference points, such as target and limit levels given in the IFMP and recent assessments – which were not available prior to peer review - are now presented in chapter 4.3 the report.

Harvest Strategy (P61): Like the sections above, the scoring comments lack specifics, which leaves it up to the reader to piece together the elements of the harvest strategy and evidence that it is working. It would be clearer to state the elements of MSC's harvest strategy definition (FAM 2008; page 72) up front and then provide specifics on each component.

I think the elements do appear in the comments, but they are scattered about and stated in general terms. The resulting vagueness of the text means that statements about how the fishery may or may not be following an explicit strategy (without formal reference points, etc.; P61), and how the fishery might hypothetically exceed the limit exploitation rate by a factor of 5 (i.e., 79%/15%) can just as easily be used to score this fishery much lower. In fact, the existing text actually seems more consistent with a score less than 80.

The situation could be interpreted differently by elaborating on the following:

The harvest strategy for this fishery is comprised of: (i) Monitoring -- both fishery-dependent and fishery-independent programs exist for monitoring fishery removals (at-sea and dockside) and changes in relative stock biomass; (ii) Stock assessment – stock status is assessed relative to target and limit exploitation reference points by measuring trends in stock biomass index data as well as computing a current exploitation rate index for each year (t) as

$$U(t) = \text{Catch}(t)/\text{Survey Biomass}(0.025, t),$$

where Survey Biomass(0.025,t) is the lower 95% confidence limit of the biomass estimate (as stated later on PG 63); and (iii) Harvest control rule – quotas are constrained such that the exploitation rate index remains less than the limit exploitation rate, i.e., $U(t) < 0.15$. These elements are designed to work together (MSC underlines this in SG80 element 1) in the future to achieve management objectives despite the current situation of high uncertainty and lack of long time-series of data. Meets first element of SG80.

To meet the second element of SG80, the text needs to provide evidence (MSC underlines this in SG80 element 2) that the average exploitation rate over SFAs 2,3, and 4 amounts to less than the limit exploitation rate of 15%...which means the strategy is working. If the unit of certification is 2,3,4 combined, then 22% exploitation in RISA is not a sign of failure, as long as exploitation is low

enough in other areas to compensate. The assessment team should show that. I think an overall average exploitation rate can be computed from the information in DFO 2008/018.

I'm not convinced there is value in suggesting that the exploitation rate would be 79% if the quota had been taken. That is hypothetical. If the fishery is ultimately certified and exploitation rates do reach 79%, then there will be consequences for re-certification; but, that is not an issue for this assessment.

MML Assessment Team Response - Thank you for detailed advice. These are good comments which we have taken into account in extensive revisions to the text.

Harvest control rules and tools (P61): The text in this section contradicts the score given (80). For instance, there are 3 statements describing how there are no well-defined harvest control rules for this fishery. So, the first element of SG80 is not met and therefore, a score of 80 may not be possible.

According to the MSC FAM (6.3.10) there doesn't need to be an explicit harvest control rule that monotonically reduces exploitation rates with declining stock size. The harvest control rule described in (iii) above seems reasonably well-defined and is presumably designed to maintain high stock abundance given the current data limitations and uncertainties (by choosing the lower 95% C.L.). I suppose the issue is more about whether this rule is just a "suggestion" or something that is (or may be) actually implemented.

The assessment should establish (empirically) whether a 15% limit exploitation rate is a plausible precautionary limit given what is generally known about the life history and productivity of the species and experience elsewhere (e.g., southern stocks?). This seems pretty straightforward, but there is no reference to fisheries elsewhere except for other units of certification, ofr which the information is not much better. Surely there are other shrimp fisheries for which exploitation and productivity has been estimated (e.g., how about the quantitative assessments from *P. borealis* in SFA 1 or in Alaska?)

MML Assessment Team Response – Text has been amended. The IFMP provides some comparative information on exploitation rates in other pandalid fisheries which have been sustainable over time, and the revised text refers to these. We have revised text to try to take account of the reviewer's suggestions, in particular to clarify how the decision rule works.

Information monitoring (P65): As above, I cannot make the 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 must be assumed unknown unless the "information form [sic] other Pandalid stock [sic] elsewhere" can be more clearly defined and shown to be "sufficient". The same goes for productivity, which is not addressed in the comments. The MSC provides a clear approach to evaluating this (FAM 6.3.16 a), e.g.,

Stock structure could incorporate information describing the distribution and geographical range of the stock, the relationship of the geographical range to the harvest control, and the age, size, sex and genetic structure of the stock.

Most of the information is available to draw some informed conclusions here instead of relying on an unclear assumption of similarity to stocks elsewhere. The only items missing are age and genetic structure, but that should not preclude meeting this condition.

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).

The only comment justifying the score is "The score would have been higher if...". This is irrelevant

and should be removed. Instead, there should be some logical arguments here to justify the actual score given. Meeting the "stock productivity" component to the first element appears to be the main challenge given the contradictory statements elsewhere in the assessment that, for example, F_{MSY} cannot be estimated.

MML Assessment Team Response – We have taken account of these comments in revising the text.

Assessment of stock status (P67): A significant portion of this section has been cut and pasted, verbatim from DFO 2008/018. Like the sections above, the score does not obviously follow from the scoring guidepost elements.

The comments under the actual score describing what "would result in a higher score" are, again, not relevant to the actual scoring. If there are conditions attached, then these should be described in relation to the scoring guidepost elements.

The assessment method is empirically-based (which is fine according to MSC) and it appears to take uncertainty into account by computing and presenting confidence limits in the harvest advice. Uncertainty in trawl catchability caused by the effects of physical factors was further taken into account by re-designing the 2008 and later surveys to improve biomass estimates. The scoring comments state that uncertainty is not taken into account in the assessment, but do not provide examples.

The challenge in this section is, like above, meeting the requirement that the assessment "evaluate stock status relative to reference points".

As noted above, much of the text in this section follows verbatim from DFO 2008/18. I'm not aware of whether this is acceptable practice or not for an MSC assessment; however, problems inevitably arise when interpreting statements like: "The high exploitation indices in the RISA are a concern" because that is not what was actually presented in DFO 2008/018. The actual statement made by DFO is: "The high exploitation indices in RISA, especially for P. borealis, are a concern." I underlined P. borealis in the quote to emphasize that the statement may not be as concerning for this assessment of *P. montagui*.

MML Assessment Team Response - We have addressed these comments in the revised text.

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.

Retained non-target species, Status (P69):

Like my comments under Principle 1, there is a general lack of quantitative detail here. For example, if *P. borealis* is "very likely to be within safe biological limits", then there should be some quantitative details supporting such a strong claim. I also don't think the reader should be directed to another certification report to get this information...what if that fishery does not pass?

It is somewhat surprising to find a "high degree of certainty" about the status of *P. borealis* in this area given all the other commentary on how uncertain all the information is.

There is no scoring element for having target reference points "under development". So, where does the score of 90 come from?

MML Assessment Team Response – Good points. We have revised the score downward and clarified text on the scoring.

Retained non-target species, management strategy (P71): Information on SFAs 5 and 6 provided here should be removed. This assessment is of SFAs 2,3,and 4. As above, there needs to be some evidence presented here, for example, that the "harvest strategy is achieving its objectives".

MML Assessment Team Response – Suggested changes to text have been made and further clarification added on scores.

Retained non-target species, Information/monitoring (P73):

1. None of the guideposts ask about peer-review and publication of information and assessments, so the sentence should be removed.

2. Although I do not disagree with the score, it is not clear what scoring guideposts the fishery meets and which it doesn't. I doubt one could say anything with a "high degree of certainty", so I'm assuming these SG100 elements were not met?

MML Assessment Team Response – Text has been revised to clarify the scoring.

Discarded species, Status (P75): The first scoring comment is one of the first examples of an adequate justification for the stated claim.

Habitat, Status (P85): In the comments below the score, it is not clear what "Given its mode of operation..." is supposed to mean.

MML Assessment Team Response – The text has been revised.

Ecosystem, Status (P89): Under P2, there has generally been better justification of the claims made. For instance, simple calculations were made to show the potential impact on predators of removing 300 t of shrimp bycatch. These calculations are absent from this ecosystem section, where they would also be helpful.

MML Assessment Team Response – We did not see an opportunity to make this kind of estimate for ecosystem issues, with the exception of the issue of removal of prey by the fishery and impact on predators, where there is reasonably quantitative information.

Ecosystem, Management strategy (P90): The scoring comments begin by stating that there is no explicit recognition of the need to maintain *P. montagui* to support predators. The end of that paragraph states "...the 15% notional level which would ensure an adequate allocation to predators,...". It is not clear whether this is the P2 expert's opinion, or a partial (implicit) ecosystem management strategy.

MML Assessment Team Response – We have clarified this --- the new management strategy is based on a 15% exploitation rate, so the statement that "there is no explicit recognition" is no longer valid.

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.

Ecosystem, Information/monitoring (P92): some of this information would be better placed in the preceding sections, especially on Status.

Principle 3

General comments

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.

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

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.

Peer Reviewer 2

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

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,
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 (this review).

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:

Page 2, Contents: - Some appendices are missing from the list (e.g. peer review, client action plan).

1- Introduction:

1. Page 5, Section 1.4 Other Information Sources – As noted for the other reports, this section is generic for all SFA reports. A statement explaining that this is by design (i.e. a template for all reports) would be useful.

MML Assessment Team Response – Further explanatory text has been provided.

2 - Glossary:

1. Page 14, – Comments from the other reports also apply here.

MML Assessment Team Response - The Glossary has been amended.

2. Page 16, Section 3.2 – It should be noted in this section that not a lot of research has been done on this species compared to *P. borealis*. However, the referenced information for the latter is fully or partly applicable to *P. montagui*.

MML Assessment Team Response – This has been pointed out in the main text.

3 - Stock Assessment:

1. Page 24, General comment – Consideration should be given to including findings of the 2010 assessment results here as well. This should not cause any major changes to the outcome of this report but will bring it up to date, especially the use of an Upper Stock Reference.

MML Assessment Team Response – New information and plots have been included from the recent assessment.

2. Page 27, Section 4.3, para. 1, penultimate sentence – If updating with the 2010 assessment is done, the Upper Stock Reference should be included.

MML Assessment Team Response – New information and plots have been included from the IFMP and the recent assessment.

3. Page 28, Section 4.3, para. 3 – Is there evidence that the impact of the collapse of groundfish stocks (mainly in southern areas) is equally applicable to *P.m.* in this area?

MML Assessment Team Response – This section has been deleted

4 - Fishery Management Framework:

1. Page 30, Section 5.2, para. 3 – Is the boundary 63⁰ 30' W or 63⁰ W?
2. Page 31, Section 5.2, para. 1 – (see section 5.7)?
3. Page 32, Section 5.5, para. 1 – Check the beginning dates of surveys. The most recent SAR indicates 2006 and 2007.
4. Page 33, Section 5.7, para. 2 – The last sentence belongs with the preceding paragraph.

MML Assessment Team Response – The text has been amended to take account of these points.

5 - Ecosystem Characteristics:

1. Page 35, para. 4, sentences 3 and 4 – These statements are misleading and contradictory to what follows two paragraphs below, which is more reflective of what is known about the effects of ocean climate and predation.

MML Assessment Team Response – the text has been amended.

2. Page 36, end of Section 6.1, last sentence – Delete “northern”.

MML Assessment Team Response – done

6 – Background to the Evaluation:

1. Page 45, Section 9.2 – Specify the *Pandalus montagui* fishery.

MML Assessment Team Response – done

7 - Observations and Scoring:

2. Page 48, Section 11.1 – The scores were presented to the first decimal (see Section 13.1) and no weighting is 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.

8 – Assessment Results:

1. Page 52, Condition 1 – Assessing the stock relative to reference points in a probabilistic way is a requirement of SG 100. Although desirable, it is not necessary to meet SG 80.

MML Assessment Team Response – Good point. The condition has been amended.

Also, see comments on Conditions below (Part D – Concluding Remarks)

Part C – Comments on the Scoring Tables:

1. PI 1.1.1 – The “recently introduced target reference point” can be explained by updating with information from the 2010 assessment. The high uncertainty, partly due to the short time series, undermines the scoring rationale for several P1 indicators. This raises the issue of using the Risk Based Framework (RBF) for the assessment of this fishery. Was this option considered and can it be useful in this case?

MML Assessment Team Response – The RBF was considered for the assessment and the client chose not to pursue this option. We have explained the situation with respect to reference points and referred to the IFMP in which these are now adopted, and the most recent assessment. We have also revised the text to provide better justification for the score that has been reduced to 80.

2. PI 1.1.2 – Scoring Comments, first para. – This is a carry-over from the *P.borealis* reports and should be edited here (e.g. biomass increase, effect of exploitation). The

Score section provides a rationale for reaching the SG 80, but needs to be explained further as to what the target reference point is (USR?).

MML Assessment Team Response – We have revised the text and clarified the justification for the score. Specifics about the estimation of provisional biomass reference points, such as target and limit levels given in the IFMP and recent assessments are now presented in chapter 4.3 the report. The text in table has been amended and made more relevant according to advice above.

3. PI 1.2.2 – Harvest control rules are not well defined. Therefore, the requirements of SG 80 are not met.

MML Assessment Team Response – The section has been rewritten and the harvest control rules have been defined according to IFMP and latest assessment report.

4. PI 1.2.3 – Provide the reference for the life history of *P. montagui*. The uncertainty expressed in the Score section undermines the scoring rationale and does not support the extra 5 points awarded.

MML Assessment Team Response – The text has been revised consistent with the comments. Reference inserted and score reduced to 80.

5. PI 1.2.4 – Updating with the 2010 assessment would help support the score but it would still remain <80.

MML Assessment Team Response – The text has been updated. We have referenced the more recent assessment and believe that justification for the score is better as now presented. Score of 80 is kept.

6. PI 2.1.1 - Under Scoring Comments, second sentence – delete *P. montagui*.

MML Assessment Team Response – done.

7. PI 2.2.1 – Scoring Comments, second para. – What references confirm that these species in northern areas are outside safe biological limits?

MML Assessment Team Response – COSEWIC assessments are one source and citations have been added (also in the introductory section 6).

8. 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 – The information is adequate to support a comprehensive strategy, even if the current strategy were deemed to not be comprehensive – scoring for this PI is based on the information.

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

MML Assessment Team Response – the score has been amended.

10. PI 2.4.2 – Under Scoring Comments, second para. – The second sentence on closed areas in the south is not relevant. Also, as there is no partial strategy - only measures, what is the basis for the intermediate score of 70?

MML Assessment Team Response – Text has been revised and score reduced in line with the comment.

11. PI 2.4.3 – 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 score closer to 60 is more appropriate.

MML Assessment Team Response – The score has been reduced and text revised to clarify the scoring justification.

12. PI 2.5.1 – Based on the kinds of evidence required, a score closer to 60 is justified. There is only qualitative assessment and expert judgment, nothing quantitative.

MML Assessment Team Response – Good point, score has been revised downward.

13. PI 2.5.2 – The first paragraph of the Scoring Comments assumes that the species is important in the diets of predators but there is no information to support that assumption. Also, in the Score section it is stated there is no partial strategy, but the reason for the higher score is not given.

MML Assessment Team Response – the text and score have been revised.

14. PI 2.5.3 - Ecological relationships are inferred from what is known for *P. borealis*. Therefore, the score should be less than for the same PI in other areas. Most of SG 80 is not met.

MML Assessment Team Response – There is a targeted publication on *P. montagui* trophic relationships, which together with inference from *P. borealis* gives some confidence that trophic relationships are known. We have reviewed text and score and made revisions.

15. PI 3.1.1 – The following paragraph, not included, appeared in other reports and seems relevant here: “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 *Act* 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-[4].”

MML Assessment Team Response This was a formatting error. The text now appears

16. PI 3.1.2 – The last sentence in the Score section is important and should be included in all reports.

MML Assessment Team Response - Agree. The sentence has been included in all reports.

17. PI 3.1.3 – As only consistency with the PA is required, there is no need for a penalty.

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.

18. PI 3.1.4 – The EA approach is replaced in this fishery with a competitive quota. A score lower than that awarded for the same PI in other areas would be expected.

MML Assessment Team Response - We are of the view that the degree of stewardship and responsibility fostered by the EA system in all other stocks and the responsible attitude displayed by the client companies toward the state of the resource in all areas are sufficient evidence to garner an equivalent score for the *P. montagui* stock as well. Although the fishery is managed on a competitive basis, the quota is always respected and there is no evidence of non-compliance

19. 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

20. PI 3.2.4 – To score higher than 60, information on the timely dissemination of research results is necessary. MML Assessment Team Response - The text under Score in this PI has been amended to reflect how research results are disseminated. Also, emphasis is on *P. borealis* and, therefore, the score should be lower than for the same PI in other areas. MML Assessment Team Response – The Team agrees with this observation and the score has accordingly been reduced to 70. Additional comments have been added to the scoring table.

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 assessment process. The evidence for scoring was well documented and traceable within the references.

As stated above in Part B, Section 4 (Stock Assessment), the report lacks the most recent stock assessments conducted in March 2010. In particular, an update would clarify the status

of reference points and their implementation. Otherwise, it should not cause any major changes to the content or outcome of this report.

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.

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

With the exception of comment 13 - 1, above, the conditions designed to improve the scores for harvest control rules and tools (1.2.4), 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.

APPENDIX C
Client Action Plan

Client Action Plan for MSC Certification of the Canadian Offshore Shrimp Fishery
January 31, 2011

Pandalus Montagu SFA2-4

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:

- i. 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.
- 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: 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.

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.

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 (Bowering 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. Bowering 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 areas of the shrimp fishery. Furthermore, an estimated 326,793 juvenile redfish

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

(*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. Legg 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.

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

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 bycatch information is available for many years in weights (all species) and number (important commercial species) in verifiable and un-verifiable (not peer reviewed) forms; not all bycatch species are within biologically based limits; several important groundfish species are depleted. However a partial strategy based on use of the Nordmore grate is demonstrably effective and 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 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 North-west 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.

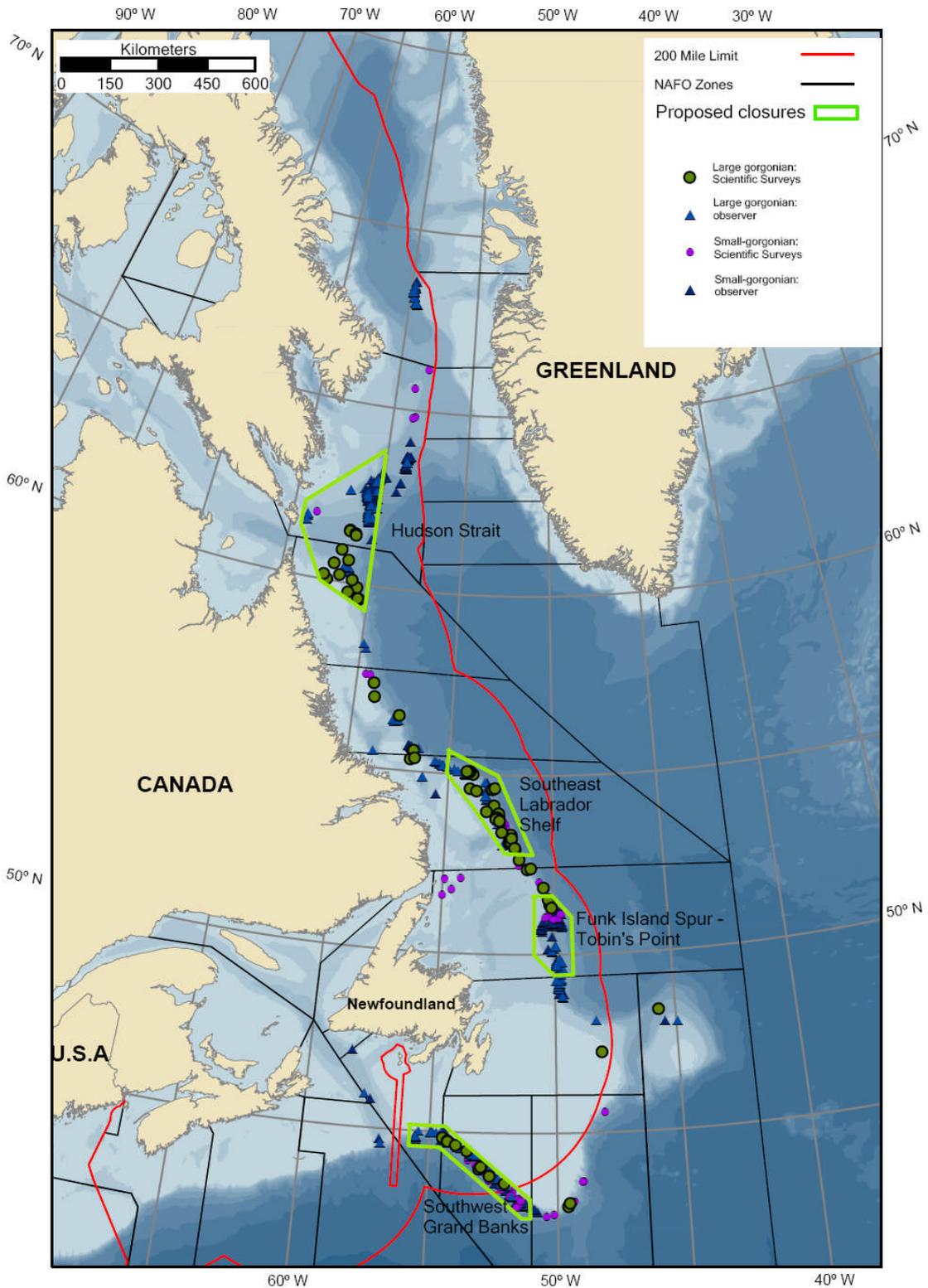
The Sierra Club would like to see similar recovery occur off Labrador and Newfoundland. We recommend that the areas identified through the scientific research be closed. Small, specific, well known and recognized shrimp trawling areas outside the aforementioned zones should be set aside for shrimp trawling. 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.

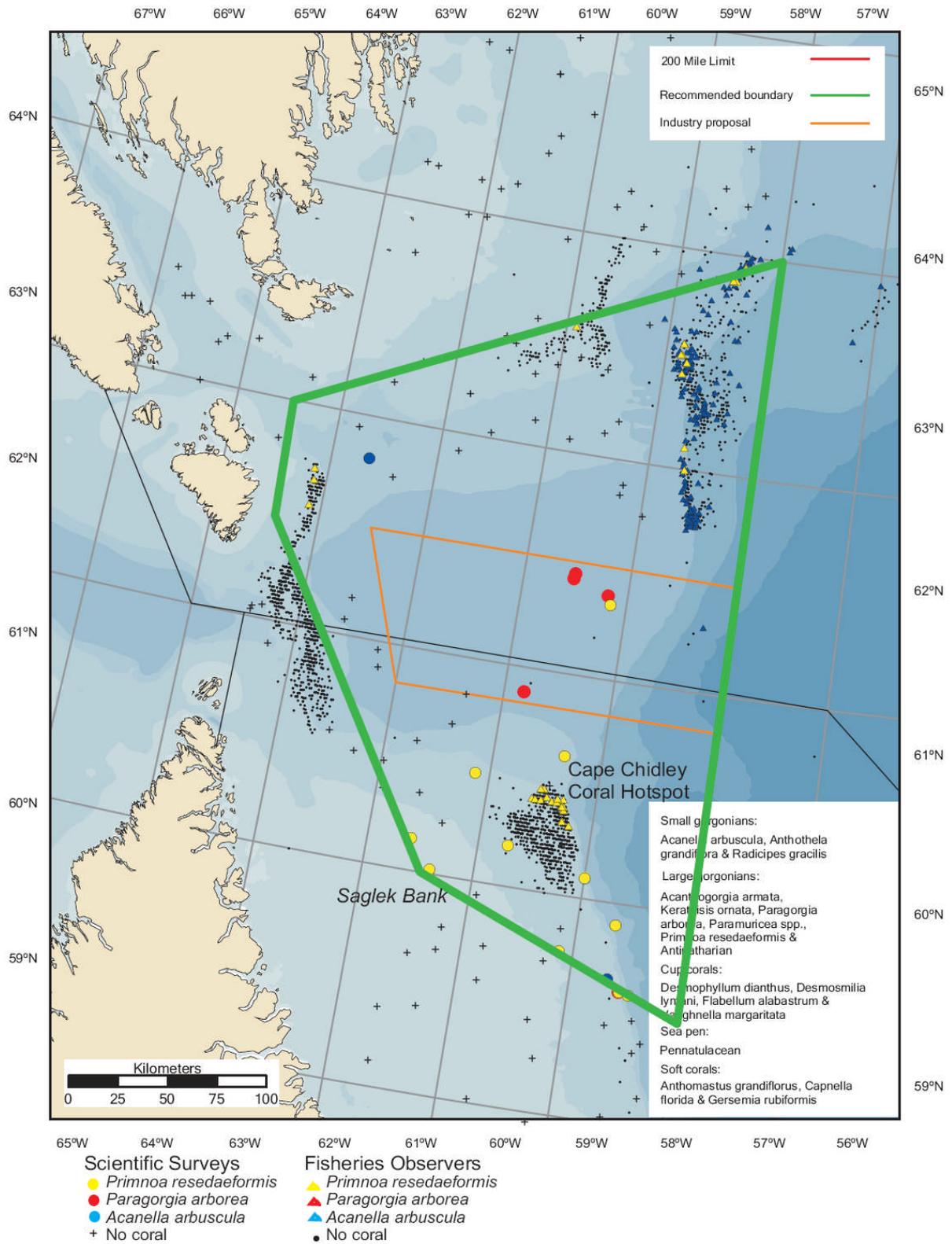
Please find attached maps outlining areas identified as being Vulnerable Marine Ecosystems. If you wish further supporting data please feel free to contact myself or Gretchen Fitzgerald, Director, Atlantic Canada Chapter, Sierra Club Canada, Halifax, Nova Scotia; tel. 1-902- 444-3113.

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.



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4/3/2011

Sent via eCert

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
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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. borealis</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

14 March

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

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

Registered companies / vessels within Unit of Certification

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 ^{5[1]} (1)	Atlantic Enterprise	Clearwater Seafoods L.P./ Ocean Prawns Canada Joint Venture
Atlantic Shrimp Co. Ltd. ^{6[2]} (1)	Atlantic Enterprise	Clearwater Seafoods LP/ Ocean Prawns Canada Joint Venture
Tornгат 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.
Unaag Fisheries Inc. (1)	Arctic Enterprise	Clearwater Seafoods L.P./ Ocean Prawns Canada Joint Venture
Newfound Resources Ltd. (1)	Newfound Pioneer	Newfound Resources Ltd.,

^{5[1]} Wholly owned subsidiary of Clearwater Seafoods Limited Partnership

^{6[2]} Ibid

APPENDIX F

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

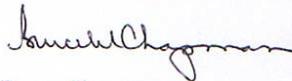
June 22, 2009

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 G

Letter of Support from Department of Fisheries Oceans, Canada



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

JAN - 4 2011

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
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